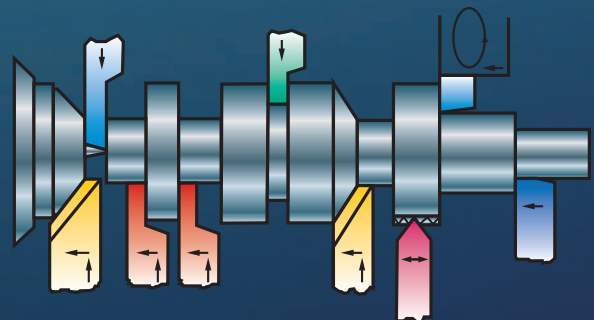
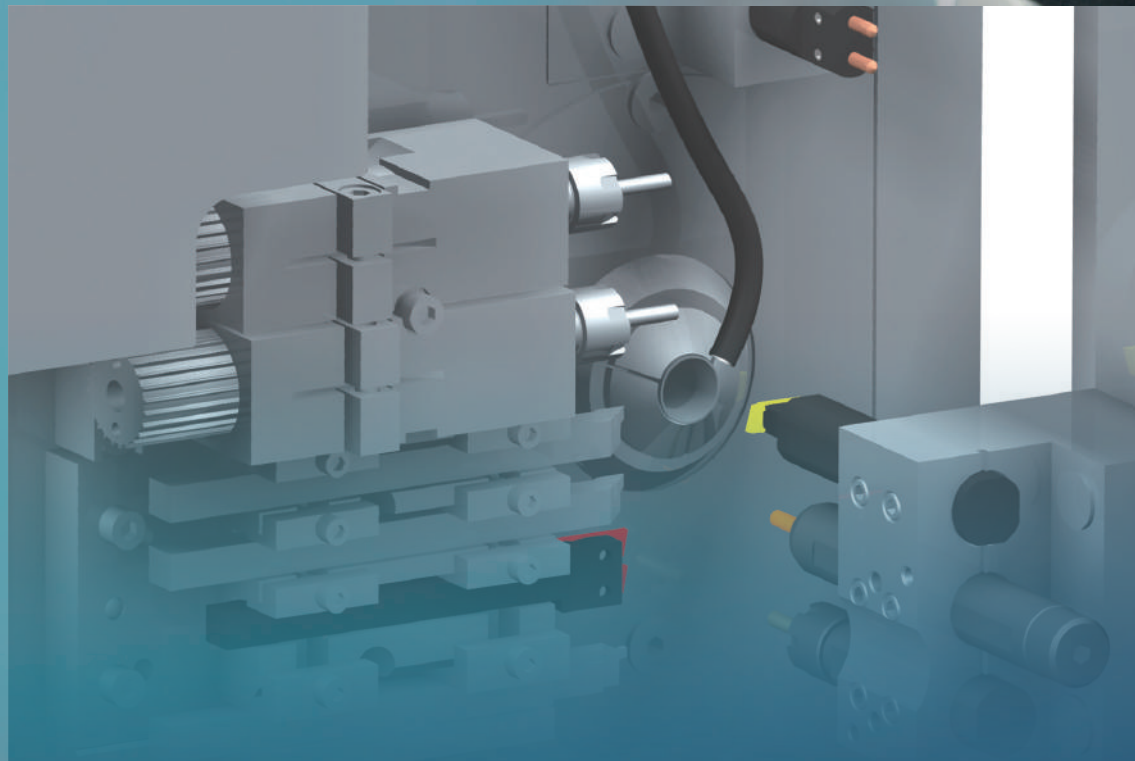




# AUTOMATIC LATHE TOTAL TOOLING SYSTEM



(주) 진성유로텍  
[www.bestjinsung.com](http://www.bestjinsung.com)



(주) 진성유로텍  
www.bestjinsung.com



### (주) 진성유로텍은

1994년 창설하여 자동선반 절삭가공분야에서 많은 경험과 전문적인 기술을 바탕으로 세계 최고의 절삭공구들을 수입하여 공급하고 있습니다.

특히 자동선반의 원조라고 할 수 있는 SWISS 절삭공구 전문 생산업체인 DIAMETAL를 포함한 10여개 업체들과 협력하여 자동선반에서 최고의 생산성을 높일수 있도록 TOTAL TOOLING SYSTEM을 갖추고 있는 국내 유일의 업체입니다.

현재 국내 시장에서 절실하게 요구되는 고경도 재질 및 초정밀 가공품에 당사 제품들이 공급·사용되므로 생산성 향상과 최고의 제품을 생산하는데 일익을 담당하는 자부심과 함께 큰 성과를 이루고 있습니다.

특히 의료제품(치과 : 임플란트/정형외과 : 교정스크류) 및 자동차, 전자, 전기 및 반도체, OA기기 등 여러 분야에서 적극적으로 사용되어지고 있습니다.

앞으로도 우수한 품질의 절삭공구개발로 생산성 향상은 물론 국산화 개발로 얻어지는 원가절감까지 저희 (주) 진성유로텍이 책임을 다하겠습니다.

그동안 당사를 사랑해 주시고 신뢰해 주셨던 고객님들께 머리 숙여 감사드리오며 계속해서 아낌없는 성원 부탁드립니다.

항상 최선을 다하며 정직함과 성실함을 바탕으로 귀사에서 신뢰받는 기업이 되도록 노력하겠습니다. 기억해주십시오.

감사합니다

(주)진성유로텍 임직원 일동





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*Success with precision*

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# 자동선반 절삭가공을 위한 초정밀 초정삭 SYSTEM



## ■ Cutting materials

Cutting material	ISO	Application
UG 8	K 01/05	Grade for high tolerance and high surface quality in the application of décolletage.
MG 6	K 05/10	Grade with high wear resistance for the applications in non-ferrous materials and light metals for high cutting speeds.
MG 7.5	K 10/20	Grade with average hardness and toughness.
MG 10	K 20/30	Grade with high toughness to machine with average cutting speed and feedrate.
M 10/30	K 20/30	This grade offers an excellent combination of strength and toughness to cut titanium as well as nickel alloys with an average cutting speed and feedrate.
Cermet		For finishing operations in steel with high cutting speed.
PCD + MCD		Polycrystalline and monocrystalline diamond to machine non-ferrous metals like aluminium, Al-Si alloys, copper, brass, bronze as well as graphite, MMC, fibreglass plastics, cemented carbides and precious metals.

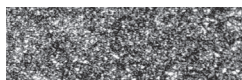
## ■ Description of carbides



MG Micrograin / Grain size 0.6 – 1.0 µm



UG Ultragrain / Grain size 0.3 – 0.6 µm



NG Nanograin / Grain size < 0.3 µm

## ■ Technical information on cutting materials

		Carbide grades					
		UG 8	MG 6	MG 7.5	MG 10	M 10/30	Cermet
Composition WC	per%	92	94	92.5	90	90	16
Composition Co	per%	8	6	7.5	10	10	11
Composition TiC/TiN	per%						50
Grain size	µm	0.4	0.8	0.8	0.7	0.8	
Transverse rupture strength	N/mm <sup>2</sup>	3150	2700	3600	3200	3000	
Density	g/cm <sup>3</sup>	14.50	14.90	14.70	14.50	14.45	7.00
Vickers hardness	HV	1900	1800	1700	1600	1580	1580



## ■ Effect of the constituents

	WC	Co	TiC / TaC	Grain size
Hardness	↑	↓	↑	↓
Compressive strength	↑	↓	○	↓
Resistance to abrasion	↑	↓↓	↑	↓
Transverse rupture strength	↓	↑	↓	↑
Wear resistance	↑	↓	↑	↓

↑ = increased

↓ = reduced

○ = insignificant

## ■ Coatings

Coating	Application
D 10	Universal application, steel
D 20	Finishing, titanium, non-ferrous metals, steel
D 30	Steel, stainless steel, nickel alloys, titanium
D 60	Stainless steel, high-temperature alloys, difficult machinable materials

## ■ Technical data

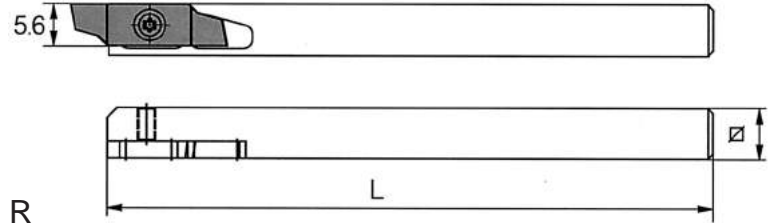
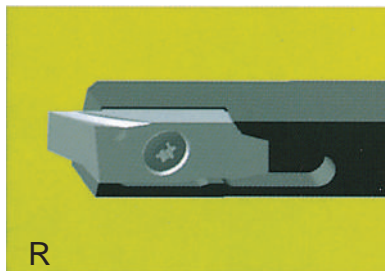
Coating	Hardness (HV 0.05)	Coefficient of friction	Max. temperature of application
D 10	2300	0.4	600 °C
D 20	3000	0.4	400 °C
D 30	3300	0.4	800 °C
D 60	3200	0.35	1000 °C



## TURNDEC (턴덱)



■ TURNDEC mini Precision toolholder (소형)

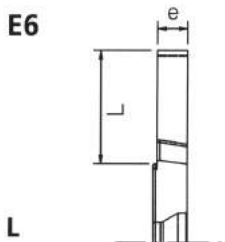


TUHAL6

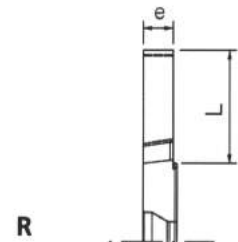
Toolholder					
Type	□ xL	Art. No	Type	□ xL	Art. No
L	7x7x110	381 932	R	7x7x110	381 933
L	8x8x110	378 819	R	8x8x110	378 820
L	10x10x120	378 813	R	10x10x120	378 816
L	12x12x120	378 814	R	12x12x120	378 817
			R	16x16x120	404 104

TORX Spare parts	Type	Art. No
Screw	TP 7 M2.5x6.5	381 683
Screwdriver	TP 7	381 682

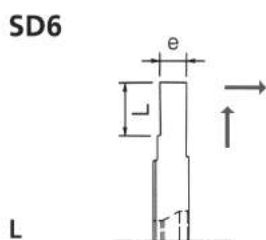
■ TURNDEC Insert uncoated in carbide MG10



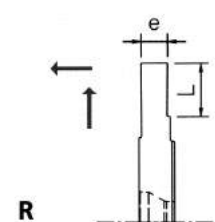
Blank					
Type	e x L	Art. No	Type	e x L	Art. No
L	2.4x7	381 634	R	2.4x7	381 635



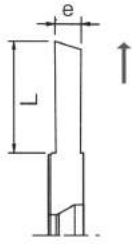
■ TURNDEC mini Insert coated with D60



Grooving, Back turning(홈, 홈터닝)					
Type	e x L	Art. No	Type	e x L	Art. No
L	0.50 x 2.0	381 636	R	0.50 x 2.0	381 642
L	0.80 x 2.5	381 637	R	0.80 x 2.5	381 643
L	1.00 x 3.0	381 638	R	1.00 x 3.0	381 644
L	1.20 x 4.0	381 639	R	1.20 x 4.0	381 645
L	1.50 x 4.0	381 640	R	1.50 x 4.0	381 646
L	2.00 x 5.0	381 641	R	2.00 x 5.0	381 647



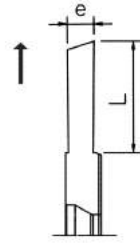
A6



L

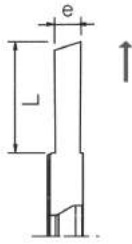
Parting(절단)

Type	e×L	Art. No	Type	e×L	Art. No
L	0.75×2.7	381 649	R	0.75×2.7	381 654
L	1.00×3.7	381 650	R	1.00×3.7	381 655
L	1.25×4.7	381 651	R	1.25×4.7	381 656
L	1.5×5.7	404 930	R	1.5×5.7	404 931
L	2.00×6.7	381 652	R	2.00×6.7	381 657



R

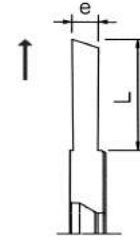
A6C



L

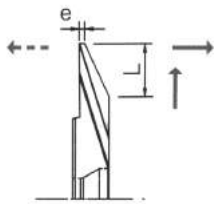
Parting(서브절단)

Type	e×L	Art. No	Type	e×L	Art. No
L	0.75×2.7	381 659	R	0.75×2.7	381 664
L	1.00×3.7	381 660	R	1.00×3.7	381 665
L	1.25×4.7	381 661	R	1.25×4.7	381 666
L	1.5×5.7	404 933	R	1.5×5.7	404 934
L	2.00×6.7	381 662	R	2.00×6.7	381 667



R

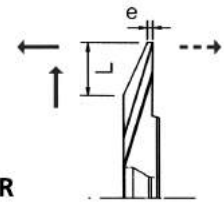
D6  
D6F



L

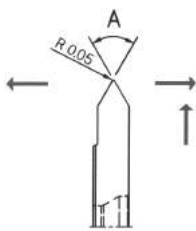
Back turning(되깎기)

Type	e×L	Art. No	Type	e×L	Art. No
L	0.5×4.0	381 668	R	0.5×4.0	381 669
L	0.5×4.0r0.05	389 959	R	0.5×4.0r0.05	389 958
			R	0.5×4.0r0.1	391 865
D6F-L	0.1×4.0	381 670	D6F-R	0.1×4.0	381 671
D6F-L	0.1×4.0r0.05	390 276	D6F-R	0.1×4.0r0.05	390 277
			R	0.3×4.0r0.05	419 290
			R	r 0.08	413 584
			R	r 0.2	401 818



R

G6

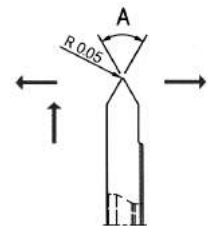


L

Threading(나사)

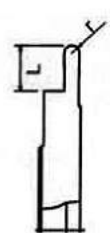
Type	e×L	Art. No	Type	e×L	Art. No
L	60 °	381 673	R	60 °	381 675

for Thread ≥ M1.6



R

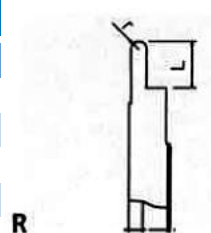
R6



L

Radius inserts (라바이트)

Type	r	L	Art. No	Type	r	L	Art. No
L	0.25	2	395 910	R	0.25	2	395 900
L	0.50	3	395 911	R	0.50	3	395 901
L	0.60	3	395 912	R	0.60	3	395 902
L	0.75	4	395 913	R	0.75	4	395 903
L	0.80	4	395 914	R	0.80	4	395 904
L	1.00	5	395 915	R	1.00	5	395 905

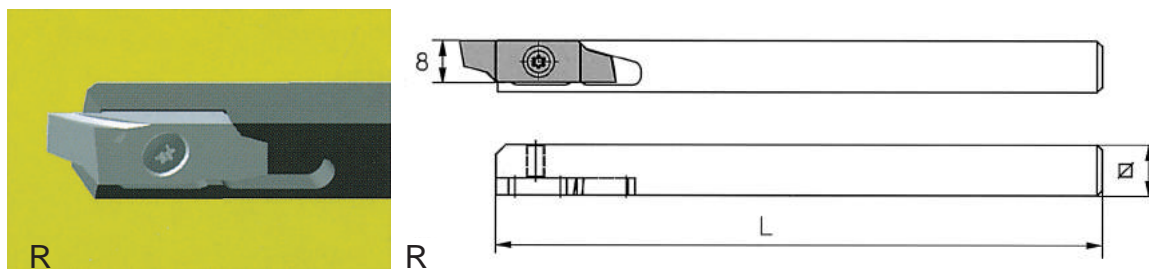


R

PCD on request



■ TURNDEC Precision toolholder (대형)

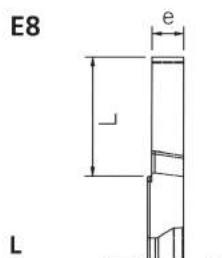


TUHAL8

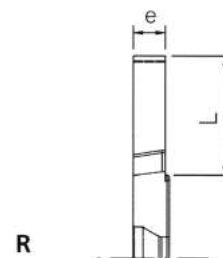
Toolholder					
Type	□ × L	Art. No	Type	□ × L	Art. No
L	10 × 10 × 120	374 662	R	10 × 10 × 120	374 665
L	12 × 12 × 120	374 663	R	12 × 12 × 120	374 666
L	16 × 16 × 120	374 664	R	16 × 16 × 120	374 667
L	20 × 20 × 120	383 910	R	20 × 20 × 120	383 790

TORX Spare parts	Type	Art. No
Screw	TP15 M3.5 × 9.0	374 757
Screwdriver	TP15	374 759

■ TURNDEC Insert uncoated in carbide MG10

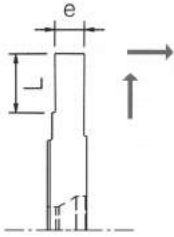


Blank					
Type	e × L	Art. No	Type	e × L	Art. No
L	2.95 × 11	374 756	R	2.95 × 11	374 755

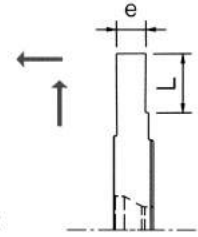


■ TURNDEC Insert coated with D60

SD8



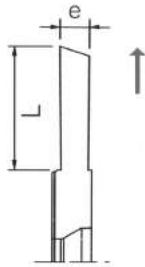
Grooving, Back turning(홈, 홈터닝)					
Type	e×L	Art. No	Type	e×L	Art. No
L	1.5×5.0	374 673	R	1.5×5.0	374 694
L	2.0×5.0	374 672	R	2.0×5.0	374 693
L	2.5×6.0	374 671	R	2.5×6.0	374 692



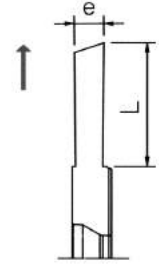
L

R

A8



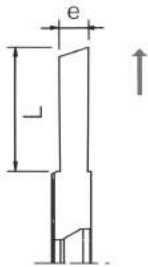
Parting(절단)					
Type	e×L	Art. No	Type	e×L	Art. No
L	1.5×8.7	374 679	R	1.5×8.7	374 700
L	2.0×9.7	374 678	R	2.0×9.7	374 699
L	2.5×10.7	374 677	R	2.5×10.7	374 698



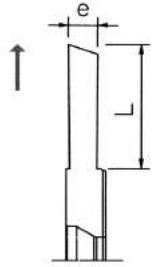
L

R

A8C



Parting(서브절단)					
Type	e×L	Art. No	Type	e×L	Art. No
L	1.5×8.7	377 859	R	1.5×8.7	377 856
L	2.0×9.7	377 858	R	2.0×9.7	377 855
L	2.5×10.7	377 857	R	2.5×10.7	377 854

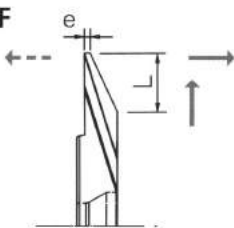


L

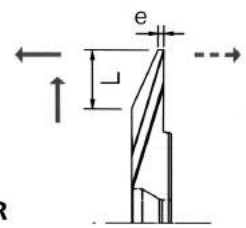
R

D8

D8F



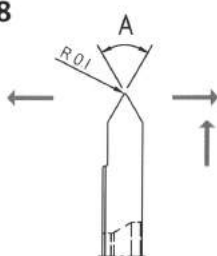
Back turning(되깎기)					
Type	e×L	Art. No	Type	e×L	Art. No
L	0.5×5.0	374 681	R	0.5×5.0	374 702
L	0.5×5.0r0.1	389 961	R	0.5×5.0r0.1	389 960
D8F-L	0.1×5.0	379 666	D8F-R	0.1×5.0	377 851
D8F-L	0.1×5.0r0.05	390 278	D8F-R	0.1×5.0r0.05	390 279
			R	r0.2	



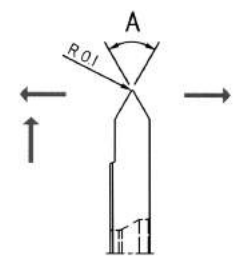
L

R

G8



Threading(나사)					
Type	e×L	Art. No	Type	e×L	Art. No
L	55 °	374 688	R	55 °	374 706
L	60 °	374 687	R	60 °	374 705



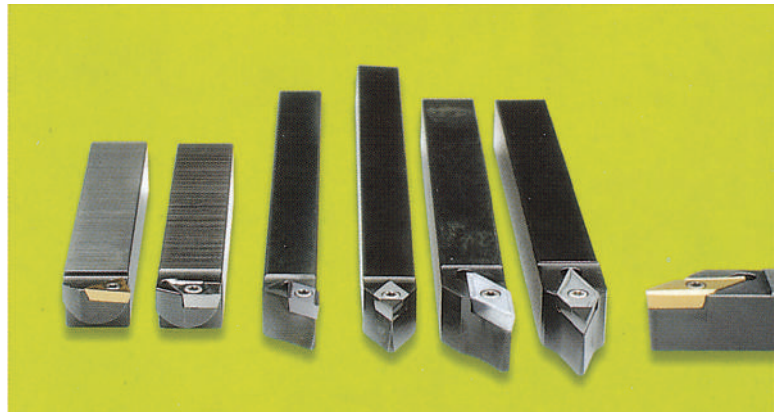
L

R

PCD on request



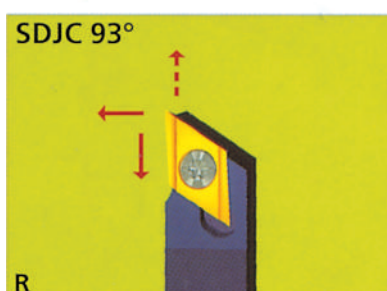
# TOPDEC (톱덱)



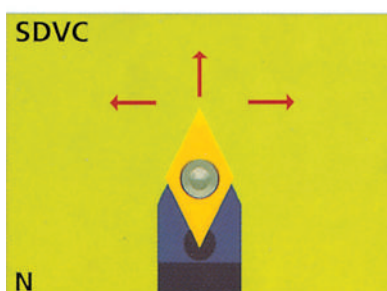
■ TOPDEC Precision toolholder(55° Insert)



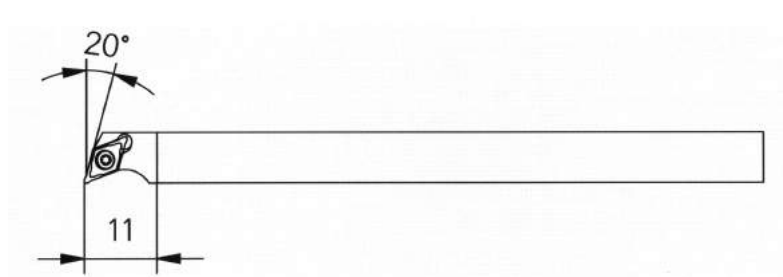
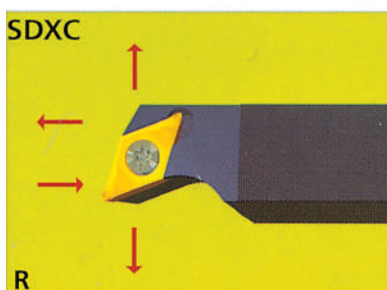
Toolholder					
Type	□ x L	Art. No	Type	□ x L	Art. No
L	8x8x120	234 238	R	8x8x120	234 242
L	10x10x120	234 239	R	10x10x120	234 243
L	12x12x120	234 240	R	12x12x120	234 244
L	16x16x120	234 241	R	16x16x120	234 245



Toolholder					
Type	□ x L	Art. No	Type	□ x L	Art. No
L	8x8x120	300 782	R	8x8x120	300 781
L	10x10x120	300 784	R	10x10x120	300 783
L	12x12x120	300 786	R	12x12x120	300 785
L	16x16x120	300 788	R	16x16x120	300 787



Toolholder		
Type	□ x L	Art. No
N	8x8x120	305 373
N	10x10x120	305 374
N	12x12x120	305 375
N	16x16x120	305 376

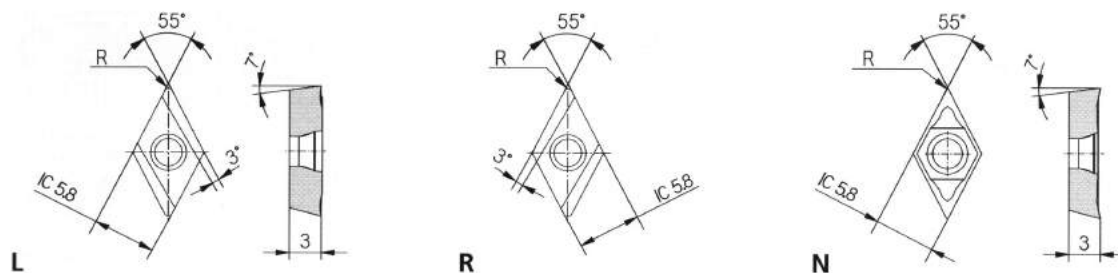


Right holder requires  
L or N insert

Toolholder					
Type	□ x L	Art. No	Type	□ x L	Art. No
L	12x12x120	305 372	R	12x12x120	305 371



■ TOPDEC Turning Inserts(55° Insert)



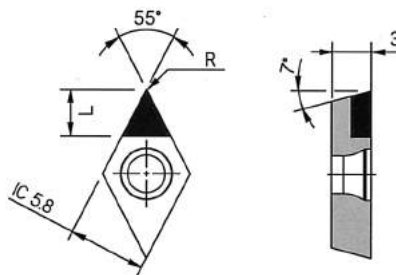
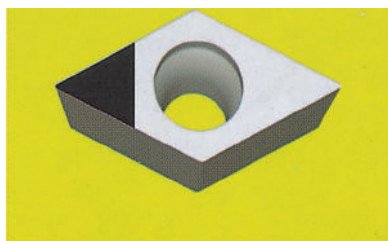
DCGX

Insert						
Size	Radius	M10/30 D10	M10/30 D20	M10/30 D30	M10/30 D60	Cermet
0703003 FL	0.03		370 856			
070301 FL	0.10	236 136	234 223	236 154		358 919
070302 FL	0.20	236 137	234 224	236 155	391 129	358 920
070304 FL	0.40	236 138	234 225	236 156		358 921
0703003 FR	0.03		369 885			
070301 FR	0.10	236 145	234 220	236 157	390 950	358 916
070302 FR	0.20	236 146	234 221	236 158	375 024	358 917
070304 FR	0.40	236 147	234 222	236 159	401 586	358 918
070301 FN	0.10	305 339	305 341	305 343		
070302 FN	0.20	305 340	305 342	305 344		

DCGX/Alu

Insert		
Size	Radius	M10/30
070302 FN	0.20	370 687
070304 FN	0.40	372 822

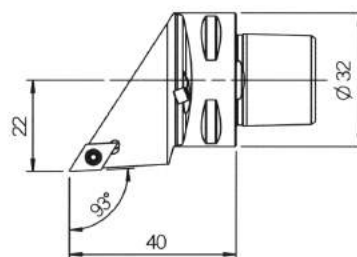
■ TOPDEC PCD Inserts



DCGX

Insert			
Size	Radius	L	Art. No
0703005 FN	0.05	4.0	371 910
070301 FN	0.10	4.0	371 909
070302 FN	0.20	4.0	371 903
070304 FN	0.40	4.0	371 908

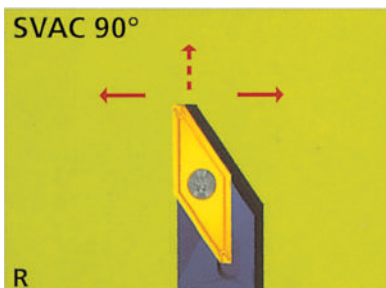
■ TOPDEC Capto C3



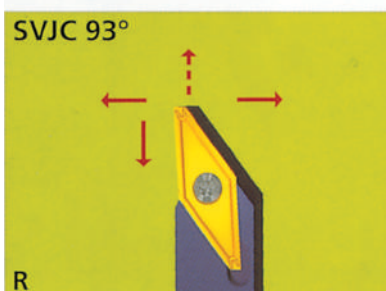
Toolholder	
Type	Art. No
R	374 974

TORX Spare parts	Type	Art. No
Screw	TP7 M2.2 x 6.5	234 212
Screwdriver	TP7	381 682

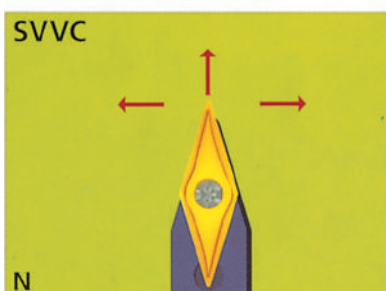
■ TOPDEC Precision toolholder(35 ° Insert)



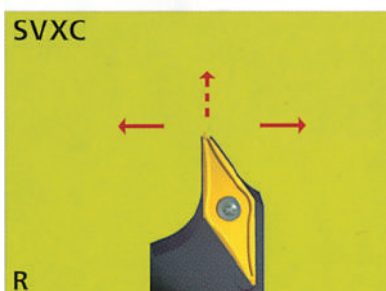
Toolholder					
Type	W x L	Art. No	Type	W x L	Art. No
L	8x8x120	234 226	R	8x8x120	234 233
L	10x10x120	234 227	R	10x10x120	234 234
L	12x12x120	234 228	R	12x12x120	234 235
L	16x16x120	234 229	R	16x16x120	234 236



Toolholder					
Type	W x L	Art. No	Type	W x L	Art. No
L	8x10x120	358 497	R	8x10x120	358 496
L	10x10x120	300 774	R	10x10x120	300 773
L	12x12x120	300 776	R	12x12x120	300 775
L	16x16x120	300 778	R	16x16x120	300 777
L	20x20x120	300 780	R	20x20x120	300 779



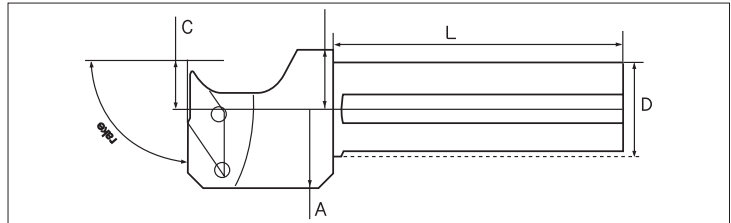
Toolholder		
Type	W x L	Art. No
N	8x8x120	234 246
N	10x10x120	234 247
N	12x12x120	234 248
N	16x16x120	234 249



Toolholder					
Type	W x L	Art. No	Type	W x L	Art. No
L	10x10x120	377 867	R	10x10x120	377 863
L	12x12x120	377 866	R	12x12x120	377 862
L	16x16x120	377 865	R	16x16x120	377 861
L	20x20x120	377 864	R	20x20x120	377 860

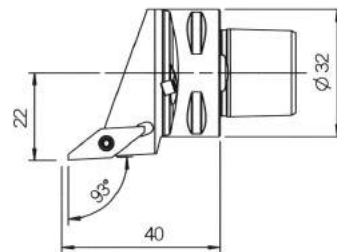
## 배면 HOLDER(SUB HOLDER)

HOLDER  
TOPDEC INSERT VCGX(1203..)장착



Description		Dimension(mm)						Spare Parts	
		A	B	C	D	L	rake	Clamp Screw	Wrench
배면 HOLDER	Ø 19.05(FOR CINCOM, NEXTURN)	16.00	11.52	9.52	19.05	60	92 °	T-7 (VCGX)	FT-7
	Ø 20.00(FOR Tsugami)	"	"	"	20.00	"	"		
	Ø 22.00(FOR Star)	"	"	"	22.00	"	"		
	Ø 25.00(FOR HANHWA)	"	"	"	25.00	70	"		

### ■ TOPDEC Capto C3

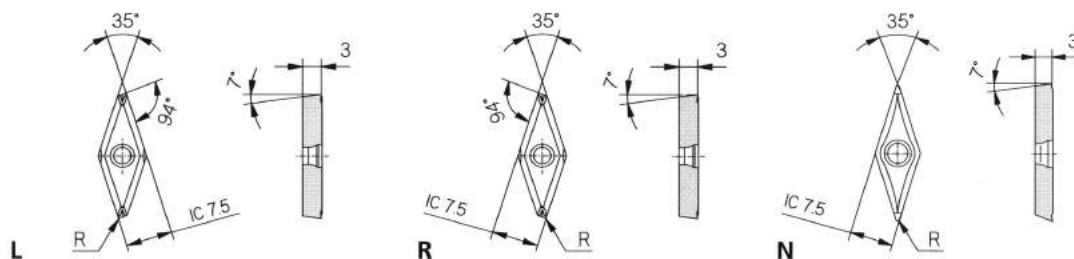


Toolholder	
Type	Art. No
R	374 971

TORX Spare parts	Type	Art. No
Screw	TP7 M 2.5x6.5	381 683
Screwdriver	TP7	381 682



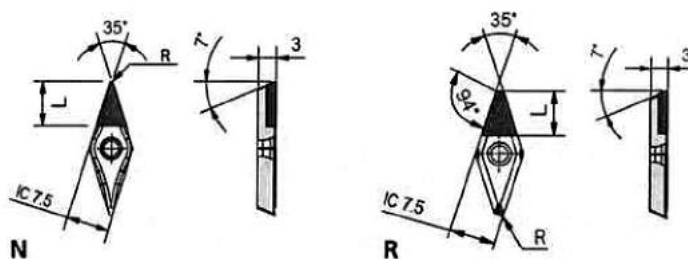
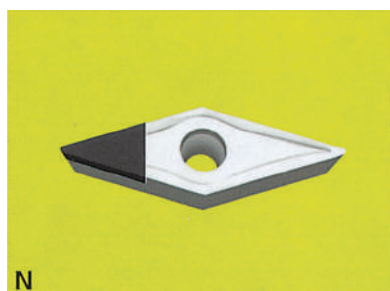
■ TOPDEC Turning inserts(35 ° Insert)



VCGX

Insert						
Size	Radius	M10/30 D10	M10/30 D20	M10/30 D30	M10/30 D60	Cermet
1203000 FL	0.00	236 148	234 216	236 160	405 907	301 473
1203008 FL	0.08	236 149	234 217	236 161	387 959	301 474
120302 FL	0.20				403 409	
1203000 FR	0.00	236 152	234 214	236 164	392 368	301 471
1203008 FR	0.08	236 153	234 215	236 165	383 574	301 472
120302 FR	0.20				387 788	
1203003 FN	0.03		406 853			
1203005 FN	0.05		381 258		401 859	
1203008 FN	0.08	367 805	367 806	367 807	400 494	
120301 FN	0.1		387 892			
120302 FN	0.20	236 150	234 218	236 162	388 948	384 543
120304 FN	0.40	236 151	234 219	236 163	386 354	371 948

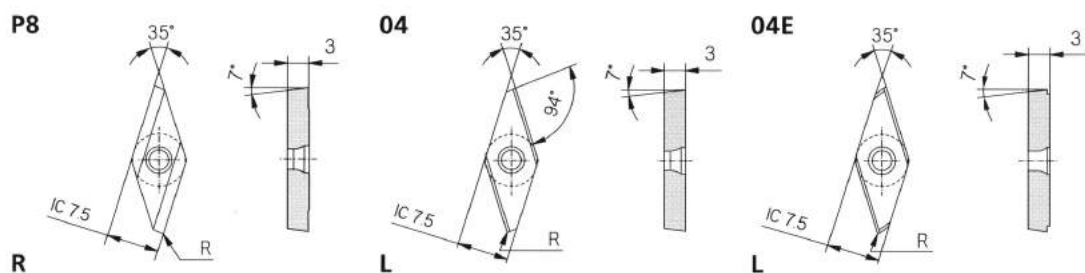
■ TOPDEC PCD Inserts



VCGX

Insert			
Size	Radius	L	Art. No
1203005 FL	0.05	5.0	375 426
1203005 FR	0.05	5.0	392 922
1203008 FN	0.08	6.0	371 916
120302 FN	0.20	6.0	371 913
120304 FN	0.40	6.0	371 912

## ■ TOPDEC VCGX Turning Inserts



### VCGX/P8

Insert P8				
Size	Radius	M10/30 D10	M10/30 D20	M10/30 D30
1203000-P8 FL	0.00		365 208	
1203008-P8 FL	0.08	369 299	364 924	
1203000-P8 FR	0.00		364 501	364 508
1203008-P8 FR	0.08	369 300	368 858	

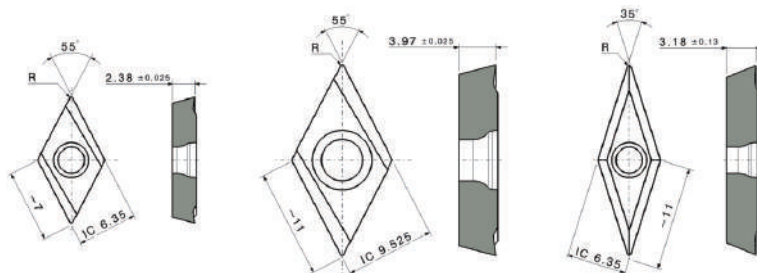
### VCGX/04

Insert 04			
Size	Radius	M10/30 D20	M10/30 D30
1203000-04 FL	0.00	361 353	
1203008-04 FL	0.08	361 354	
1203000-04 FR	0.00	361 352	
1203008-04 FR	0.08	361 351	

### VCGX/04E

Insert 04E			
Size	Radius	M10/30 D20	M10/30 D30
1203000-04E FL	0.00	367 835	
1203008-04E FL	0.08	367 653	
1203000-04E FR	0.00	368 914	
1203008-04E FR	0.08	368 916	

## ISO Turning inserts



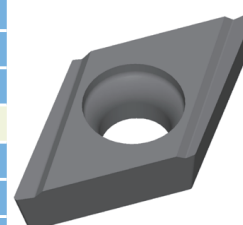
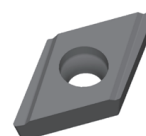
DCET 0702 FL

DCET 11T3 FL

VCGT 1103 FN

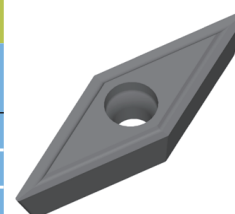
### DCET

Insert				
Size		Radius	M10/30 D20	M10/30 D60
0702003	FL	0.03	418229	418251
070201	FL	0.1	418230	418252
070202	FL	0.2	418231	418253
070204	FL	0.4	418232	418254
0702003	FR	0.03	418233	418255
070201	FR	0.1	418234	418256
070202	FR	0.2	418235	418257
070204	FR	0.4	418236	418258
11T3005	FL	0.05	418237	418259
11T301	FL	0.1	418238	418260
11T302	FL	0.2	418239	418261
11T304	FL	0.4	418240	418262
11T308	FL	0.8	418241	418263
11T3005	FR	0.05	418242	418264
11T301	FR	0.1	418243	418265
11T302	FR	0.2	418244	418266
11T304	FR	0.4	418245	418267
11T308	FR	0.8	418246	418268



### VCGT

Insert				
Size		Radius	M10/30 D20	M10/30 D60
1103005	FN	0.05	418247	418269
1103008	FN	0.08	418248	418270
110302	FN	0.2	418249	418271

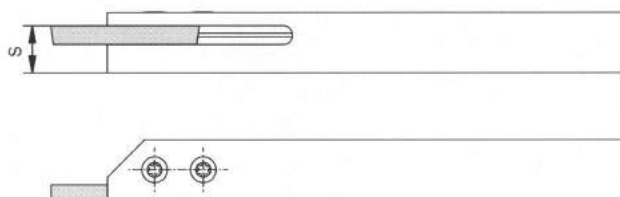
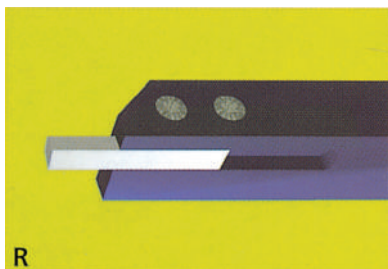




## ■ DIADEC (디아텍) BLADE (블레이드) Turning and parting

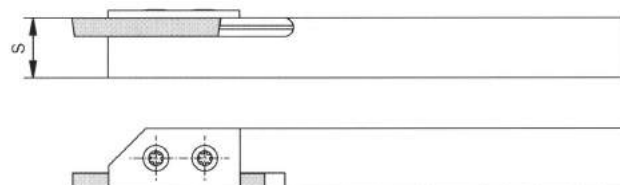
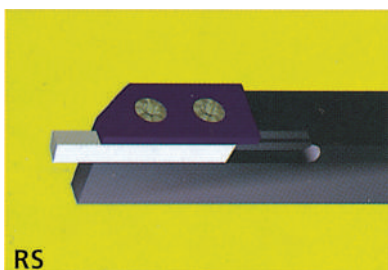


■ DIADEC Precision toolholder (초경블레이드)



DDHAL

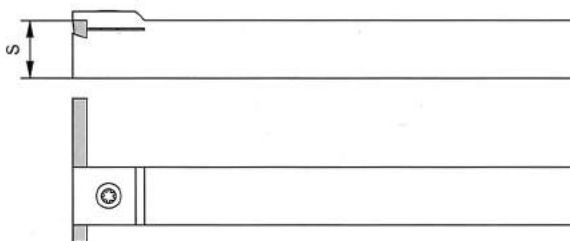
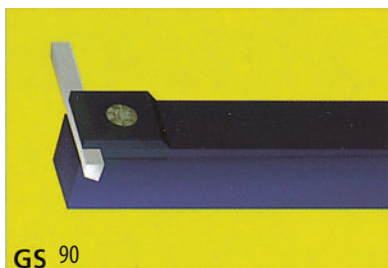
Type	□ x L	Blade height	Centre height S	Art. No
L	7x7x110	5	6.0	201 034
L	8x8x110	5	6.5	201 036
L	10x10x120	5	7.5	201 038
L	12x12x120	5	8.5	201 040
L	14x14x120	5	10.5	201 042
R	7x7x110	5	6.0	201 035
R	8x8x110	5	6.5	201 037
R	10x10x120	5	7.5	201 039
R	12x12x120	5	8.5	201 041
R	14x14x120	5	10.5	201 043



DDHAL

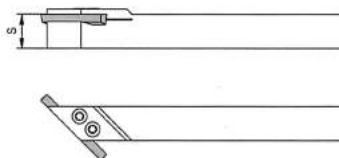
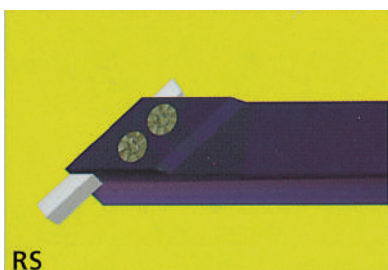
Type	□ x L	Blade height	Centre height S	Art. No
LS	8x8/10x120	5	8.0	207 415
LS	10x10/12x120	5	10.0	207 413
LS	12x12/14x120	5	12.0	207 411
LS	16x16/18x120	5	16.0	214 597
RS	8x8/10x120	5	8.0	207 416
RS	10x10/12x120	5	10.0	207 414
RS	12x12/14x120	5	12.0	207 412
RS	16x16/18x120	5	16.0	212 616

■ DIADEC Precision toolholder

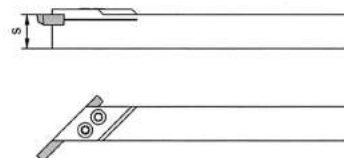


DDHAL

Type	□ x L	Blade height	Centre height S	Art. No
GS 90	8x8/10x120	5	8.0	214 440
GS 90	10x10/12x120	5	10.0	214 441
GS 90	12x12/14x120	5	12.0	214 442
GS 90	14x14/16x120	5	14.0	212 009
GS 90	16x16/18x120	5	16.0	212 010
GS 90	20x20/22x120	5	20.0	212 011



LS 45



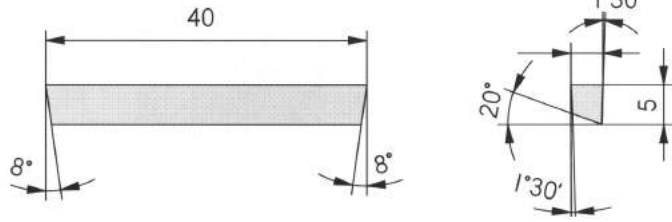
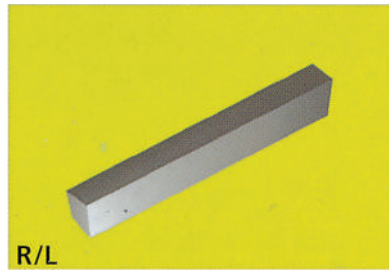
RS 45

DDHAL

Type	□ x L	Blade height	Centre height S	Art. No
LS 45	12x12/14.0x140	5	12.0	214 443
LS 45	14x14/16.5x140	5	14.0	212 004
LS 45	16x16/18.5x140	5	16.0	212 005
LS 45	20x20/22.5x140	5	20.0	212 008
RS 45	12x12/14.0x140	5	12.0	214 444
RS 45	14x14/16.5x140	5	14.0	212 003
RS 45	16x16/18.5x140	5	16.0	212 006
RS 45	20x20/22.5x140	5	20.0	212 007



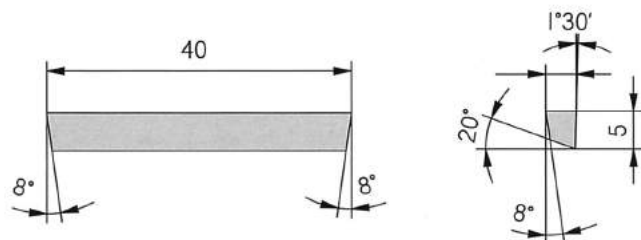
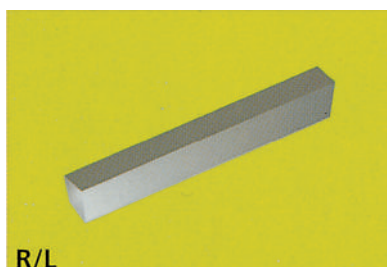
■ DIADEC Parting blades 5mm (절단)



DDKLIS

Size	K 10/20	MG 6	MG 7.5	MG 10	HSS
2.0x5x20				215 229	
2.5x5x20				215 230	
3.0x5x20				215 231	
0.8x5x40		217 408			
0.9x5x40		217 409			
1.0x5x40	201 108	201 107	201 110	212 084	211 652
1.1x5x40		217 410			
1.2x5x40		217 411			
1.3x5x40		217 412			
1.4x5x40		217 413			
1.5x5x40	201 112	201 111	201 114	212 085	207 604
1.6x5x40		217 414			
1.7x5x40		217 415			
1.8x5x40		217 416			
1.9x5x40		217 417			
2.0x5x40	201 116	201 115	201 118	208 447	207 605
2.2x5x40		224 766			
2.5x5x40	201 120	201 119	201 124	212 086	207 606
3.0x5x40	201 126	201 125	201 128	212 087	207 607
4.0x5x40	201 130	201 129	201 132	212 088	212 860

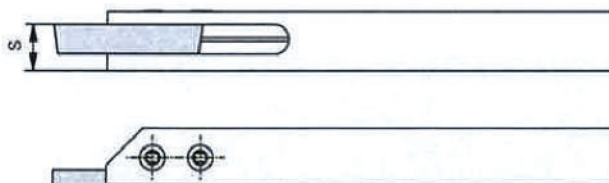
■ DIADEC Turning blades 5mm (터닝)



DDKLID

Size	K 10/20	MG6	MG 7.5	MG 10
2.5x5x40	201 046	201 045	201 048	212 081
3.0x5x40	201 050	201 049	201 052	212 082
4.0x5x40	201 054	201 053	201 056	212 083

■ DIADEC Precision toolholder for 8mm blade



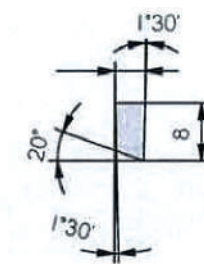
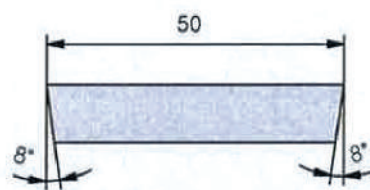
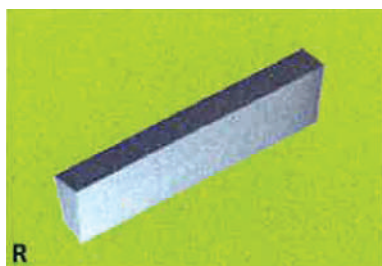
DDHAL

Type	□ x L	Blade height	Centre height S	Art. No
L	16x16x120	8	12.5	220 797
L	20x20x120	8	16.0	220 798
R	16x16x120	8	12.5	220 799
R	20x20x120	8	16.0	220 800

■ DIADEC Spare parts for holder for 8mm blade

Holder		Screw			Screwdriver	
Type	Size	pcs.	Size	Art. No	Type	Art. No
L8	16x16	2	M5x15	221 542	T-25	201 138
R8	16x16	2	M5x15	221 542	T-25	201 138
L8	20x20	2	M6x16	221 543	T-30	221 544
R8	20x20	2	M6x16	201 543	T-30	221 544

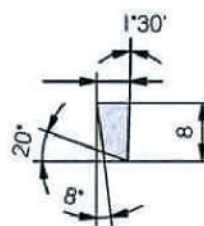
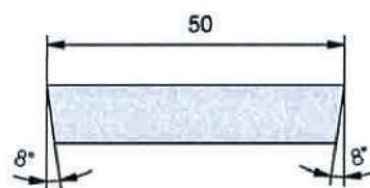
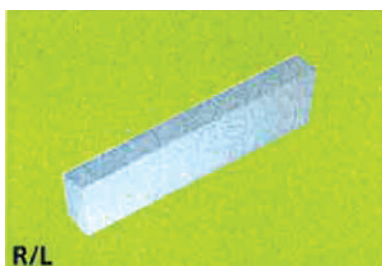
■ DIADEC Parting blades 8mm



DDKLIS

Size	MG 10
1.5x8x50	302 175
2.0x8x50	222 706
3.0x8x50	220 804
4.0x8x50	220 805

■ DIADEC Turning blades 8mm

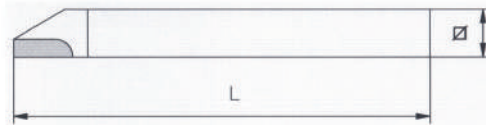
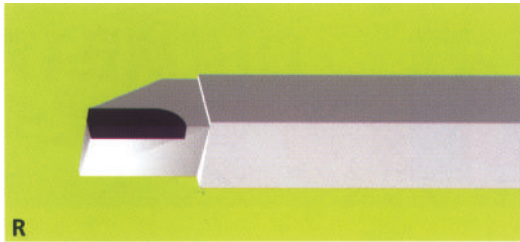


DDKLID

Size	MG 10
4.0x8x50	220 801



■ Turning tools soldered ((초경 터닝 완성 바이트))

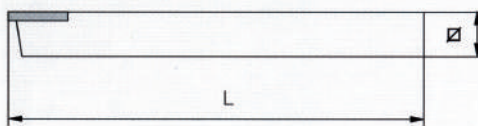


**DRAUTDRE**

Standard turning tools

Type	Position	□ x L	K05	MG7.5	MG10	UG8
L	-	6x6x120	200 005	200 007		226 455
L	I	6x6x120		200 009		
L	-	7x7x140	200 011	200 013	210 387	226 457
L	I	7x7x140	200 014	200 015		363 879
L	-	8x8x140	200 017	200 019	210 388	226 458
L	I	8x8x140	200 020	200 021	215 514	
L	-	10x10x150	200 023		210 389	237 306
L	-	12x12x150	200 026		210 390	237 307
R	-	6x6x120	200 004			
R	-	8x8x140	200 016		214 298	364 973
R	-	10x10x150	200 022		214 299	387 252
R	-	12x12x150	200 025		214 300	

■ Head tools soldered

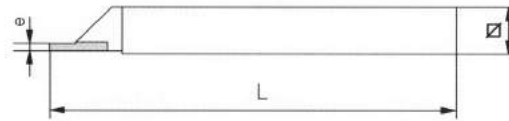


**DRAUTKOP**

Standard head tools

□ x L	MG 10
6x6x120	200 070
7x7x140	200 071
8x8x140	200 072
10x10x150	200 073
12x12x150	200 074
14x14x150	200 075

■ Parting tools soldered (초경 절단 완성바이트)

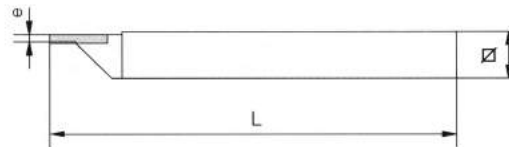


**DRAUTSTE**

**Standard parting tools**

Type	□ x L	e	K05	MG10	UG8
R	7x7x140	1.75	200 040		
R	8x8x140	1.60		384 681	366 593
R	8x8x140	1.75	200 051	384 685	
R	8x8x140	2.00	207 391	214 293	366 321
R	8x8x140	3.00	200 306		
R	10x10x150	1.50	398 375		
R	10x10x150	1.75	200 059		
R	10x10x150	2.00	220 501		
R	10x10x150	2.50	350 841	214 294	
R	10x10x150	3.00		390 853	386 949
R	12x12x150	2.00	206 769		
R	12x12x150	2.50		214 295	
R	12x12x150	2.70	200 064		
R	12x12x150	3.00		214 296	

■ Parting tools soldered (초경 절단 완성바이트)



**DRAUTSTE**

**Standard parting tools**

Type	□ x L	e	K05	KG7.5	MG10	UG8
L	5x5x120	1.25	200 032			
L	6x6x120	1.00	200 295	217 582		
L	6x6x120	1.25	200 250	217 583		226 448
L	6x6x120	1.50	218 649	217 584		238 344
L	6x6x120	1.60	200 034	200 036		
L	6x6x120	2.00		215 277		383 312
L	7x7x140	1.25	200 037	217 580		226 450
L	7x7x140	1.50	200 039	200 298		226 451
L	7x7x140	1.60			210 370	
L	7x7x140	1.75	200 041	200 043		
L	7x7x140	2.00	200 044	217 581	210 371	226 452
L	7x7x140	2.50	214 669		210 372	
L	8x8x140	1.50	200 050	216 023		226 453
L	8x8x140	1.60			210 373	
L	8x8x140	1.75	200 052	200 054	387 309	
L	8x8x140	2.00	200 055	206 772	210 374	226 454
L	8x8x140	2.25	200 056			
L	8x8x140	2.50	200 058		210 375	
L	10x10x150	1.75	200 060			
L	10x10x150	2.00	212 188		210 376	237 302
L	10x10x150	2.50	217 418			237 303
L	10x10x150	3.00			210 378	
L	12x12x150	1.50	212 391			
L	12x12x150	2.00	219 678		210 379	
L	12x12x150	2.50	200 313	226 726	210 380	237 304
L	12x12x150	2.70	200 065			
L	12x12x150	3.00	206 803	226 727	210 381	237 305

■ Cutting data, turning

			Vc(m/min)					
Material	ap[mm]	f[mm/U]	HM Carbide	D10	D20	D30 (D60)	Cermet	PCD
Free cutting steel	< 4	0.02-0.15	70-140	120-200		150-280		
95MnPb28(1.0718)	< 4	0.02-0.15		120-200		170-250		
Stahl < 600N/mm2	< 4	0.02-0.12	50-100	90-170		90-180		
Steel								
Stahl < 850N/mm2	< 3	0.02-0.12	40-80	70-150		80-170		
Steel								
Stahl > 850N/mm2	< 3	0.02-0.12	30-70	60-120		70-170	140-280	
Steel								
ETG100(1.7225)	< 3	0.02-0.12				110-170		
Stainless steel	< 3	0.02-0.12		60-120	60-120	60-180	140-300	
316L(1.4435)	< 3	0.02-0.12		60-120		100-160	150-280	
Aluminium < 10% Si	< 5	0.05-0.25	200-2000	300-2000	300-2000			1000-3000
Aluminium > 10% Si	< 5	0.03-0.25		200-1000	200-1000			500-2500
CFK I GFK								
Fibreglass plastics	< 6	0.02-0.12						200-1200
Brass/Bronze	< 5	0.02-0.20	120-250	300-600	300-600			400-1200
Copper	< 5	0.02-0.20	120-250	180-500	180-500			400-1200
Gold	< 2	0.01-0.10	150-1500	200-2000				300-3000
Platinum/Palladium	< 2	0.01-0.10						100-400
Fe - based								
high-temperature alloys	< 3	0.01-0.10				30-80	20-50	
Ni - based								
high-temperature alloys	< 3	0.01-0.10				20-50	10-30	
Co - based								
high-temperature alloys	< 3	0.01-0.10				20-50	10-30	
Titanium pure	< 3	0.01-0.10			70-110	70-110		
Titanium alloys alpha-beta	< 3	0.01-0.08			60-80	60-80		



■ Cutting data, grooving and parting

		Vc(m/mim)					
Material	f[mm/U]	HM Carbide	D10	D20	D60	Cermet	PCD
Free cutting steel	0.01-0.15	70-140	120-200		150-280		
95MnPb28(1.0718)	0.01-0.15		120-200		170-250		
Stahl < 600N/mm2	0.01-0.12	50-100	90-170		90-180		
Steel							
Stahl < 850N/mm2	0.01-0.12	40-80	70-150		80-170		
Steel							
Stahl > 850N/mm2	0.01-0.12	30-70	60-120		70-170	140-280	
Steel							
ETG100(1.7225)	0.01-0.12				110-160		
Stainless steel	0.01-0.12		60-120	60-120	60-180	140-300	
316L(1.4435)	0.01-0.12		60-120		100-160	150-280	
Aluminium < 10% Si	0.02-0.20	200-2000	300-2000	300-2000			1000-3000
Aluminium > 10% Si	0.02-0.20		200-1000				500-2500
CFK I GFK	0.01-0.12						200-1200
Fibreglass plastics							
Brass/Bronze	0.01-0.12	120-250	300-600	300-600			400-1200
Copper	0.01-0.12	120-250	180-500	180-500			400-1200
Gold	0.01-0.08	150-1500	200-2000				300-3000
Platinum/Palladium	0.01-0.08						100-400
Fe-based	0.01-0.10				30-80	20-50	
high-temperature alloys							
Ni-based	0.01-0.10				20-50	10-30	
high-temperature alloys							
Co-based	0.01-0.10				20-50	10-30	
high-temperature alloys							
Titanium pure	0.01-0.10			70-110	70-110		
Titanium alloys alphabeta	0.01-0.08			50-80	50-80		

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

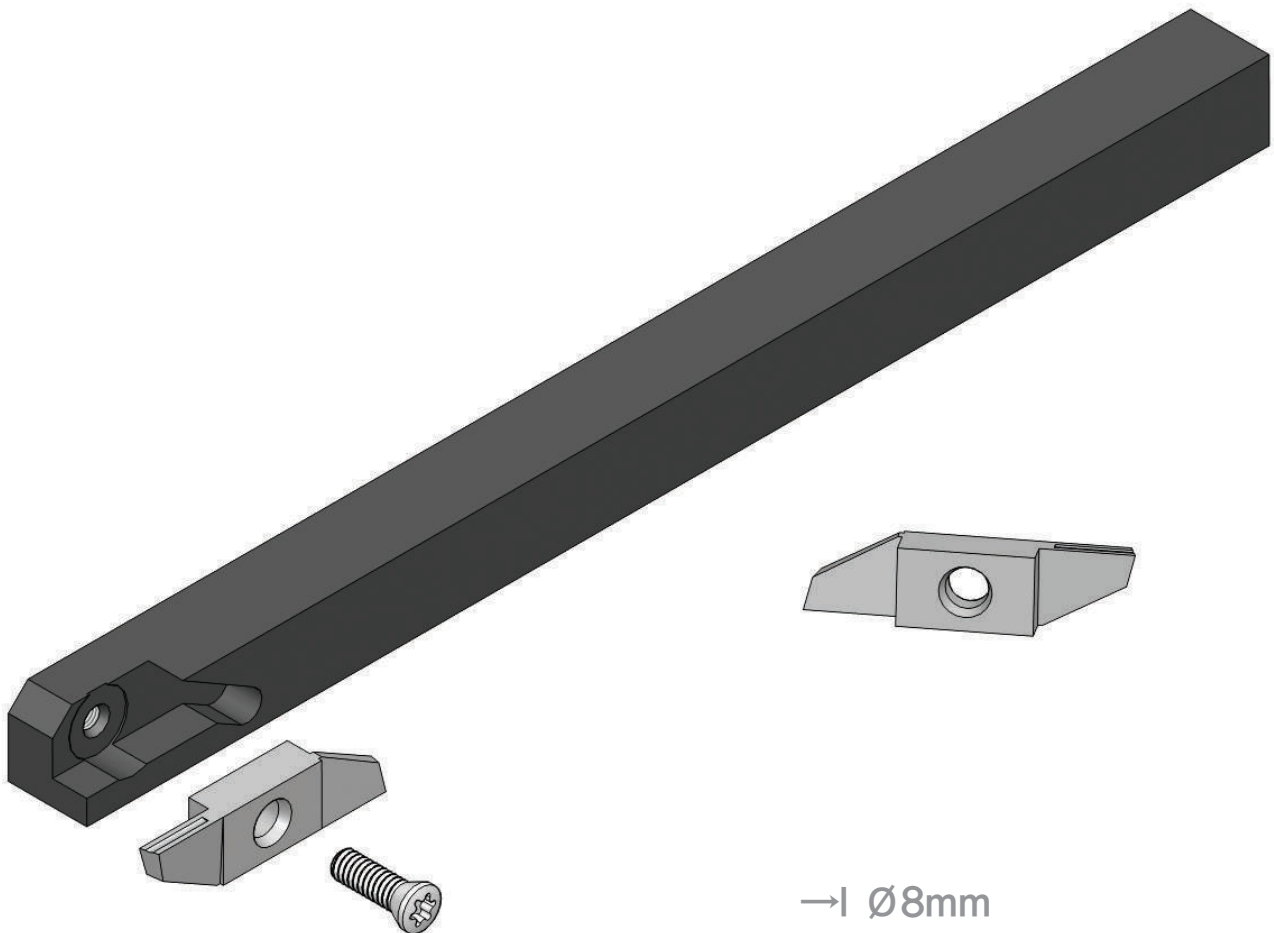
6. Whiz Cut



7. SPHINX

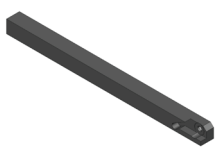
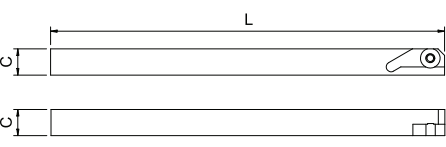
040line


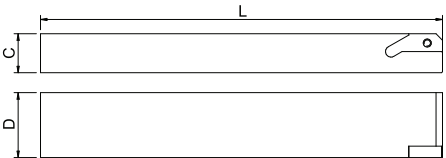
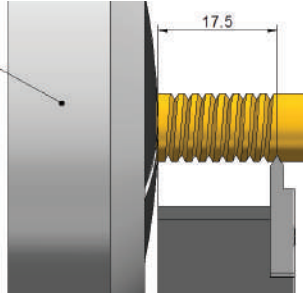
 **Bimu**  
cutting tools & accessories

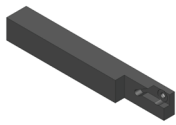
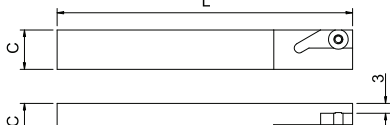
# 040 line





0xxR	Right tool-holder	Section C	Length L	Article nr.
		8 x 8	124	008R
		10 x 10	124	010R
		12 x 12	124	012R
		16 x 16	100	016R
		20 x 20	100	020R

0xxL	Left tool-holder	Section C	Length L	Article nr.
		7 x 7	140	007L
		8 x 8	140	008L
		10 x 10	124	010L
		12 x 12	124	012L
		16 x 16	100	016L
		20 x 20	100	020L

0xx-20L	Left offset threading tool-holder	Section C	Section D	Length L	Article nr.
		8	20	124	008-20L
		12	20	124	012-20L
		 <p>Guide bush Führungsbüchse Canon</p> <p>Use with 080R and 081R inserts Verwendung mit 080R und 081R Wendeplatten Utilisation avec les plaquettes 080R et 081R</p>			

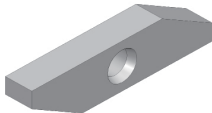
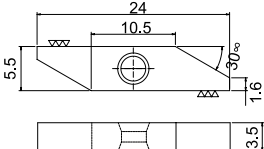
012R3 90	Right «Pick-up» tool-holder	Section C	Length L	Article nr.
		12 x 12	90	012R 3 90
		Use with 053R inserts		

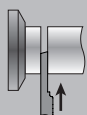
001-1	Key	Article nr.
	Torx 8	001-1

001-2	Screw for standart tool-holder	Article nr.
	M2,5 x 7,5	001-2

## Blank

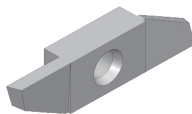
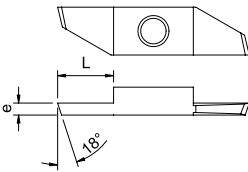
R : Right machining

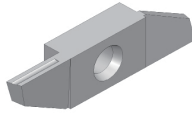
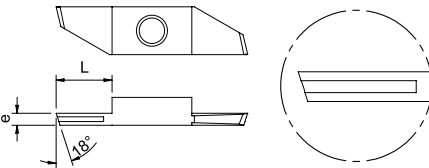
040R/L	Blank insert	e	Article nr.	K10	BI20	BI30	BI40	TIN
		1,4	040R/L1,4	✓	◇	◇	◇	◇
		1,7	040R/L1,7	✓	◇	◇	◇	◇
		2,0	040R/L2,0	✓	◇	◇	◇	◇
		2,2	040R/L2,2	✓	◇	◇	◇	◇
		3,5	040R/L3,5	✓	◇	◇	◇	◇

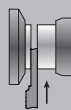


## Cutting off Ø 8 mm

R : Right machining

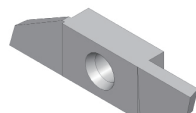
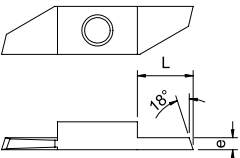
050R/L	Cutting insert 18°	e	L	Article nr.	K10	BI20	BI30	BI40	TIN
		0,8	3	050R/L0,8	◇	✓	◇	✓	✓
		1,0	4	050R/L1,0	◇	✓	◇	✓	✓
		1,2	5	050R/L1,2	◇	✓	◇	✓	✓
		1,5	6,5	050R/L1,5	◇	✓	◇	✓	✓
		1,8	6,5	050R/L1,8	◇	✓	◇	✓	✓
		2,0	6,5	050R/L2,0	◇	✓	◇	✓	✓

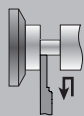
054R/L	Cutting insert with chip roller	e	L	Article nr.	K10	BI20	BI30	BI40	TIN
		1,0	4	054R/L1,0	◇	✓	◇	✓	◇
		1,2	5	054R/L1,2	◇	✓	◇	✓	◇
		1,5	6,5	054R/L1,5	◇	✓	◇	✓	◇
		2,0	6,5	054R/L2,0	◇	✓	◇	✓	◇



## Opposite cutting off Ø 8mm

R : Right machining

053R/L	Opposite cutting insert 18°	e	L	Article nr.	K10	BI20	BI30	BI40	TIN
		0,7	3	053R 0,7	◇	✓	◇	◇	◇
		1,0	4	053R/L1,0	◇	✓	◇	✓	◇
		1,2	5	053R 1,2	◇	✓	◇	✓	◇
		1,5	6,5	053R/L1,5	◇	✓	◇	✓	◇
		1,8	6,5	053R 1,8	◇	✓	◇	✓	◇
		2,0	6,5	053R 2,0	◇	✓	◇	✓	◇
Use with 0xxL tool-holders									



## Grooving turning

R : Right machining

1. DIAMETAL

2. BIMU

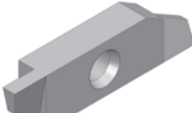
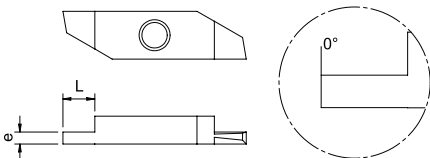
3. IFANGER

4. ZEUS

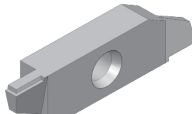
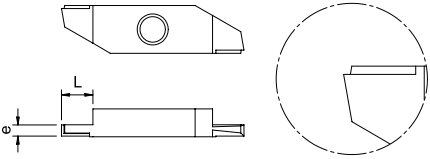
5. ARNO

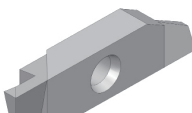
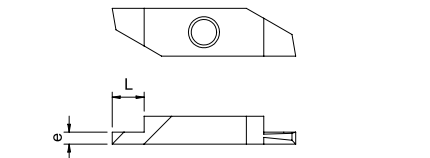
6. Whiz Cut

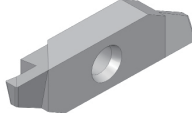
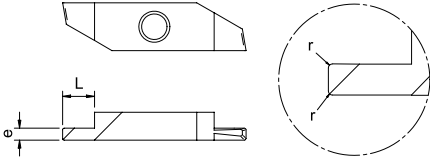
7. SPHINX

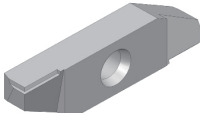
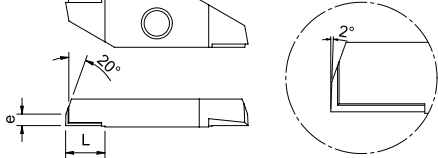
060RP/LP	Back turning insert 0° Drehplatte hinten 0° Tourneur arrière 0°	e	L	Article nr. Artikel Nr. N° Article	K10	B120	B130	B140	TIN
		1,2	3,0	060RP/LP1,2	◇	✓	◇	✓	◇
		1,5	3,0	060RP/LP1,5	◇	✓	◇	✓	◇
		1,8	4,5	060RP/LP1,8	◇	✓	◇	✓	◇
		2,0	4,5	060RP/LP2,0	◇	✓	◇	✓	◇

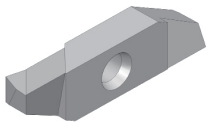
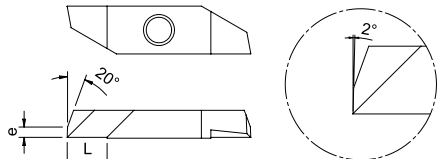
※ 0,6 부터 제작되어 있으며 0,05 단위로 생산되니 문의 바랍니다.

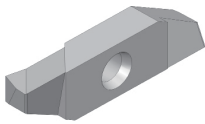
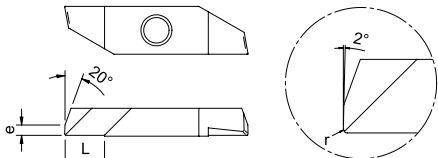
060RPX/LPX	Back turning insert 0° with chip breaker	e	L	Article nr.	K10	B120	B130	B140	TIN
		1,2	3	060RPX/LPX1,2	◇	◇	◇	✓	◇
		1,5	3	060RPX/LPX1,5	◇	◇	◇	✓	◇
		1,8	4,5	060RPX/LPX1,8	◇	◇	◇	✓	◇

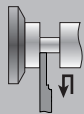
061R/L	Back turning insert with «parisian cut»	e	L	Article nr.	K10	B120	B130	B140	TIN
		1,2	3	061R/L1,2	◇	✓	◇	✓	✓
		1,5	3	061R/L1,5	◇	✓	◇	✓	✓
		2,0	4,5	061R/L2,0	◇	✓	◇	✓	✓
		2,5	4,5	061R/L2,5	◇	✓	◇	✓	✓

061R - r	Back turning insert with «parisian cut»	e	L	r	Article nr.	K10	B120	B130	B140	TIN
		0,7	2,0	0,05	061R0,7 - r0,05 -	◇	✓	◇	✓	◇
		1,0	3	0,1	061R1,0 - r0,1 -	◇	✓	◇	✓	◇
		1,5	3	0,1	061R1,5 - r0,1 -	◇	✓	◇	✓	◇
		1,5	3	0,2	061R1,5 - r0,2 -	◇	✓	◇	✓	◇
		2,0	4,5	0,1	061R2,0 - r0,1 -	◇	✓	◇	✓	◇
		2,0	4,5	0,2	061R2,0 - r0,2 -	◇	✓	◇	✓	◇

064RX/LX	Front turning insert with chip breaker	e	L	Article nr.	K10	B120	B130	B140	TIN
		1,5	5	064RX/LX	◇	◇	◇	✓	◇

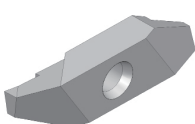
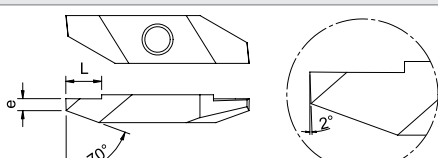
065R/L	Front turning insert with chip roller	e	L	Article nr.	K10	B120	B130	B140	TIN
		1,5	5	065R/L	◇	✓	◇	✓	✓

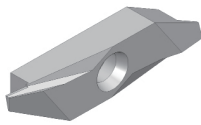
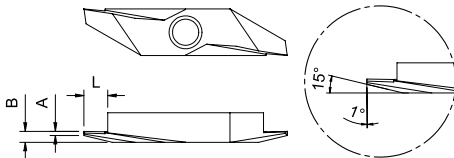
065R - r	Front turning insert with chip roller and radius	e	L	r	Article nr.	K10	B120	B130	B140	TIN
		1,5	5	0,1	065R - r 0,1 -	◇	✓	◇	✓	◇
		1,5	5	0,2	065R - r 0,2 -	◇	✓	◇	✓	◇

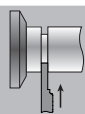


Back turning

R : Right machining

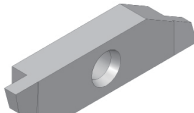
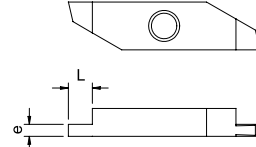
062R/L	Back turning insert 0° with «parisian cut»	e	L	Article nr.	K10	B120	B130	B140	TIN
		1,5	4	062R/L1,5	◇	✓	◇	✓	◇
		0,5	4	062R/L1,6	◇	◇	◇	✓	◇
		0,5	4	062R/L0,5 r0,1	◇	◇	◇	✓	◇
		0,5	4	062R0,5 r0,2	◇	◇	◇	✓	◇

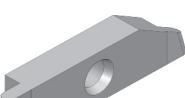
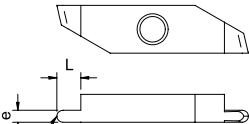
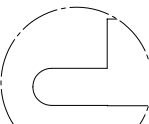
066R/L	Back turning insert with «W» chip roller	A	B	L	Article nr.	K10	ALL3	B120	B130	B140	TIN
		0,5	1,3	2,5	066R/L2,5	✓	✓	×	×	×	◇
		0,5	1,3	2,5	066R/L2,5 r0,05	✓	✓	×	×	×	◇

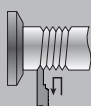


## Grooving

R : Right machining

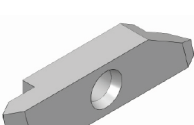
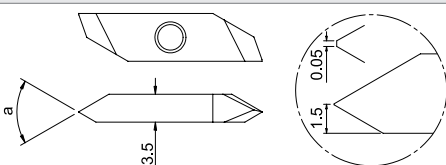
070R/L	Grooving insert	e	L	Article nr.	K10	BI20	BI30	BI40	TiN
		0,3	1,5	070R 0,3	◇	✓	◇	◇	◇
		0,35	1,5	070R 0,35	◇	✓	◇	◇	◇
		0,4	1,5	070R 0,4	◇	✓	◇	◇	◇
		0,5	1,5	070R/L 0,5	◇	✓	◇	◇	◇
		0,6	1,5	070R/L 0,6	◇	✓	◇	◇	◇
		0,7	2,5	070R/L 0,7	◇	✓	◇	◇	◇
		0,8	2,0	070R/L 0,8	◇	✓	◇	◇	◇
		0,9	2,5	070R/L 0,9	◇	✓	◇	◇	◇
		1,0	3,0	070R/L 1,0	◇	✓	◇	◇	◇
		1,1	3,0	070R/L 1,1	◇	✓	◇	◇	◇
		1,2	3,0	070R/L 1,2	◇	✓	◇	◇	◇
		1,3	3,0	070R/L 1,3	◇	✓	◇	◇	◇
		1,4	3,0	070R/L 1,4	◇	✓	◇	◇	◇
		1,5	3,0	070R/L 1,5	◇	✓	◇	◇	◇

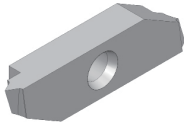
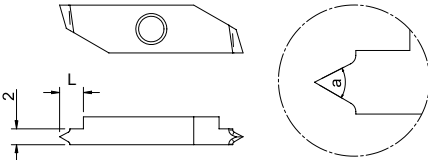
071R/L	Grooving insert with radius	e	L	r	Article nr.	K10	BI20	BI30	BI40	TiN
	 	0,5	3,0	0,25	071R/L0,5 - r 0,25 -	◇	◇	◇	✓	◇
		0,8	3,0	0,4	071R/L0,8 - r 0,4 -	◇	◇	◇	✓	◇
		1,0	3,0	0,5	071R/L1,0 - r 0,5 -	◇	◇	◇	✓	◇
		1,2	3,0	0,6	071R/L1,2 - r 0,6 -	◇	◇	◇	✓	◇
		1,5	4,0	0,75	071R/L1,5 - r 0,75 -	◇	◇	◇	✓	◇
		2,0	4,0	1,0	071R/L2,0 - r 1,0 -	◇	◇	◇	✓	◇



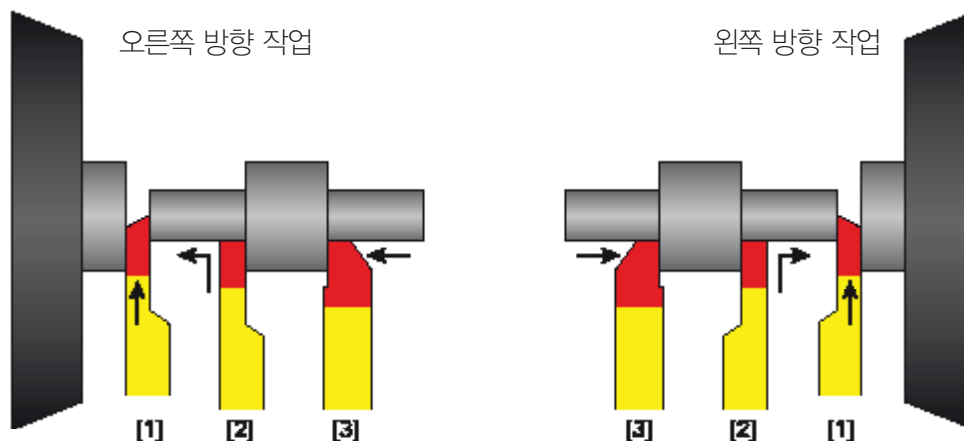
## Threading

R : Right machining

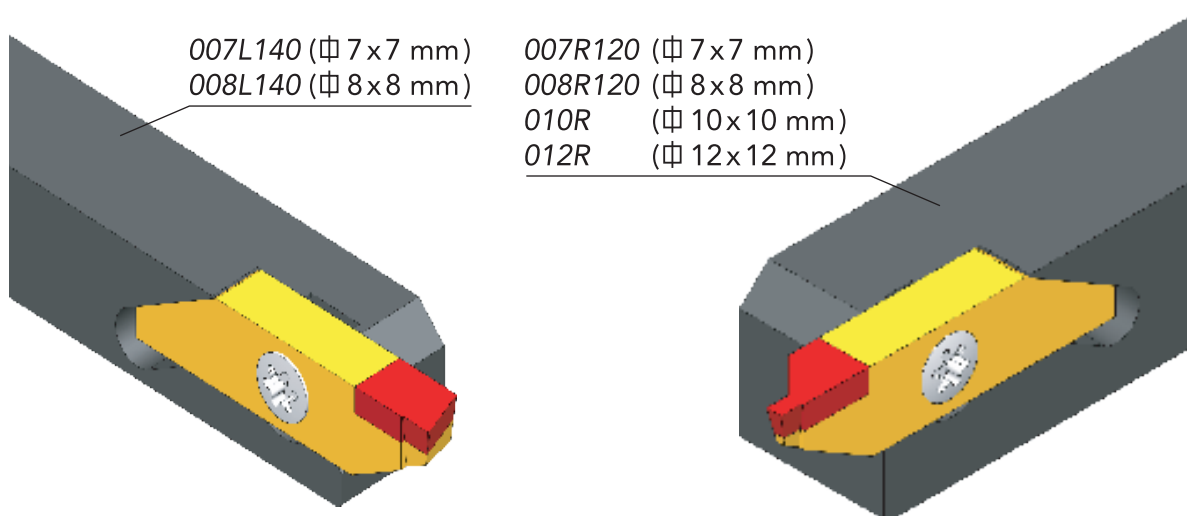
080R/L	Threading insert with partial profile	a	Article nr.	K10	B120	B130	B140	TIN
		55°	080R/L- 55° -	◇	✓	◇	◇	◇
		60°	080R/L- 60° -	◇	✓	◇	◇	◇

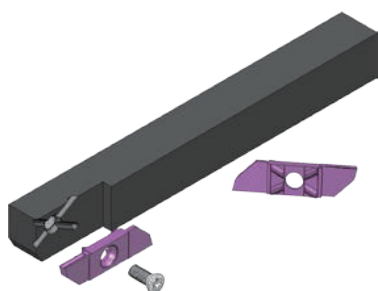
081R/L	Threading insert with full profile	a	Pitch	M	Article nr.	K10	BI20	BI30	BI40	TIN
 	60°	0,20	-	081R0,2	◇	◇	◇	✓	◇	
	60°	0,25	1 / 1,2	081R0,25	◇	◇	◇	✓	◇	
	60°	0,30	1,4	081R0,3	◇	◇	◇	✓	◇	
	60°	0,35	1,6	081R0,35	◇	◇	◇	✓	◇	
	60°	0,40	2	081R0,4	◇	◇	◇	✓	◇	
	60°	0,45	2,5	081R0,45	◇	◇	◇	✓	◇	
	60°	0,50	3	081R0,5	◇	◇	◇	✓	◇	
	60°	0,70	4	081R0,7	◇	◇	◇	✓	◇	
	60°	0,75	-	081R0,75	◇	◇	◇	✓	◇	
	60°	0,80	5	081R0,8	◇	◇	◇	✓	◇	
	60°	1,00	6	081R1,0	◇	◇	◇	✓	◇	
	60°	1,25	8	081R1,25	◇	◇	◇	✓	◇	
	60°	1,50	10	081R1,5	◇	◇	◇	✓	◇	





- 절단(1), 홈터닝(2), 전면 터닝(3)
- 3.3T까지 프로파일 형상 작업 가능
- 여러가지 작업이 가능하도록 스페셜 홀더 제작 가능

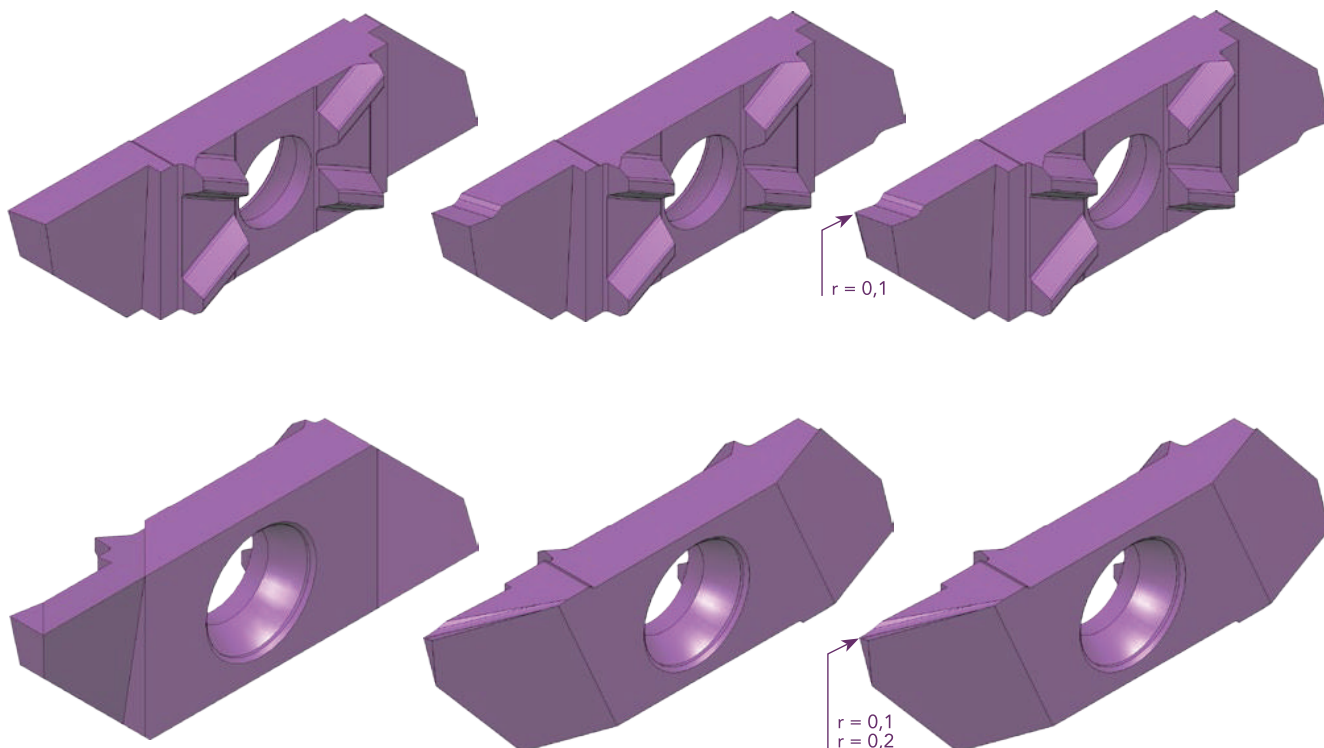




# 800 line +

Cut off and back turning inserts  
*High performance geometries*

Excellent value for money !

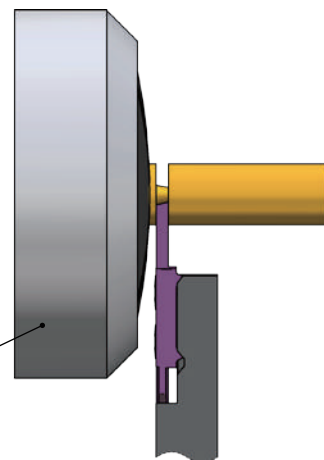


## Guide bush cut off

→  $\varnothing$  18 mm (844R)

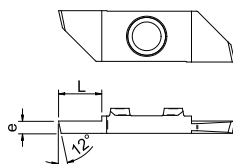
→  $\varnothing$  14 mm (842Rb / 843Rb - r)

Guide bush

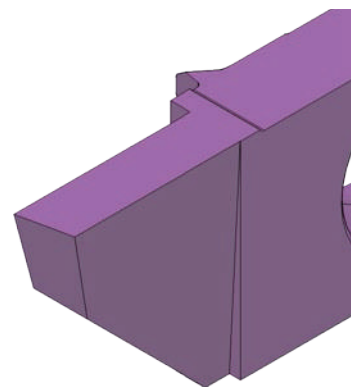


### 844R

Standard resharppable cut off insert  
Economically priced

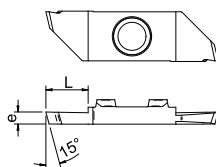


Feed per revolution

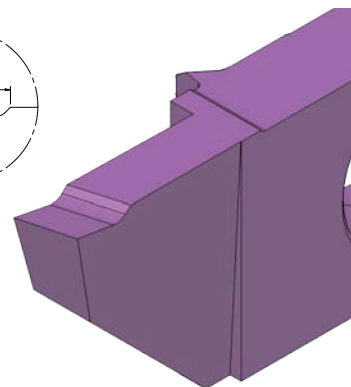
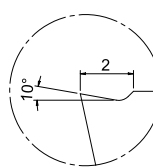


### 842Rb

Short cut off insert with chip breaker  
Improved chip control  
Pipless cut off

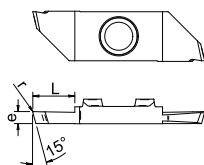


Feed per revolution

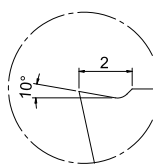


### 843Rb - r

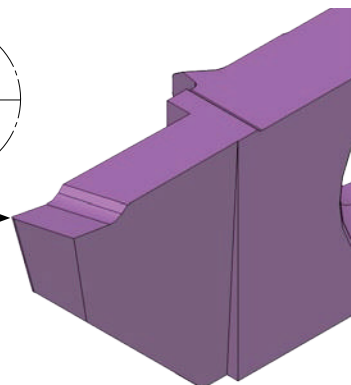
Short cut off insert with chip breaker and radius  
Improved chip control  
Life time increased thanks to the point radius  
The treatment of the edge allows extreme feeds



Feed per revolution



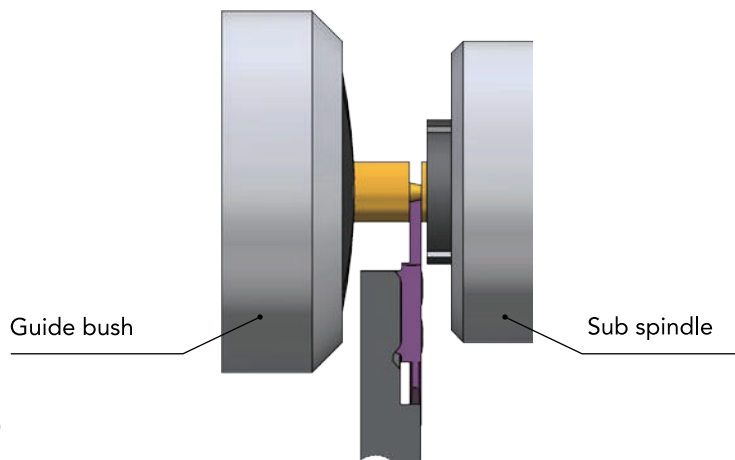
r 0,1 mm



## Sub spindle cut off

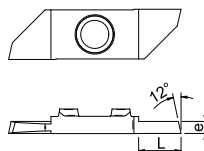
→  $\varnothing 18 \text{ mm}$  (853R+)

→  $\varnothing 14 \text{ mm}$  (853Rb / 853Rb - r)



### 853R+

Standard resharpenable cut off insert  
Economically priced

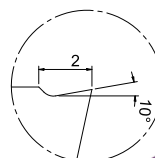
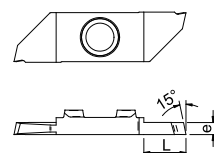


Feed per revolution



### 853Rb

Short cut off insert with chip breaker  
Improved chip control  
Pipless cut off

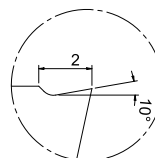
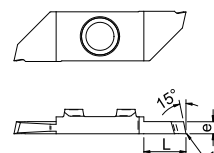


Feed per revolution



### 853Rb - r

Short cut off insert with chip breaker and radius  
Improved chip control  
Life time increased thanks to the point radius  
The treatment of the edge allows extreme feeds



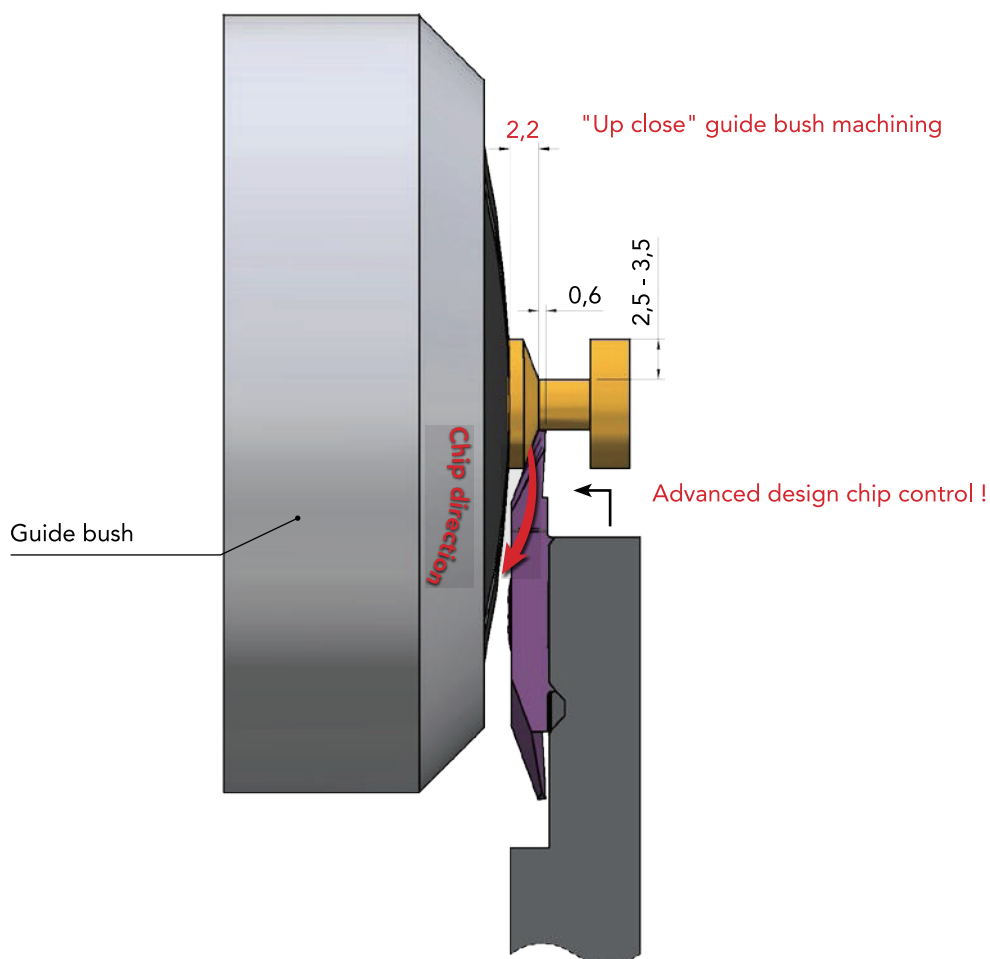
r 0,1 mm

Feed per revolution



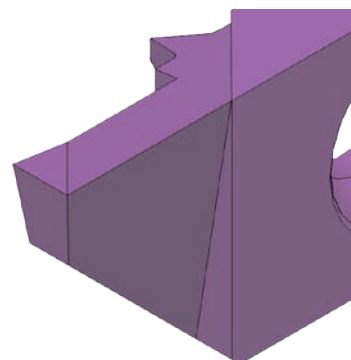
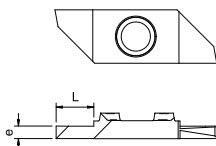
## Back turning

→ I ap 3,5 mm



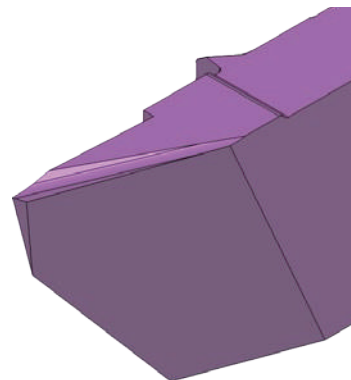
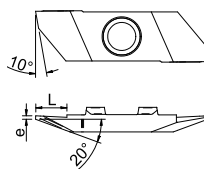
## 861Rb

Back turning insert  
Machining conditions improved by the treatment of the cutting edge  
Economically priced



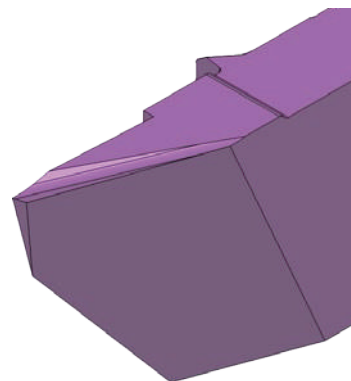
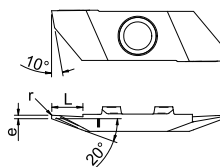
## 863Rb - 20°

Back turning insert  
Improved chip control  
Chip control geometry allowing higher feeds or greater depth of cut  
Economically priced

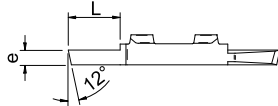
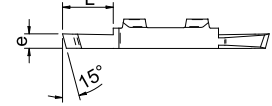
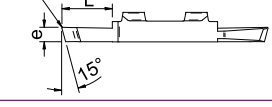



## 863Rb - r - 20°

Back turning insert with radius  
Improved chip control  
Chip control geometry allowing higher feeds or greater depth of cut  
Economically priced

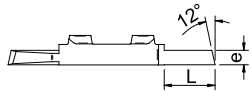
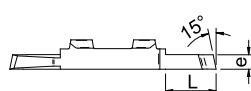
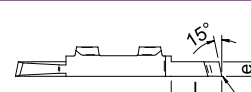


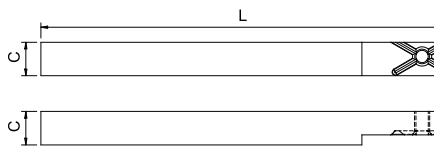
## Guide bush cut off

Insert		e	L	r	Coating	Article nr.
<b>844R</b>		1,5	7	-	AlTiN	844R1,5BI40U
		2,0	7	-	AlTiN	844R2,0BI40U
<b>842Rb</b>		1,5	7	-	AlTiN	842Rb1,5BI40U
		2,0	7	-	AlTiN	842Rb2,0BI40U
<b>843Rb - r</b>		1,5	7	0,1	AlTiN	843Rb1,5 - r 0,1 - BI40U
		2,0	7	0,1	AlTiN	843Rb2,0 - r 0,1 - BI40U

Right tool-holder		Section C	Length L	Article nr.
<b>8xxR</b>		10 x 10	124	810R
		12 x 12	124	812R
		16 x 16	124	816R
		8 x 8	124	808R+

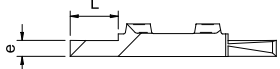
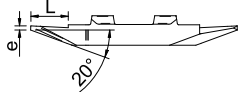
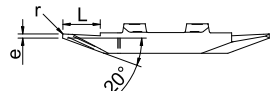
## Counterspindle side cut


Insert		e	L	r	Coating	Article nr.
<b>853R+</b>		1,5	7	-	AlTiN	853R+1,5BI40U
		2,0	7	-	AlTiN	853R+2,0BI40U
<b>853Rb</b>		1,5	7	-	AlTiN	853Rb1,5BI40U
		2,0	7	-	AlTiN	853Rb2,0BI40U
<b>853Rb - r</b>		1,5	7	0,1	AlTiN	853Rb1,5 - r 0,1 - BI40U
		2,0	7	0,1	AlTiN	853Rb2,0 - r 0,1 - BI40U

Left tool-holder		Section C	Length L	Article nr.
<b>8xxL</b>		10 x 10	124	810L
		12 x 12	124	812L
		16 x 16	124	816L
		8 x 8	124	808L+



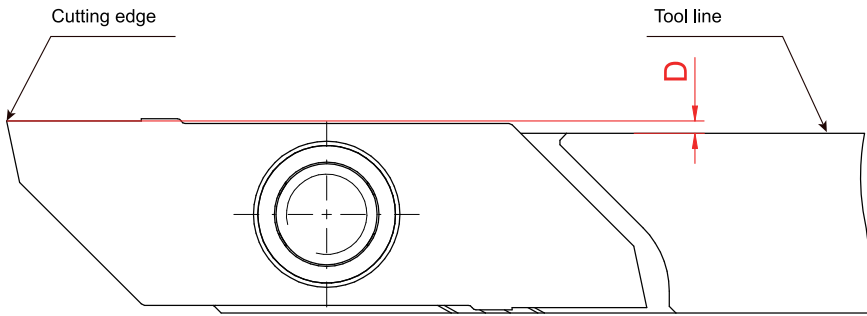
## Back turning

Insert		e	L	r	Coating	Article nr.
<b>861Rb</b>		1,5	3	-	AlTiN	861Rb1,5BI40U
		1,5	3	0,1	AlTiN	861Rb1,5r0,1BI40U
		1,5	3	0,2	AlTiN	861Rb1,5r0,2BI40U
		2,0	5	-	AlTiN	861Rb2,0BI40U
		2,0	5	0,1	AlTiN	861Rb2,0r0,1BI40U
		2,0	5	0,2	AlTiN	861Rb2,0r0,2BI40U
		2,5	6	0,2	AlTiN	861Rb2,5r0,2BI40U
<b>863Rb - 20°</b>		0,6	5	-	AlTiN	863Rb0,6 - 20° - BI40U
<b>863Rb - r - 20°</b>		0,6	5	0,1	AlTiN	863Rb0,6 - r 0,1 - 20° - BI40U
		0,6	5	0,2	AlTiN	863Rb0,6 - r 0,2 - 20° - BI40U

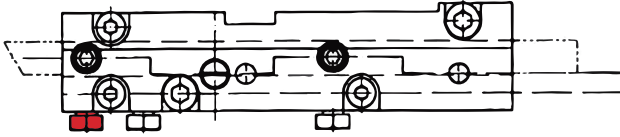
Right tool-holder		Section C	Length L	Article nr.
<b>8xxR</b>		10 x 10	124	810R
		12 x 12	124	812R
		16 x 16	124	816R
		8 x 8	124	808R+

## Note on the tool-holders 808R+ and 808L+

Tool-holder section 8 x 8 mm



$0,5 \leq D \leq 0,6$



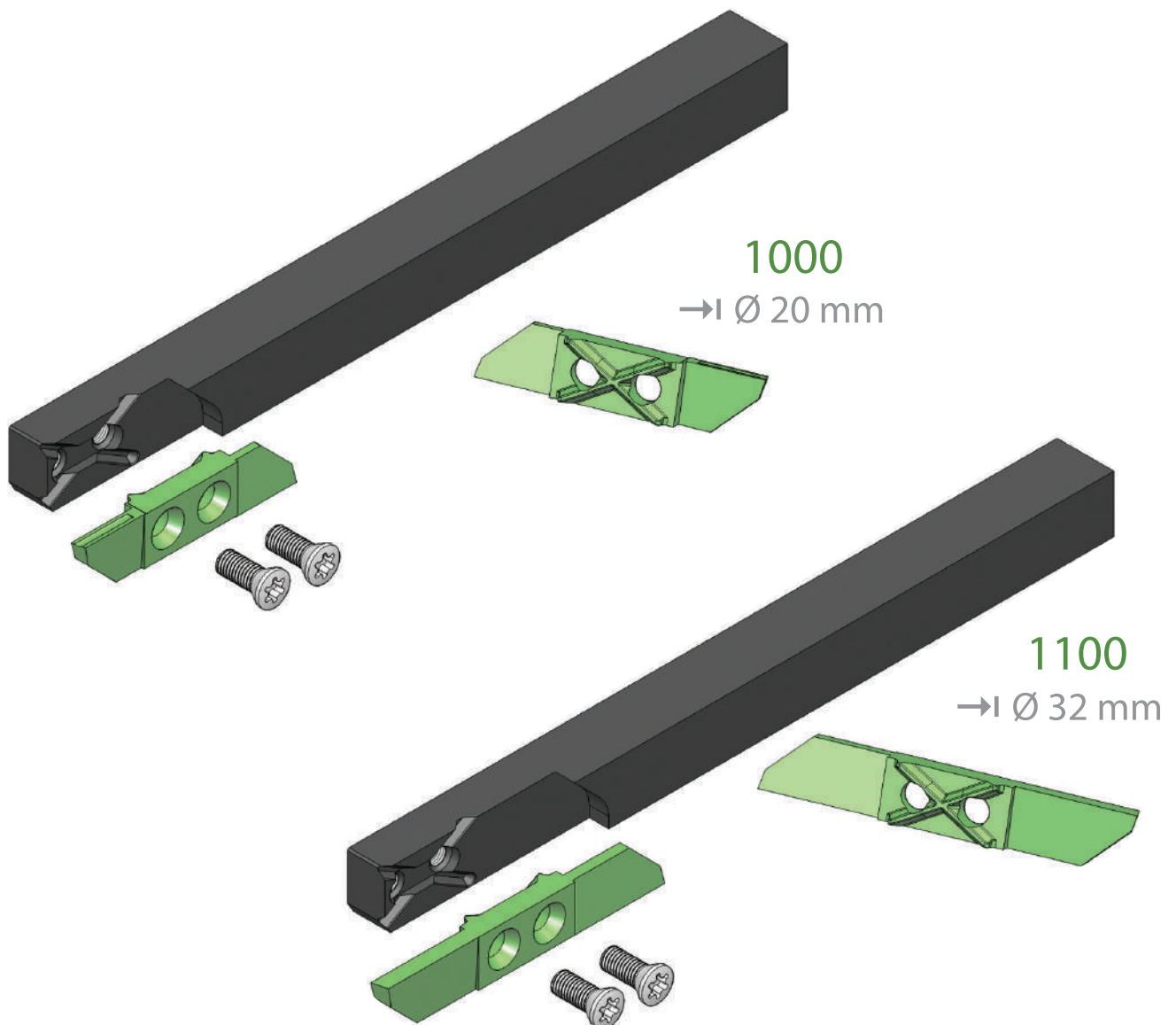
If the tool-holder 808R+ / 808L+ is fitted on a long Tornos tool-holder nr 305007, the screw which is in front must not be tightened

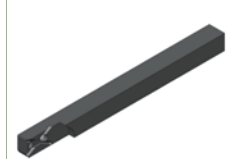

OXOline 1000




**Bimu**  
 cutting tools & accessories


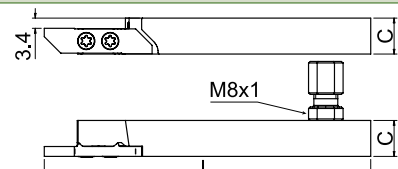
# oxoline



Very high rigidity inserts **1000**


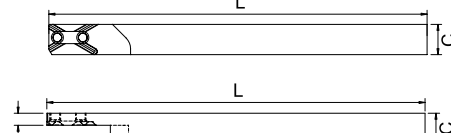



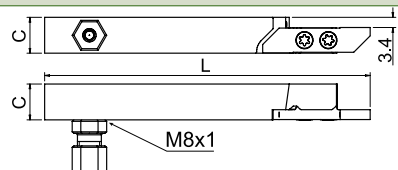
10xxR	Right tool-holder	Section C	Length L	Article nr.
		10 x 10	124	1010R
		12 x 12	124	1012R
		14 x 14	124	1014R
		16 x 16	124	1016R
		20 x 20	124	1020R

10xxR4	Right «Pick-up» tool-holder	Section C	Length L	Article nr.
		10 x 10	124	1010R4
		12 x 12	124	1012R4
		16 x 16	124	1016R4
		Use with 1053R, 1053RP, 1053RX, 1056R inserts		

10xxR IK	Right tool-holder with internal coolant	Section C	Length L	Article nr.
		12 x 12	124	1012R IK
		16 x 16	124	1016R IK

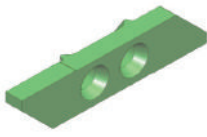
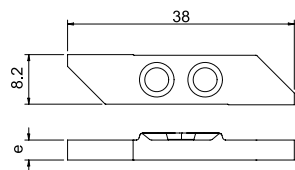
10xxL	Left tool-holder	Section C	Length L	Article nr.
		10 x 10	124	1010L
		12 x 12	124	1012L
		14 x 14	124	1014L
		16 x 16	124	1016L
		20 x 20	124	1020L

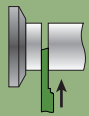
10xxL4	Left «Pick-up» tool-holder	Section C	Length L	Article nr.
		10 x 10	124	1010L4
		12 x 12	124	1012L4
		16 x 16	124	1016L4
		Use with 1053L inserts		

10xxL IK	Left tool-holder with internal coolant	Section C	Length L	Article nr.
		12 x 12	124	1012L IK
		16 x 16	124	1016L IK

# OXOline 1000

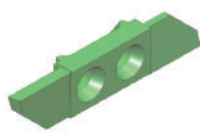
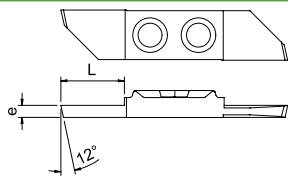


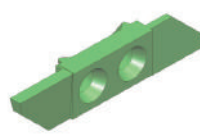
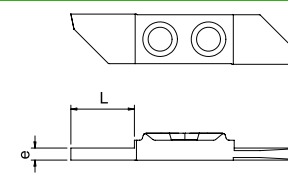
1040R/L	Blank insert	e	Article nr.	K10	BI40	BI40U	TIN
		3,3	1040R/L3,3	✓	✓	◇	◇

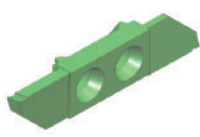
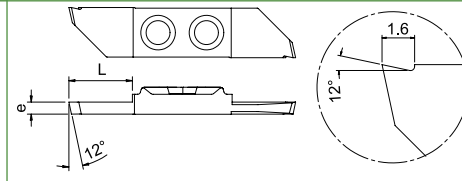



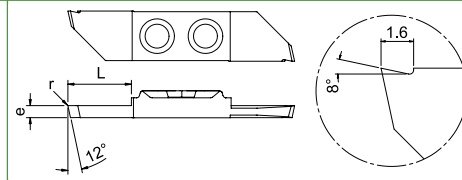
Cutting off Ø 20 mm

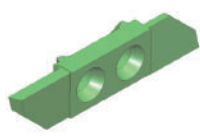
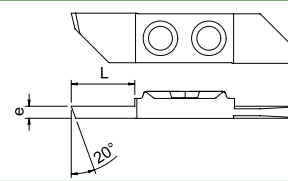
R : Right machining


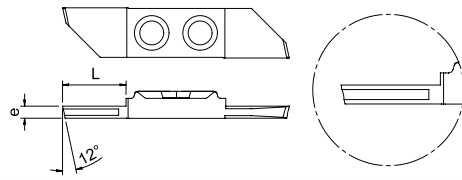
1050R/L	Cutting insert 12°	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,0	5,0	1050R/L1,0	✓	✓	◇	◇
		1,2	6,0	1050R/L1,2	✓	✓	◇	◇
		1,5	7,5	1050R/L1,5	✓	✓	◇	◇
		2,0	10,5	1050R/L2,0	✓	✓	◇	◇
		2,5	10,5	1050R/L2,5	✓	✓	◇	◇

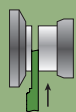
1050RP	Cutting insert 0°	e	L	Article nr.	K10	BI40	BI40U	TIN
		2,0	10,5	1050RP2,0	✓	✓	◇	◇
		2,5	10,5	1050RP2,5	✓	✓	◇	◇

1051R	Cutting insert with chip breaker	e	L	Article nr.	K10	BI40	BI40U	TIN
		2,0	10,5	1051R2,0	✓	✓	◇	◇
		2,5	10,5	1051R2,5	✓	✓	◇	◇

1051R - r	Cutting insert with chip breaker and radius	e	L	r	Article nr.	K10	BI40	BI40U	TIN
		1,5	7,5	0,1	1051R1,5 - r 0,1 -	✓	✓	◇	◇
		2,0	10,5	0,1	1051R2,0 - r 0,1 -	✓	✓	◇	◇

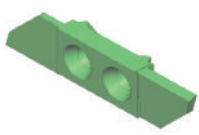
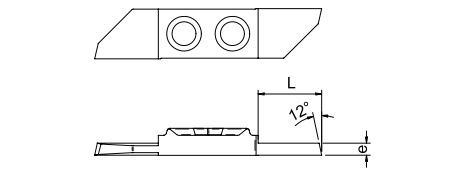
1052R/L	Cutting insert 20°	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,5	7,5	1052R/L1,5	✓	✓	◇	◇
		2,0	10,5	1052R/L2,0	✓	✓	◇	◇
		2,5	10,5	1052R/L2,5	✓	✓	◇	◇


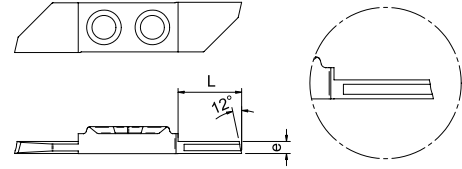
1054R/L	Cutting insert with chip roller	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,5	7,5	1054R/L1,5	✓	✓	◇	◇
		2,0	10,5	1054R/L2,0	✓	✓	◇	◇
		2,5	10,5	1054R2,5	✓	✓	◇	◇

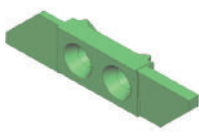
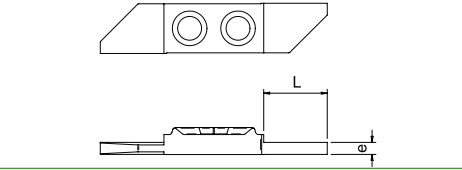



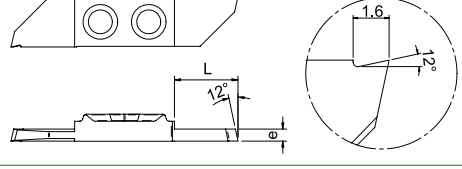
Opposite cutting off Ø 20 mm

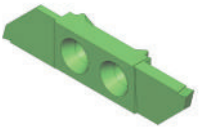
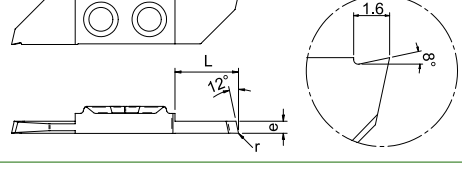
R : Right machining

1053R/L	Opposite cutting insert	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,0	6	1053R1,0	✓	✓	◇	◇
		1,2	6	1053R1,2	✓	✓	◇	◇
		1,5	7,5	1053R/L1,5	✓	✓	◇	◇
		2,0	10,5	1053R/L2,0	✓	✓	◇	◇
		2,5	10,5	1053R2,5	✓	✓	◇	◇

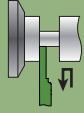
1053RX	Opposite cutting insert with chip roller	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,5	7,5	1053RX1,5	✓	✓	◇	◇
		2,0	10,5	1053RX2,0	✓	✓	◇	◇

1053RP	Opposite cutting insert 0°	e	L	Article nr.	K10	BI40	BI40U	TIN
		2,0	10,5	1053RP2,0	✓	✓	◇	◇
		2,5	10,5	1053RP2,5	✓	✓	◇	◇

1056R	Opposite cutting insert with chip breaker	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,5	7,5	1056R1,5	✓	✓	◇	◇
		2,0	10,5	1056R2,0	✓	✓	◇	◇
		2,5	10,5	1056R2,5	✓	✓	◇	◇

1056R - r	Opposite cutting insert with chip breaker and radius	e	L	r	Article nr.	K10	BI40	BI40U	TIN
		1,5	7,5	0,1	1056R1,5 - r 0,1 -	✓	✓	◇	◇
		2,0	10,5	0,1	1056R2,0 - r 0,1 -	✓	✓	◇	◇

# OXOline 1000



## Back turning

R : Right machining

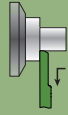
1060RP/LP	Back turning insert 0°	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,0	3	1060RP 1,0	✓	✓		
		1,5	4	1060RP 1,5	✓	✓	◇	◇
		2,0	5	1060RP/LP2,0	✓	✓	◇	◇
		2,5	6	1060RP/LP2,5	✓	✓	◇	◇
		3,0	6	1060RP/LP3,0	✓	✓	◇	◇

1061R/L	Back turning insert with «parisian cut»	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,0	3	1061L1,0	✓	✓		
		1,2	3	1061R/L1,2	✓	✓		
		1,5	4	1061R/L1,5	✓	✓	◇	◇
		1,8	4	1061L1,8	✓	✓	◇	◇
		2,0	5	1061R/L2,0	✓	✓	◇	◇
		2,5	6	1061R/L2,5	✓	✓	◇	◇
		3,0	6	1061R/L3,0	✓	✓	◇	◇

1061R - r	Back turning insert with «parisian cut» and radius	e	L	r	Article nr.	K10	BI40	BI40U	TIN
		1,2	3	0,1	1061R1,2 - r 0,1 -	✓	✓		
		1,5	4	0,1	1061R1,5 - r 0,1 -	✓	✓	◇	◇
		1,5	4	0,2	1061R1,5 - r 0,2 -	✓	✓	◇	◇
		2,0	5	0,1	1061R2,0 - r 0,1 -	✓	✓	◇	◇
		2,0	5	0,2	1061R2,0 - r 0,2 -	✓	✓	◇	◇
		2,5	6	0,1	1061R2,5 - r 0,1 -	✓	✓	◇	◇
		2,5	6	0,2	1061R2,5 - r 0,2 -	✓	✓	◇	◇
		3,0	6	0,2	1061R3,0 - r 0,2 -	✓	✓	◇	◇


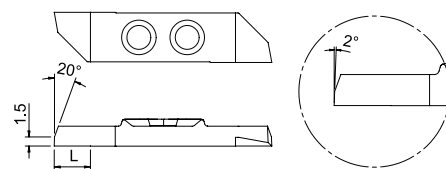
1062R/L	Back turning insert with «parisian cut»	e	L	Article nr.	K10	BI40	BI40U	TIN
		1,0	6	1062R/L1,0	✓	✓		
		1,5	6	1062L1,5				
		2,0	6	1062R 2,0	✓	✓	◇	◇

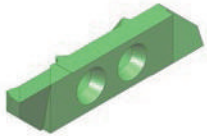
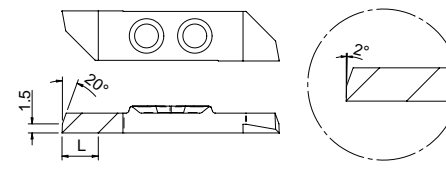
1063Rb - r	Front copy turning insert Vorne Kopierdrehplatte Tourneur avant par copiage	L	α	r	Article nr. Artikel Nr. N° Article	K10	BI40	BI90	TIN
		6	29°	0,15	1063Rb - 29° - r 0,15 -	✓	✗	✓	✗
		6	29°	0,35	1063Rb - 29° - r 0,35 -	✓	✗	✓	✗
		6	35°	0,15	1063Rb - 35° - r 0,15 -	✓	✗	✓	✗
		6	35°	0,35	1063Rb - 35° - r 0,35 -	✓	✗	✓	✗

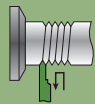


## Front turning

R : Right machining


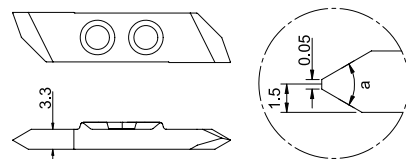
1064R/L	Front turning insert	L	Article nr.	K10	BI40	BI40U	TIN
		6	1064R/L	✓	✓	◇	◇

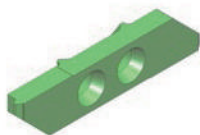
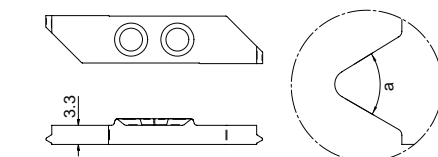
1065R	Front turning insert with chip breaker Drehplatte vorne mit Spanbrecher Tourneur avant avec brise-copeau	L	Article nr. Artikel Nr. N° Article	K10	BI40	BI40U	TIN
		6	1065R	✓	✓	◇	◇



## Threading

R : Right machining

1080R	Threading insert with partial profile	a	Article nr.	K10	BI40	BI40U	TIN
		55°	1080R - 55° -	✓	✓	◇	◇
		60°	1080R - 60° -	✓	✓	◇	◇

1081R	Threading insert with full profile Gewindeplatte mit Vollprofil Fileteur avec profil complet	a	Pitch Teilung Pas	M	Article nr. Artikel Nr. N° Article	K10	BI40	BI40U	TIN
		60°	0,80	5	1081R0,8	✓	✓	◇	◇
		60°	1,00	6	1081R1,0	✓	✓	◇	◇
		60°	1,50	10	1081R1,5	✓	✓	◇	◇
		60°	1,75	12	1081R1,75	✓	✓	◇	◇
		60°	2,00	16	1081R2,0	✓	✓	◇	◇



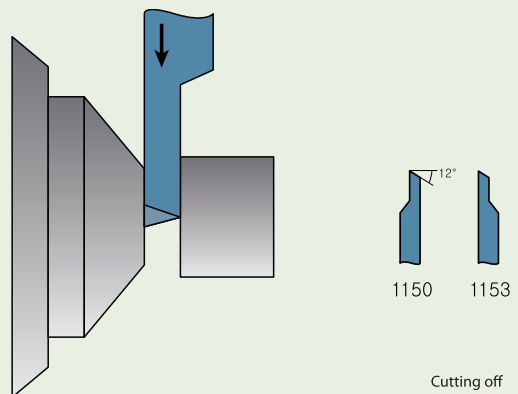
# OXOline 1100



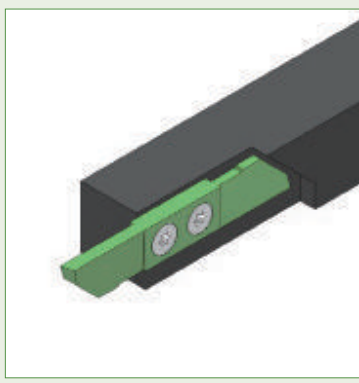
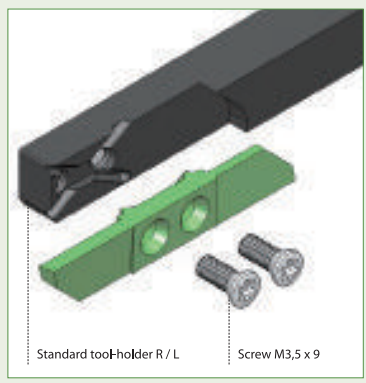
## Field of application of OXOline 1100

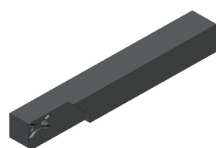
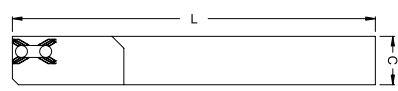
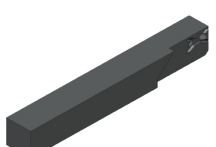
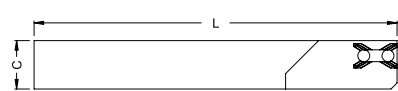
Maximum cutting-off

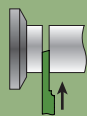
Ø 32 mm



## Standard fixation


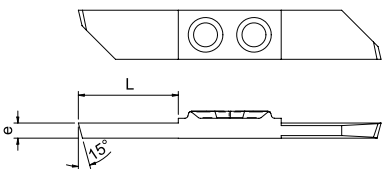


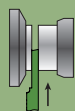
11xxR	Right tool-holder	Section C	Length L	Article nr.
		10 x 10	125	1110R
		12 x 12	125	1112R
		16 x 16	125	1116R
		20 x 20	100	1120R
11xxL	Left tool-holder	Section C	Length L	Article nr.
		10 x 10	125	1110L
		12 x 12	125	1112L
		16 x 16	125	1116L
		20 x 20	100	1120L



## Cutting off Ø 32 mm


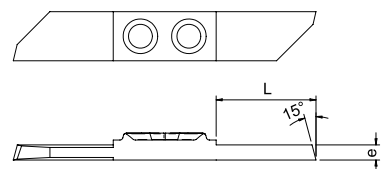
R : Right machining

1150R/L	Cutting insert 15°	e	L	Article nr.	K10	B140	B140U	TIN
		2,0	17	1150R/L2,0	✓	✗	✓	◇
		2,5	17	1150R/L2,5	✓	✗	✓	◇
		3,0	17	1150R/L3,0	✓	✗	✓	◇

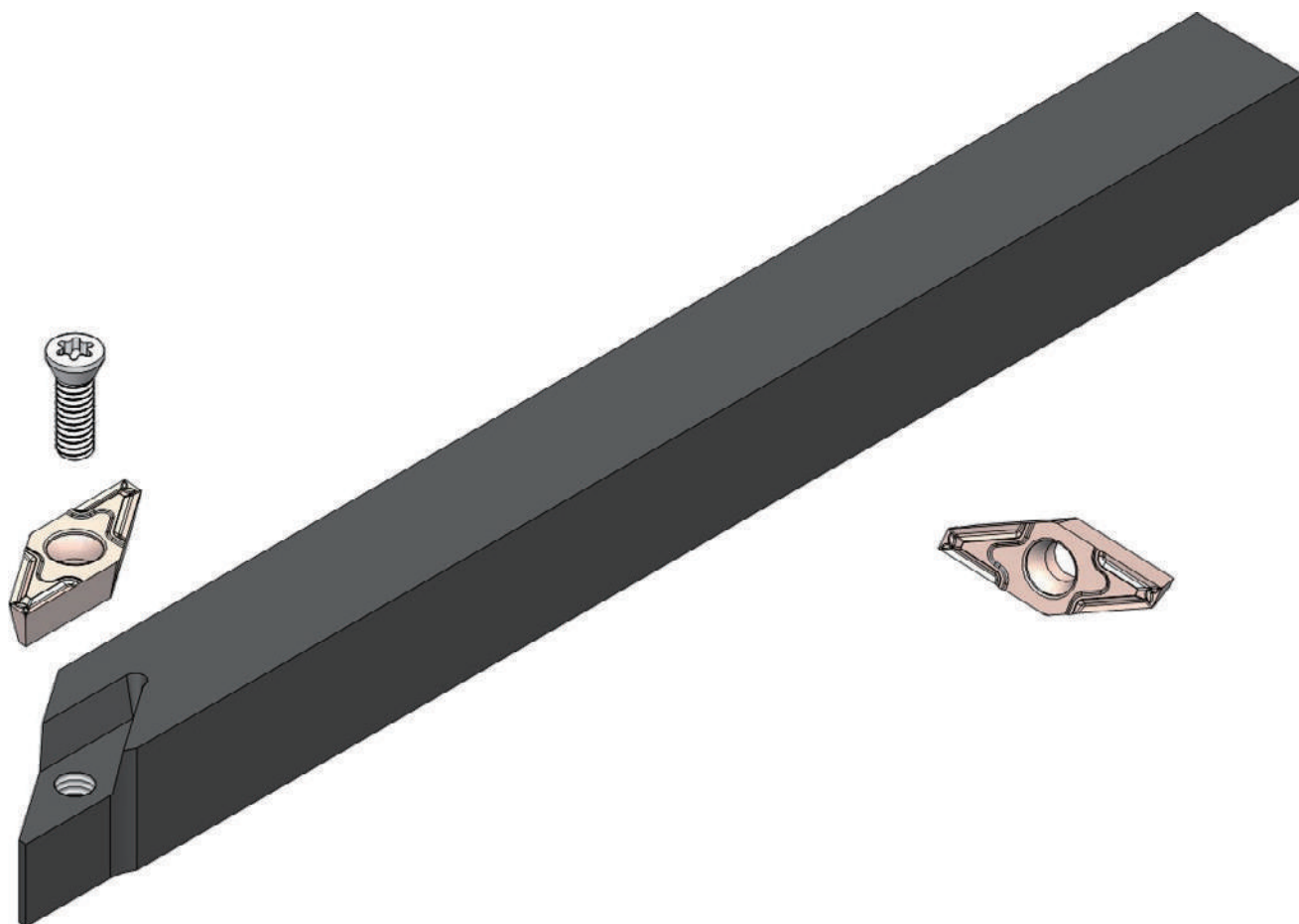


## Opposite cutting off Ø 32mm

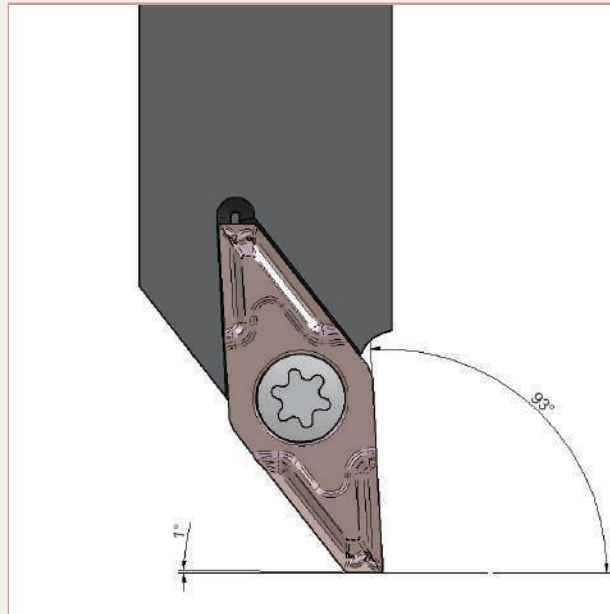
R : Right machining

1153R/L	Opposite cutting insert 15°	e	L	Article nr.	K10	B140	B140U	TIN
		2,0	17	1153R/L2,0	✓	✗	✓	◇
		2,5	17	1153R/L2,5	✓	✗	✓	◇
		3,0	17	1153R/L3,0	✓	✗	✓	◇

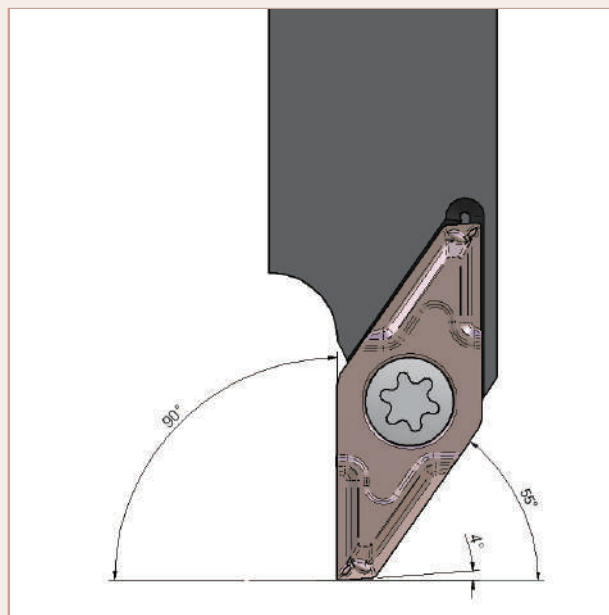
# Multiturn-Dec VPGT



## Cutting angles

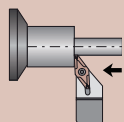


SVJP



SVXP


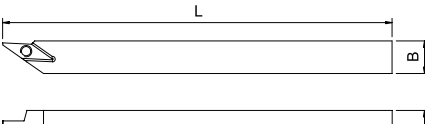
# Multiturn-Dec – VPGT

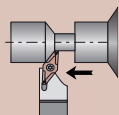


Front turning

R / L : Right / Left machining

SVJP R ...	Right tool-holder	B	H	L	Article nr.
		8	8	120	SVJP R 0808 K10
		10	10	120	SVJP R 1010 K10
		12	12	120	SVJP R 1212 K10
		16	16	120	SVJP R 1616 K10
		for inserts R			

SVJP L ...	Left tool-holder	B	H	L	Article nr.
		8	7	120	SVJP L 0807 K10
		8	8	120	SVJP L 0808 K10
		10	10	120	SVJP L 1010 K10
		12	12	120	SVJP L 1212 K10
		16	16	120	SVJP L 1616 K10
for inserts L					




Back turning

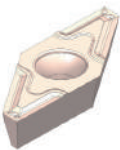
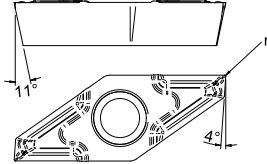
R / L : Right / Left machining

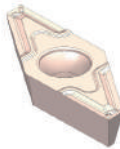
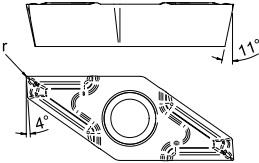
SVXP R ...	Right tool-holder	B	H	L	Article nr.
		12	12	120	SVXP R 1212 M10
		10	10	120	SVXP R 1010 M10
		for inserts L			

SVXP L ...	Left tool-holder	B	H	L	Article nr.
		12	12	120	SVXP L 1212 M10
		for inserts R			

001-1	Key	Article nr.
	Torx 8	001-1

001-2	Screw for tool-holder SVJP / SVXP	Article nr.
	M2,5 x 7,0	001-2

VPGT...FR	Right VPGT insert	r	Article nr.	HB30F	BI40F	BI40U	TiN
		0	VPGT 10 03 ZZ FR FW	✓	✓	✓	◇
		0,08	VPGT 10 03 008 FR FW	✓	✓	✓	◇
		0,2	VPGT 10 03 02 FR FW	✓	✓	✓	◇
Use with SVJP R and SVXP L tool-holders							

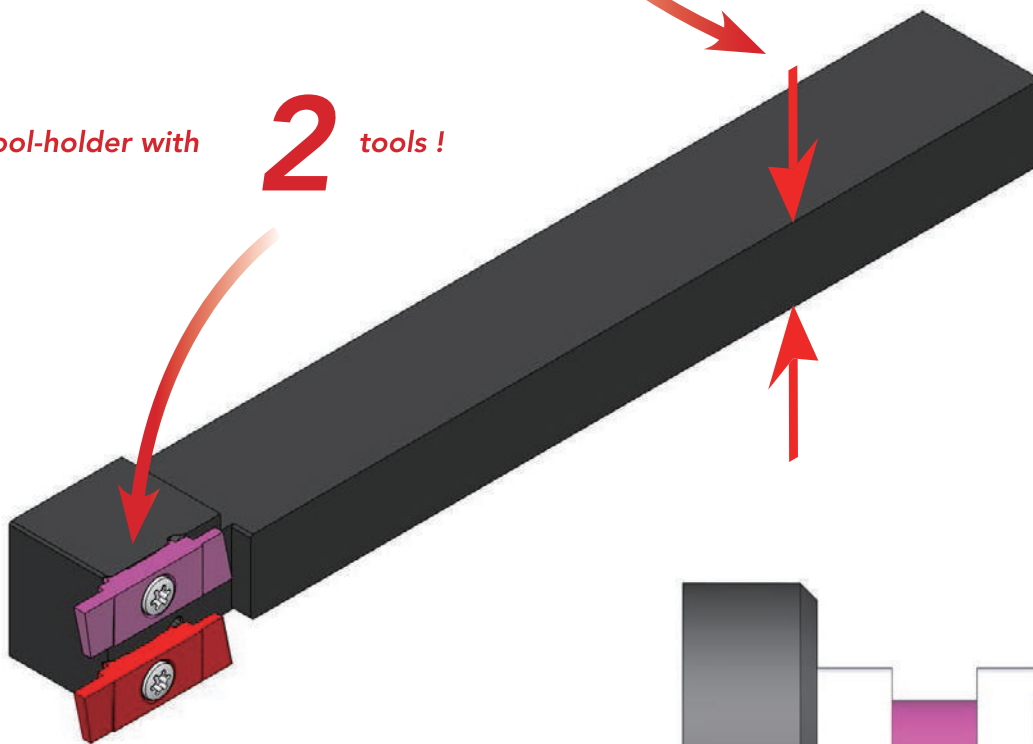
VPGT...FL	Left VPGT insert	r	Article nr.	HB30F	BI40F	BI40U	TiN
		0	VPGT 10 03 ZZ FL FW	✓	✓	✓	◇
		0,08	VPGT 10 03 008 FL FW	✓	✓	✓	◇
		0,2	VPGT 10 03 02 FL FW	✓	✓	✓	◇
Use with SVJP L and SVXP R tool-holders							

7, 8, 10, 12, 16 mm 다양한 두께의 툴 홀더들을 두개의 공구를 사용할 수 있게 공구대의 수가 부족한 부분을 해결 할 수 있습니다.

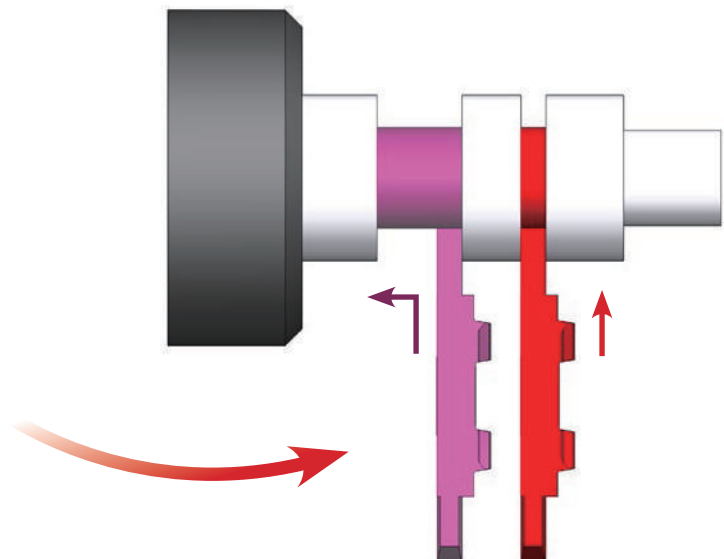
Section

**7, 8, 10, 12, 16 mm**

1 tool-holder with **2** tools !



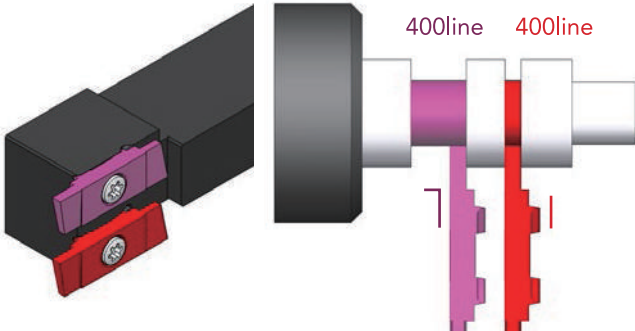
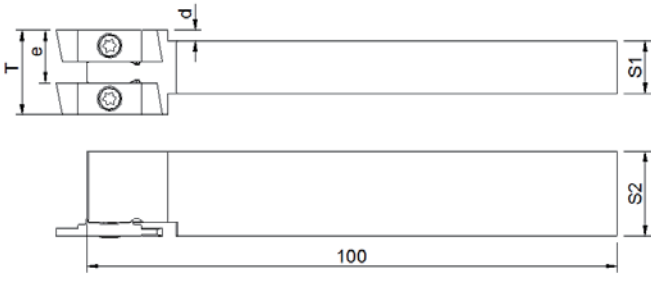
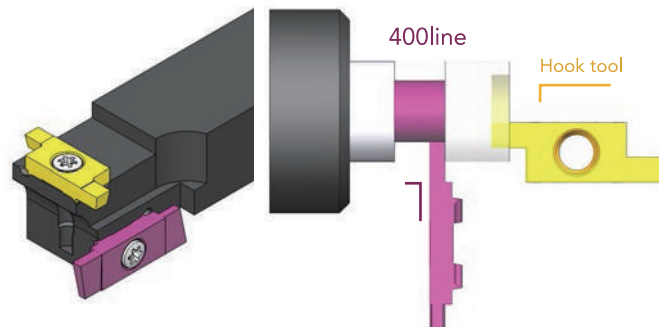
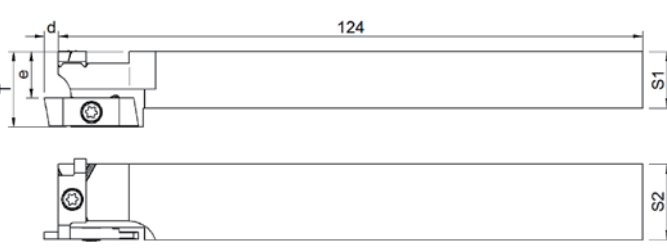
**2** different applications





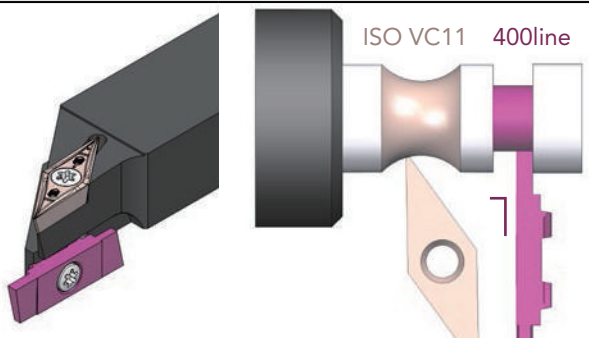
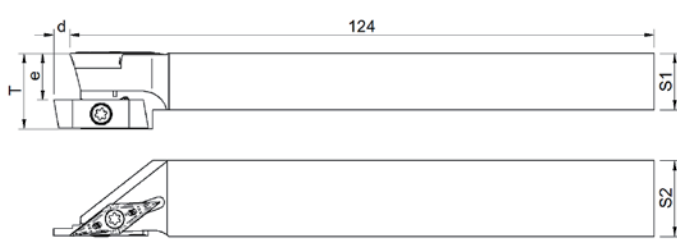
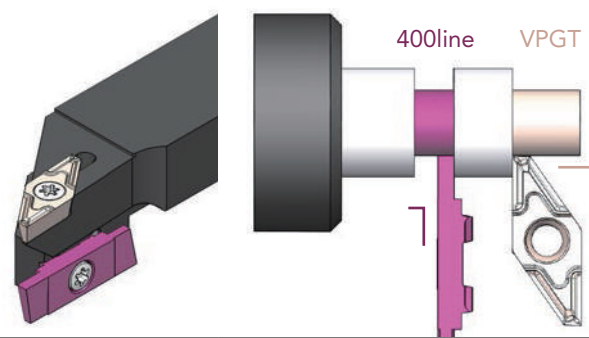
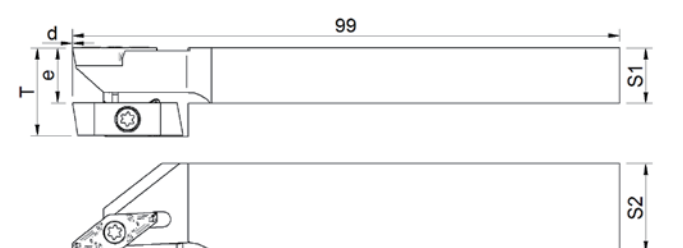
Maximum cutting-off :      Ø 8 mm

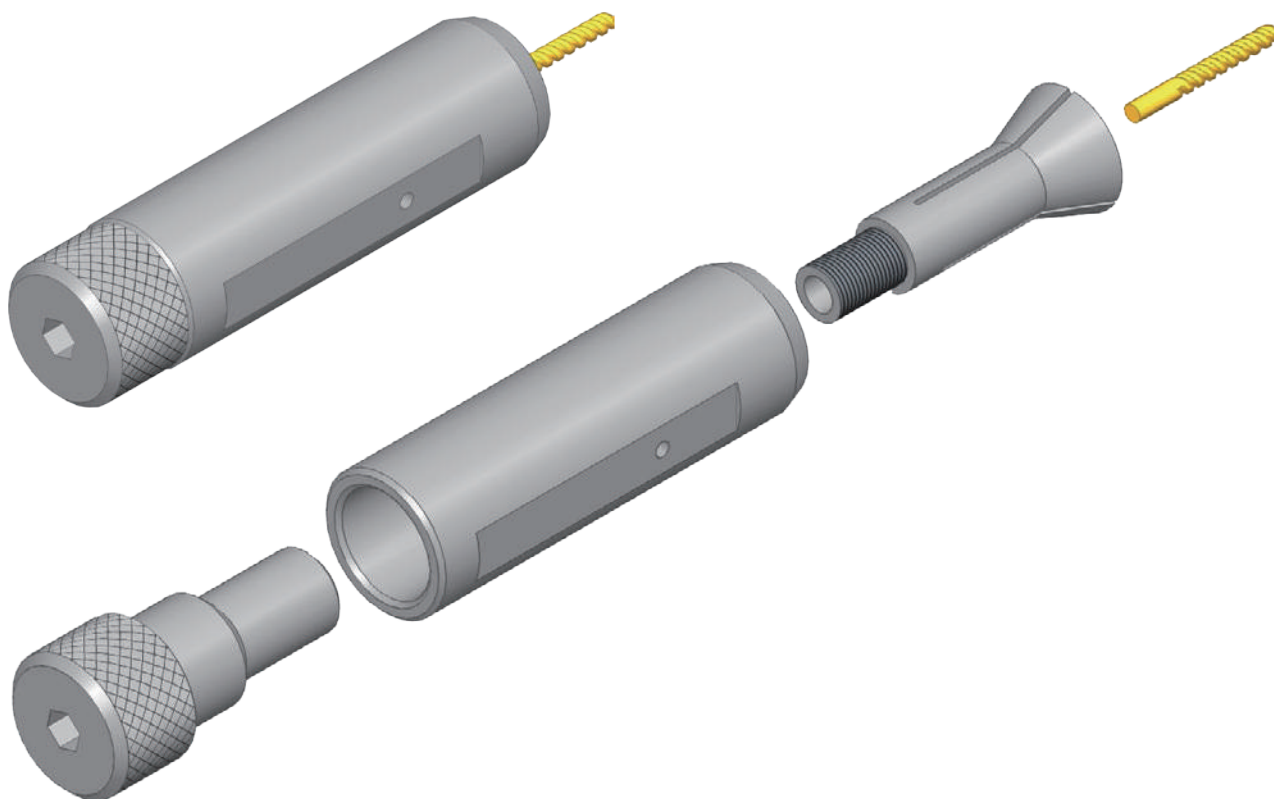
Maximum turning :      Ø ap 2 mm

Examples of use for double tool-holders	S1	S2	T	d	e	Article nr.
	7	16	16	5	10	407RD
	8	16	16	4	10	408RD
	8	8	14	3	8	408RD8
	10	16	16	2	10	410RD
	12	16	16	2	10	412RD
	16	16	16	0	10	416RD
	10	16	16	3	10	410RDCR
	12	16	16	3	10	412RDCR

Maximum cutting-off :  $\varnothing 8 \text{ mm}$ 

Maximum turning :  $\varnothing \text{ ap } 2 \text{ mm}$ 

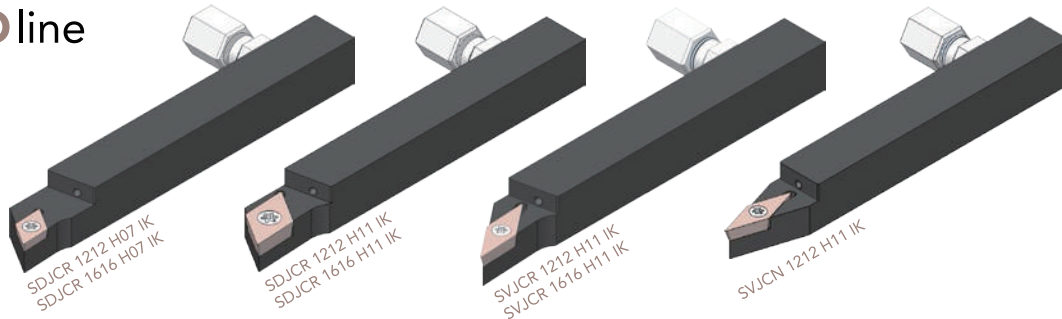
Examples of use for double tool-holders	S1	S2	T	d	e	Article nr.
 <p>ISO VC11 400line</p>	10	16	16	3	10	410RDVC11
 <p>124</p> <p>d</p> <p>e</p> <p>T</p> <p>S1</p> <p>S2</p>	12	16	16	3	10	412RDVC11
 <p>400line VPGT</p>	10	16	16	0	10	410RDVPGT
 <p>99</p> <p>d</p> <p>e</p> <p>T</p> <p>S1</p> <p>S2</p>						



**Increased precision compared to standard ER collets**

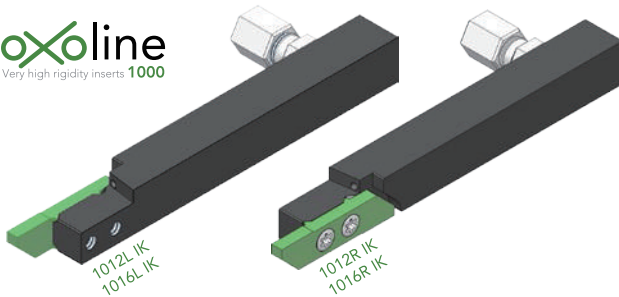
Article nr.	Ø (mm)	Length (mm)	Recommended for
B8 12 100	12	100	Tornos SwissNano
B8 16 60	16	60	Tornos Micro 7 Tornos Micro 8 Tsugami P01
B8 5/8" 60	15,875 (5/8")	60	Citizen R04 Citizen R07
B8 16 100	16	100	Star SR-10J Tornos Micro 7 Tornos SwissNano
B8 3/4" 100	19,05 (3/4")	100	Citizen C16 Citizen M16
B8 20 100	20	100	Tornos Delta 12/20 Tornos Gamma 20
B8 22 100	22	100	Star SB-16 Star SR-20
B8 25 100	25	100	Tornos Deco 13

## ISO line

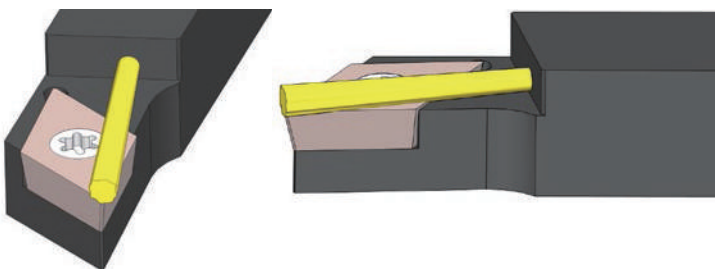
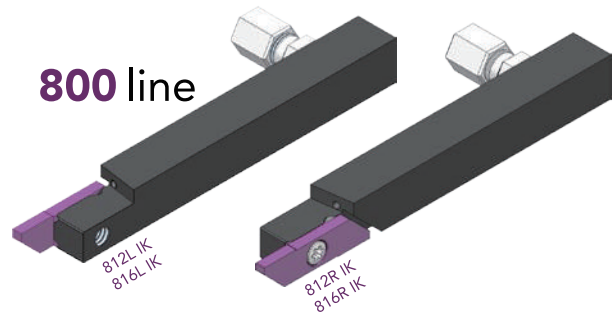


## oxoline

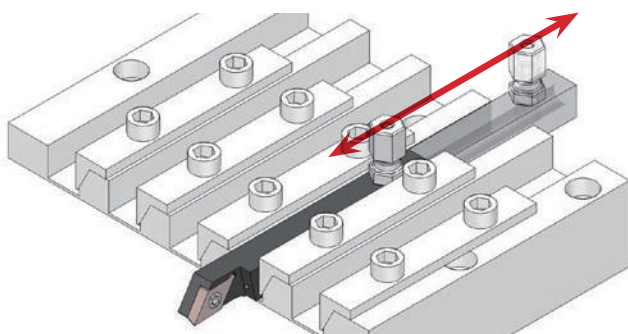
Very high rigidity inserts 1000



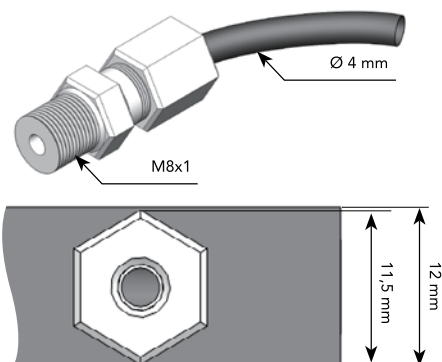
## 800 line



- High pressure coolant directly on the cutting edge. Coolant in the insert's axis.



- Possibility to slide the tool-holder on whole length for setting.



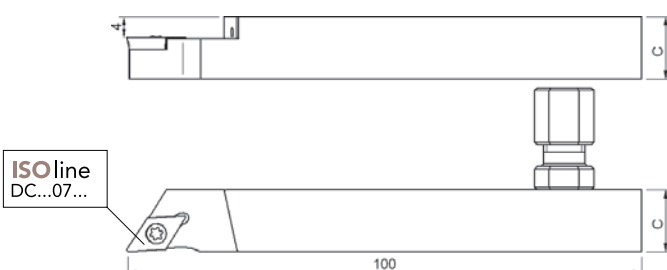
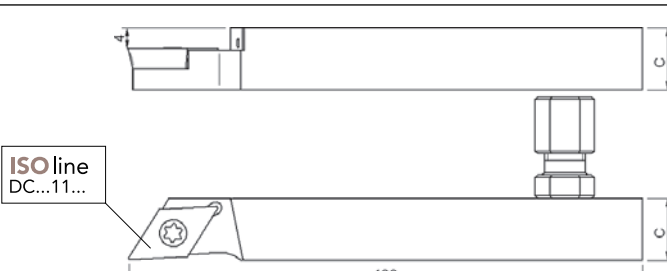
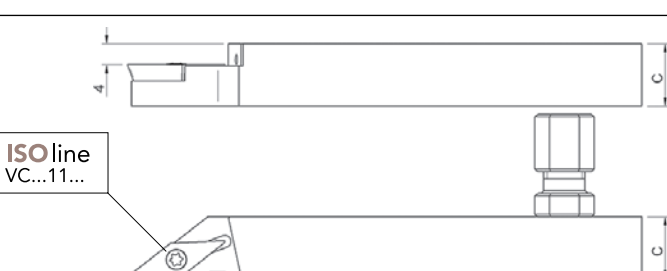
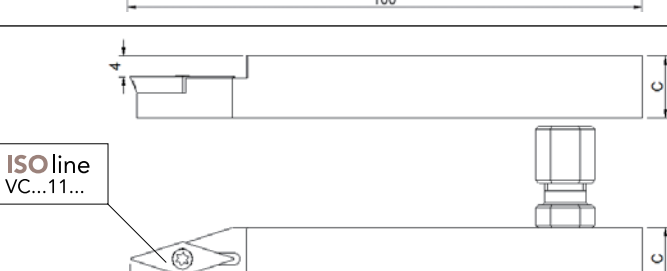
- The hydraulic fitting does not cover the tool, even for section 12x12 mm.



1 hydraulic fitting (M8x1, cone shape, output Ø 4 mm) is delivered with each tool-holder.



To guarantee the smooth running of tool-holders, the oil must be filtered in 60 µm.

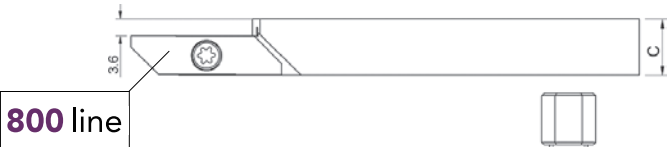
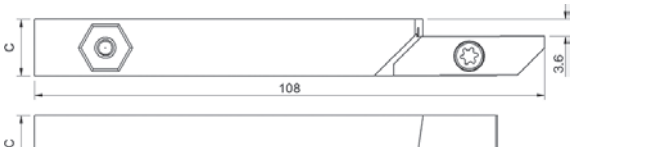
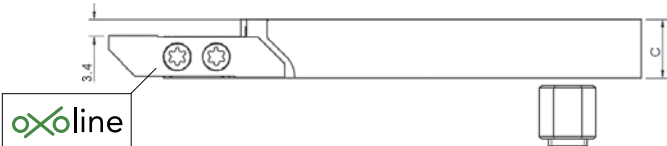
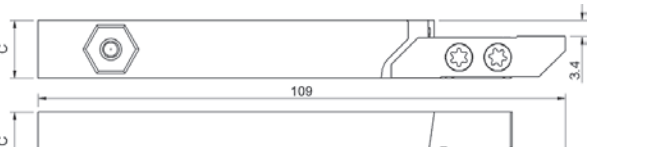
Tool-holders with internal coolant	Section C	Article nr.
 <p>ISO line DC...07...</p>	12x12 mm	SDJCR 1212 H07 IK
	16x16 mm	SDJCR 1616 H07 IK
 <p>ISO line DC...11...</p>	12x12 mm	SDJCR 1212 H11 IK
	16x16 mm	SDJCR 1616 H11 IK
 <p>ISO line VC...11...</p>	12x12 mm	SVJCR 1212 H11 IK
	16x16 mm	SVJCR 1616 H11 IK
 <p>ISO line VC...11...</p>	12x12 mm	SVJCN 1212 H11 IK

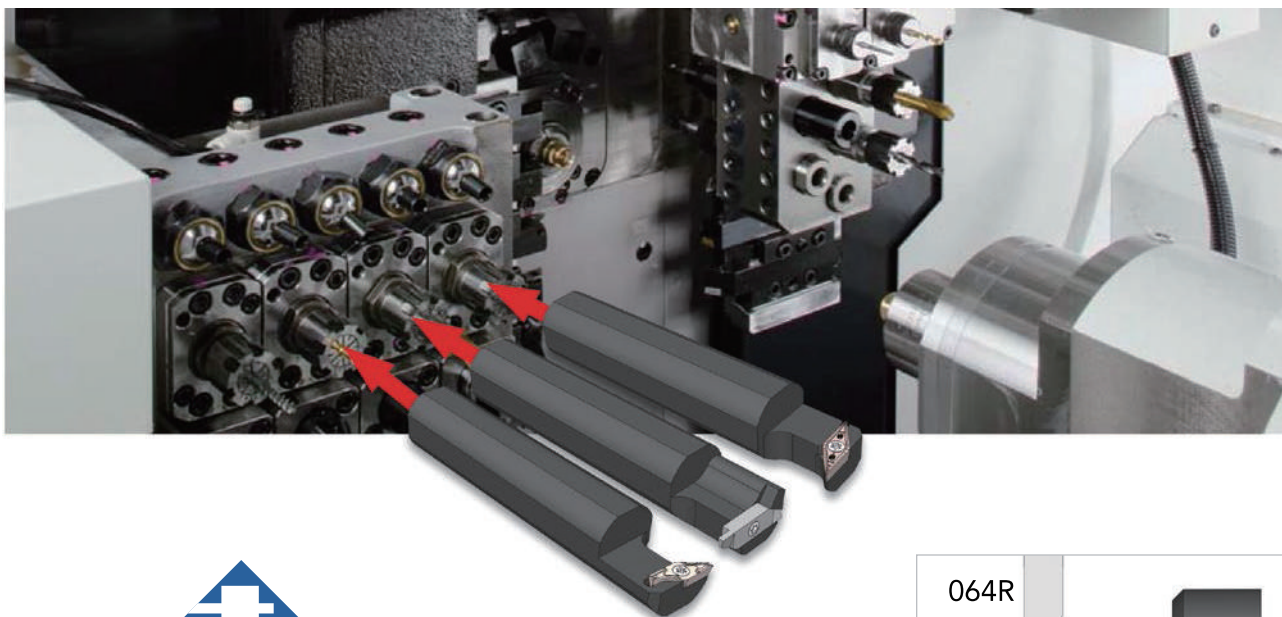


1 hydraulic fitting (M8x1, cone shape, output Ø 4 mm) is delivered with each tool-holder.



To guarantee the smooth running of tool-holders, the oil must be filtered in 60 µm.

Tool-holders with internal coolant	Section C	Article nr.
 <p><b>800 line</b></p>	12x12 mm	812R IK
	16x16 mm	816R IK
 <p><b>800 line</b></p>	12x12 mm	812L IK
	16x16 mm	816L IK
 <p><b>oxoline</b></p>	12x12 mm	1012R IK
	16x16 mm	1016R IK
 <p><b>oxoline</b></p>	12x12 mm	1012L IK
	16x16 mm	1016L IK

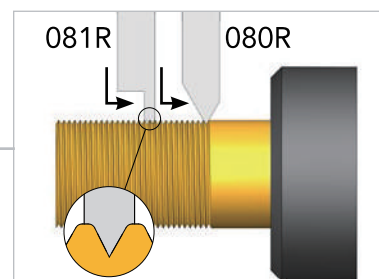
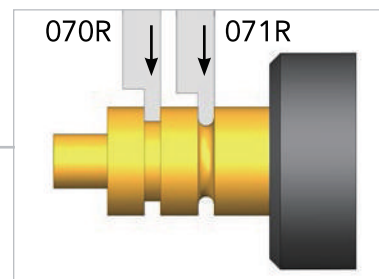
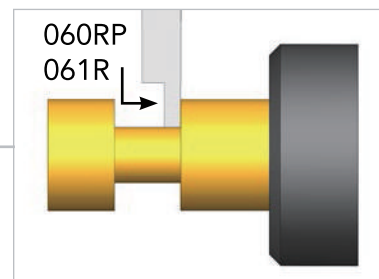
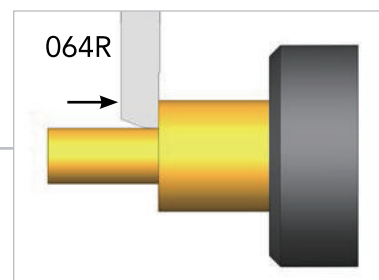
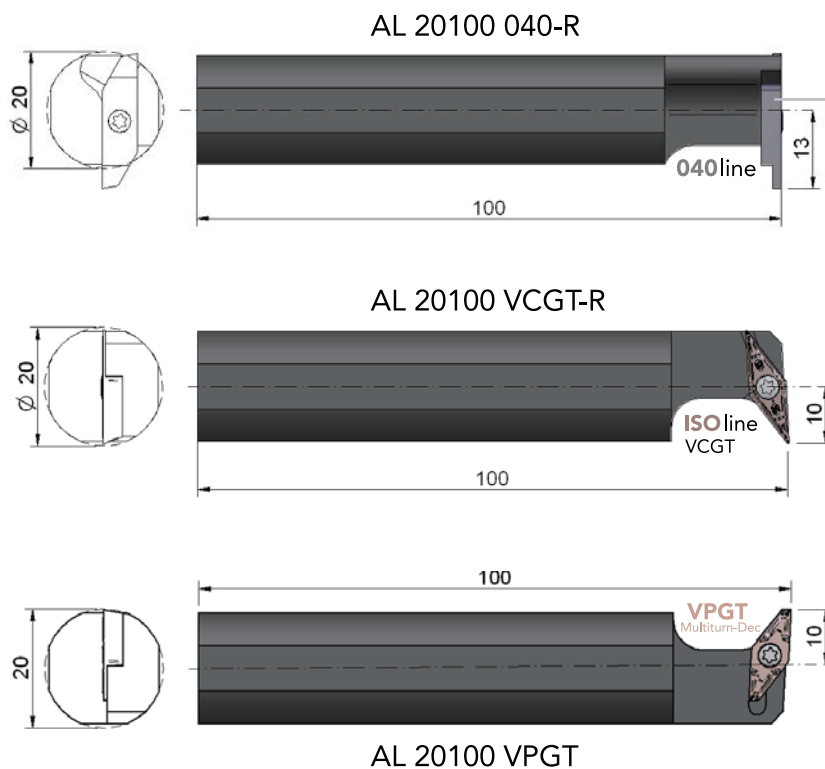


**TORNOS**

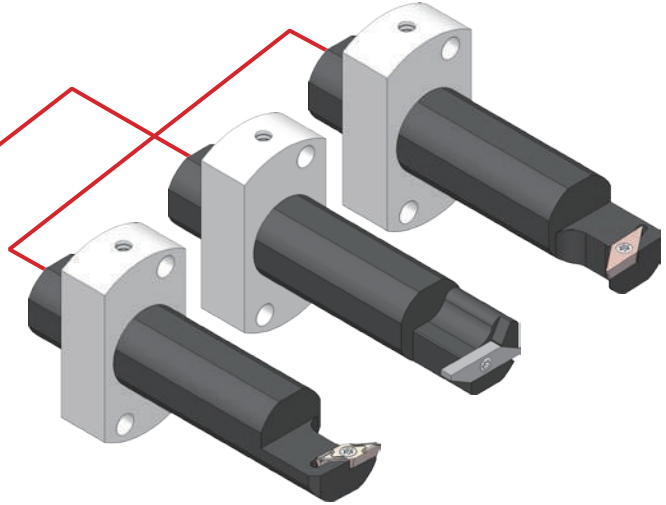
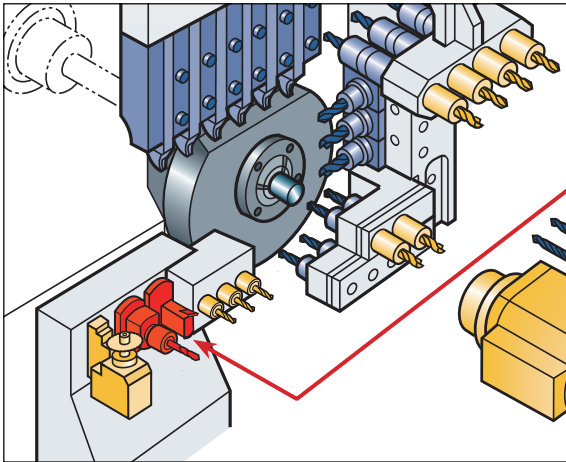
GAMMA 20

DELTA 12 / DELTA 20

EvoDECO 10

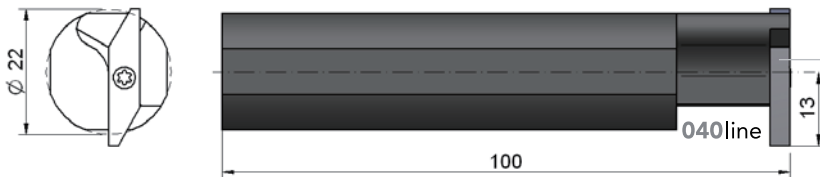




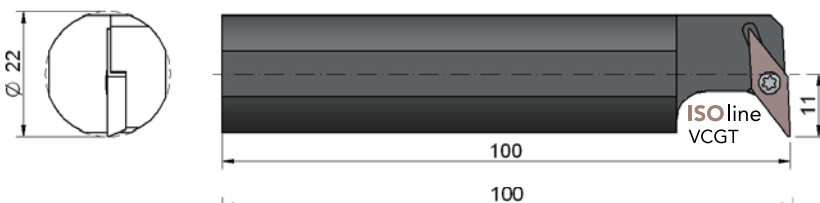


SR-20RIII SB-16  
SR-20RIV SB-20  
SR-20J SW-20  
SR-20JN

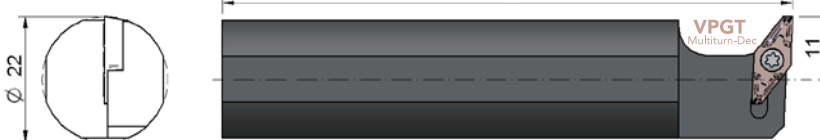
AL 22100 040-R



AL 22100 VCGT-R



AL 22100 VPGT

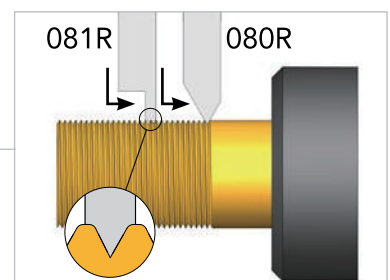
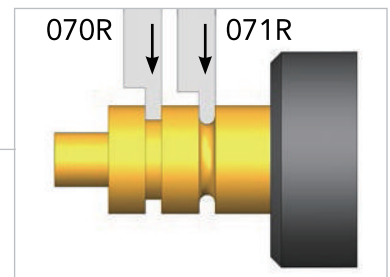
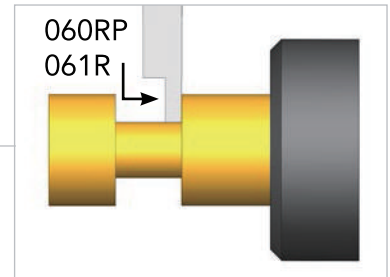
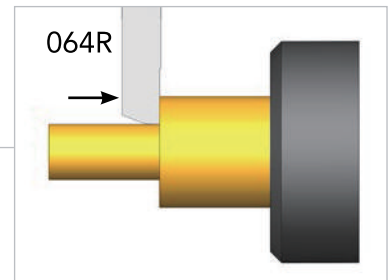
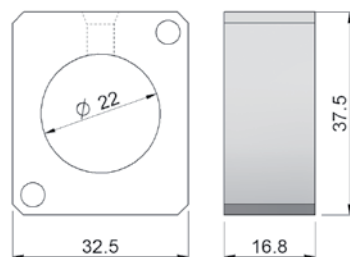
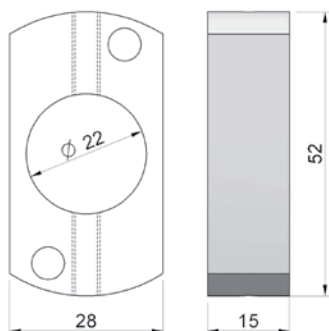


STAR-KP1-22SRR

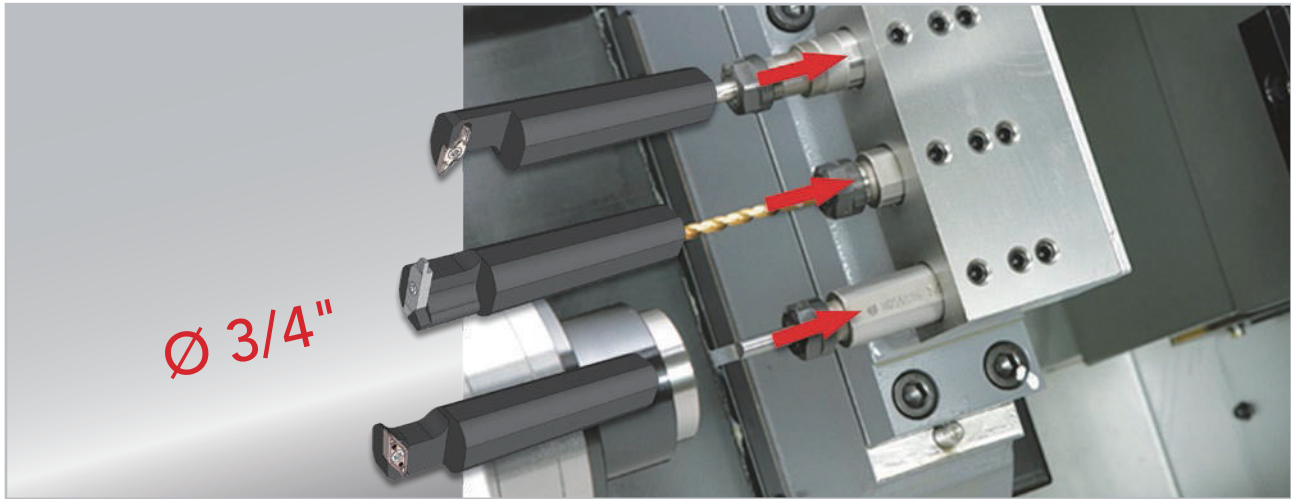
SR-20RIII | SR-20J | SR-20JN  
SB-16C/E | SB-20 C/E

STAR-KP1-22SW

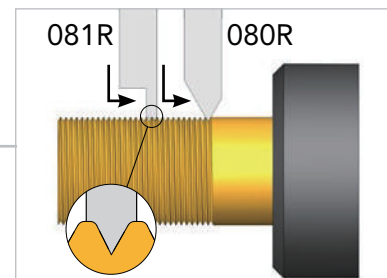
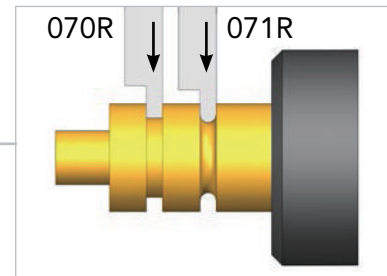
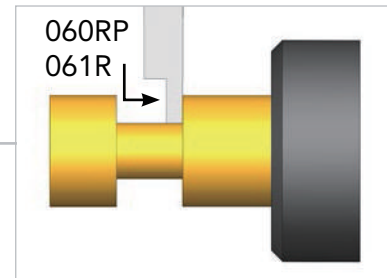
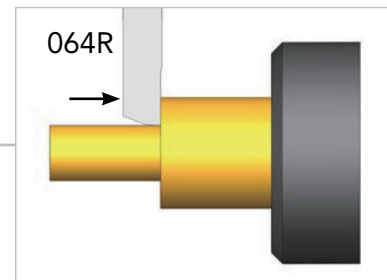
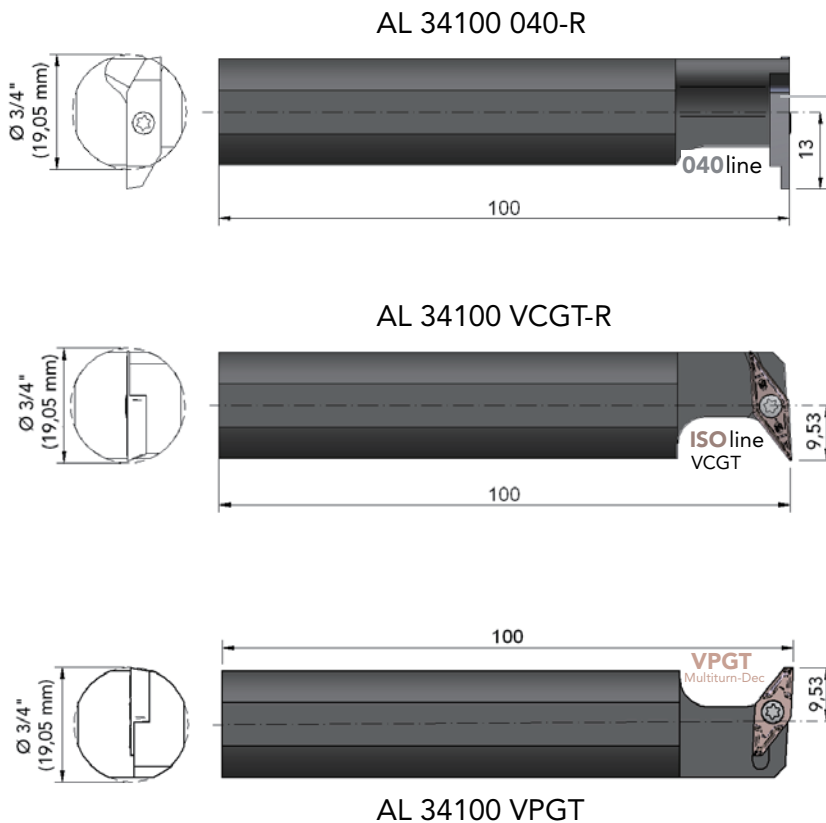
SR-20R IV | SW-20







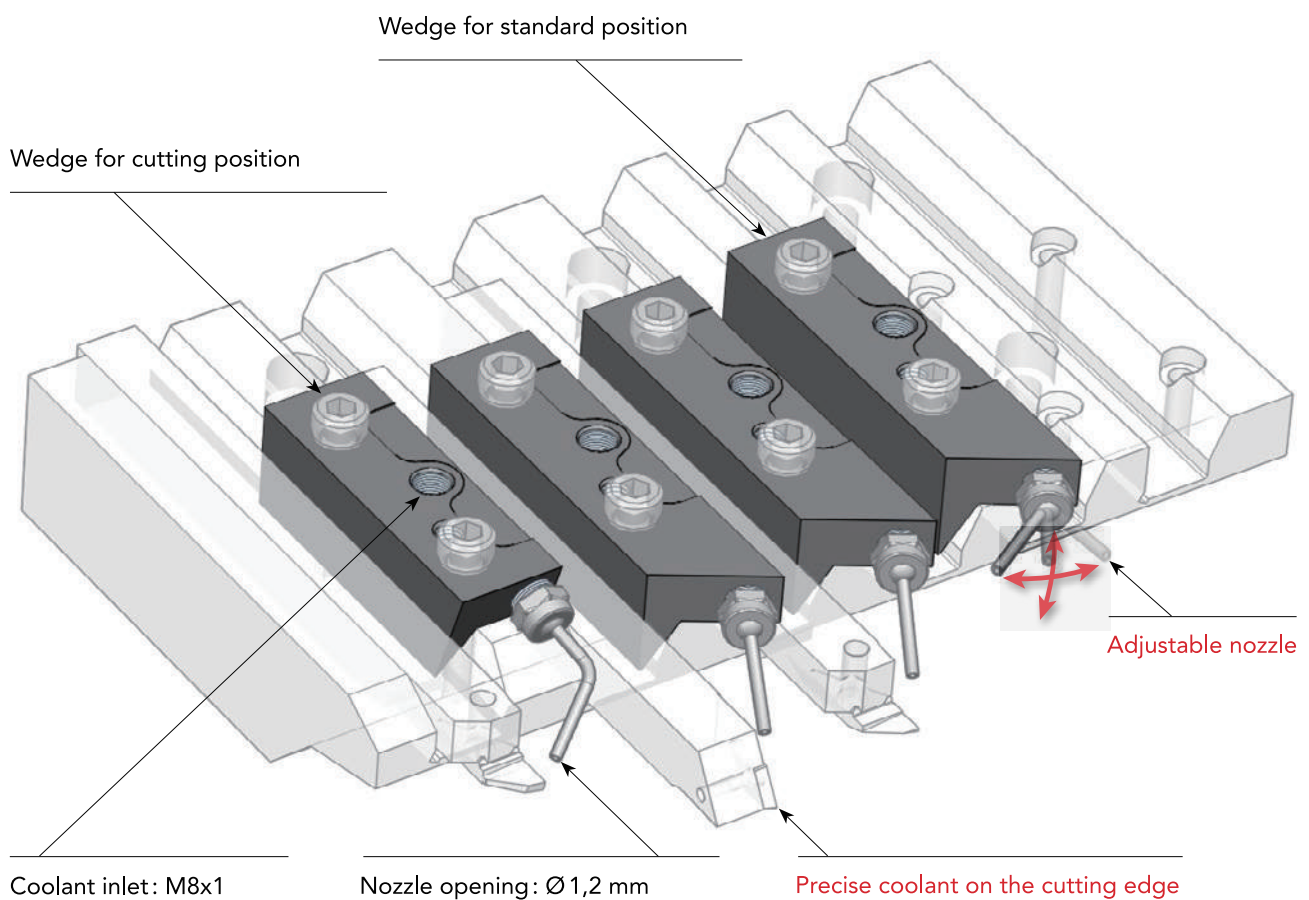
**Citizen**



유압 시스템의 최적의 효과를 50 bar 부터 최대 200 bar까지 사용 가능하도록 설계된 시스템입니다.

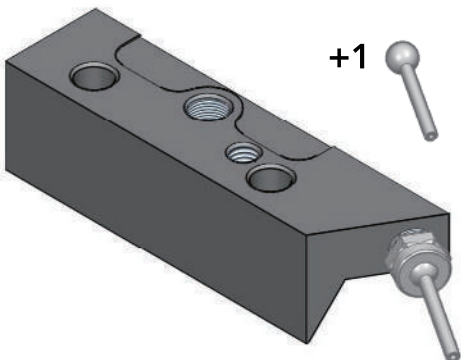
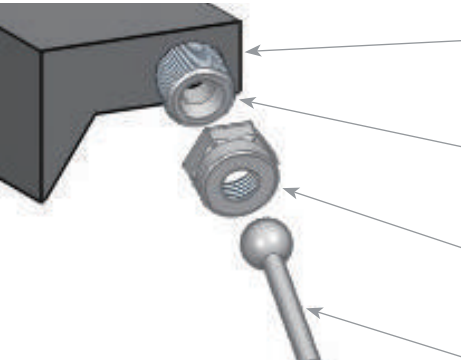
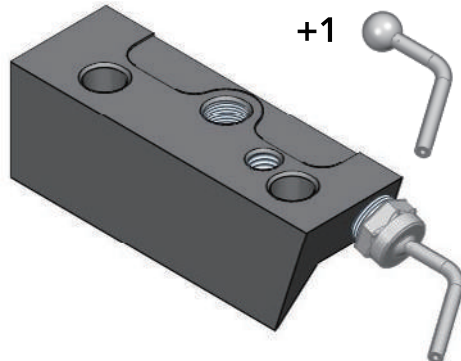
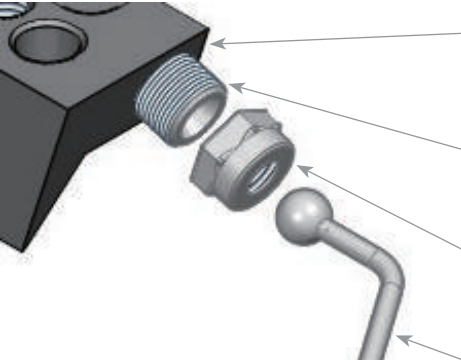
For machines **stair**

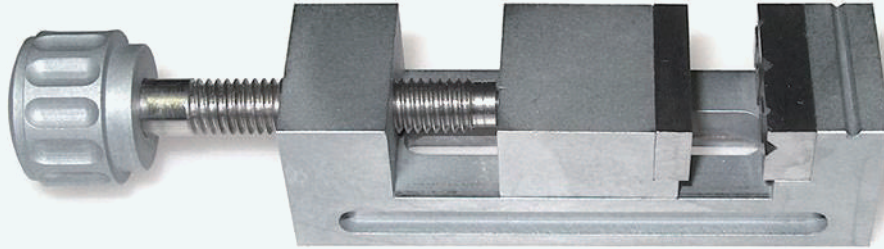
SB16 | SR-20R | SR-20J/JN | SR-20RII | SR-20RIII | SR-20RIV | SR-32J/JN | SV-12 | SV-20



**Ideal system with the use of a high pressure coolant.**

Optimum efficiency from 50 bar. Maximum allowable pressure: 200 bar

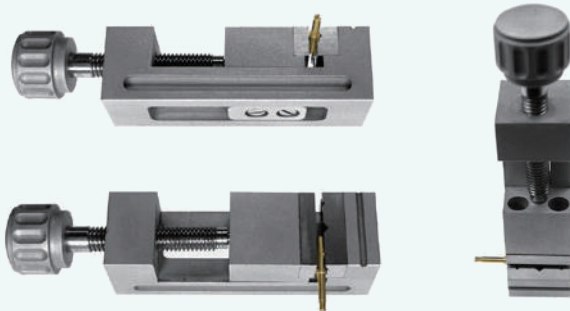
	Description	Article nr.
	Wedges with internal coolant system and adjustable nozzle. Complete kit with spare nozzle. <b>Use on the standard positions of the gang.</b>	015.80.200
	Wedge	015.80.100
	Adapter M6X0,5 / M8X0,75	015.81.304
	Nut	015.81.301
	Straight spraying nozzle	015.81.302
	Wedges with internal coolant system and adjustable nozzle. Complete kit with spare nozzle. <b>Use on the cutting position of the gang.</b>	015.80.400
	Wedge	015.80.300
	Adapter M6X0,5 / M8X0,75	015.81.304
	Nut	015.81.301
	Angled spraying nozzle	015.81.303



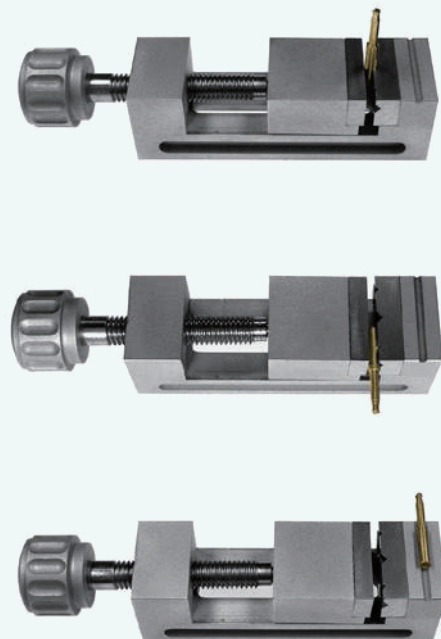
L x H x P : 15 x 15 x 80 mm

- Helps the fastening of parts for their optical & mechanical measurement.
- Ideal for measuring turned parts.

- Perpendicular conception utilizable on all faces.



- Numerous possibilities to grip the part.



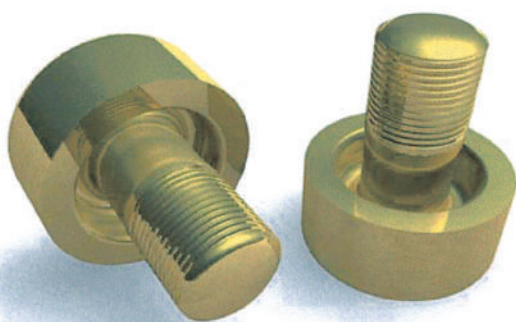
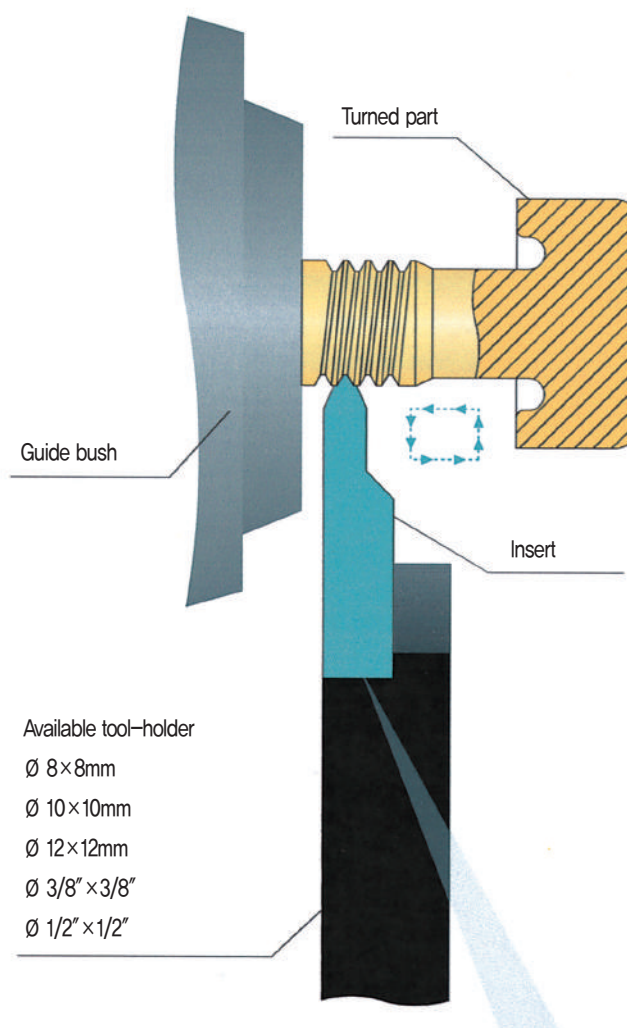
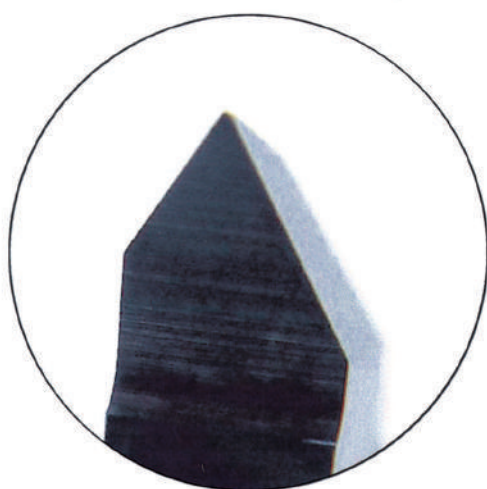
- Tightening conceived for different part diameters.



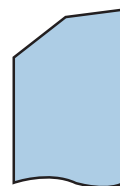
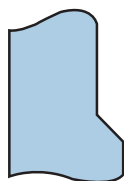
- Part reference : **MEP**

# Insert for external threading on dental implants

High precision tool for medical application



Dental implants

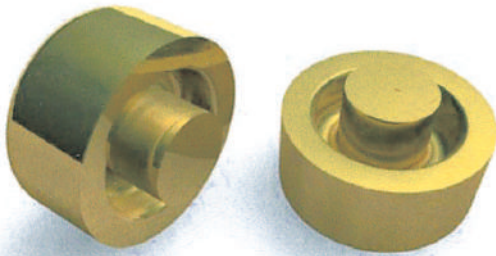
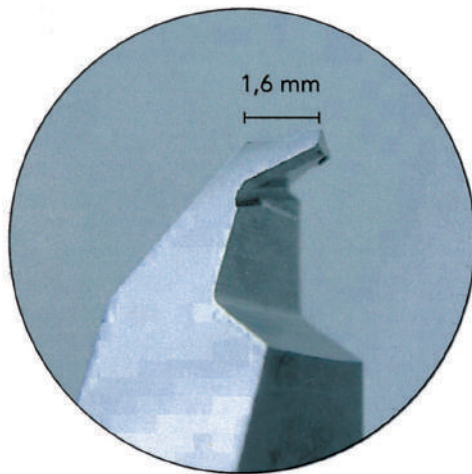


Different geometries available – Special request possible

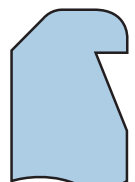
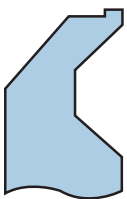
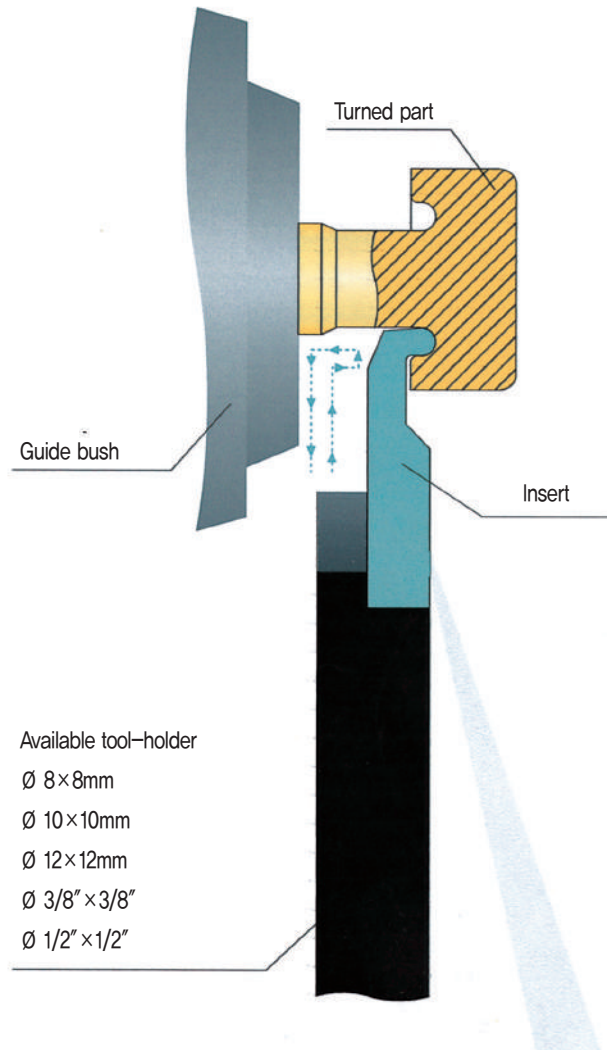


# Back trepan tool

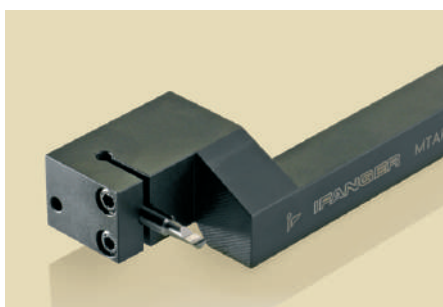
Very high precision tool for medical application



Dental implants

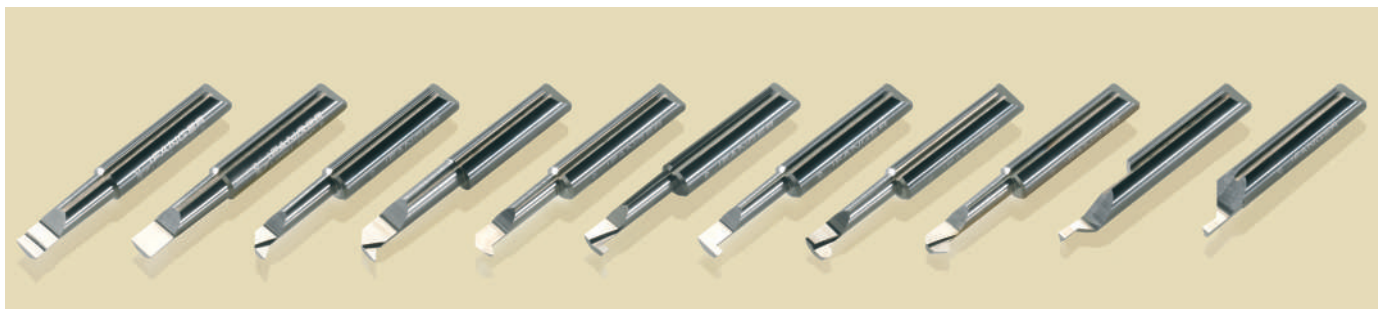


Different geometries available – Special request possible



## MicroTurn

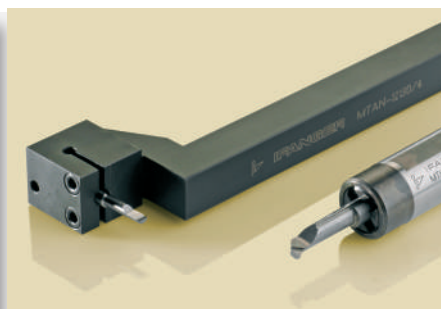
Turning starting at Ø 0,3 mm



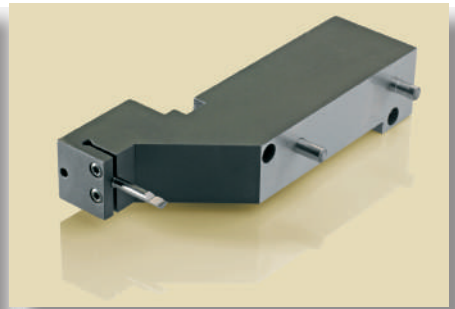
## MicroTurn

### Advantages of MicroTurn system

- Thanks to clamping from in front easy changing of the cutting tool.
- A V-seat in the tool holder standing for a changing accuracy of cutting tool of <0.05 mm.
- For machining various materials carbide tools, TiAlN coated and uncoated, are available.
- An absolutely fine grinding of rake and chip face and a sharp cutting edge guarantee a fine and clean surface of the workpiece.







1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

### Efficient and innovative

By using state-of-the-art technology, Ifanger AG can offer innovative, user-friendly and reliable cutting tools. They do not only guarantee to do the job, they are technically, functionally and aesthetically top of the range.



## Identification

1. DIAMETAL

2. BIMU

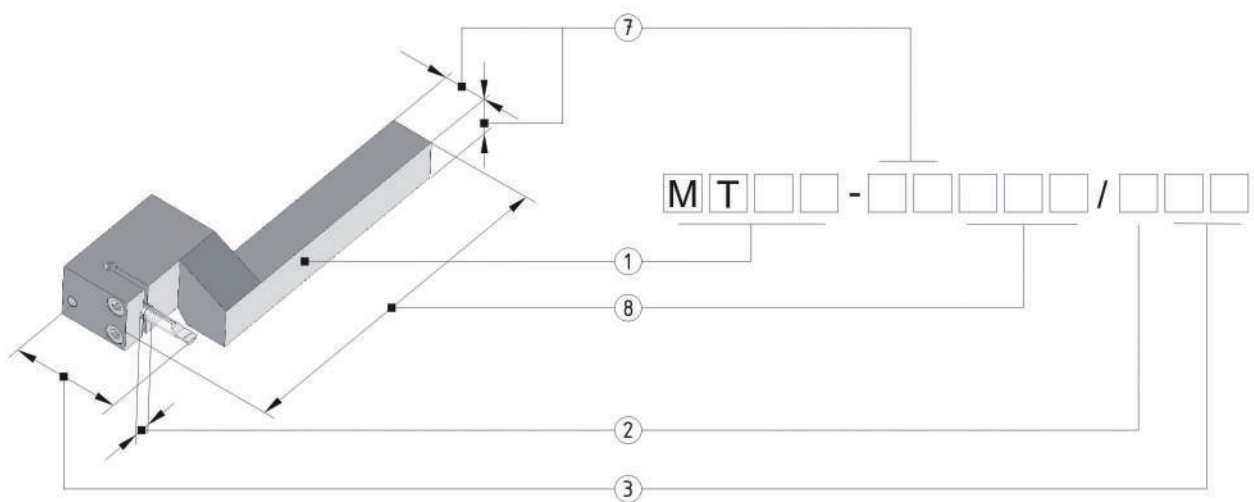
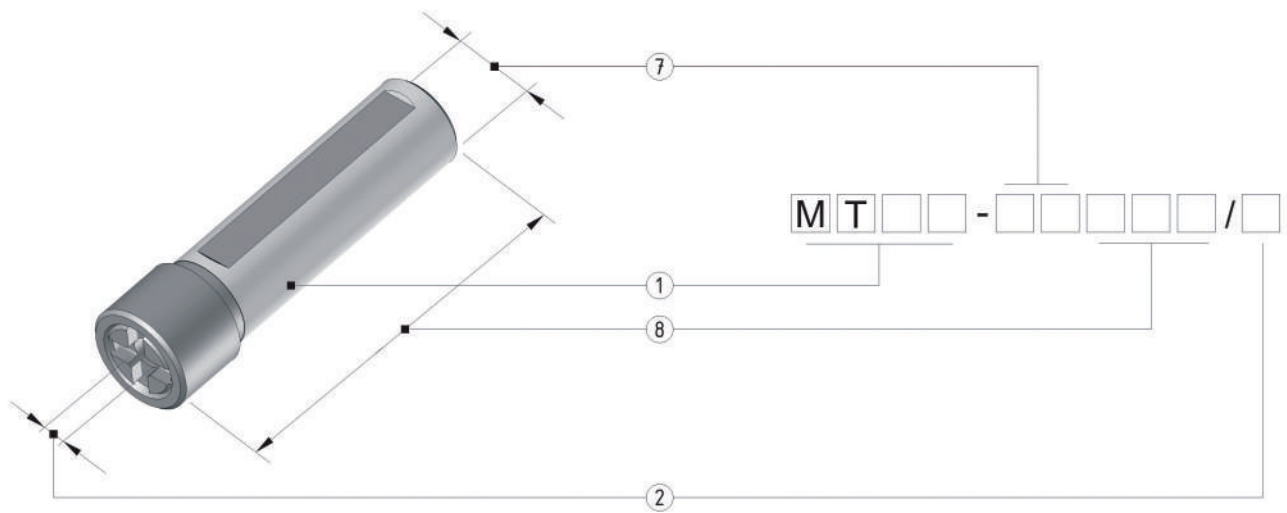
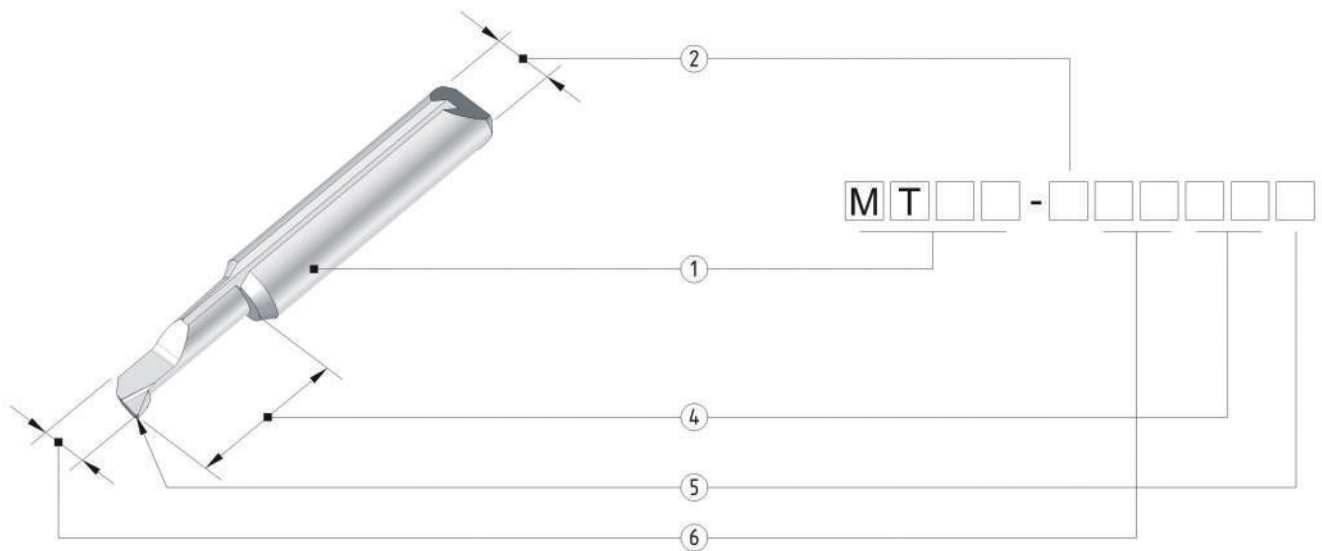
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



- 1 Type of tool
- 2 Diameter of shank
- 3 Tool length
- 4 Length of neck
- 5 Radius of cutter
- 6 Minimal bore
- 7  $\varnothing$  resp  $\varnothing$  of holder
- 8 Length of holder

Materials	$v$ (m/min)	$f$ (mm/U)					
		Cutting tool					
		MTEC $\varnothing 1,0-2,5$ mm	MTEC $\varnothing 2,5-6,0$ mm	MTEC $>\varnothing 5,0$ mm	MTEN $\varnothing 1,0-2,5$ mm	MTEN $\varnothing 2,5-5,0$ mm	MTEN $>\varnothing 5,0$ mm
Free-cutting steels	70-100	0,02-0,04	0,03-0,08	0,07-0,15	0,02-0,04	0,03-0,08	0,07-0,15
Constructional steels $<1,000$ N/mm <sup>2</sup>	70-100	0,01-0,03	0,03-0,07	0,07-0,12			
Constructional steels $>900$ N/mm <sup>2</sup>	60-90	0,005-0,02	0,03-0,07	0,07-0,1			
Case- hardening steels $<1,000$ N/mm <sup>2</sup>	70-100	0,01-0,03	0,02-0,06	0,05-0,12			
Case- hardening steels $>900$ N/mm <sup>2</sup>	60-90	0,005-0,02	0,03-0,06	0,04-0,08			
Tempering steels $<1,000$ N/mm <sup>2</sup>	60-90	0,01-0,03	0,02-0,05	0,05-0,1			
Tempering steels $>900$ N/mm <sup>2</sup>	60-80	0,005-0,02	0,02-0,06	0,05-0,08			
Tool steels	60-80	0,005-0,02	0,02-0,06	0,05-0,08			
Stainless steels	60-90	0,01-0,03	0,03-0,07	0,05-0,1			
Grey cast iron	40-80				0,01-0,03	0,04-0,08	0,07-0,15
Nodular cast iron	40-70				0,01-0,03	0,03-0,08	0,07-0,12
Brass 58	80-150				0,02-0,05	0,03-0,08	0,07-0,15
Forging alloys of aluminium	80-150	0,01-0,05	0,03-0,08	0,07-0,15			
Nickel alloys	20-40	0,005-0,02	0,01-0,04	0,03-0,06			
Titanium alloys	40-60	0,01-0,03	0,02-0,05	0,05-0,1			

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

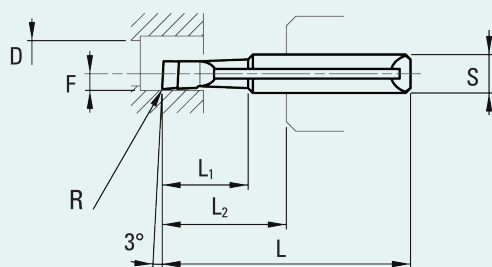
Materials	v (m/min)	f (mm/U)						
		Cutting tool						
		MTK.. Ø3,2–6,0 mm	MTFA Ø3,2–6,0 mm	MTNU Ø2,0–6,0 mm	MTNN Ø2,0–6,0 mm	MTNX/..Y ab Ø6,0 mm	*MTG.. p = 0,5–0,75	*MTG.. p = 1,0–1,5
Free-cutting steels	70–100 *25–60	0,05–0,15	0,05–0,12	0,02–0,06	0,02–0,06	0,02–0,05	6–8	9–12
Constructional steels <1,000 N/mm <sup>2</sup>	70–100 *25–60	0,05–0,15	0,05–0,12	0,02–0,06		0,02–0,05	6–8	8–10
Constructional steels >900 N/mm <sup>2</sup>	60–90 *25–50	0,03–0,12	0,03–0,1	0,015–0,04		0,01–0,03	7–9	9–12
Case-hardening steels <1,000 N/mm <sup>2</sup>	70–100 *25–60	0,04–0,12	0,04–0,1	0,02–0,04		0,01–0,03	6–8	8–10
Case-hardening steels >900 N/mm <sup>2</sup>	60–90 *25–50	0,03–0,1	0,03–0,08	0,015–0,04		0,005–0,02	7–9	9–12
Tempering steels <1,000 N/mm <sup>2</sup>	60–90 *25–50	0,05–0,12	0,04–0,1	0,02–0,04		0,01–0,03	7–9	9–12
Tempering steels >900 N/mm <sup>2</sup>	60–80 *22–50	0,03–0,1	0,03–0,08	0,015–0,04		0,005–0,02	8–10	12–15
Tool steels	60–80 *22–50	0,05–0,01	0,03–0,08	0,015–0,04		0,005–0,03	8–10	12–15
Stainless steels	60–90 *20–50	0,03–0,12	0,03–0,07	0,01–0,03		0,005–0,02	8–10	12–15
Grey cast iron	40–80 *30–60	0,05–0,15	0,05–0,1		0,02–0,07	0,02–0,05	7–9	11–14
Nodular cast iron	40–70 *25–50	0,03–0,12	0,03–0,1		0,02–0,05	0,01–0,04	8–10	12–15
Brass 58	80–150 *30–65	0,05–0,15	0,05–0,12		0,03–0,06	0,02–0,05	6–8	8–10
Forging alloys of aluminium	80–150 *30–65	0,05–0,15	0,05–0,12	0,03–0,06		0,02–0,05	6–8	9–12
Nickel alloys	20–40 *10–18	0,02–0,08	0,02–0,06	0,01–0,04		0,005–0,02	7–9	10–14
Titanium alloys	40–60 *15–30	0,02–0,1	0,02–0,08	0,02–0,05		0,01–0,03	7–9	10–14

**Cutting threads (MTGE / MTGW)**

The number of cuttings is highly dependent of the material to be machined, of the clamping of the work piece and of the quality grade of the thread.

**Important: Last cutting at least 0,04 mm!**

# Boring tools



MTEC



$\gamma$ : Rake angle

Right hand

Left hand

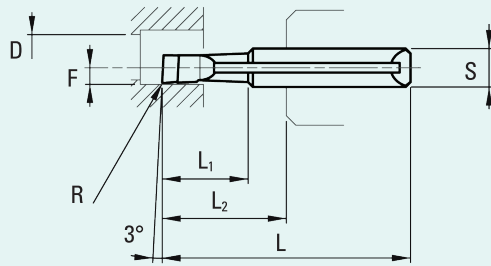
Type of tool									MTEC...-R-K10	MTEC...-R-TiAIN	MTEC...-L-K10	MTEC...-L-TiAIN
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	F	$\gamma$	$\varnothing D_{min}$	R	Ident. N°				
4	26	3	10	0,50	6°	1,0	0 0,02×45°	...410030... ...41003...	●	●	○	○
4	26	5	10	0,50	6°	1,0	0 0,02×45°	...410050... ...41005...	●	●	●	●
4	31	4	15	0,60	12°	1,2	0 0,02×45°	...412040... ...41204...	●	●	○	○
4	31	7	15	0,60	12°	1,2	0 0,02×45°	...412070... ...41207...	●	●	○	○
4	31	5	15	0,75	12°	1,5	0 0,02×45°	...415050... ...41505...	●	●	○	○
4	31	8	15	0,75	12°	1,5	0 0,02×45°	...415080... ...41508...	●	●	●	●
4	31	5	15	0,90	12°	1,8	0 0,03×45°	...418050... ...41805...	●	●	○	○
4	31	9	15	0,90	12°	1,8	0 0,03×45°	...418090... ...41809...	●	●	●	●
4	31	14	15	0,90	12°	1,8	0 0,03×45°	...418140... ...41814...	●	●	○	○
4	31	6	15	1,10	12°	2,2	0 R0,05	...422060... ...42206...	●	●	○	○
4	31	6	15	1,25	12°	2,5	0 R0,05	...425060... ...42506...	●	●	●	●
4	31	10	15	1,25	12°	2,5	0 R0,05	...425100... ...42510...	●	●	●	●
4	31	14	15	1,25	12°	2,5	0 R0,05	...425140... ...42514...	●	●	○	○
4	31	8	15	1,60	12°	3,2	0 R0,05 R0,08	...432080... ...432085... ...43208...	●	●	○	○
4	31	12	15	1,60	12°	3,2	0 R0,05 R0,08	...432120... ...432125... ...43212...	●	●	○	○
4	36	17	20	1,60	12°	3,2	0 R0,05 R0,08	...432170... ...432175... ...43217...	●	●	○	○
4	31	10	15	1,95	12°	4,0	0 R0,05 R0,12	...440100... ...440105... ...44010...	●	●	●	●
4	31	14	15	1,95	12°	4,0	0 R0,05 R0,12	...440140... ...440145... ...44014...	●	●	●	●
4	36	19	20	1,95	12°	4,0	0 R0,05 R0,12	...440190... ...440195... ...44019...	●	●	○	○

**Order number:** Add Ident. No. to type of tool, e.g.:  
MTEC-410030-R-K10

- Available ex stock
- Delivery time on request

# Boring tools

MTEC



$\gamma$ : Rake angle

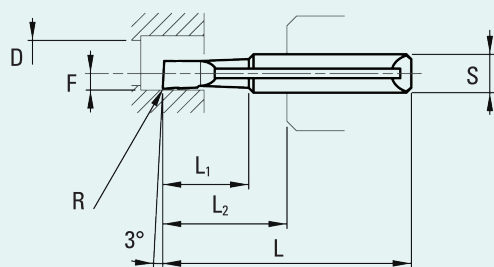
Rechts A droite Right hand Links A gauche Left hand

Type of tool										MTEC...-R-K10	MTEC...-R-TiAIN	MTEC...-L-K10	MTEC...-L-TiAIN
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	F	$\gamma$	$\varnothing D_{min}$	R	Ident. N°					
6	48	25	29	1,95	12°	4,0	0	...640250...		●	●	○	○
							R0,05	...640255...		●	●	○	○
							R0,12	...64025...		●	●	○	○
6	53	30	34	1,95	12°	4,0	0	...640300...		●	●	○	○
							R0,05	...640305...		●	●	○	○
							R0,12	...64030...		●	●	○	○
6	35	12	16	2,50	12°	5,0	R0,05	...650125...		●	●	●	●
							R0,15	...65012...		●	●	●	●
6	43	17	24	2,50	12°	5,0	R0,05	...650175...		●	●	●	●
							R0,15	...65017...		●	●	●	●
6	48	25	29	2,50	12°	5,0	R0,05	...650255...		●	●	●	●
							R0,15	...65025...		●	●	●	●
6	53	32	34	2,50	12°	5,0	R0,05	...650325...		●	●	○	○
							R0,15	...65032...		●	●	○	○
6	61	40	42	2,50	12°	5,0	R0,05	...650405...		●	●	○	○
							R0,15	...65040...		●	●	●	●
6	35	12	16	2,95	12°	6,0	R0,05	...660125...		●	●	●	●
							R0,20	...66012...		●	●	●	●
6	43	20	24	2,95	12°	6,0	R0,05	...660205...		●	●	●	●
							R0,20	...66020...		●	●	●	●
6	53	30	34	2,95	12°	6,0	R0,05	...660305...		●	●	●	●
							R0,20	...66030...		●	●	●	●
6	61	40	42	2,95	12°	6,0	R0,05	...660405...		●	●	○	○
							R0,20	...66040...		●	●	○	○
6	71	50	52	2,95	12°	6,0	R0,05	...660505...		●	●	○	○
							R0,20	...66050		●	●	○	○

**Order number:** Add ident. No. to type of tool, e.g.:  
MTEC-640250-R-K10

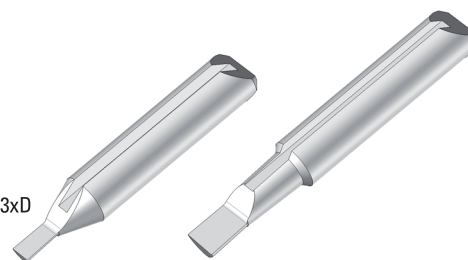
- Available ex stock
- Delivery time on request

# Neutral boring tools



MTEN

$L_1 < 3 \times D$



$\gamma$ : Rake angle

Right hand

Left hand

Type of tool									MTEN...-R-K10	MTEN...-R-TiAIN	MTEN...-L-K10	MTEN...-L-TiAIN
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	F	$\gamma$	$\varnothing D_{min}$	R	Ident. N°				
4	26	0,4	10	0,15	0°	0,3	0	...403010...	●	●	○	○
4	26	0,5	10	0,20	0°	0,4	0	...404010...	●	●	○	○
4	26	0,6	10	0,25	0°	0,5	0	...405010...	●	●	○	○
4	26	1,5	10	0,25	0°	0,5	0	...405020...	●	●	●	●
4	26	0,8	10	0,35	0°	0,7	0	...407010...	●	●	○	○
4	26	2	10	0,35	0°	0,7	$\frac{0}{0,02 \times 45^\circ}$	...407020... ...40702...	● ●	● ●	● ●	● ●
4	26	1,2	10	0,50	0°	1,0	0	...410020...	●	●	○	○
4	26	3	10	0,50	0°	1,0	$\frac{0}{0,02 \times 45^\circ}$	...410030... ...41003...	● ●	● ●	● ○	● ○
4	26	5	10	0,50	0°	1,0	$\frac{0}{0,02 \times 45^\circ}$	...410050... ...41005...	● ●	● ●	● ●	● ●
4	26	2	10	0,60	0°	1,2	0	...412020...	●	●	○	○
4	31	4	15	0,60	0°	1,2	$\frac{0}{0,02 \times 45^\circ}$	...412040... ...41204...	● ●	● ●	● ○	● ○
4	31	7	15	0,60	0°	1,2	$\frac{0}{0,02 \times 45^\circ}$	...412070... ...41207...	● ●	● ●	● ●	● ●
4	26	3	10	0,75	0°	1,5	0	...415030...	●	●	○	○
4	31	5	15	0,75	0°	1,5	$\frac{0}{0,02 \times 45^\circ}$	...415050.. ...41505...	● ●	● ●	● ●	● ●
4	31	8	15	0,75	0°	1,5	$\frac{0}{0,02 \times 45^\circ}$	...415080... ...41508...	● ●	● ●	● ●	● ●
4	26	4	10	0,90	0°	1,8	0	...418040...	●	●	○	○
4	31	5	15	0,90	0°	1,8	$\frac{0}{0,03 \times 45^\circ}$	...418050... ...41805...	● ●	● ●	● ●	● ●
4	31	9	15	0,90	0°	1,8	$\frac{0}{0,03 \times 45^\circ}$	...418090... ...41809...	● ●	● ●	● ●	● ●
4	31	14	15	0,90	0°	1,8	$\frac{0}{0,03 \times 45^\circ}$	...418140... ...41814...	● ●	● ●	○ ○	○ ○
4	31	6	15	1,10	0°	2,2	$\frac{0}{0,05 \times 45^\circ}$	...422060... ...42206...	● ●	● ●	○ ○	○ ○
4	31	6	15	1,25	0°	2,5	$\frac{0}{R0,05}$	...425060... ...42506...	● ●	● ●	● ●	● ●
4	31	10	15	1,25	0°	2,5	$\frac{0}{R0,05}$	...425100... ...42510...	● ●	● ●	● ●	● ●
4	31	14	15	1,25	0°	2,5	$\frac{0}{R0,05}$	...425140... ...42514	● ●	● ●	○ ○	○ ○

**Order number:** Add Ident. No. to type of tool, e.g.:  
MTEN-403010-R-K10

- Available ex stock
- Delivery time on request

Neutral boring tools

1.DIAMETAL

2. BIMU

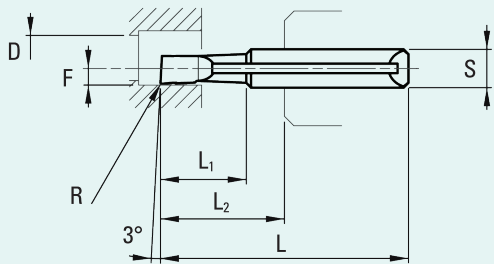
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



MTEN

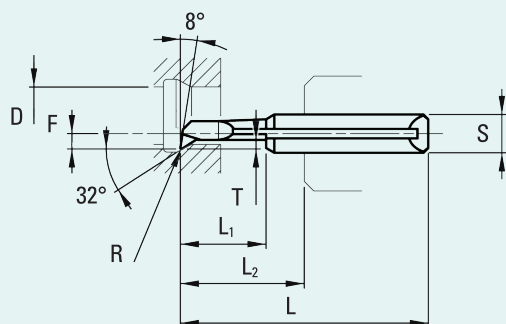


γ: Rake angle										Right hand		Left hand	
Type of tool										MTEN...-R-K10	MTEN...-R-TiAIN	MTEN...-L-K10	MTEN...-L-TiAIN
∅S	L	L <sub>1</sub>	L <sub>2</sub>	F	γ	∅D <sub>min</sub>	R	Ident. N°					
4	31	8	15	1,60	0°	3,2	0	...432080...		●	●	●	●
							R0,05	...432085...		●	●	●	●
							R0,08	...43208...		●	●	●	●
4	31	12	15	1,60	0°	3,2	0	...432120...		●	●	●	●
							R0,05	...432125...		●	●	●	●
							R0,08	...43212...		●	●	●	●
4	36	17	20	1,60	0°	3,2	0	...432170...		●	●	○	○
							R0,05	...432175...		●	●	○	○
							R0,08	...43217...		●	●	○	○
4	31	10	15	1,95	0°	4,0	0	...440100...		●	●	●	●
							R0,05	...440105...		●	●	●	●
							R0,12	...44010...		●	●	●	●
4	31	14	15	1,95	0°	4,0	0	...440140...		●	●	●	●
							R0,05	...440145...		●	●	●	●
							R0,12	...44014...		●	●	●	●
4	36	19	20	1,95	0°	4,0	0	...440190...		●	●	●	●
							R0,05	...440195...		●	●	●	●
							R0,12	...44019...		●	●	●	●
6	48	25	29	1,95	0°	4,0	0	...640250...		●	●	○	○
							R0,05	...640255...		●	●	○	○
							R0,12	...64025...		●	●	○	○
6	53	30	34	1,95	0°	4,0	0	...640300...		●	●	○	○
							R0,05	...640305...		●	●	○	○
							R0,12	...64030...		●	●	○	○
6	35	12	16	2,50	0°	5,0	R0,05	...650125...		●	●	●	●
							R0,15	...65012...		●	●	●	●
	6	43	17	2,50	0°	5,0	R0,05	...650175...		●	●	●	●
							R0,15	...65017...		●	●	●	●
	6	48	25	2,50	0°	5,0	R0,05	...650255...		●	●	●	●
							R0,15	...65025...		●	●	●	●
	6	53	32	2,50	0°	5,0	R0,05	...650325...		●	●	○	○
							R0,15	...65032...		●	●	○	○
	6	61	40	2,50	0°	5,0	R0,05	...650405...		●	●	○	○
							R0,15	...65040...		●	●	○	○
6	35	12	16	2,95	0°	6,0	R0,05	...660125...		●	●	●	●
							R0,20	...66012...		●	●	●	●
	6	43	20	2,95	0°	6,0	R0,05	...660205...		●	●	●	●
							R0,20	...66020...		●	●	●	●
	6	53	30	2,95	0°	6,0	R0,05	...660305...		●	●	●	●
							R0,20	...66030...		●	●	●	●
	6	61	40	2,95	0°	6,0	R0,05	...660405...		●	●	○	○
							R0,20	...66040...		●	●	○	○
	6	71	50	2,95	0°	6,0	R0,05	...660505...		●	●	○	○
							R0,20	...66050		●	●	○	○

Order number: Add ident. No. to type of tool, e.g.:  
MTEN-432080-R-K10

- Available ex stock
- Delivery time on request





γ: Rake angle

MTKO

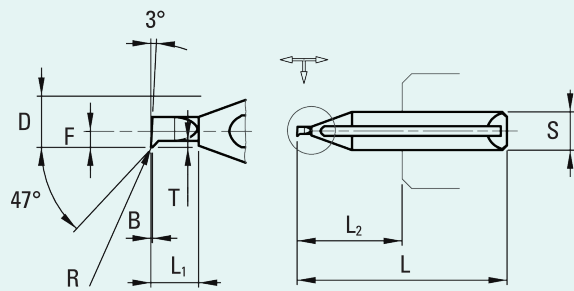


										Right hand		Left hand	
Type of tool										MTKO...-R-K10	MTKO...-R-TiAIN	MTKO...-L-K10	MTKO...-L-TiAIN
ØS	L	L <sub>1</sub>	L <sub>2</sub>	R	T	F	γ	ØD <sub>min</sub>	Ident. N°				
4	31	4	15	0,05	0,4	1,00	8°	2,0	...42004...	●	●	○	○
4	31	6	15	0,05	0,6	1,25	8°	2,5	...42506...	●	●	●	●
4	31	10	15	0,05	0,6	1,25	8°	2,5	...42510...	●	●	●	●
4	31	8	15	0,08	0,8	1,60	8°	3,2	...43208...	●	●	●	●
4	31	12	15	0,08	0,8	1,60	8°	3,2	...43212...	●	●	●	●
4	36	17	20	0,08	0,8	1,60	8°	3,2	...43217...	●	●	○	○
4	31	10	15	0,12	0,8	1,95	8°	4,0	...44010...	●	●	●	●
4	31	14	15	0,12	0,8	1,95	8°	4,0	...44014...	●	●	●	●
4	36	19	20	0,12	0,8	1,95	8°	4,0	...44019...	●	●	●	●
6	48	25	29	0,12	0,8	1,95	8°	4,0	...64025...	●	●	○	○
6	53	30	34	0,12	0,8	1,95	8°	4,0	...64030...	●	●	○	○
6	35	12	16	0,15	1,2	2,50	8°	5,0	...65012...	●	●	●	●
6	43	17	24	0,15	1,2	2,50	8°	5,0	...65017...	●	●	●	●
6	48	25	29	0,15	1,2	2,50	8°	5,0	...65025...	●	●	●	●
6	53	32	34	0,15	1,2	2,50	8°	5,0	...65032...	●	●	○	○
6	61	40	42	0,15	1,2	2,50	8°	5,0	...65040...	●	●	○	○
6	35	12	16	0,20	1,45	2,95	8°	6,0	...66012...	●	●	○	○
6	43	20	24	0,20	1,45	2,95	8°	6,0	...66020...	●	●	●	●
6	48	30	34	0,20	1,45	2,95	8°	6,0	...66030...	●	●	●	●
6	61	40	42	0,20	1,45	2,95	8°	6,0	...66040...	●	●	○	○
6	71	50	52	0,20	1,45	2,95	8°	6,0	...66050...	●	●	○	○

**Order number:** Add Ident. No. to type of tool, e.g.:  
MTKO-42004-R-K10

- Available ex stock
- Delivery time on request

# Copying tools 3° / 47°



MTKN

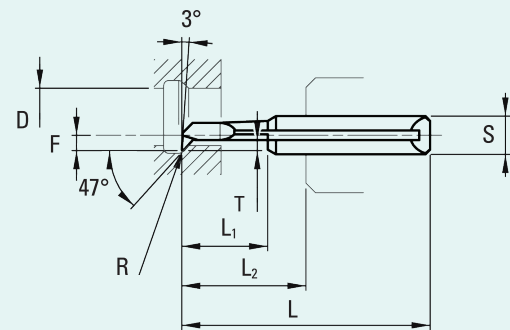


γ: Rake angle

Right hand

Left hand

Type of tool										MTKN...-R-K10	MTKN...-R-TiAlN	MTKN...-L-K10	MTKN...-L-TiAlN
∅S	L	L <sub>1</sub>	L <sub>2</sub>	B	T	F	γ	∅D <sub>min</sub>	Ident. N°				
4	26	0,6	10	0,02	0,05	0,15	0°	0,3	...40301...	●	●	○	○
4	26	0,8	10	0,02	0,07	0,20	0°	0,4	...40401...	●	●	○	○
4	26	1,0	10	0,02	0,10	0,25	0°	0,5	...40501...	●	●	○	○
4	26	1,2	10	0,02	0,15	0,35	0°	0,7	...40701...	●	●	○	○
4	26	1,5	10	0,05	0,20	0,50	0°	1,0	...41002...	●	●	○	○
∅S	L	L <sub>1</sub>	L <sub>2</sub>	R	T	F	γ	∅D <sub>min</sub>	Ident. N°				
4	26	2	10	0,03	0,30	0,60	0°	1,2	...41202...	●	●	○	○
4	26	3	10	0,03	0,40	0,75	0°	1,5	...41503...	●	●	○	○
4	26	4	10	0,03	0,50	0,90	0°	1,8	...41804...	●	●	○	○



MTKH



γ: Rake angle

Right hand

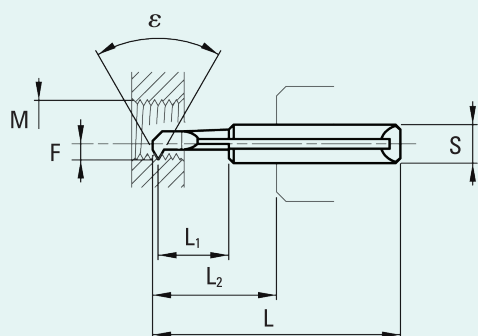
Left hand

Type of tool										MTKN...-R-K10	MTKN...-R-TiAlN	MTKN...-L-K10	MTKN...-L-TiAlN
∅S	L	L <sub>1</sub>	L <sub>2</sub>	R	T	F	γ	∅D <sub>min</sub>	Ident. N°				
4	31	4	15	0,05	0,4	1,00	8°	2,0	...42004...	●	●	○	○
4	31	6	15	0,05	0,4	1,25	8°	2,5	...42506...	●	●	●	●
4	31	10	15	0,05	0,4	1,25	8°	2,5	...42510...	●	●	●	●
4	31	8	15	0,08	0,6	1,60	8°	3,2	...43208...	●	●	○	○
4	31	12	15	0,08	0,6	1,60	8°	3,2	...43212...	●	●	●	●
4	36	17	20	0,08	0,6	1,60	8°	3,2	...43217...	●	●	○	○
4	31	10	15	0,12	0,8	1,95	8°	4,0	...44010...	●	●	○	○
4	31	14	15	0,12	0,8	1,95	8°	4,0	...44014...	●	●	●	●
4	36	19	20	0,12	0,8	1,95	8°	4,0	...44019...	●	●	○	○
6	48	25	29	0,12	0,8	1,95	8°	4,0	...64025...	●	●	○	○
6	53	30	34	0,12	0,8	1,95	8°	4,0	...64030...	●	●	○	○
6	35	12	16	0,15	1,2	2,50	8°	5,0	...65012...	●	●	○	○
6	43	17	24	0,15	1,2	2,50	8°	5,0	...65017...	●	●	○	○
6	48	25	29	0,15	1,2	2,50	8°	5,0	...65025...	●	●	●	●
6	53	32	34	0,15	1,2	2,50	8°	5,0	...65032...	●	●	○	○
6	61	40	42	0,15	1,2	2,50	8°	5,0	...65040...	●	●	○	○
6	35	12	16	0,20	1,45	2,95	8°	6,0	...66012...	●	●	○	○
6	43	20	24	0,20	1,45	2,95	8°	6,0	...66020...	●	●	○	○
6	53	30	34	0,20	1,45	2,95	8°	6,0	...66030...	●	●	○	○
6	61	40	42	0,20	1,45	2,95	8°	6,0	...66040...	●	●	○	○
6	71	50	52	0,20	1,45	2,95	8°	6,0	...66050...	●	●	○	○

**Order number:** Add ident. No. to type of tool, e.g.:  
MTKN-40301-R-K10

- Available ex stock
- Delivery time on request

## Threading tools 60



MTGE

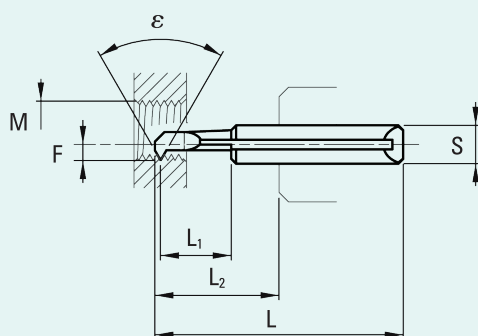


Right hand

Left hand

Type of tool										MTGE...-R-K20	MTGE...-R-TiAIN	MTGE...-L-K20	MTGE...-L-TiAIN
ØS	L	L <sub>1</sub>	L <sub>2</sub>	ε	M	P	F	ØD <sub>min</sub>	Ident. N°				
4	26	2,3	10	60°	M1,6	0,2-0,4	0,60	1,2	...41203...	●	●	○	○
4	26	3,7	10	60°	M2	0,2-0,5	0,80	1,6	...41604...	●	●	○	○
4	31	5,1	15	60°	M3	0,2-0,5	1,10	2,2	...42206...	●	●	●	●
4	31	7,5	15	60°	M4	0,5-0,8	1,60	3,2	...43208...	●	●	●	●
4	31	9,4	15	60°	M5	0,75-1,0	1,95	4,0	...44010...	●	●	●	●
4	31	13,4	15	60°	M5	0,75-1,0	1,95	4,0	...44014...	●	●	●	●
6	35	11,1	16	60°	M6	0,75-1,25	2,50	5,0	...65012...	●	●	●	●
6	43	16,1	24	60°	M6	0,75-1,25	2,50	5,0	...65017...	●	●	●	●
6	35	11	16	60°	M8	1,0-1,75	2,95	6,0	...66012...	●	●	●	●
6	43	19	24	60°	M8	1,0-1,75	2,95	6,0	...66020...	●	●	●	●
6	53	29	34	60°	M8	1,0-1,75	2,95	6,0	...66030...	●	●	●	●

## Threading tools 55



MTGW



Right hand

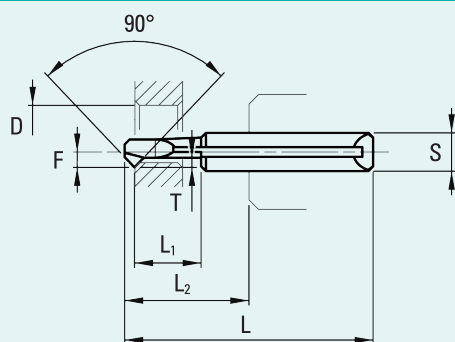
Left hand

Type of tool										MTGE...-R-K20	MTGE...-R-TiAIN	MTGE...-L-K20	MTGE...-L-TiAIN
ØS	L	L <sub>1</sub>	L <sub>2</sub>	ε	M	P	F	ØD <sub>min</sub>	Ident. N°				
4	31	9,4	15	55°	W 7/32"	20-28	1,95	4,0	...44010...	●	●		
6	35	11,1	16	55°	W 5/16"	18-26	2,50	5,0	...65012...	●	●		
6	43	19	24	55°	W 3/8"	16-22	2,95	6,0	...66020...	●	●		

**Order number:** Add Ident. No. to type of tool, e.g.:  
MTGE-41203-R-K10

- Available ex stock
- Delivery time on request

## Chamfering tools



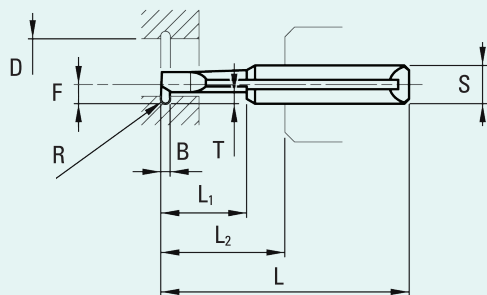
$\gamma$ : Rake angle

MTFA



Type of tool										Right hand		Left hand	
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	T	F	$\gamma$	$\varnothing D_{min}$	Ident. N°		MTFA...-R-K10	MTFA...-R-TiAIN	MTFA...-L-K10	MTFA...-L-TiAIN
4	31	11	15	0,8	1,60	8°	3,2	...43212...	●	●	●	●	●
4	31	13	15	0,8	1,95	8°	4,0	...44014...	●	●	●	●	●
4	36	18	20	0,8	1,95	8°	4,0	...44019...	●	●	●	●	●
6	43	15,4	24	1,45	2,50	8°	5,0	...65017...	●	●	●	●	●
6	43	18,4	24	1,45	2,95	8°	6,0	...66020...	●	●	●	●	●
6	53	28,4	34	1,45	2,95	8°	6,0	...66030...	●	●	●	●	●

## Grooving tools with full radius



$\gamma$ : Rake angle

MTNR

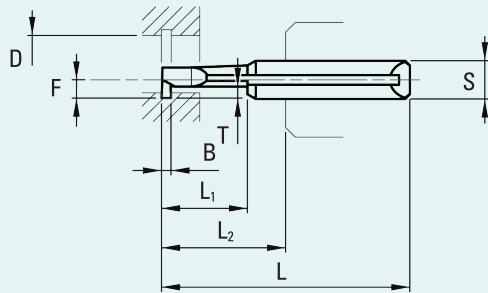


Type of tool											Right hand		Left hand	
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	T	B	F	R	$\gamma$	$\varnothing D_{min}$	Ident. N°	MTFA...-R-K10	MTFA...-R-TiAIN	MTFA...-L-K10	MTFA...-L-TiAIN
4	31	6	15	0,6	0,8	1,25	0,4	6°	2,5	...425064...	●	●	○	○
4	31	8	15	0,8	1,0	1,60	0,5	6°	3,2	...432085...	●	●	○	○
4	31	12	15	0,8	1,0	1,60	0,5	6°	3,2	...432125...	●	●	○	○
4	31	10	15	0,8	1,0	1,95	0,5	6°	4,0	...440105...	●	●	○	○
4	31	14	15	0,8	1,0	1,95	0,5	6°	4,0	...440145...	●	●	○	○
4	36	19	20	0,8	1,0	1,95	0,5	6°	4,0	...440195...	●	●	○	○
6	35	12	16	1,5	1,0	2,50	0,5	6°	5,0	...650125...	●	●	○	○
6	35	12	16	1,5	1,5	2,50	0,75	6°	5,0	...650127...	●	●	○	○
6	35	12	16	1,5	2,0	2,50	1,0	6°	5,0	...650129...	●	●	○	○
6	43	17	24	1,5	1,0	2,50	0,5	6°	5,0	...650175...	●	●	○	○
6	43	17	24	1,5	1,5	2,50	0,75	6°	5,0	...650177...	●	●	○	○
6	43	17	24	1,5	2,0	2,50	1,0	6°	5,0	...650179...	●	●	○	○
6	43	20	24	2,0	1,0	2,95	0,5	6°	6,0	...660205...	●	●	○	○
6	43	20	24	2,0	1,5	2,95	0,75	6°	6,0	...660207...	●	●	○	○
6	43	20	24	2,0	2,0	2,95	1,0	6°	6,0	...660209...	●	●	○	○

**Order number:** Add ident. No. to type of tool, e.g.:  
MTFA-43212-R-K10

- Available ex stock
- Delivery time on request

## Grooving tools



MTNU



$\gamma$ : Rake angle

Type of tool										Right hand		Left hand	
										MTNU...-R-K10	MTNU...-R-TiAIN	MTNU...-L-K10	MTNU...-L-TiAIN
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	T	B	F	$\gamma$	$\varnothing D_{min}$	Ident. N°				
4	31	6	15	0,5	0,6	1,00	12°	2,0	...42006...	●	●	●	●
4	31	8	15	0,6	0,8	1,25	12°	2,5	...42508...	●	●	●	●
4	31	8	15	0,8	1,0	1,60	12°	3,2	...43208...	●	●	●	●
4	31	12	15	0,8	1,0	1,60	12°	3,2	...43212...	●	●	●	●
4	36	17	20	0,8	1,0	1,60	12°	3,2	...43217...	●	●	○	○
4	31	10	15	0,8	1,0	1,95	12°	4,0	...44010...	●	●	●	●
4	31	14	15	0,8	1,0	1,95	12°	4,0	...44014...	●	●	●	●
4	36	19	20	0,8	1,0	1,95	12°	4,0	...44019...	●	●	●	●
6	48	25	29	0,8	1,0	1,95	12°	4,0	...64025...	●	●	○	○
6	53	30	34	0,8	1,0	1,95	12°	4,0	...64030...	●	●	○	○
6	35	12	16	1,5	1,2	2,50	12°	5,0	...65012...	●	●	●	●
6	43	17	24	1,5	1,2	2,50	12°	5,0	...65017...	●	●	●	●
6	48	25	29	1,5	1,2	2,50	12°	5,0	...65025...	●	●	○	○
6	53	32	34	1,5	1,2	2,50	12°	5,0	...65032...	●	●	○	○
6	61	40	42	1,5	2,0	2,50	12°	5,0	...65040...	●	●	○	○
6	35	12	16	2,0	1,5	2,95	12°	6,0	...66012...	●	●	●	●
6	43	20	24	2,0	2,0	2,95	12°	6,0	...66020...	●	●	●	●
6	53	30	34	2,0	2,0	2,95	12°	6,0	...66030...	●	●	○	○
6	61	40	42	2,0	2,0	2,95	12°	6,0	...66040...	●	●	○	○

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

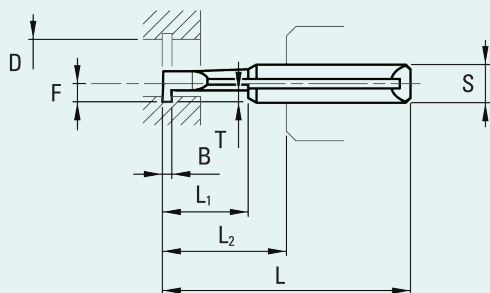
7. SPHINX

**Order number:** Add Ident. No. to type of tool, e.g.:  
MTNU-42006-R-K10

- Available ex stock
- Delivery time on request

# Neutral grooving tools

MTNN



$\gamma$ : Rake angle

Right hand

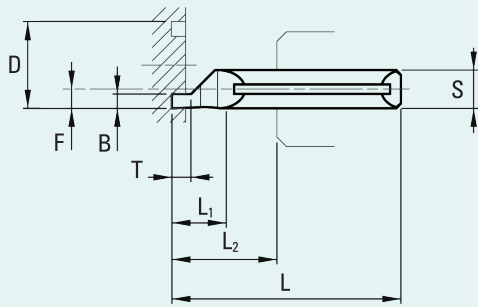
Left hand

Type of tool										MTNN...-R-K10	MTNN...-R-TiAlN	MTNN...-L-K10	MTNN...-L-TiAlN
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	T	B	F	$\gamma$	$\varnothing D_{min}$	Ident. N°				
4	26	0,6	10	0,05	0,1	0,15	0°	0,3	...40301...	●	●	○	○
4	26	0,8	10	0,07	0,1	0,20	0°	0,4	...40401...	●	●	○	○
4	26	1,0	10	0,10	0,15	0,25	0°	0,5	...40501...	●	●	○	○
4	26	1,2	10	0,15	0,2	0,35	0°	0,7	...40701...	●	●	○	○
4	26	1,5	10	0,2	0,3	0,50	0°	1,0	...41002...	●	●	○	○
4	26	2	10	0,3	0,4	0,60	0°	1,2	...41202...	●	●	○	○
4	26	3	10	0,4	0,4	0,75	0°	1,5	...41503...	●	●	○	○
4	26	4	10	0,5	0,5	0,90	0°	1,8	...41804...	●	●	○	○
4	31	6	15	0,5	0,6	1,00	0°	2,0	...42006...	●	●	○	○
4	31	8	15	0,6	0,8	1,25	0°	2,5	...42508...	●	●	●	●
4	31	8	15	0,8	1,0	1,60	0°	3,2	...43208...	●	●	●	●
4	31	12	15	0,8	1,0	1,60	0°	3,2	...43212...	●	●	●	●
4	36	17	20	0,8	1,0	1,60	0°	3,2	...43217...	●	●	○	○
4	31	10	15	0,8	1,0	1,95	0°	4,0	...44010...	●	●	●	●
4	31	14	15	0,8	1,0	1,95	0°	4,0	...44014...	●	●	○	○
4	36	19	20	0,8	1,0	1,95	0°	4,0	...44019...	●	●	●	●
6	48	25	29	0,8	1,0	1,95	0°	4,0	...64025...	●	●	○	○
6	53	30	34	0,8	1,0	1,95	0°	4,0	...64030...	●	●	○	○
6	35	12	16	1,5	1,2	2,50	0°	5,0	...65012...	●	●	○	○
6	43	17	24	1,5	1,2	2,50	0°	5,0	...65017...	●	●	●	●
6	48	25	29	1,5	1,2	2,50	0°	5,0	...65025...	●	●	○	○
6	53	32	34	1,5	1,2	2,50	0°	5,0	...65032...	●	●	○	○
6	61	40	42	1,5	1,2	2,50	0°	5,0	...65040...	●	●	○	○
6	35	12	16	2,0	1,5	2,95	0°	6,0	...66012...	●	●	○	○
6	43	20	24	2,0	2,0	2,95	0°	6,0	...66020...	●	●	●	●
6	53	30	34	2,0	2,0	2,95	0°	6,0	...66030...	●	●	○	○
6	61	40	42	2,0	2,0	2,95	0°	6,0	...66040...	●	●	○	○

**Order number:** Add ident. No. to type of tool, e.g.:  
MTNN-40301-R-K10

- Available ex stock
- Delivery time on request

## Tools for axial plunging



$\gamma$ : Rake angle

Type of tool									Ident. N°	
ØS	L	L <sub>1</sub>	L <sub>2</sub>	T	B	F	γ	ØD <sub>min</sub>		
4	26	5	12	1,5	1,0	1,95	8°	6,0		...41015...
4	26	7	12	2,0	1,5	1,95	8°	6,0		...41520...
6	43	8	16	2,5	1,5	2,95	8°	8,0		...61525...
6	43	10	16	3,0	2,0	2,95	8°	8,0		...62030...

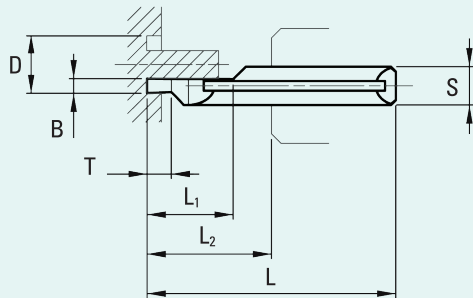
MTNX



Right hand

Left hand

MTNX...-R-K10	MTNX...-R-TiAIN	MTNX...-L-K10	MTNX...-L-TiAIN
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	•



$\gamma$ : Rake angle

Type of tool								Ident. N°	
ØS	L	L <sub>1</sub>	L <sub>2</sub>	T	B	γ	ØD <sub>min</sub>		
4	31	8	15	1,5	1,0	8°	6,0		...41015...
4	31	12	15	2,0	1,5	8°	6,0		...41520...
6	35	14	16	2,5	1,5	8°	8,0		...61525...
6	43	20	24	3,0	2,0	8°	8,0		...62030...

MTNY



Right hand

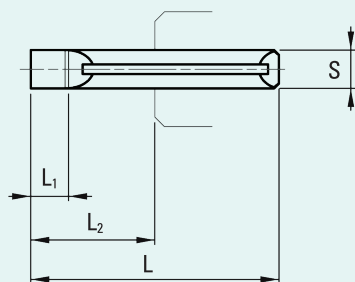
Left hand

MTNX...-R-K10	MTNX...-R-TiAIN	MTNX...-L-K10	MTNX...-L-TiAIN
•	•	•	•
•	•	•	•
•	•	○	○
•	•	○	○

**Order number:** Add Ident. No. to type of tool, e.g.:  
MTNX-41015-R-K10

- Available ex stock
- Delivery time on request

## Blanks



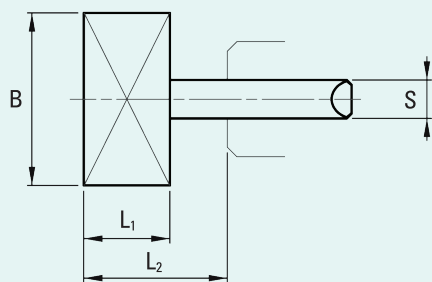
$\gamma$  : Rake angle

MTR0



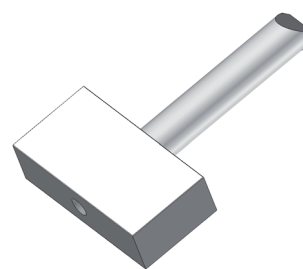
Type of tool						MTR0...-K10
$\varnothing S$	L	L <sub>1</sub>	L <sub>2</sub>	$\gamma$	Ident. N°	
4	31	4	15	0°	...40015...	•
6	43	6	23	0°	...60023...	•

## Adjusting tool



$\gamma$  : Rake angle

MTRP

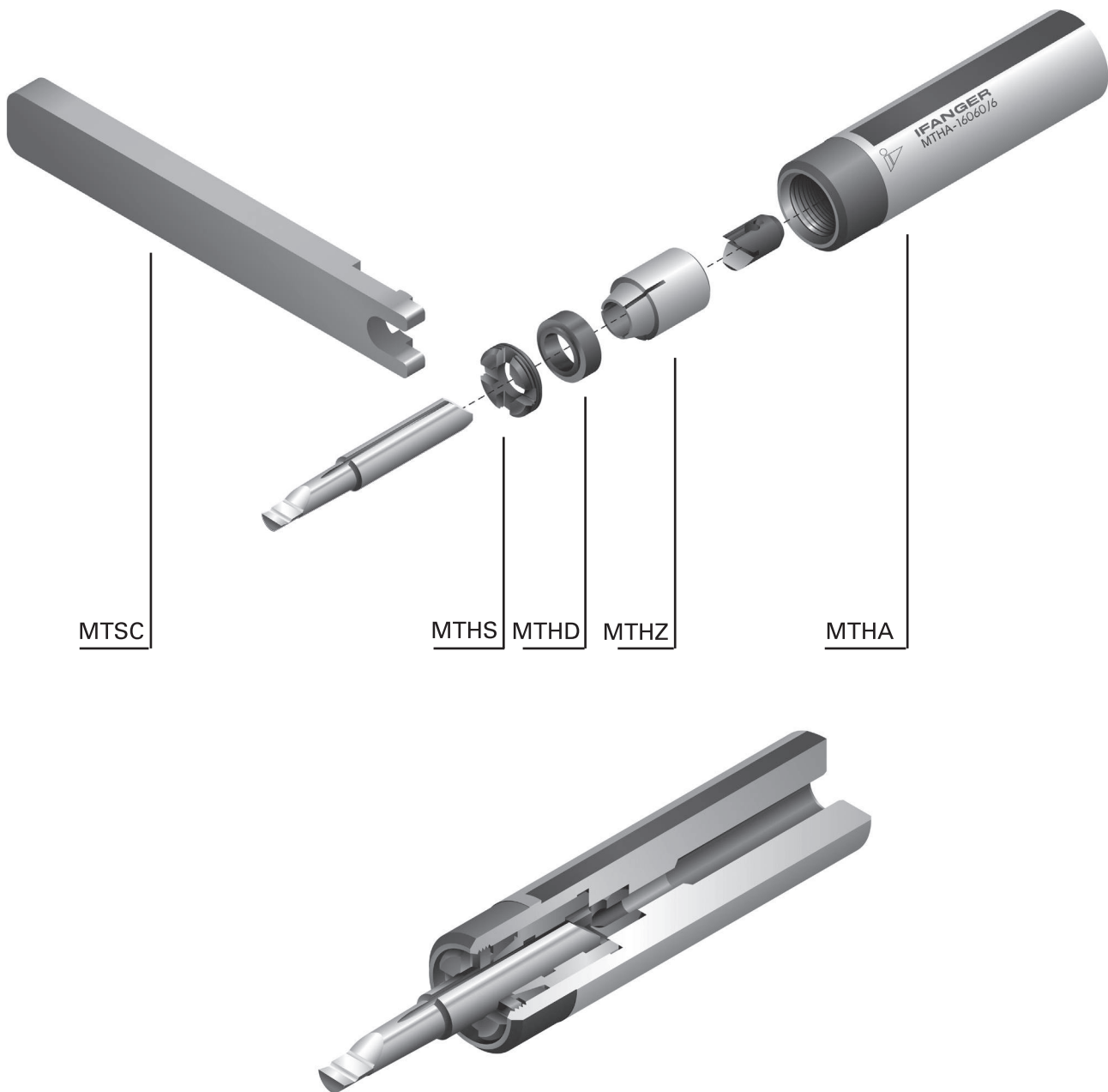


Type of tool					MTRP-...
$\varnothing S$	L <sub>1</sub>	L <sub>2</sub>	B	Ident. N°	
4	10	17	20	...00004	•
6	10	18	20	...00006	•

Order number: Add ident. No. to type of tool, e.g.:  
MTR0-40015-R-K10

- Available ex stock
- Delivery time on request



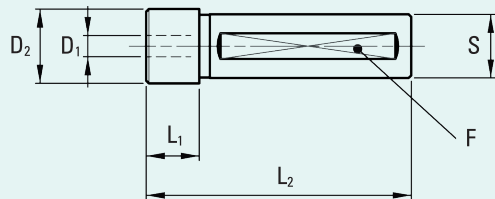


### 〈특징〉

- ※ Shank 내부에 직접 지지해 줌으로 강력 절삭에도 밀리지 않는다.
- ※ 안정적인 체결방식으로 떨림 현상이 없어 최상의 면 조도를 얻을 수 있다.
- ※ V홈으로 인하여 센터조정이 필요 없다.
- ※ 오일 홀이 있어 깊은 구멍가공에 적합하다

The tool positioner is bolted down stable in the holder and should not be unfixed. It is not available as a spare part.

# Holders with round shank



MTHA



With coolant capabilit

Type of holder							MTHA...	MTHA...	MTHA...
ØS	ØD <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>	ØD <sub>2</sub>	F	Ident. N°		Machine	Machine
7	4	25	49	14	1x	...07049/4	●		
8	4	21	60	14	1x	...08060/4	●		
10	4	21	60	14	1x	...10060/4	●		
10	6	25	60	16	1x	...10060/6	●		
12	4	10	50	14	1x	...12050/4	●		
12	4	10	90	14	1x	...12090/4	●		
12	6	25	60	16	1x	...12060/6	●		
5/8"	4	-	50	5/8"	1x	...15050/4	●	● Citizen R04 / R07	
16	4	10	50	14	1x	...16050/4	●	● Tornos Micro	
16	4	10	52	14	4x	...16052/4			
16	4	10	90	14	1x	...16090/4	● Star 10J		
16	6	10	60	15,8	1x	...16060/6	● Star 10J		
3/4"	4	20	70	18,8	2x	...19070/4		● Citizen	
3/4"	6	20	70	18,8	2x	...19070/6		● Citizen	
3/4"	4	20	145	18,8	2x	...19145/4		● Citizen	
3/4"	6	20	145	18,8	2x	...19145/6		● Citizen	
20	4	20	70	19,6	1x	...20070/4	● Tsugami		
20	6	20	70	19,6	1x	...20070/6	● Tsugami		
20	4	20	160	19,6	2x	...20160/4		● Tornos DECO, Tsugami	
20	6	20	160	19,6	2x	...20160/6		● Tornos DECO, Tsugami	
20	4	20	161	19,6	-	...20161/4			● Tornos DECO
20	6	20	161	19,6	-	...20161/6			● Tornos DECO
22	4	20	130	21,6	2x	...22130/4		● Star	
22	6	23	130	21,6	2x	...22130/6		● Star	
25	4	20	80	24,6	1x	...25080/4	● Hanwha		
25	6	20	80	24,6	1x	...25080/6	● Hanwha		
25	4	20	100	24,6	1x	...25100/4	● Hanwha		
25	6	20	100	24,6	1x	...25100/6	● Hanwha		
25	4	20	170	24,6	4x	...25170/4		● Tornos DECO, Hanwha	
25	6	23	170	24,6	4x	...25170/6		● Tornos DECO, Hanwha	
25	4	20	171	24,6	-	...25171/4			● Tornos DECO
25	6	20	171	24,6	-	...25171/6			● Tornos DECO
1"	4	20	70	25	2x	...26070/4		● Citizen	
1"	6	20	70	25	2x	...26070/6		● Citizen	
1"	4	20	145	25	2x	...26145/4		● Citizen	
1"	6	23	145	25	2x	...26145/6		● Citizen	
28	4	20	100	27,6	2x	...28100/4		● Traub	
28	6	23	100	27,6	2x	...28100/6		● Traub	
32	4	20	80	31,6	1x	...32080/4	● Hanwha		
32	6	23	80	31,6	1x	...32080/6	● Hanwha		

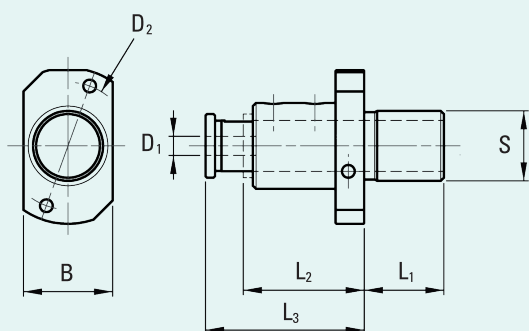
From shank diameter S 16 mm with  
thread G1/8" for coolant connection.

Space parts refer to page 25

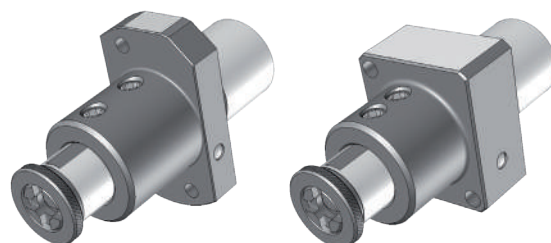
**Order number:** Add ident. No. to type of tool, e.g.:  
MTHA-07049/4

- Available ex stock
- Delivery time on request

## Holders for back operation on CNC sliding head automatic lathes

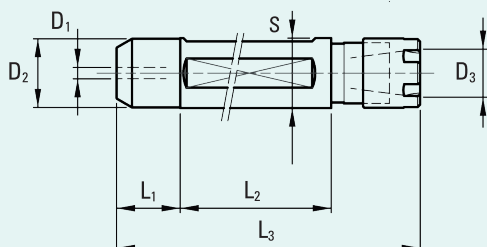


MTHB



Type of holder								MTHB...	
ØS	ØD <sub>1</sub>	ØD <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	B	Ident. N°	Maschine/Machine/Machine	
16	4	31	21	26	42	24	...16065/4	●	Star
16	4	32	21	38	54	17	...16074/4	●	Star SR10 J
22	4	40	25	38	58	28	...22078/4	●	Star
22	6	40	25	38	58	28	...22078/6	●	Star
22	4	39	25	40	62	37,5	...22079/4	●	Star SR20 IV und Star SW20
22	6	39	25	40	62	37,5	...22079/6	●	Star SR20 IV und Star SW20
22	4	38	30	34	56	38	...22080/4	●	Star SR32
22	6	38	30	34	56	38	...22080/6	●	Star SR32
32	4	40	25	39	59	39	...32081/4	○	Hanwha
32	6	40	25	39	59	39	...32081/6	●	Hanwha
33	4	40	37	39	59	36	...33091/4	○	Hanwha
33	6	40	37	39	59	36	...33091/6	●	Hanwha
34	4	42	25	39	59	38	...34081/4	●	Star
34	6	42	25	39	59	38	...34081/6	●	Star

## Double holders for MicroTurn and collet chuck ER



MTHE



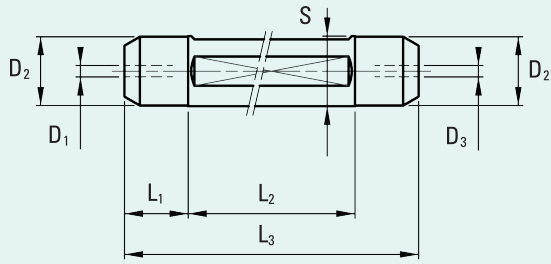
Type of holder								MTHE...	
ØS	ØD <sub>1</sub>	ØD <sub>2</sub>	ØD <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	Ident. N°	Maschine/Machine/Machine	
16	4	16	ER11	-	55	75	...16071/4	●	Tornos Micro
16	4	14	ER11	10	85	115	...16110/4	●	Star SR10 J
3/4"	4	18,6	ER11	23	70	114	...19108/4	●	Citizen
3/4"	6	18,6	ER11	23	70	114	...19108/6	●	Citizen
3/4"	4	18,6	ER11	23	100	144	...19138/4	●	Citizen
3/4"	6	18,6	ER11	23	100	144	...19138/6	●	Citizen
20	4	19,6	ER11	20	32	76	...20071/4	●	Citizen B12
22	4	21,6	ER16	20	78	126	...22114/4	●	Star
22	6	21,6	ER16	20	78	126	...22114/6	●	Star
22	4	21,6	ER16	20	109	157	...22145/4	○	Star
22	6	21,6	ER16	20	109	157	...22145/6	○	Star

**Order number:** Add Ident. No. to type of tool, e.g.:  
MTHB-16065/4

- Available ex stock
- Delivery time on request

## Double holders for MicroTurn

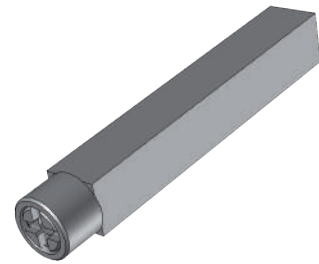
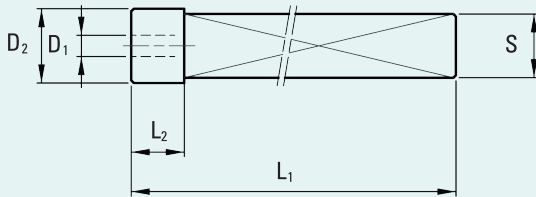
MTHC



Type of holder								MTHC...	
ØS	ØD <sub>1</sub>	ØD <sub>2</sub>	ØD <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	Ident. N°	Machine	
5/8"	4	-	4	-	-	48	...15048/4	•	Citizen R04/R07
16	4	16	4	-	-	70	...16070/4	•	Tornos Micro
16	4	14	4	10	90	110	...16110/4	•	Star SR10J
22	4	21,6	4	20	32	114	...22114/4	•	Star
22	4	21,6	6	20	74	114	...22114/46	•	Star
22	6	21,6	6	20	74	114	...22114/6	•	Star
22	4	21,6	4	20	95	135	...22135/4	•	Star
22	4	21,6	6	20	95	135	...22135/6	•	Star
22	4	21,6	4	20	105	145	...22145/4	○	Star
22	6	21,6	6	20	105	145	...22145/6	○	Star

## Holders with square shank

MTHV



Type of holder						MTHV...	
S	ØD <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>	ØD <sub>2</sub>	Ident. N°		
12 × 12	4	85	10	14	...12085/4	•	
12 × 12	6	99	24	16	...12100/6	•	
16 × 16	4	100	3	14	...16100/4	•	
16 × 16	6	100	10	15,8	...16100/6	•	

## Spare parts for MTH...

Spare part		Wrench	Screw	Thrust collar	Collet chuck
for MTH.../4		MTSC...	MTHS...	MTHD...	MTHZ...
...00004		•	•	•	•
for MTH.../6		•	•	•	•
...00006		•	•	•	•



1.DIAMETAL

2. BIMU

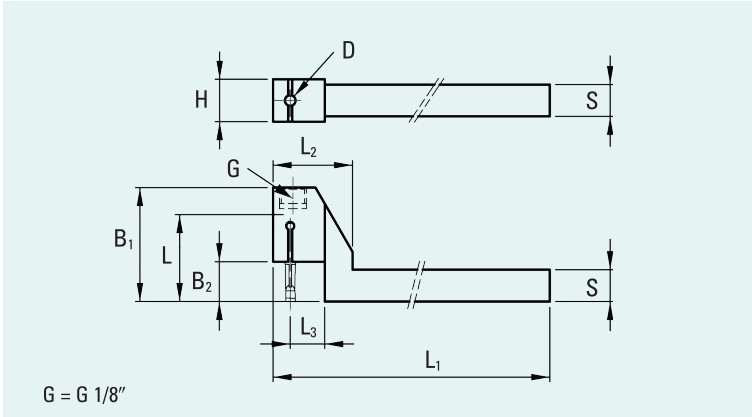
3. IFANGER

4. ZEUS

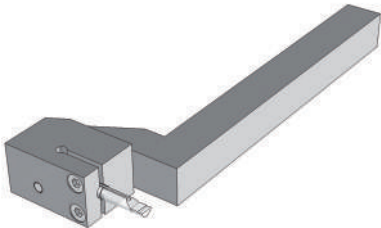
5. ARNO

6. Whiz Cut

7. SPHINX



MTAN



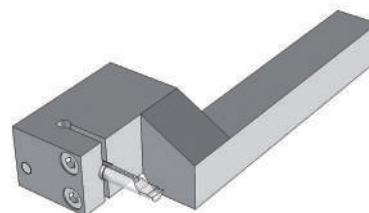
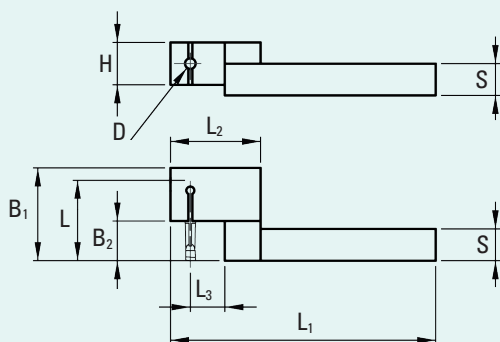
Type of holder										MTAN...
S	ØD	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	B <sub>1</sub>	B <sub>2</sub>	H	Ident. N°	
12	4	31	130	30	13	43	15	16	...12131/431	●
12	4	36	130	30	13	48	20	16	...12131/436	○
12	6	43	130	30	13	53	21	16	...12131/643	●
12	6	48	130	30	13	58	26	16	...12131/648	○
12	6	53	130	30	13	63	31	16	...12131/653	○
16	4	31	130	34	13	43	15	16	...16131/431	●
16	4	36	130	34	13	48	20	16	...16131/436	○
16	6	43	130	34	13	53	21	16	...16131/643	●
16	6	48	130	34	13	58	26	16	...16131/648	○
16	6	53	130	34	17	63	31	16	...16131/653	○

**Order number:** Add ident. No. to type of tool, e.g.:  
MTAN-12131/431

● Available ex stock  
○ Delivery time on request

## Cranked holders, right hand

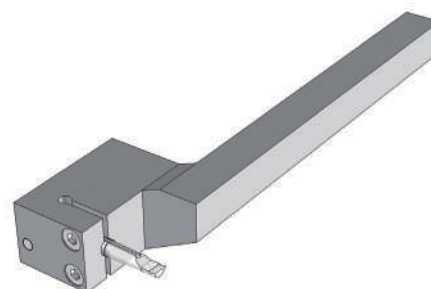
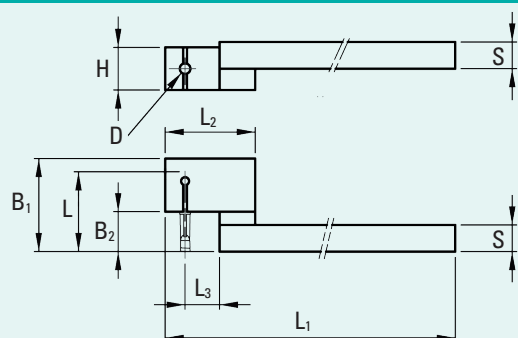
MTAR



Type of holder										MTAR...
S	ØD	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	B <sub>1</sub>	B <sub>2</sub>	H	Ident. N°	
7	4	31	100	34	13	35	15	16	...07100/431	△
8	4	26	100	34	13	29	8	16	...08100/426	○
8	4	31	100	34	13	35	15	16	...08100/431	●
10	4	26	100	34	13	29	8	16	...10100/426	○
10	4	31	100	34	13	35	15	16	...10100/431	●
10	4	36	100	34	13	40	21	16	...10100/436	○
10	6	35	100	34	13	38	14	16	...10100/635	○
10	6	43	100	34	13	45	21	16	...10100/643	●
10	6	48	100	34	13	52	28	16	...10100/648	○
12	4	26	100	34	13	29	8	16	...12100/426	○
12	4	31	100	34	13	35	15	16	...12100/431	●
12	4	36	100	34	13	40	21	16	...12100/436	○
12	6	35	100	34	13	38	14	16	...12100/635	○
12	6	43	100	34	13	45	21	16	...12100/643	●
12	6	48	100	34	13	52	28	16	...12100/648	○
12	6	53	100	34	13	57	33	16	...12100/653	○
16	4	31	130	34	13	35	15	16	...16130/431	●
16	4	36	130	34	13	40	21	16	...16100/436	○
16	6	35	130	34	13	38	14	16	...16100/635	○
16	6	43	130	34	13	45	21	16	...16130/643	●
16	6	48	130	34	13	52	28	16	...16130/648	○
16	6	53	130	38	17	57	33	16	...16130/653	○
16	6	61	130	38	17	66	42	16	...16130/661	○
16	6	71	130	38	17	76	52	16	...16130/671	○

## Cranked holders, left hand

MTAL

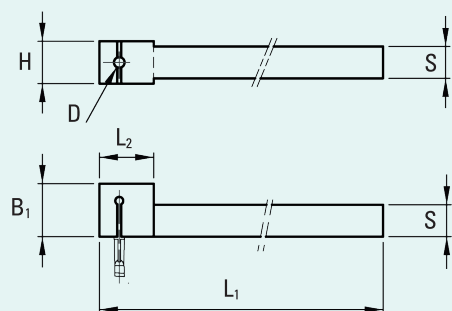


Type of holder										MTAL...
S	ØD	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	B <sub>1</sub>	B <sub>2</sub>	H	Ident. N°	
7	4	31	120	34	13	35	15	16	...07120/4	△
8	4	31	130	34	13	35	15	16	...08130/4	△
10	6	43	130	34	13	45	21	16	...10130/6	△
12	4	31	130	34	13	35	15	16	...12130/4	△
12	6	43	130	34	13	45	21	16	...12130/6	△
16	4	31	150	34	13	35	15	16	...16150/4	△
16	6	43	150	34	13	45	21	16	...16150/6	△

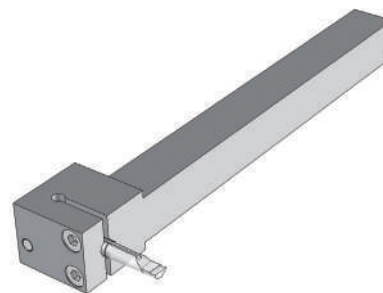
△ Until use up of stock



## Neutral holders, without coolant capability, for back operation on DECO

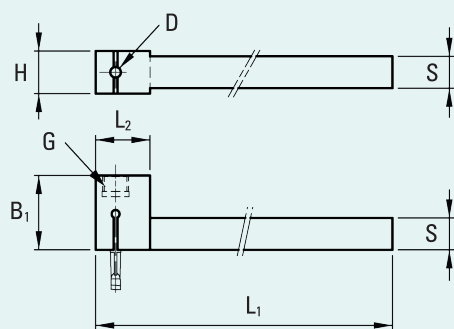


MTAT



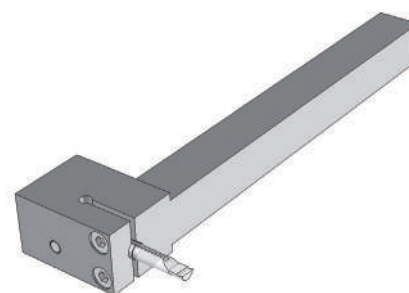
Type of holder							MTAT...
S	Ø D	L <sub>1</sub>	L <sub>2</sub>	B <sub>1</sub>	H	Ident. N°	
8	4	100	20,5	20	16	...08100/4	●
10	4	100	20,5	20	16	...10100/4	●
12	4	130	20,5	20	16	...12130/4	●
12	6	130	20,5	24	16	...12130/6	●
16	4	130	20,5	20	16	...16130/4	●
16	6	130	20,5	24	16	...16130/6	●

## Neutral holders, with coolant capability, for back operation on DECO



G = G 1/8"

MTAT



Type of holder							MTAT...
S	ØD	L <sub>1</sub>	L <sub>2</sub>	B <sub>1</sub>	H	Ident. N°	
12	4	130	20,5	28	16	...12131/4	●
12	6	130	20,5	32	16	...12131/6	●
16	4	130	20,5	28	16	...16131/4	●
16	6	130	20,5	32	16	...16131/6	●

**Order number:** Add ident. No. to type of tool, e.g.:  
MTAT-08100/4

- Available ex stock
- Delivery time on request

# KNURLING Tool



## Knurling roll holders for knurling by cutting

- Knurling roll holder RZSL
- Knurling roll holder RZSR-K/RZSR
- Knurling roll holder RKDL
- Knurling roll holder RKDR-K/RKDR
- Knurling roll holder RRTN

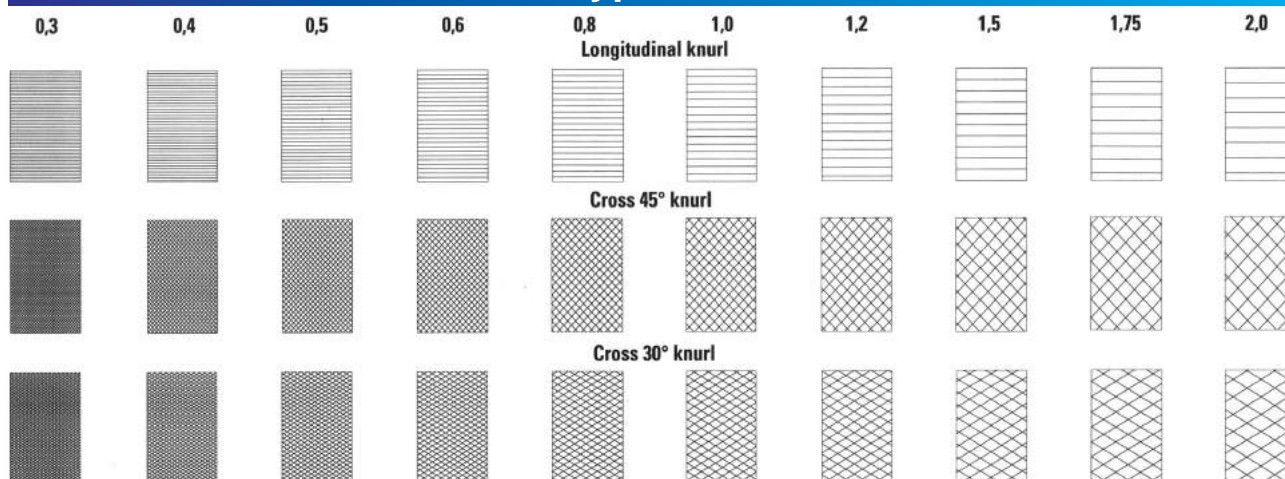
## Knurling roll holders for knurling by deformation

- Knurling roll holder RCSL
- Knurling roll holder RCSR
- Conventional Knurling roll holder for knurling by deformation RASN
- Knurling roll holder RTDL for TORNOS screw machines
- Knurling roll holder RCDL
- Knurling roll holder RCDR
- Adjustable knurling roll holder RVDR
- General remarks to knurling by deformation



# IFANGER

## Pitches of knurls in mm and types of knurls



## Cutting Data : Knurling by deformation

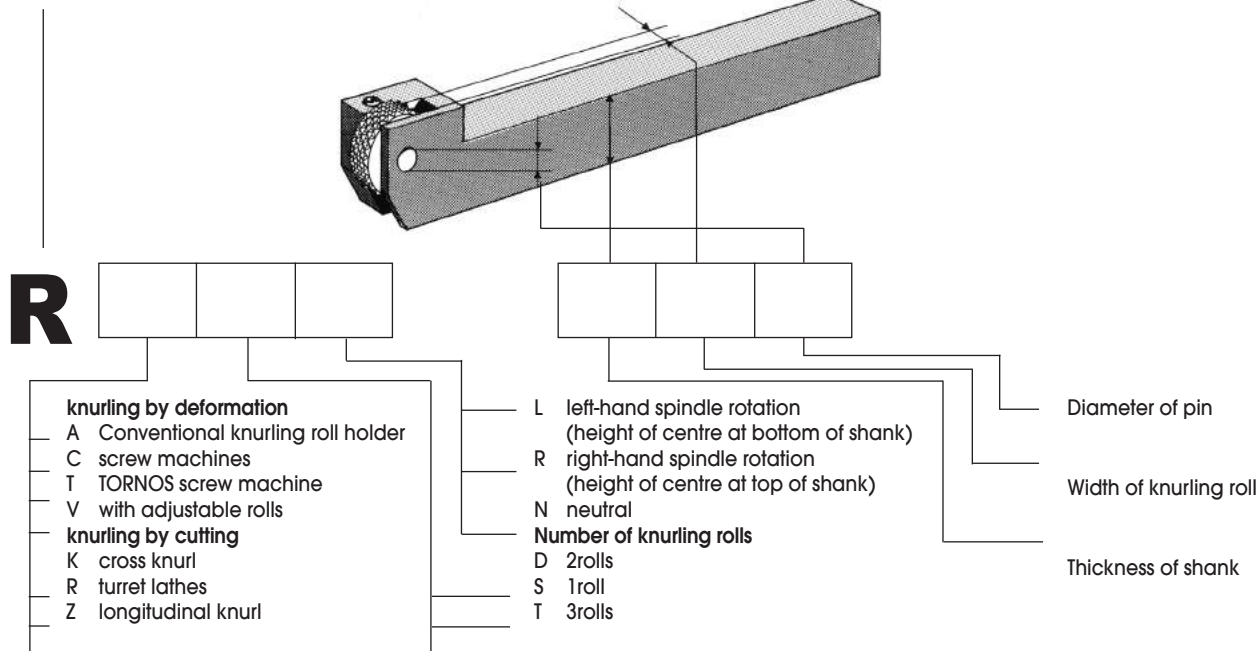
Pitch		0.3		0.4		0.5		0.6		0.8		1.0		1.2		1.5		2.0	
Pitch		A/B	G	A/B	G	A/B	G	A/B	G	A/B	G	A/B	G	A/B	G	A/B	G	A/B	G
Material	φ	Growth+mm																	
Free cutting steel	10	0.09	0.05	0.14	0.10	0.18	0.12	0.20	0.15	0.22	0.16	-	-	-	-	-	-	-	-
	20	0.11	0.06	0.15	0.10	0.21	0.12	0.27	0.19	0.34	0.22	0.42	0.28	0.46	0.33	0.53	0.42	0.61	0.50
Stainless steel	10	0.10	0.06	0.11	0.08	0.14	0.10	0.17	0.12	0.20	0.13	-	-	-	-	-	-	-	-
	20	0.14	0.06	0.18	0.10	0.22	0.14	0.26	0.18	0.35	0.23	0.48	0.28	0.54	0.34	0.60	0.44	-	-
Brass	5	0.10	0.06	0.14	0.08	0.18	0.10	0.22	0.15	0.26	0.16	-	-	-	-	-	-	-	-
	10	0.10	0.07	0.15	0.10	0.20	0.15	0.24	0.18	0.30	0.22	0.35	0.28	0.41	0.32	-	-	-	-
Aluminium	5	0.10	0.06	0.12	0.08	0.18	0.11	0.22	0.15	0.26	0.21	-	-	-	-	-	-	-	-
	10	0.10	0.06	0.14	0.09	0.19	0.18	0.22	0.24	0.38	0.30	0.42	0.33	0.48	0.38	0.57	0.45	0.66	0.51

## Knurling by cutting - Approx. cutting values

Material to be machined	φ of knurling roll	2-12		12-40		40-250		250+	
		usiner φ of workpiece		usiner φ of workpiece		usiner φ of workpiece		usiner φ of workpiece	
		V m/Min	s mm/U/t/rev	V m/Min	s mm/U/t/rev	V m/Min	s mm/U/t/rev	V m/Min	s mm/U/t/rev
Steel up to 600 N.mm <sup>2</sup>	8.9-11	30	0.05-0.08						
	14.5-15	40	0.07-0.09	40	0.07-0.09				
	20-21.5	60	0.07-0.14	60	0.07-0.15	55	0.07-0.15		
	25			100	0.10-0.20	100	0.10-0.20	50	0.10-0.20
Steel up to 900 N.mm <sup>2</sup>	8.9-11	25	0.04-0.07						
	14.5-15	35	0.06-0.08	30	0.06-0.08				
	20-21.5	45	0.06-0.12	45	0.06-0.12	40	0.06-0.12		
	25			60	0.08-0.16	55	0.08-0.16	50	0.08-0.16
Stainless steel	8.9-11	20	0.04-0.06						
	14.5-15	30	0.06-0.08	28	0.06-0.08				
	20-21.5	40	0.06-0.12	35	0.06-0.12	32	0.06-0.12		
	25			45	0.08-0.17	42	0.08-0.17	40	0.08-0.17
Grey cast iron	8.9-11	22	0.04-0.06						
	14.5-15	30	0.06-0.08	28	0.06-0.08				
	20-21.5	40	0.06-0.12	35	0.06-0.12	32	0.06-0.12		
	25			45	0.08-0.17	42	0.08-0.17	40	0.08-0.17
Cast steel	8.9-11	25	0.04-0.07						
	14.5-15	35	0.05-0.08	30	0.05-0.08				
	20-21.5	45	0.06-0.12	45	0.06-0.12	40	0.06-0.12		
	25			90	0.08-0.15	65	0.08-0.15	60	0.08-0.15
Brass 58	8.9-11	60	0.06-0.10						
	14.5-15	70	0.08-0.12	60	0.08-0.12				
	20-21.5	100	0.08-0.20	100	0.08-0.20	90	0.08-0.20		
	25			140	0.10-0.20	130	0.10-0.20	115	0.10-0.20
Brass 60	8.9-11	50	0.05-0.08						
	14.5-15	60	0.06-0.10	60	0.06-0.10				
	20-21.5	90	0.07-0.15	90	0.07-0.15	80	0.07-0.15		
	25			125	0.08-0.20	120	0.08-0.20	105	0.08-0.20
"Aluminium, copper"	8.9-11	70	0.06-0.13						
	14.5-15	80	0.08-0.18	70	0.08-0.18				
	20-21.5	120	0.10-0.25	110	0.10-0.25	100	0.10-0.25		
	25			150	0.10-0.35	135	0.10-0.35	125	0.10-0.35
Bronze	8.9-11	35	0.05-0.08						
	14.5-15	45	0.07-0.09	40	0.07-0.09				
	20-21.5	60	0.07-0.14	60	0.07-0.14	55	0.07-0.14		
	25			80	0.10-0.18	86	0.10-0.18	80	0.10-0.18
V= Cutting speed		s= feed							

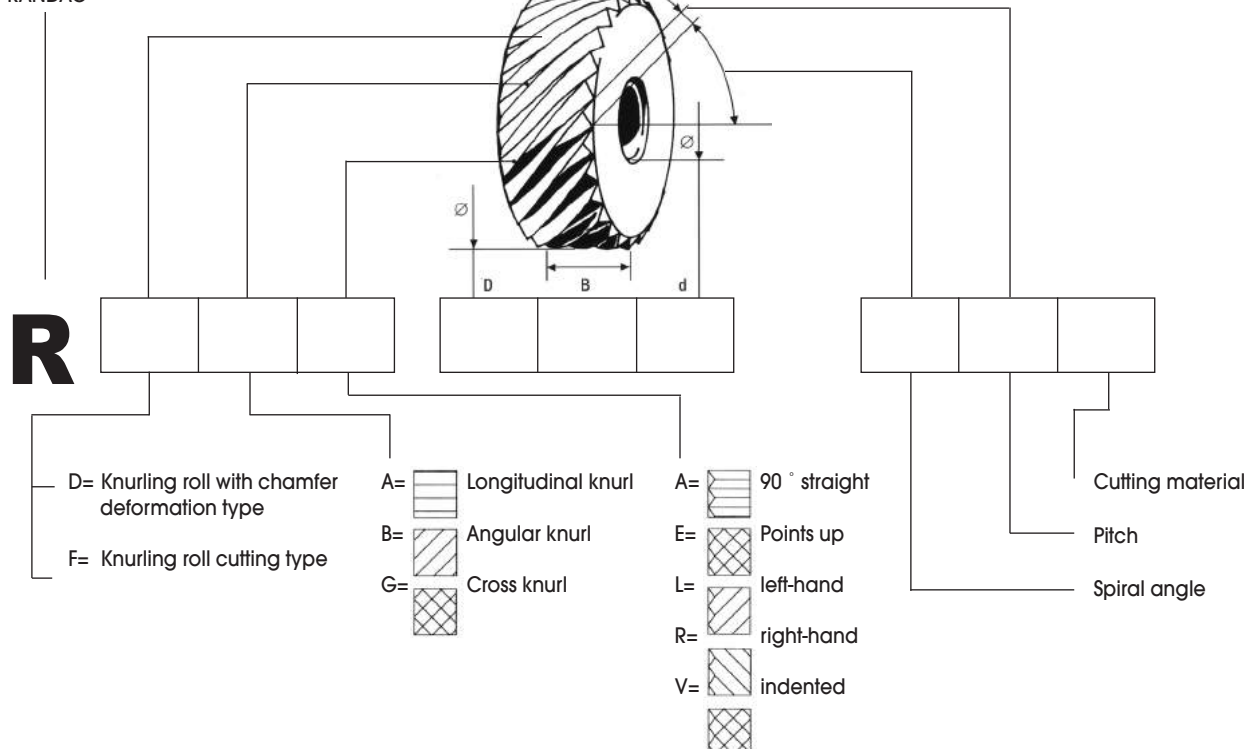
## Knurling roll holders

RANDAG

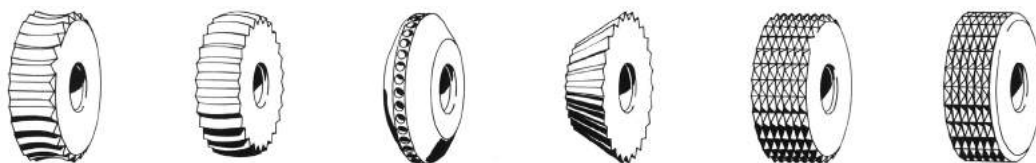


## Identification Knurling rolls

RANDAG

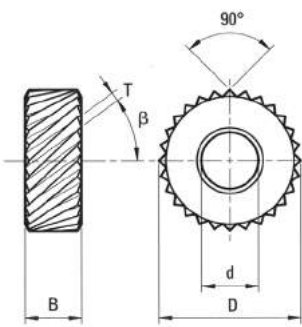


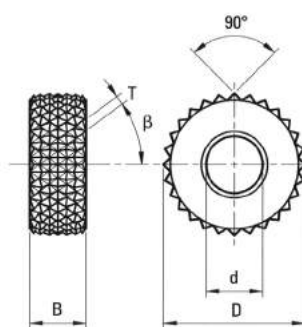
## Special knurling rolls



Special knurling rolls according to different standards or to customers drawing available ex stock or at short notice

## Rolls for knurling by deformation RD HSS

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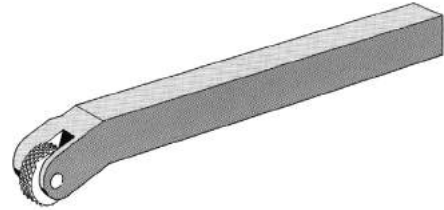
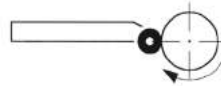
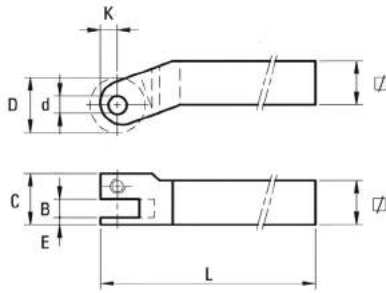
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Availability ● standard ex stock ○ semi-standard, 3 - 4 weeks



## 7. SPHINX

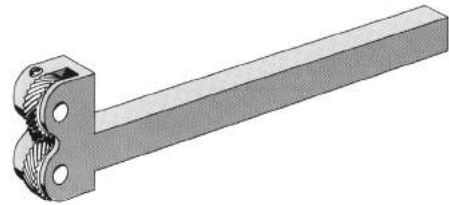
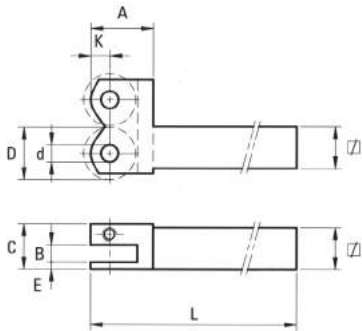
## RCSL type HOLDER Knurling roll holder for knurling by deformation



Knurling applications  
Longitudinal knurl with knurling rolls RDAA  
Cross knurl with knurling rolls RDGE/RDGV  
Positioning of roll holder relative to spindle rotation

Type of knurling roll holder for knurling rolls										Ident. No	RCSL-... available ex stock
∅	E	C	L	K	Dmin-max	x	B	x	d		
6	1.5	10	120	3.3	8-10	x	3	x	3	...-0633	•
7	1.5	10	120	3.3	8-10	x	3	x	3	...-0733	•
7	1.5	11	120	3.3	8-10	x	4	x	3	...-0743	•
8	1.5	10	120	3.3	8-10	x	3	x	3	...-0833	•
8	1.5	11	120	3.3	8-10	x	4	x	3	...-0843	•
8	1.5	11	120	3.9	10-15	x	4	x	4	...-0844	•
8	1.5	13	120	3.9	15	x	5	x	5	...-0855	•
10	1.5	10	135	3.4	8-10	x	3	x	3	...-1033	•
10	1.5	11	135	4.1	10-15	x	4	x	4	...-1044	•
10	2.0	13	135	4.1	15	x	5	x	5	...-1055	•
12	2.0	12	150	4.1	10-15	x	4	x	4	...-1244	•
12	2.0	13	150	4.1	15	x	5	x	4	...-1254	•
12	2.0	13	150	4.1	15	x	5	x	5	...-1255	•
14	2.0	14	150	5	10-15	x	4	x	4	...-1444	•
14	2.0	14	150	5	15	x	5	x	5	...-1455	•
14	2.0	14	150	5	20	x	6	x	6	...-1466	•

## RCDR type HOLDER Knurling roll holder for knurling by deformation

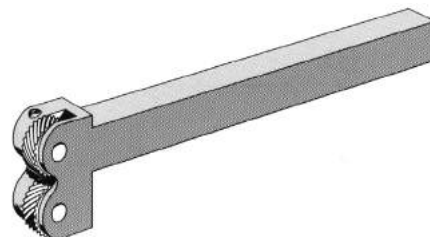
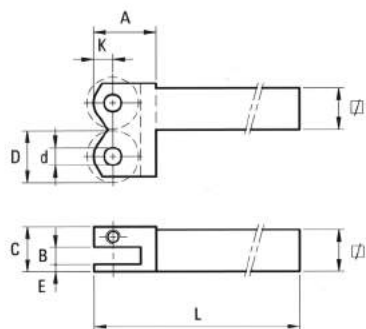


Knurling applications  
Cross knurl 30°/45° with knurling rolls  
RDBL/RDBR 30°/45°  
Positioning of roll holder relative to spindle rotation

Type of knurling roll holder											Ident. No	RCDR-... available ex stock
∅	E	C	L	A	K	Dmin-max	x	B	x	d		
8	10	1.5	100	10	3	8	x	3	x	3	...-0833/08	•
8	10	1.5	100	12	3.5	10	x	3	x	3	...-0833/10	•
10	10	1.5	100	10	3	8	x	3	x	3	...-1033/08	•
10	10	1.5	100	12	3.5	10	x	3	x	3	...-1033/10	•
10	12	1.5	100	10	3	8	x	4	x	3	...-1043/10	•
10	12	2.0	100	12	3.5	10	x	4	x	3	...-1043/10	•
10	12	2.0	100	12	4	10	x	4	x	4	...-1044/10	•
12	12	2.0	115	12	4	10	x	4	x	4	...-1244/10	•
12	12	2.0	115	18	5.5	15	x	4	x	4	...-1244/15	•
12	12	2.0	115	18	5.5	15	x	5	x	4	...-1254/15	•
12	12	2.0	115	18	5.5	15	x	5	x	5	...-1255/15	•
16	16	2.0	120	18	5.5	15	x	4	x	4	...-1644/15	•
16	16	2.0	120	18	5.5	15	x	5	x	4	...-1654/15	•
16	16	2.0	120	18	5.5	15	x	5	x	5	...-1655/15	•
16	16	2.0	120	18	5.5	15	x	6	x	4	...-1664/15	•
20	20	2.0	120	18	5.5	15	x	4	x	4	...-2044/15	•
20	20	2.0	120	18	5.5	15	x	5	x	4	...-2054/15	•
20	20	2.0	120	18	5.5	15	x	6	x	4	...-2064/15	•
20	20	2.0	120	21	6.5	20	x	6	x	6	...-2066/20	•
20	20	2.0	120	21	6.5	20	x	8	x	6	...-2086/20	•



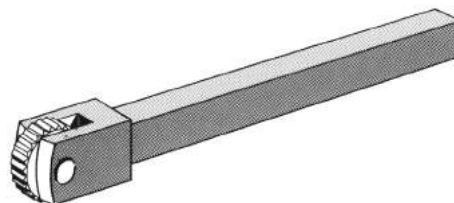
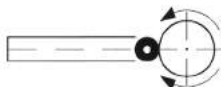
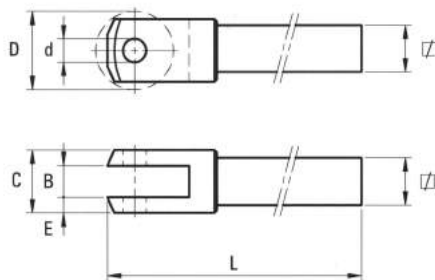
## RCDL type HOLDER Knurling roll holder for knurling by deformation



Knurling applications  
Cross knurl 30°/45° with knurling rolls  
RDBL/RDBR 30°/45°  
Positioning of roll holder relative to spindle rotation

Type of knurling roll holder for knurling rolls												RCDL-...		
∅	C	E	L	A	K	D	x	B	x	d	Ident. No	• = lieferbar ab Lager livrable du stock available ex stock		
6	10	1.5	120	10	3	8	x	3	x	3	...-0633/08	•		
7	10	1.5	120	10	3	8	x	3	x	3	...-0733/08	•		
7	11	1.5	120	10	3	8	x	4	x	3	...-0743/08	•		
8	10	1.5	135	10	3	8	x	3	x	3	...-0833/08	•		
8	10	1.5	135	11.5	3.5	10	x	3	x	3	...-0833/10	•		
8	12	1.5	135	10	3	8	x	4	x	3	...-0843/08	•		
10	10	1.5	135	10	3	8	x	3	x	3	...-1033/08	•		
10	10	1.5	135	11.5	3.5	10	x	3	x	3	...-1033/10	•		
10	12	1.5	135	10	3	8	x	4	x	3	...-1043/08	•		
10	12	2.0	135	11.5	3.5	10	x	4	x	4	...-1044/10	•		
12	12	2.0	150	11.5	3.5	10	x	4	x	4	...-1244/10	•		

## RASN type HOLDER Knurling roll holder for knurling by deformation

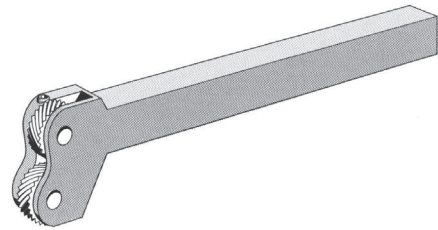
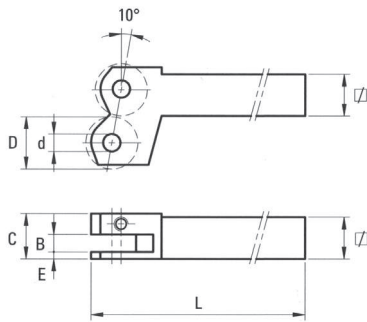


Knurling applications  
Longitudinal knurl with knurling rolls RDAA  
Cross knurl 30°/45° with knurling rolls RDGE/RDGV 30°/45°  
Spindle rotation

Type of knurling roll holder for knurling rolls											RASN-... available ex stock		
∅	C	F	L	Dmin-max	x	B	x	d	ex	Ident. No			
7	8	2	120	8	x	4	x	3	KL101	...-0743	•		
8	8	2	120	8	x	4	x	3	KL102	...-0843	•		
7	10	3	120	10-15	x	4	x	4	KL103	...-0744	•		
8	10	3	120	10-15	x	4	x	4	KL104	...-0844	•		
10	10	3	120	10-15	x	4	x	4	KL105	...-1044	•		
8	12	3.5	120	15	x	5	x	5	KL106	...-0855	•		
10	12	3.5	120	15	x	5	x	5	KL107	...-1055	•		
12	12	3.5	120	15	x	5	x	5	KL108	...-1255	•		
10	16	4	160	20	x	8	x	6	KL109	...-1086	•		
12	16	4	160	20	x	8	x	6	KL110	...-1286	•		
12	20	5	160	20	x	10	x	6	KL111	...-12106	•		
20	20	5	160	20	x	10	x	6	KL112	...-20106	•		

## RTDL type HOLDER

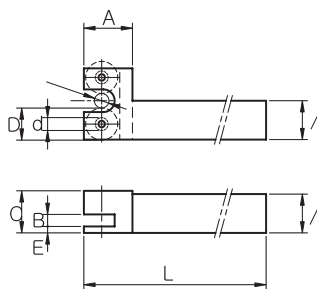
Knurling roll holder for knurling  
by deformation on TORNOS screw machines



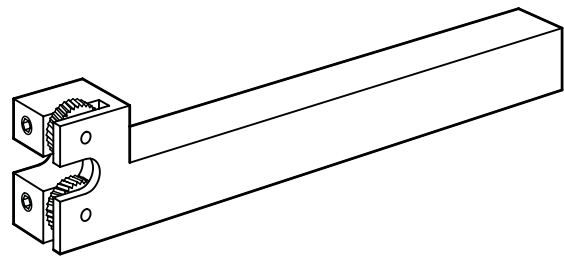
Knurling applications  
Cross knurl 30° / 45° with knurling rolls  
RDBL/RDBR 30° / 45°  
For use on TORNOS screw machines, tool post no. 2

Type of knurling roll holder for knurling rolls									Ident. No	RTDL-...
∅	C	E	L	D	x	B	x	d		
6	10	1.5	120	8	x	3	x	3	...-0633/08	•
7	10	1.5	120	8	x	3	x	3	...-0733/08	•
7	10	1.5	120	8	x	4	x	3	...-0743/08	•
8	10	1.5	120	8	x	3	x	3	...-0833/08	•
8	10	1.5	120	8	x	4	x	3	...-0843/08	•
10	10	1.5	150	10	x	4	x	4	...-1044/10	•
12	12	2	150	10	x	4	x	4	...-1244/10	•
12	12	2	150	15	x	4	x	4	...-1244/15	•

## RVDR type HOLDER



RVDR

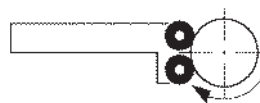


Knurling applications

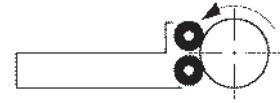
Positioning of roll and  
holder relative to  
spindle rotation

Cross knurl 45°  
with knurling rolls  
RDBL/RDBR 45°

Diamond knurl 30°  
with knurling rolls  
RDBL/RDBR 30°

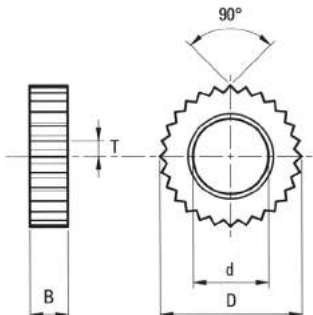
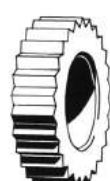


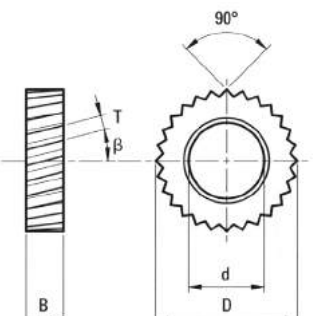
RVDL



RVDR

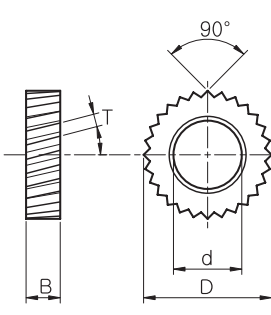
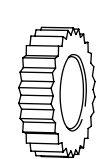
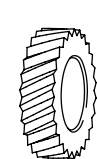
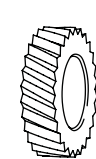
# Rolls for knurling by cutting RF

													RFAA									
Spiral angle $\beta$													0 °				AA					
type																						
Type of roll													RFAA -...									
D	B	d	T=Teilungen					Pitches					Ident. No	HSS				Tin				
			0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.2	1.5	1.75		2.0	Dimension - $\beta$ - pitch - Material							
8.9	2.5	4	•	•	•	•	•	•	•	•	•	•	•	...	09	02	04	00	...	•	•	•
11	3	6	•	•	•	•	•	•	•	•	•	•	•	...	11	03	06	00	...	•	•	•
14.5	3	5	•	•	•	•	•	•	•	•	•	•	•	...	14	03	05	00	...	•	•	•
15	4	8	•	•	•	•	•	•	•	•	•	•	•	...	15	04	08	00	...	•	•	•
15	4	9	•	•	•	•	•	•	•	•	•	•	•	...	15	04	09	00	...	•	•	•
20	5	8	•	•	•	•	•	•	•	•	•	•	•	...	20	05	08	00	...	•	•	•
20	5	11	•	•	•	•	•	•	•	•	•	•	•	...	20	05	11	00	...	•	•	•
21.5	5	8	•	•	•	•	•	•	•	•	•	•	•	...	21	05	08	00	...	•	•	•
25	5	11	•	•	•	•	•	•	•	•	•	•	•	...	25	05	11	00	...	•	•	•
25	6	8	•	•	•	•	•	•	•	•	•	•	•	...	25	06	08	00	...	•	•	•

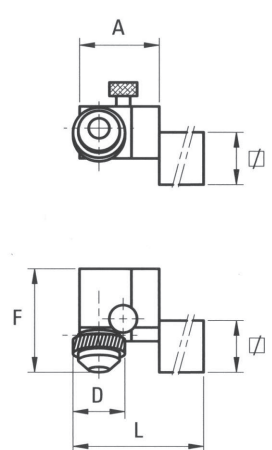
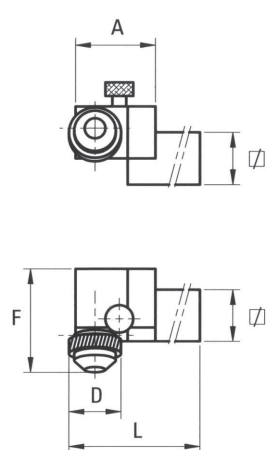
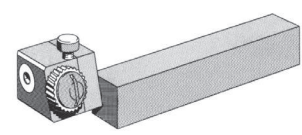
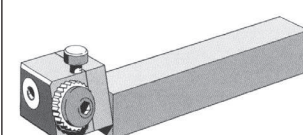
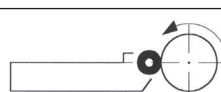
	RFBL		RFBR					
Spiral angle $\beta$	15 ° BL		30 ° BL		15 ° BR		30 ° BR	
type	RFBL -...		RFBL -...		RFBR -...		RFBR -...	
Type of roll	HSS...		HSS...		HSS...		HSS...	
D B d	Tin		Tin		Tin		Tin	
8.9 2.5 4	•	•	•	•	•	•	•	•
11 3 6	•	•	•	•	•	•	•	•
14.5 3 5	•	•	•	•	•	•	•	•
15 4 8	•	•	•	•	•	•	•	•
15 4 9	•	•	•	•	•	•	•	•
20 5 8	•	•	•	•	•	•	•	•
20 5 11	•	•	•	•	•	•	•	•
21.5 5 8	•	•	•	•	•	•	•	•
25 5 11	•	•	•	•	•	•	•	•
25 6 8	•	•	•	•	•	•	•	•

Availability ● standard ex stock ○ semi-standard, 3 - 4weeks

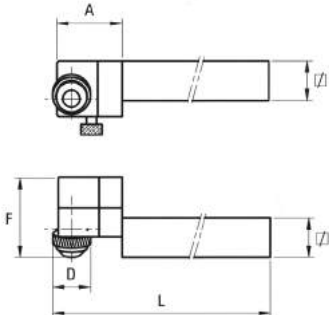
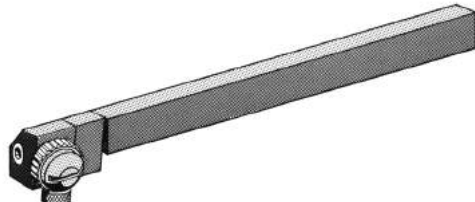
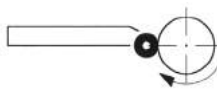
## Rolls for knurling by cutting RF-Solid carbide

															RFAA		RFBL		RFBR					
																								
															HSS		HSS		HSS		HSS		HSS	
Spiral angle Type															0° AA		15° BL		30° BL		15° BR		30° BR	
Type of roll															RFAA-...		RFBL-...		RFBL-...		RFBR-...		RFBR-...	
D B d			T=Teilungen Pas Pitches											Ident. No										
8,9 2,5 4			• • • • •											...-090204-... - ...-HM										
11 3 6			• • • • •											...-110306-... - ...-HM										

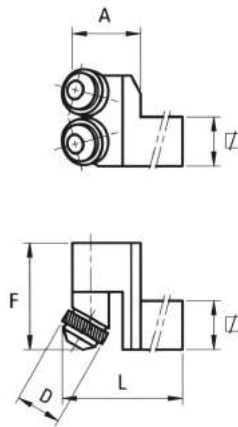
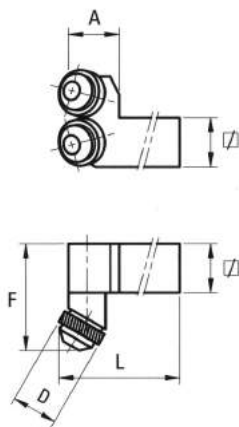
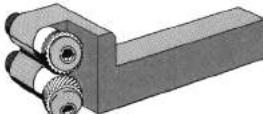
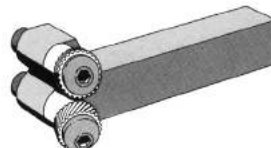
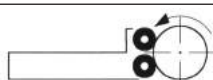
## RZSR type : Knurling roll holder for knurling by cutting

											
RZSR-K	RZSR	RZSR-K	RZSR								
		Knurling applications Longitudinal knurl with roll RFBR 15° Positioning of roll holder relative to spindle rotation									
Type of knurling roll holder		RZSR-...-K	RZSR-...								
∅	L	F	A	D	x	B	x	d	Ident. No	available ex stock	
8	100	24	19	11	x	3	x	6	...-0836	•	
10	110	24	19	11	x	3	x	6	...-1036	•	
12	110	24	19	11	x	3	x	6	...-1236	•	
16	110	24	19	11	x	3	x	6	...-1636	•	
16	110	31	25	15	x	4	x	9	...-1649	○	•
20	130	36	30	20	x	5	x	11	...-20511		•
25	130	41	35	25	x	5	x	11	...-25511		•

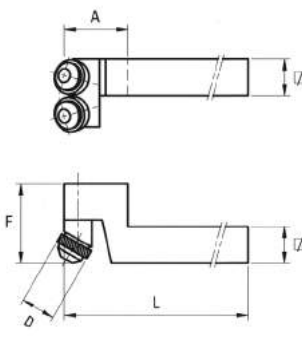
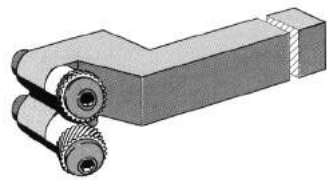
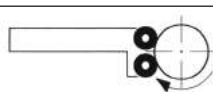
## RZSL type : Knurling roll holder for knurling by cutting

 <p><b>RZSL</b></p>	 <p><b>RZSL</b></p>																																																																									
	Knurling applications Longitudinal knurl with roll RFBL 15° Positioning of roll holder relative to spindle rotation																																																																									
<table><tr><th colspan="9">Type of knurling roll holder</th><th colspan="2">for knurling rolls</th></tr><tr><th>∅</th><th>L</th><th>F</th><th>A</th><th>D</th><th>x</th><th>B</th><th>x</th><th>d</th><th>Ident. No</th></tr><tr><td>8</td><td>135</td><td>22</td><td>18</td><td>11</td><td>x</td><td>3</td><td>x</td><td>6</td><td>...-0836</td></tr><tr><td>10</td><td>135</td><td>24</td><td>18</td><td>11</td><td>x</td><td>3</td><td>x</td><td>6</td><td>...-1036</td></tr><tr><td>12</td><td>135</td><td>24</td><td>21</td><td>11</td><td>x</td><td>3</td><td>x</td><td>6</td><td>...-1236</td></tr><tr><td>16</td><td>140</td><td>31</td><td>25</td><td>15</td><td>x</td><td>4</td><td>x</td><td>9</td><td>...-1649</td></tr></table>	Type of knurling roll holder									for knurling rolls		∅	L	F	A	D	x	B	x	d	Ident. No	8	135	22	18	11	x	3	x	6	...-0836	10	135	24	18	11	x	3	x	6	...-1036	12	135	24	21	11	x	3	x	6	...-1236	16	140	31	25	15	x	4	x	9	...-1649	<table><tr><th colspan="2">RZSL-...</th></tr><tr><th colspan="2">available ex stock</th></tr><tr><td>•</td><td></td></tr><tr><td>•</td><td></td></tr><tr><td>•</td><td></td></tr><tr><td>•</td><td></td></tr></table>	RZSL-...		available ex stock		•		•		•		•	
Type of knurling roll holder									for knurling rolls																																																																	
∅	L	F	A	D	x	B	x	d	Ident. No																																																																	
8	135	22	18	11	x	3	x	6	...-0836																																																																	
10	135	24	18	11	x	3	x	6	...-1036																																																																	
12	135	24	21	11	x	3	x	6	...-1236																																																																	
16	140	31	25	15	x	4	x	9	...-1649																																																																	
RZSL-...																																																																										
available ex stock																																																																										
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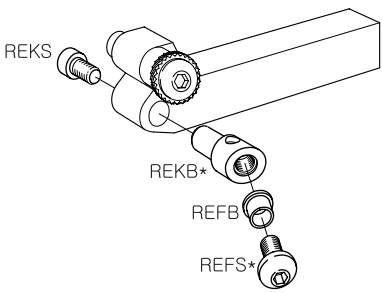
## RKDR type : Knurling roll holder for knurling by cutting

													
RKDR-K	RKDR	RKDR-K	RKDR										
		Knurling applications Cross knurl 45 ° with one roll each RFBR and RFBL 15 ° Cross knurl 30 ° with 2 rolls RFAA Positioning of roll holder relative to spindle rotation											
Type of knurling roll holder for knurling rolls		RKDR-...-K RKDR-...											
∅	L	F	A	D	x	B	x	d	ex DUSS	Ident. No	available ex stock		
8	110	24	20	3-40	11	x	3	x	6	-	...-0836	•	
10	90	27	14	3-40	11	x	3	x	6	K0	...-1036		•
10	110	24	20	3-40	11	x	3	x	6	-	...-1036	•	
12	90	27	14	3-40	11	x	3	x	6	-	...-1236		•
12	110	24	20	3-40	11	x	3	x	6	-	...-1236	•	
16	110	24	20	4-60	11	x	3	x	6	-	...-1636	•	
16	105	39	17	4-60	15	x	4	x	9	K1	...-1649		•
16	115	35	25	4-60	15	x	4	x	9	-	...-1649	•	
20	130	49	23	6-100	20	x	5	x	11	K2	...-20511		•
25	150	62	35	6-250	25	x	5	x	11	K3	...-25511		•

## RKDL : Knurling roll holder for knurling by cutting

 <p><b>RKDL</b></p>	 <p><b>RKDL</b></p>																																																																						
	Knurling applications Longitudinal knurl with roll RFBR 15° Positioning of roll holder relative to spindle rotation																																																																						
<table><tr><th colspan="10">Type of knurling roll holder for knurling rolls</th></tr><tr><th>∅</th><th>L</th><th>F</th><th>A</th><th>D</th><th>x</th><th>B</th><th>x</th><th>d</th><th>Ident. No</th></tr><tr><td>8</td><td>135</td><td>22</td><td>18</td><td>3-40</td><td>11</td><td>x</td><td>3</td><td>x</td><td>6</td><td>...-0836</td></tr><tr><td>10</td><td>135</td><td>24</td><td>18</td><td>3-40</td><td>11</td><td>x</td><td>3</td><td>x</td><td>6</td><td>...-1036</td></tr><tr><td>12</td><td>135</td><td>24</td><td>21</td><td>3-40</td><td>11</td><td>x</td><td>3</td><td>x</td><td>6</td><td>...-1236</td></tr><tr><td>16</td><td>135</td><td>31</td><td>25</td><td>3-60</td><td>15</td><td>x</td><td>4</td><td>x</td><td>9</td><td>...-1649</td></tr></table>	Type of knurling roll holder for knurling rolls										∅	L	F	A	D	x	B	x	d	Ident. No	8	135	22	18	3-40	11	x	3	x	6	...-0836	10	135	24	18	3-40	11	x	3	x	6	...-1036	12	135	24	21	3-40	11	x	3	x	6	...-1236	16	135	31	25	3-60	15	x	4	x	9	...-1649	<table><tr><th>RKDL-... available ex stock</th></tr><tr><td>•</td></tr><tr><td>•</td></tr><tr><td>•</td></tr><tr><td>•</td></tr><tr><td>•</td></tr></table>	RKDL-... available ex stock	•	•	•	•	•
Type of knurling roll holder for knurling rolls																																																																							
∅	L	F	A	D	x	B	x	d	Ident. No																																																														
8	135	22	18	3-40	11	x	3	x	6	...-0836																																																													
10	135	24	18	3-40	11	x	3	x	6	...-1036																																																													
12	135	24	21	3-40	11	x	3	x	6	...-1236																																																													
16	135	31	25	3-60	15	x	4	x	9	...-1649																																																													
RKDL-... available ex stock																																																																							
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•																																																																							

## RKD : Spare parts for RKD...

<p>ACHTUNG/ATTENTION/ATTENTION:          *Auf Wunsch auch mit Linksgewinde lieferbar.          *Sur demande, livrable aussi avec filet à gauche.          *On request also with left-hand thread available.</p>					
Spare part for		REFB - ...	REFS - ...	REKB - ...	REKS - ...
RLDL-1836, -1036, -1236 RLDR-1836, -1036, -1236, -1636	...-0036	•	•	•	•
RLDL-1649, RKDR-1649	...-1049	•	•	•	•
RLDL-20511	...-2511	•	•	•	•
RLDL-25511	...-3511	•	•	•	•
<p>Lieferbarkeit: d Lieferbar ab Lager</p> <p>Disponibilité: d Livrable du stock</p>		<p>Availability: d Available ex stock</p>			





## zeus<sup>ECO</sup> KNURLING TECHNOLOGY



- > KNURLING WHEELS
- > FORM KNURLING TOOLS
- > CUT KNURLING TOOLS

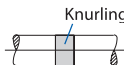




Knurling profile (DIN 82)	Knurling technique		Machine type	Profile in the middle of the work piece, without groove	Profile starts at work piece
	Form Knurling	Cut Knurling			
<b>RAA-Knurl with straight pattern</b>  			LD	130, 131, 141, 161	130, 131, 141, 161, 162, 192, 391
			KD	130, 131, 141, 161	130, 131, 141, 161, 162, 192, 391
			MS	130, 131, 141, 161	130, 131, 141, 161, 162, 192, 391
			RT		192, 391
			LD	X	231
			KD		231
			MS		231
			RT		
<b>RBL-Knurl, left-hand spiral</b>  			LD	130, 131, 141, 161	130, 131
			KD	130, 131, 141, 161	130, 131
			MS	130, 131, 141, 161	130, 131
			RT		130, 131
			LD	X	231 *
			KD		231 *
			MS		231 *
			RT		
<b>RBR-Knurl, right-hand spiral</b>  			LD	130, 131, 141, 161	130, 131
			KD	130, 131, 141, 161	130, 131
			MS	130, 131, 141, 161	130, 131
			RT		130, 131
			LD	X	231 *
			KD		231 *
			MS		231 *
			RT		
<b>RGE-Diamond knurl, left-/right-hand knurl, points raised (male), 30°</b>  			LD	130, 131, 132, 161	
			KD	130, 131, 132, 161	
			MS	130, 131, 132, 161	
			RT		
			LD	141, 161	141, 161, 162, 192
			KD	141, 161	141, 161, 162, 192
			MS	141, 161	141, 161, 162, 192
			RT		161, 162, 192
			LD	X	241, 291
			KD		241, 291
			MS		241, 291
			RT		291
<b>RGV-Diamond knurl, left-/right-hand knurl, points indented (female), 30°</b>  			LD	130, 131	RGV: Only suitable for plunge knurling
			KD	130, 131	
			MS	130, 131	
			RT		
<b>RKE-Cross-knurl, points raised (male), 90°</b>  			LD	130, 131	RKE: Only suitable for plunge knurling
			KD	130, 131	
			MS	130, 131	
			RT		
<b>RKV-Cross-knurl, points indented (female), 90°</b>  			LD	130, 131	RKV: Only suitable for plunge knurling
			KD	130, 131	
			MS	130, 131	
			RT		



EXAMPLE: Knurling profile

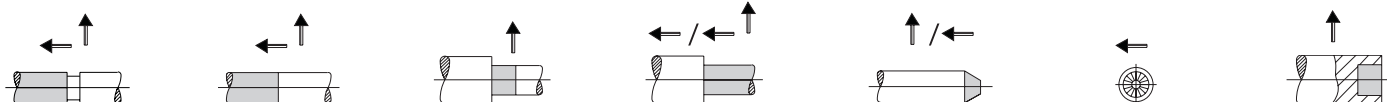


EXPLANATION OF ARROWS:

- ↑ Profile can only be produced in radial tool direction (plunge knurling)
- ← Profile can only be produced in axial tool direction (feed knurling)
- ↕ Profile can be produced in axial and radial tool direction

SYMBOLS:

- LD = Swiss type autolathes
- KD = Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- MS = Multispindle automatic lathes
- RT = Rotary indexing machines / Indexing table machines / Automatic transfer machines
- X = Cut knurling not possible for this application (see also p.13)
- = Limited length of knurling profile
- \* = When cut knurling the manufacture of RBR / RBL profiles is restricted



Profile starts in the middle of the work piece, after a groove	Profile starts in the middle of the work piece, without a groove	Knurling to a shoulder	Profile starts at work piece, knurling to a shoulder	Conical knurling profile	Face knurling	Knurling within a bore
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
			162 , 192			330, 332
231	X	X	X	X	X	X
231						
231						
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
			162 , 192			
231 *	X	X	X	X	X	X
231 *						
231 *						
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
130, 131, 141, 161	130, 131, 141, 161	132, 142	132, 142, 162 , 192	311, 312	311, 312	330, 332
			162 , 192			
231 *	X	X	X	X	X	X
231 *						
231 *						
	Only suitable for plunge knurling	132	132	311, 312	311, 312	330, 332
		132	132	311, 312	311, 312	330, 332
		132	132	311, 312	311, 312	330, 332
			162			
141, 161	141, 161	142	141, 162 , 192			340, 342
141, 161	141, 161	142	141, 162 , 192			340, 342
141, 161	141, 161	142	141, 162 , 192			340, 342
			162 , 192			
241	X	X	X	X	X	X
241						
241						
RGV: Only suitable for plunge knurling	RGV: Only suitable for plunge knurling	132	RGV: Only suitable for plunge knurling	311, 312	311, 312	330, 332
		132		311, 312	311, 312	330, 332
		132		311, 312	311, 312	330, 332
				311, 312		330, 332
RKE: Only suitable for plunge knurling	RKE: Only suitable for plunge knurling	132	RKE: Only suitable for plunge knurling			330, 332
		132				330, 332
		132				330, 332
						330, 332
RKV: Only suitable for plunge knurling	RKV: Only suitable for plunge knurling	132	RKV: Only suitable for plunge knurling			330, 332
		132				330, 332
		132				330, 332
						330, 332

1. DIAMETAL

2. BIMU

3. IFANGER

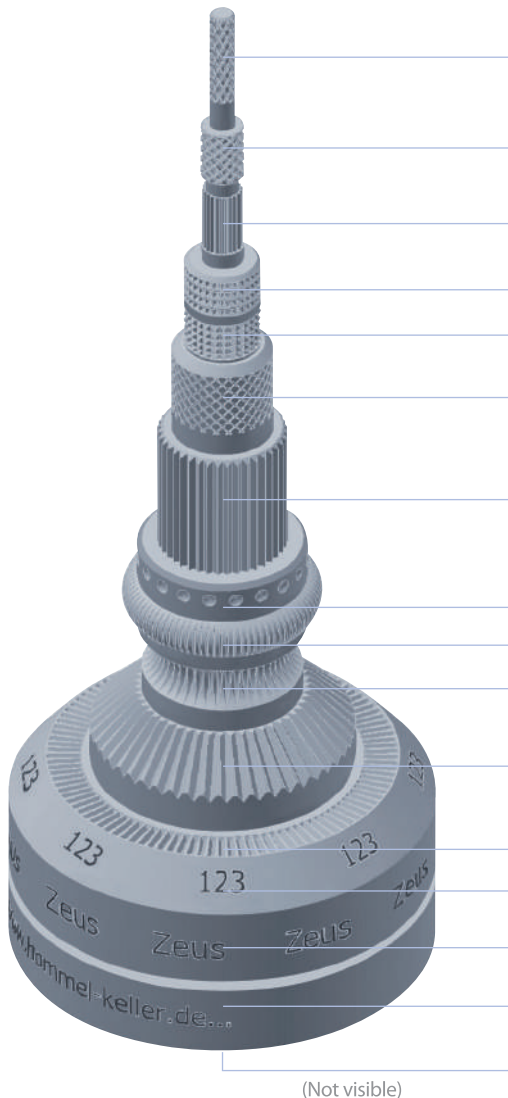
4. ZEUS

5. ARNO

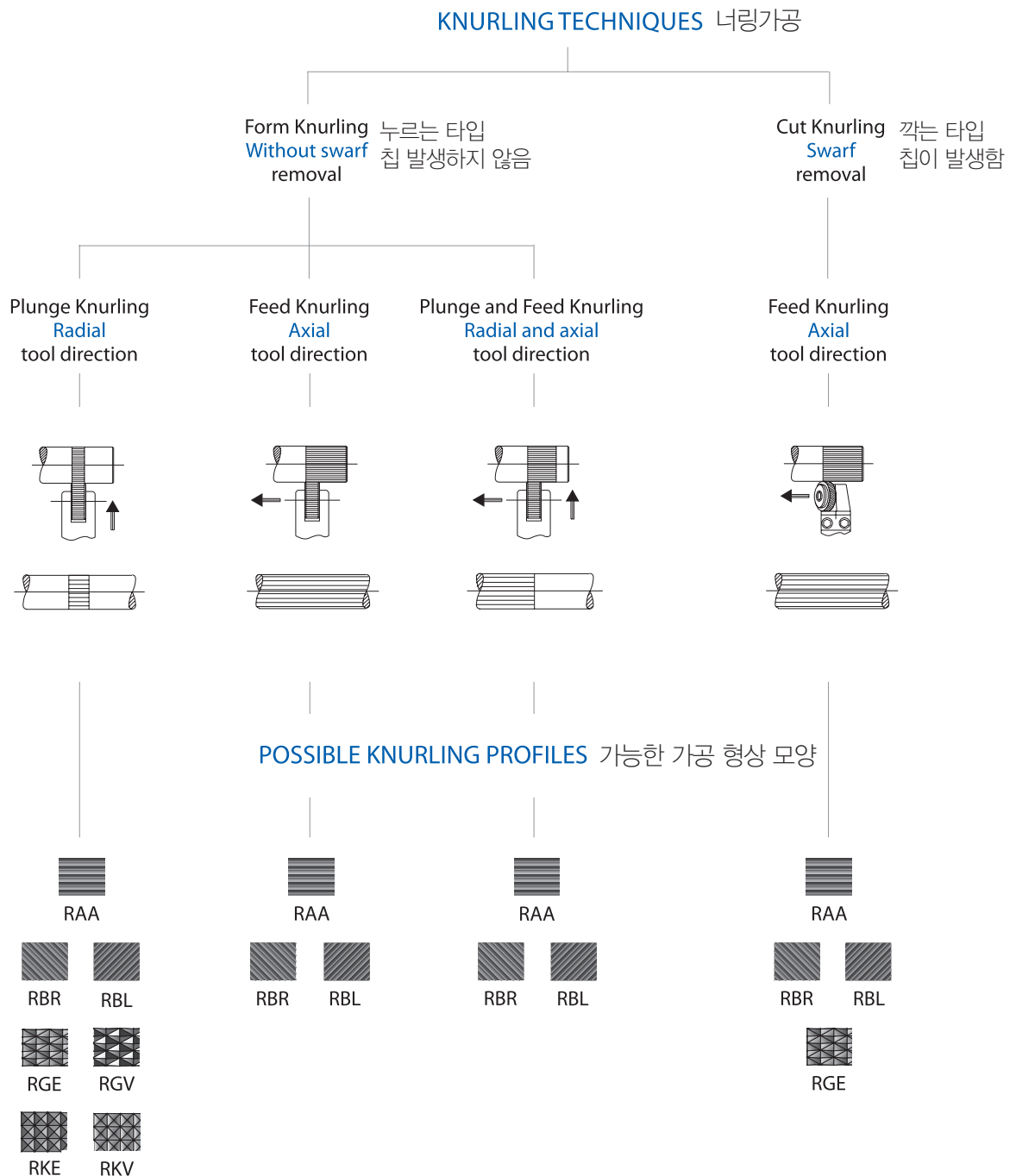
6. Whiz Cut

7. SPHINX

## APPLICATION EXAMPLE:



Application	Profile (DIN 82) Pitch	Tool	Knurling wheels
Cut knurling (Axial)	RGE30° 0,8	291	3 x AA
Cut knurling (Axial)	RGE45° 0,6	241	1 x BL15° 1 x BR15°
Cut knurling (Axial)	RAA 1,0	231	1 x BR30°
Form knurling (Radial)	RKE 0,8	131	1 x KV
Form knurling (Radial)	RKV 0,6	132	1 x KE
Form knurling (Radial)	RGE45° 0,8	141	1 x BL45° 1 x BR45°
Form knurling (Radial + Axial) Knurling to a shoulder	RAA 1,0	132	1 x AA
Form knurling (Radial)	RHV	131	1 x HE
Form knurling (Radial)	RE	131	1 x C
Form knurling (Radial)	RC	131	1 x E
Form knurling (Radial + Axial)	RKAA	311	1 x KAA
Form knurling (Axial)	RAA-plane	311	AA
Marking conical	123	312	40W
Marking revolving	zeus®	130	40W
Marking spring-back	hommel-keller.de	431	41W
Marking plane	XYZ	311	40W



## 누르는 타입

Form Knurling

Application (적용)

- 냉간성형 재질에 적용 가능
- 모든 재질의 프로파일과 마킹이 가능
- 단면부와 내경면의 너링가공에 적용 가능
- 솔더면의 너링가공 가능
- 피삭재의 어떤 위치에서 부터라도 너링가공 가능

Knurling profile  
on work piece  
DIN 82:



RAA



RBL



RBR



RGE



RGV



RKE



RKV

Characteristics (특징)

- 피삭재는 하경보다 커진다.
- 표면이 압축된다.
- 깎는 타입보다 기계에 무리를 준다.
- 피삭재의 변형을 줄 수 있다.

Handling (취급)

- 피삭재의 일반적 준비과정이 필요없다.  
(셋팅시간 단축)
- 취급이 용이하다.

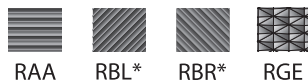
## 깎는 타입

### Cut Knurling

#### Application (적용)

- 모든 피삭재에 적용 가능
- 두껍고 얇은 피삭재에도 적용 가능
- 뛰어난 조도의 프로파일이 가능
- 적용 범위가 한정되어 있다.
- 축방향으로의 피삭재에도 적용 가능
- 피삭재의 처음부터 적용 가능 or 중간 층 홈이 있을 경우 홈 이후 적용 가능
- 솔더면의 너링가공은 불가능

Knurling profile  
on work piece  
DIN 82:



#### Characteristics (특징)

- 너링작업후 치수의 변화가 없다.
- 표면 부하 최소.
- 누르는 타입보다 기계와 공구에 무리를 덜 준다.

#### Handling (취급)

- 공구와 피삭재의 정확한 셋팅과 조정 필요
- 피삭재의 정확한 셋팅이 필요

\* The possibility of the knurling profiles RBR and RBL is limited.

# FORM KNURLING TOOLS CUT KNURLING TOOLS SPECIAL TOOLS



## CONTENT

- FORM KNURLING TOOLS:  
RD1, RD2, RD3
- CUT KNURLING TOOLS:  
RD1, RD2, RD3
- SPECIAL TOOLS



Form knurling을 위한 ZEUS의 RD1 시리즈는 경제적이고 쉽게 모든 종류의 knurling의 프로파일에 적용시킬 수 있다.

## 적용시 장점

### APPLICATION ADVANTAGES:

#### 편리한 공구 장착

- 홀더의 조정과 적용이 용이
- 최소 시간의 준비과정
- 나사조정의 편리함과 각도조정의 확실성
- Click-Pin로 빠르고 편리한 휠 교체

#### 내마모성

- 스페셜한 표면강화로 인한 tool-life 극대화
- 초경 핀으로 인해 가공율과 수명 연장

#### 모듈형 제품디자인

- 모든 CNC자동선반 및 캠에 비용 절감을 위한 홀더 시스템

### MODULAR PRODUCT DESIGN

For swiss type autolathe versions:



### Click Pin시스템



- 빠르고 안전한 휠 교체를 위해
  - 과도한 나사 조임 방지
  - 충격과 진동으로 인한 풀림 방지
  - 빠른 교체와 휠 적용 용이



### KNURLING TO SHOULDER

Tool types for knurling to shoulder:



### APPLICATION EXAMPLE:

Bushing



### APPLICATION:

Material: Cu2n38Pb2  
Knurling Profile/Pitch (DIN 82): RGE45°/P. 0,6  
Machine: Traub TD 60  
No. of pcs. produced/ knurling wheel: 150.000

### APPLICATION PARAMETERS zeus® RD1:

Knurling tool: 130-12U250606  
Knurling wheel: GV45°20x6x6, P. 0,6  
Cycle time: 0,8 sec/piece  
Speed rate: 240 m/min  
Feed rate: 0,2 mm/rev  
Tool life knurling wheel: 2000 (min/ knurling wheel)







# Form knurling tools RD1 누르는 타입 홀더 (1휠)

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

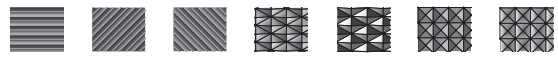
7. SPHINX



ZEUS® FORM KNURLING TOOL 130:

THE CLASSIC WITH ONE KNURLING WHEEL:  
CONVINCING EFFICIENCY FOR CONVENTIONAL AUTOLATHES!

Knurling profile  
on work piece  
DIN 82:



Knurling  
wheels:



## ORDER EXAMPLE:

Tool holder No. 130-16 U 250806 -A

Product series 130-16 U 250806 -A Model A  
Shank size 16 x 16 mm For knurling wheels 25 x 8 x 6 (Ø x width x bore)  
Right-/ and left- hand use

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	x mm	Knurling wheels mm	Spare part Pin
				width Ø15 width Ø25		width Ø15 width Ø25		width Ø15 width Ø25	mm (Ø x width x bore)	
130-08U150404-A	3-20	8	8	99	10	19	10	4	10 / 15 x 4 x 4	06TER0972
130-08U150604-A	3-20	8	8	99	14	19	10	4	10 / 15 x 6 x 4	06TER0974
130-10U150404-A	3-20	10	10	99	10	-	10	4	10 / 15 x 4 x 4	06TER0972
130-10U150604-A	3-20	10	10	99	14	19	10	4	10 / 15 x 6 x 4	06TER0974
130-10U250806-A	15-200	10	10	110,5	16	30,5	16	5,5	20 / 25 x 8 x 6	06TER0980
130-12U150404-A	3-20	12	12	99	12	-	12	4	10 / 15 x 4 x 4	06TER0973
130-12U250606-A	15-200	12	12	110,5	14	30,5	14	5,5	20 / 25 x 6 x 6	06TER0979
130-12U250806-A	15-200	12	12	110,5	16	30,5	16	5,5	20 / 25 x 8 x 6	06TER0980
130-14U150604-A	3-20	14	14	99	14	-	14	4	10 / 15 x 6 x 4	06TER0974
130-14U250606-A	15-200	14	14	110,5	14	-	14	5,5	20 / 25 x 6 x 6	06TER0979
130-16U250806-A	15-200	16	16	110,5	16	-	16	5,5	20 / 25 x 8 x 6	06TER0980
130-20U251006-A	15-200	20	20	110,5	20	-	20	5,5	20 / 25 x 10 x 6	06TER0982
130-20U251506-A	15-200	20	25	110,5	25	-	20	5,5	20 / 25 x 15 x 6	06TER0983

Tool holder No.	Working area Ø mm	a inch	b inch/ mm	c mm	d mm	e mm	f mm	x mm	Knurling wheels inch	Spare part Pin
									mm (Ø x width x bore)	
130-70U515318-A	3-20	5/16	5/16	96	10	16	10	1	5/16 x 5/32 x 1/8	06TER0985
130-75U123131-A	3-20	1/2	1/2	96,3	12,7	-	12,7	1,3	1/2 x 3/16 x 3/16	06TER0986
130-80U581414-A	3-20	5/8	5/8	107	15,8	-	15,8	2	5/8 x 1/4 x 1/4	06TER0988
130-85U343814-A	15-200	3/4	3/4	108	19,05	-	19,05	3	3/4 x 3/8 x 1/4	06TER0970
130-90U343814-A	15-200	3/4	20mm	111	20	-	25,4	6	3/4 x 3/8 x 1/4	06TER0970



Carbide pin



Carbide pin





## ZEUS° FORM KNURLING TOOL 131:

THE CLASSIC WITH ONE KNURLING WHEEL -  
CONVINCING EFFICIENCY FOR SWISS TYPE AUTOLATHES!

Machine type: Conventional and CNC – suitable for:  
• Swiss type autolathes

Application: Form knurling (non-cutting forming)

Knurling profile  
on work piece  
DIN 82:

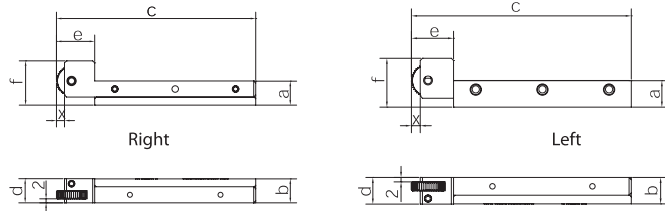


Knurling  
wheels:

AA BR BL GV GE KV KE

### ORDER EXAMPLE:

Tool holder No. 131-10 L 100306-A (-Z) with ClickPin®  
Product series 100306-A (-Z) Model A  
Shank size 10 x 10 mm For knurling wheels  
Left-hand use 10 x 3 x 6 (Ø x width x bore)



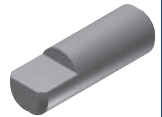
### TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c* mm	d mm	e* mm	f mm	x* mm
131-08L150404-A	3-50	8	8	99	12	19	18	4
131-08R150404-A	3-50	8	8	99	12	19	18	4
131-10L150404-A	3-50	10	10	99	12	19	20	4
131-10R150404-A	3-50	10	10	99	12	19	20	4
131-12L150404-A	3-50	12	12	99	12	19	22	4
131-12R150404-A	3-50	12	12	99	12	19	22	4
131-16L150404-A	3-50	16	16	99	12	19	26	4
131-16R150404-A	3-50	16	16	99	12	19	26	4

With ClickPin®:								
131-08L150404-A-Z	3-50	8	8	99	12	19	18	4
131-08R150404-A-Z	3-50	8	8	99	12	19	18	4
131-10L150404-A-Z	3-50	10	10	99	12	19	0	4
131-10R150404-A-Z	3-50	10	10	99	12	19	20	4
131-12L150404-A-Z	3-50	12	12	99	12	19	22	4
131-12R150404-A-Z	3-50	12	12	99	12	19	22	4
131-16L150404-A-Z	3-50	16	16	99	12	19	26	4
131-16R150404-A-Z	3-50	16	16	99	12	19	26	4

\* width Ø15

Knurling wheels mm (Ø x width x bore)	Spare part Pin
10/15 x 4 x 4	06TER0960
10/15 x 4 x 4	06TER0960
10/15 x 4 x 4	06TER0960
10/15 x 4 x 4	06TER0960
10/15 x 4 x 4	06TER0960
10/15 x 4 x 4	06TER0960
10/15 x 4 x 4	06TER0960
10/15 x 4 x 4	06TER0960

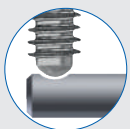


06TER0960



06TER1015

### CLICK-PIN®-SYSTEM:



For fast and safe change of the knurling wheel:  
--> No more break off through overtightening  
--> No more loosening through impact, hits or vibration  
--> Quick change and positioning of the knurling wheel

### SHANK ADAPTORS:

Shank size	Part -No.
10 x 10	21BHR0833
12 x 12	21BHR0834
16 x 16	21BHR0835



Modular shank construction for conversion to alternative shank sizes



# Form knurling tools RD1 누르는 타입 홀더 (1휠)



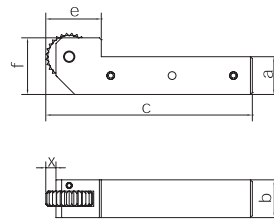
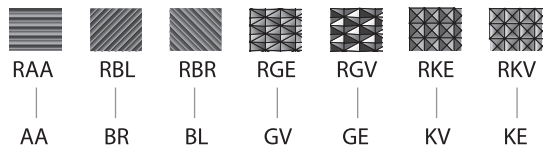
ZEUS® FORM KNURLING TOOL 131:

THE CLASSIC WITH ONE KNURLING WHEEL -  
CONVINCING EFFICIENCY FOR CNC-AUTOLATHES!

Machine type: Conventional and CNC – suitable for:  
• Automatic short-turning lathes, Universal lathes,  
Turning-/milling centre  
• Multispindle automatic lathes

Application: Form knurling (non-cutting forming)

Knurling profile  
on work piece  
DIN 82:



## ORDER EXAMPLE:

Tool holder No. 131-20 U 250806 - A (-Z) with ClickPin®  
Product series 131-20 U 250806 - A (-Z) Model A  
Shank size 20 x 20 mm For knurling wheels 25 x 8 x 6 (Ø x width x bore)  
Right-/ and left- hand use

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm width Ø 25	e mm width Ø 25	f mm width Ø 25	x mm width Ø 25
131-20U250806-A	8-200	20	20	109,5	29,5	32,5	5,5
131-25U250806-A	8-200	25	20	109,5	29,5	37,5	5,5

## With ClickPin®:

131-20U250806-A-Z	8-200	20	20	109,5	29,5	32,5	5,5
131-25U250806-A-Z	8-200	25	20	109,5	29,5	37,5	5,5

Tool holder No.	Working area Ø mm	a inch	b mm	c mm	e mm	f mm	x mm
131-85U343814-A	8-200	3/4"	20	116,5	24,5	29	2,5
131-90U343814-A	8-200	1"	20	116,5	24,5	35	2,5

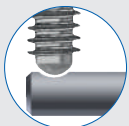
Knurling wheels mm (Ø x width x bore)	Spare part Pin
20 / 25 x 8 x 6	06TER0965
20 / 25 x 8 x 6	06TER0965

20 / 25 x 8 x 6	06TER1018
20 / 25 x 8 x 6	06TER1018

Knurling wheels mm (Ø x width x bore)	Spare part Pin
3/4" x 3/8" x 1/4"	06TER0989
3/4" x 3/8" x 1/4"	06TER0989

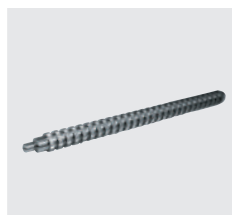


## CLICK-PIN®-SYSTEM:



For fast and safe change of the knurling wheel:

- > No more break off through overtightening
- > No more loosening through impact, hits or vibration
- > Quick change and positioning of the knurling wheel





## ZEUS® FORM KNURLING TOOL 132:

THE CLASSIC FOR KNURLING TO A SHOULDER -  
CONVINCING FUNCTIONALITY!

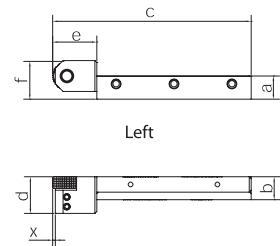
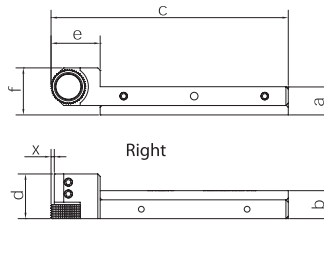
Machine type: Conventional and CNC – suitable for:  
• Swiss type autolathes

Application: Form knurling (non-cutting forming)

Knurling profile on work piece DIN 82:	RAA	RBL	RBR	RGE	RGV	RKE	RKV
Knurling wheels:	AA	BR	BL	GV	GE	KV	KE

Tool  
direction:

- Plunge knurling: Suitable for all knurling profiles, patterns and markings
- Feed knurling: Suitable for RAA, RBR, RBL



### ORDER EXAMPLE:

Tool holder No. 132-08 L 150611 - A

Product series  
Shank size 8 x 8 mm  
Left-hand use  
Model A  
For knurling wheels  
15 x 6 x 6/11 (Ø x width x bore)

### TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	x mm
132-08L150611-A	3-50	8	8	101	19	21	16	1,5
132-08R150611-A	3-50	8	8	101	19	21	16	1,5
132-10L150611-A	3-50	10	10	101	19	21	18	1,5
132-10R150611-A	3-50	10	10	101	19	21	18	1,5
132-12L150611-A	3-50	12	12	101	19	21	20	1,5
132-12R150611-A	3-50	12	12	101	19	21	20	1,5
132-16L150611-A	3-50	16	16	101	19	21	24	1,5
132-16R150611-A	3-50	16	16	101	19	21	24	1,5

Knurling wheels mm (Ø x width x bore)	Spare part Shoulder pin	Spare part Run disc
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375



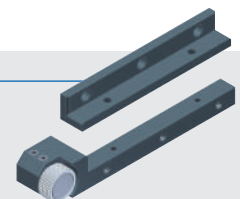
### KNURLING TO A SHOULDER:

Suitable for knurling up to  
a shoulder



### SHANK ADAPTORS:

Shank size	Part-No.
10 x 10	21BHR0833
12 x 12	21BHR0834
16 x 16	21BHR0835



Modular shank construction for conversion to alternative shank sizes



# Form knurling tools RD1 누르는 타입 홀더 (1월) – 단까지 작업 가능

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



ZEUS® FORM KNURLING TOOLS 132:

THE CLASSIC FOR KNURLING TO A SHOULDER –  
CONVINCING FUNCTIONALITY!

Machine type: Conventional and CNC – suitable for:  
• Automatic short-turning lathes, Universal lathes,  
Turning-/milling centre  
• Multispindle automatic lathes

Application: Form knurling (non-cutting forming)

Knurling profile  
on work piece  
DIN 82:



Knurling  
wheels:

AA BR BL GV GE KV KE

## ORDER EXAMPLE:

Tool holder No. 132-20 U 200813-A  
Product series • Model A  
Shank size 20 x 20 mm •  
Right-/ and left- hand use • For knurling wheels  
20 x 8 x 6/13 (Ø x width x bore)

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm
132-20U200813-A	8-200	20	20	105,5	24	25,5	30
132-25U200813-A	8-200	25	20	105,5	24	25,5	35

Tool holder No.	Working area Ø mm	a inch	b mm	c mm	d mm	e mm	f mm
132-85U200813-A	8-200	3/4"	20	105,5	24	25,5	29
132-90U200813-A	8-200	1"	20	105,5	24	25,5	35,4

Knurling wheels mm (Ø x width x bore)	Spare part Shoulder pin	Spare part Run disc
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380



06TER0383

Knurling wheels mm (Ø x width x bore)	Spare part Shoulder pin	Spare part Run disc
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380



21BHR0380

## KNURLING TO A SHOULDER:

Suitable for knurling up to a shoulder





ZEUS의 RD2 시리즈는 RGE 프로파일의 축 방향 공구입니다.

어떠한 치수와 넓이도 축 작업이 가능합니다. RD2 디자인으로 오른쪽, 왼쪽 모두 작업이 용이합니다. 휠 종류별 다양한 치수 생산하며, RD2 시리즈는 양쪽 작업에 적합합니다. 또한 CNC 자동선반 홀더의 치수별 생산이 가능합니다.

## 적용시 장점

### 편리한 공구 장착

- 홀더의 조정과 적용이 용이
- 최소 시간의 준비작업
- 나사조정의 편리함과 각도조정의 확실성
- 나사와 핀의 장착으로 빠르고 편리한 휠 교체
- Click-Pin로 빠르고 편리한 휠 교체

### 내마모성

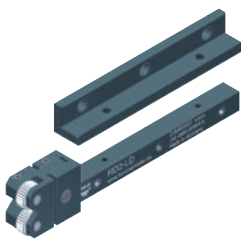
- 스페셜한 표면강화로 인한 tool-life 극대화
- 초경 핀으로 인해 가공율과 수명 연장

### 모듈형 제품디자인

- 모든 CNC자동선반 및 캠에 비용 절감을 위한 홀더 시스템
- 양 방향 범용 공구들로 인해 knurling 장착이 쉽고 용이.

#### MODULAR PRODUCT DESIGN

For swiss type autolathe versions:



#### Click Pin시스템

- 빠르고 안전한 휠 교체를 위해
  - 과도한 나사 조임 방지
  - 충격과 진동으로 인한 풀림 방지
  - 빠른 교체와 휠 적용 용이



#### KNURLING TO SHOULDER

Tool types for knurling to shoulder:



#### APPLICATION EXAMPLE:

Threaded bushing M5

#### APPLICATION:

Material: C35Pb  
Knurling Profile/Pitch (DIN 82): RGE30°/P. 0,8  
Machine: Tornos SAS 16DC  
No. of pcs. produced: 120.000  
Knurling wheel:

#### APPLICATION PARAMETERS zeus® RD2:

Knurling tool: 141-16M150604  
Knurling wheel: BL30° 15x6x4, P. 0,8  
BR30° 15x6x4, P. 0,8  
Cycle time: 0,8 sec/piece  
Speed rate: 68 m/min  
Feed rate: 0,2 mm/rev  
Tool life knurling wheel: 1.600 min/knurling wheel  
Performance: 19,2 m<sup>2</sup>/knurling wheel





# Form knurling tools RD2 누르는 타입 홀더 (2휠)

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



ZEUS® FORM KNURLING TOOL 141:

THE GENERALIST WITH TWO KNURLING WHEELS – TWICE THE RIGIDITY, EASY TO USE!

Machine type: Conventional and CNC – suitable for:  
• Swiss type autolathes

Application: Form knurling (non-cutting forming)

Knurling profile  
on work piece  
DIN 82:



RAA



RGE30°



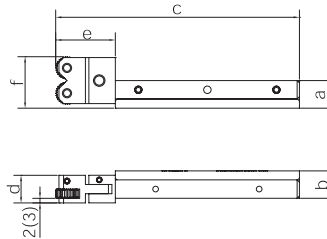
RGE45°

Knurling  
wheels:

2 x AA

1 x BL30° / 1 x BR30°

1 x BL45° / 1 x BR45°



## ORDER EXAMPLE:

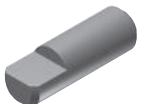
Tool holder No. 141-08M 100404 - A

Product series • Model A  
Shank size 8 x 8 mm •  
Modular • For knurling wheels  
10 x 4 x 4 (Ø x width x bore)

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	x mm
141-08M100404-A	3-12	8	8	105,5	12	25,5	21	1
141-10M100404-A	3-12	10	10	105,5	12	25,5	21	1
141-12M100404-A	3-12	12	12	105,5	12	25,5	23	1
141-16M100404-A	3-12	16	16	105,5	12	25,5	27	1
141-16M150604-A	5-40	16	16	129	16	39	33	1,5

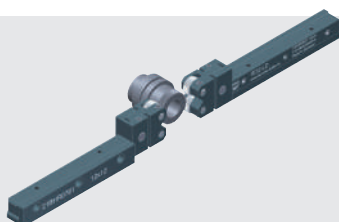
Knurling wheels mm (Ø x width x bore)	Spare part Pin
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
15 x 6 x 4	06TER0964



06TER0960  
06TER0964

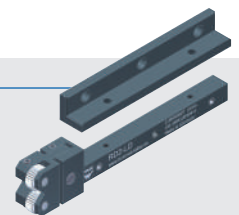
## FLEXIBILITY:

Fast and easy turning of  
the tool head for right- /  
and left-hand use



## SHANK ADAPTORS:

Shank size	Part-No.
10 x 10	21BHR0833
12 x 12	21BHR0834
16 x 16	21BHR0835



Modular shank construction for conversion to alternative shank sizes



## ZEUS® FORM KNURLING TOOL 141:

THE GENERALIST WITH TWO KNURLING WHEELS –  
DOUBLE THE RIGIDITY, EASY TO USE!



Machine type: Conventional and CNC – suitable for:

- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes

Application: Form knurling (non-cutting forming)

Knurling profile on work piece  
DIN 82:



RAA



RGE30°



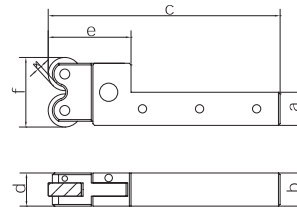
RGE45°

Knurling wheels:

2 x AA

1 x BL30° / 1 x BR30°

1 x BL45° / 1 x BR45°



### ORDER EXAMPLE:

Tool holder No. 141-20M 200806-A-(Z) with ClickPin®  
Product series 141-20M 200806-A-(Z)  
Shank size 20 x 20 mm  
Modular 200806-A-(Z)  
For knurling wheels 20 x 8 x 6 (Ø x width x bore)  
Model A

### TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	x mm
141-20M200806-A	10-80	20	20	130	20	50	42	2,5
141-25M250806-A	50-200	25	20	156	20	56	55	2,5
With ClickPin®:								
141-20M200806-A-Z	10-80	20	20	130	20	50	42	2,5
141-25M250806-A-Z	50-200	25	20	156	20	56	55	2,5

Tool holder No.	Working area Ø mm	a inch	b mm	c mm	d mm	e mm	f mm	x mm
141-80M581414-A	6-15	5/8"	16	119	16	29	34	2
141-85M343814-A	10-80	3/4"	20	130	20	50	41	2
141-90M343814-A	10-80	1"	20	140	20	50	41	2

Knurling wheels mm (Ø x width x bore)	Spare part Pin
20 x 8 x 6	06TER0965
25 x 8 x 6	06TER0965
20 x 8 x 6	06TER1018
25 x 8 x 6	06TER1018

Knurling wheels inch (Ø x width x bore)	Spare part Pin
5/8" x 1/4" x 1/4"	06TER0969
3/4" x 3/8" x 1/4"	06TER0989
3/4" x 3/8" x 1/4"	06TER0989

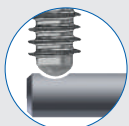


06TER0965  
06TER0969  
06TER0989



06TER1018

### CLICK-PIN®-SYSTEM:

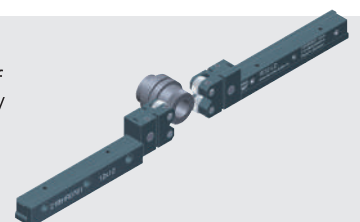


For fast and safe change of the knurling wheel:

- > No more break off through overtightening
- > No more loosening through impact, hits or vibration
- > Quick change and positioning of the knurling wheel

### FLEXIBILITY:

Fast and easy turning of the tool head for right- / and left-hand use





# Form knurling tools RD2 누르는 타입 홀더 (2휠) – 단까지 작업 가능

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



ZEUS<sup>®</sup> FORM KNURLING TOOL 142:

THE GENERALIST WITH DOUBLE POWER UP TO A SHOULDER!

Machine type: Conventional and CNC – suitable for:

- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes

Application: Form knurling (non-cutting forming)

Knurling profile on work piece  
DIN 82:



Knurling wheels:

2 x AA

1 x BL30° / 1 x BR30°

1 x BL45° / 1 x BR45°

## ORDER EXAMPLE:

Tool holder No. 142-16 M 150611-A

Product series 142-16 M  
Shank size 16 x 16 mm  
Modular 150611-A

Model A  
For knurling wheels  
15 x 6 x 6/11 (Ø x width x bore)

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm
142-16M150611-A	8-15	16	16	119	19	39	33
142-20M200813-A	10-80	20	20	130	24	50	42
142-25M200813-A	10-80	25	20	130	24	50	42

Tool holder No.	Working area Ø mm	a inch	b mm	c mm	d mm	e mm	f mm
142-80M150611-A	8-15	5/8"	16	119	19	39	33
142-85M200813-A	10-80	3/4"	20	130	24	50	42
142-90M200813-A	10-80	1"	20	130	24	50	42

Knurling wheels mm (Ø x width x bore)	Spare part Shoulder pin	Spare part Run disc
15 x 6 x 6/11	06TER0380	21BHR0375
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380



06TER0380  
06TER0383

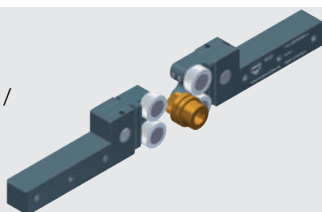
Knurling wheels mm (Ø x width x bore)	Spare part Shoulder pin	Spare part Run disc
15 x 6 x 6/11	06TER0380	21BHR0375
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380



21BHR0375  
21BHR0380

## FLEXIBILITY:

Fast and easy turning of the tool head for right- / and left-hand use



## KNURLING TO A SHOULDER:

Suitable for knurling up to a shoulder





## ZEUS® FORM KNURLING TOOL 161:

THE GENERALIST - DOUBLE FORCE FOR MINIMAL PRESSURE ON SMALL WORK PIECES!



Machine type: Conventional and CNC – suitable for:  
• Swiss type autolathes

Application: Form knurling (non-cutting forming)

Knurling profile on work piece  
DIN 82:



RAA



RGE30°



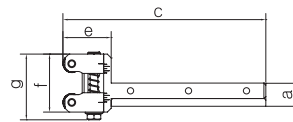
RGE45°

Knurling wheels:

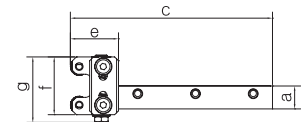
2 x AA

1 x BL30° / 1 x BR30°

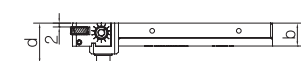
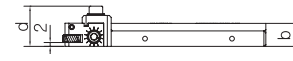
1 x BL45° / 1 x BR45°



Right



Left



### ORDER EXAMPLE:

Tool holder No. 161-08 L 100404-A1

Product series  
Shank size 8 x 8 mm  
Left-hand use  
Model A1  
For knurling wheels  
10 x 4 x 4 (Ø x width x bore)

### TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	g mm
161-08L100404-A1	1-10	8	8	105,5	21	25,5	30	38
161-08R100404-A1	1-10	8	8	105,5	21	25,5	30	38
161-10L100404-A1	1-10	10	10	105,5	21	25,5	30	38
161-10R100404-A1	1-10	10	10	105,5	21	25,5	30	38
161-12L100404-A1	1-10	12	12	105,5	21	25,5	30	38
161-12R100404-A1	1-10	12	12	105,5	21	25,5	30	38
161-16L100404-A1	1-10	16	16	105,5	21	25,5	30	38
161-16R100404-A1	1-10	16	16	105,5	21	25,5	30	38

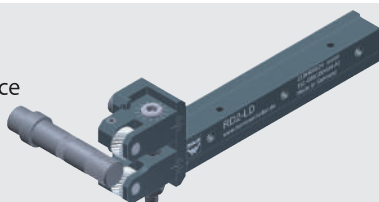
Knurling wheels mm (Ø x width x bore)	Spare part Pin
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960
10 x 4 x 4	06TER0960



06TER0960

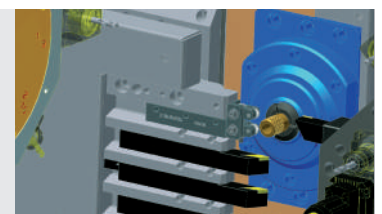
### NO LATERAL PRESSURE:

Reduced wear on work piece and machine



### FOR LIMITED WORK SPACES:

Knurling in axial tool direction





## ZEUS\* FORM KNURLING TOOL 161:

THE UNIVERSAL – DOUBLE OPERATION ON WHEELS FOR MAXIMUM RIGIDITY WITH MINIMAL PRESSURE!

Machine type: Conventional and CNC – suitable for:  
 • Automatic short-turning lathes, Universal lathes, Turning-/milling centre  
 • Multispindle automatic lathes

Application: Form knurling (non-cutting forming)

Knurling profile on work piece  
DIN 82:



RAA



RGE30°



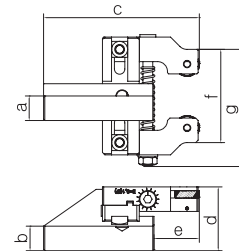
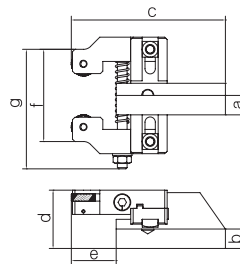
RGE45°

Knurling wheels:

2 x AA

1 x BL30° / 1 x BR30°

1 x BL45° / 1 x BR45°



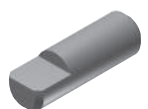
### ORDER EXAMPLE:

Tool holder No. 161-16 L 200606

Product series  
Shank size 16 x 16 mm  
Left-hand use  
For knurling wheels 20 x 6 x 6 (Ø x width x bore)

### TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	g mm	Knurling wheels mm (Ø x width x bore)	Spare part Pin
161-16L200606	5-25	16	16	134	48	37	96	104	20 x 6 x 6	06TER0965
161-16R200606	5-25	16	16	134	48	37	96	104	20 x 6 x 6	06TER0965
161-16L250606	25-50	16	16	136,5	48	39,5	101	106,5	25 x 6 x 6	06TER0965
161-16R250606	25-50	16	16	136,5	48	39,5	101	106,5	25 x 6 x 6	06TER0965
161-20L200606	5-25	20	20	134	52	37	96	104	20 x 6 x 6	06TER0965
161-20R200606	5-25	20	20	134	52	37	96	104	20 x 6 x 6	06TER0965
161-20L250606	25-50	20	20	136,5	52	39,5	101	106,5	25 x 6 x 6	06TER0965
161-20R250606	25-50	20	20	136,5	52	39,5	101	106,5	25 x 6 x 6	06TER0965
161-25L200606	5-25	25	20	134	52	37	96	104	20 x 6 x 6	06TER0965
161-25R200606	5-25	25	20	134	52	37	96	104	20 x 6 x 6	06TER0965
161-25L250606	25-50	25	20	136,5	52	39,5	101	106,5	25 x 6 x 6	06TER0965
161-25R250606	25-50	25	20	136,5	52	39,5	101	106,5	25 x 6 x 6	06TER0965

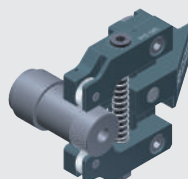


06TER0965

Alternative versions available on demand: Working area > 50 mm, feed knurling with profile length > 100 mm, knurling to a shoulder

### NO LATERAL PRESSURE:

Reduced wear on work piece and machine



## ZEUS<sup>®</sup> FORM KNURLING TOOL 162:

THE MINIMALIST – FOR HIGH PRECISION  
ON TINY WORK PIECES IN LIMITED WORK SPACE!



Machine type: Conventional and CNC – suitable for:

- Swiss type autolathes
- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes
- Rotary indexing machines, Indexing table type machines, Transfer machines (Work piece fix / tool rotating)

Application: Form knurling (non-cutting forming)

Knurling profile  
on work piece  
DIN 82:



RAA  
2 x AA

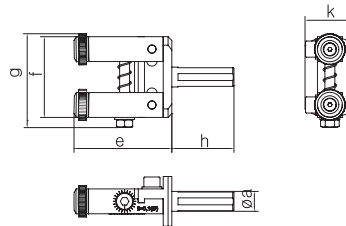


RGE30°  
1 x BL30° / 1 x BR30°



RGE45°  
1 x BL45° / 1 x BR45°

Knurling  
wheels:



### ORDER EXAMPLE:

Tool holder No. 162-06 U 150408

Product series

Shank size 6 x 6 mm

Right-/ and left- hand use

For knurling wheels  
15 x 4 x 8 (Ø x width x bore)

### TOOL TYPES:

Tool holder No.	Working area Ø mm	a Ø mm	e mm	f mm	g mm	h mm	k mm	l mm
162-06U150408	1-14,5	6	49	44	51	40	24	21
162-12U150408	1-14,5	12	49	44	51	40	24	21
162-16U250608	3-25	16	76	67	84	50	40	32
162-20U250608	3-25	20	76	67	84	50	40	32
162-22U250608	3-25	22	76	67	84	50	40	32
162-25U250608	3-25	25	76	67	84	50	40	32

Knurling wheels mm (Ø x width x bore)	Spare part E-Kit
15 x 4 x 8	21BHR0504
15 x 4 x 8	21BHR0504
25 x 6 x 8	21BHR0506
25 x 6 x 8	21BHR0506
25 x 6 x 8	21BHR0506
25 x 6 x 8	21BHR0506

Tool holder No.	Working area Ø mm	a Ø inch	e mm	f mm	g mm	h mm	k mm	l mm
162-85U250608	3-25	3/4"	76	67	84	50	40	32
162-90U250608	3-25	1"	76	67	84	50	40	32

Knurling wheels mm (Ø x width x bore)	Spare part E-Kit
25 x 6 x 8	21BHR0506
25 x 6 x 8	21BHR0506



21BHR0504  
21BHR0506

### APPLICATION ORIENTED TOOL DESIGN:

Reduced lateral pressure,  
suitable for small work spaces



### FLEXIBILITY:

Retooling accessories  
for knurling to a shoulder





# Form knurling tools RD2 누르는 타입 홀더 (2휠)

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

ZEUS° FORM KNURLING TOOL 162:

THE MINIMALIST – FOR KNURLINGS TO A SHOULDER  
IN LIMITED WORK SPACES



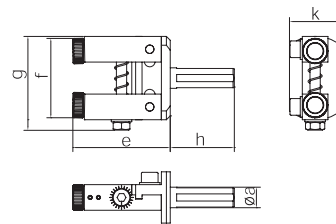
Machine type: Conventional and CNC – suitable for:

- Swiss type autolathes
- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes
- Rotary indexing machines, Indexing table type machines, Transfer machines (Work piece fix / tool rotating)

Application: Form knurling (non-cutting forming)

Knurling profile  
on work piece  
DIN 82:  
Knurling  
wheels:

RAA RGE30° RGE45°  
2 x AA 1 x BL30° / 1 x BR30° 1 x BL45° / 1 x BR45°



## ORDER EXAMPLE:

Tool holder No. 162-06 U 150611  
Product series 162-06 U  
Shank size 6 x 6 mm  
Right-/ and left- hand use U  
For knurling wheels  
15 x 6/11 (Ø x width x bore)

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a Ø mm	e mm	f mm	g mm	h mm	k mm	l mm
162-06U150611	1-14	6	49	44	51	40	24	22
162-12U150611	1-14	12	49	44	51	40	24	22
162-16U200813	4-27,5	16	76	67	80	50	40	32
162-20U200813	4-27,5	20	76	67	80	50	40	32
162-22U200813	4-27,5	22	76	67	80	50	40	32
162-25U200813	4-27,5	25	76	67	80	50	40	32

Tool holder No.	Working area Ø mm	a Ø inch	e mm	f mm	g mm	h mm	k mm	l mm
162-85U200813	4-27,5	3/4"	76	67	80	50	40	32
162-90U200813	4-27,5	1"	76	67	80	50	40	32

Knurling wheels mm (Ø x width x bore)	Spare part Shoulder pin	Spare part Run disc
15 x 6 x 6/11	06TER0380	21BHR0375
15 x 6 x 6/11	06TER0380	21BHR0375
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380

Knurling wheels mm (Ø x width x bore)	Spare part Shoulder pin	Spare part Run disc
20 x 8 x 6/13	06TER0383	21BHR0380
20 x 8 x 6/13	06TER0383	21BHR0380



06TER0380  
06TER0383



21BHR0375  
21BHR0380

## APPLICATION-ORIENTED TOOL DESIGN:

Reduced lateral pressure,  
suitable for small work spaces



## KNURLING TO A SHOULDER:

Suitable for knurling to a shoulder



## ZEUS® FORM KNURLING TOOL 192:

THE ALL-ROUNDER – A SAFE BET ON ALL MACHINE TYPES.  
FOR MAXIMUM RIGIDITY WITH MINIMAL PRESSURE!



Machine type: Conventional and CNC - suitable for:

- Lathe / autolathes
- Swiss type autolathes
- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes
- Rotary indexing machines, Indexing table type machines, Transfer machines (Work piece fixed / tool rotating)

Application: Form knurling (non-cutting forming)

Knurling profile on work piece DIN 82:



RAA



RGE30°



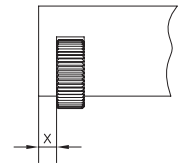
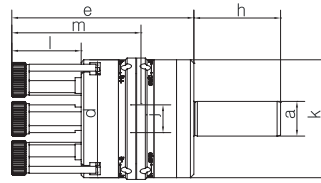
RGE45°

Knurling wheels:

3 x AA

1 x BL30° / 2 x BR30°  
or 2 x BL30° / 1 x BR30°

1 x BL15° / 2 x BR15°  
or 2 x BL15° / 1 x BR15°



### ORDER EXAMPLE:

Tool holder No. 192-12 M 100404

Product series

Shank size Ø 12

Modular

For knurling wheels  
10 x 4 x 4 (Ø x width x bore)

### TOOL TYPES:

Tool holder No.	Working area Ø mm	a Ø mm	d Ø mm	e mm	h mm	j Ø mm	k Ø mm	l mm	m mm	x mm
192-12M100404	2,5-14	12	58	95	45	8	40	35	70	4
192-12M150611	3-15	12	50	95	45	8	40	35	70	-
192-20M200806	4-35	20	90	111	50	16	70	40	80	6
192-20M200813	4-35	20	76	105	50	16	70	40	80	-
192-20M200813	27-62	20	102	105	50	16	70	36	80	-
192-32M200806	16-65	32	120	116	60	32	100	40	80	6
192-32M200813	4-60	32	102	110	60	32	100	40	80	-
192-32M200813	35-94	32	134	110	60	32	100	36	80	-

d = max. work piece Ø

m = max. work piece length (with Ø j)

Knurling wheels mm (Ø x b x b)	Spare part E-Kit	Spare part Jaw-set
10 x 4 x 4	06TER0960	21BHR0877
15 x 6 x 6/11	06TER0380	21BHR0878
20 x 8 x 6	06TER0965	21BHR0879
20 x 8 x 6/13	06TER0383	21BHR0880
20 x 8 x 6/13	06TER0383	21BHR0881
20 x 8 x 6	06TER0965	21BHR0879
20 x 8 x 6/13	06TER0383	21BHR0888
20 x 8 x 6/13	06TER0383	21BHR0881



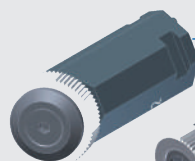
06TER0960  
06TER0965



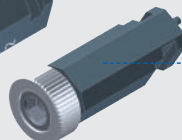
06TER0380  
06TER0383

### MODULAR PARTS:

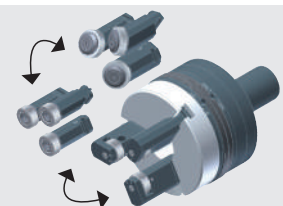
Optionally available for cut knurling / knurling to a shoulder



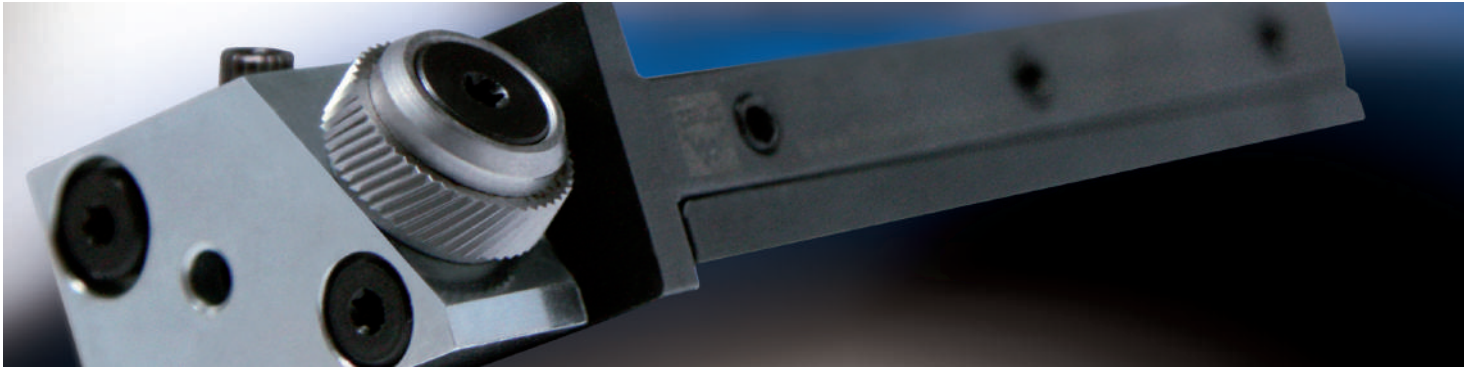
Cut knurling



Knurling to a shoulder







새로운 RF-1LD는 최고의 안정성, 효율성과 수익성을 요구로 하는 작업을 위해 만들어졌습니다. 또한 뛰어난 조도와 품질, 그리고 최대 양산을 위해 개발되었습니다.

## 적용시 장점

### 공정의 안정성

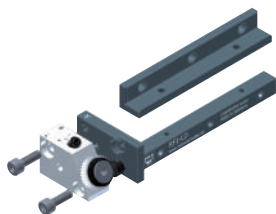
- 진동의 최소화, 프로파일의 높은 품질, 공차의 정확성
- 스케일링과 위치 보조를 통한 재현 과정
- 모든 세팅변수를 사전에 조절 가능
- 공구 교체의 컨트롤 : 휠의 정확한 장착과 정확한 휠의 위치 선정
- 의료, 전기, 자동차 산업이나 유공압 분야의 고정밀 작업 가능
- 최상의 비주얼 프로파일 작업 용이

### 효율성

- 높은 피드와 회전율로 생산 시간 단축
- 스페셜한 표면 강화로 인한 내마모성 극대화
- 모든 CNC자동선반의 및 캠에 비용절감을 위한 홀더시스템
- Cut knurling 공구 Head의 좌, 우측 변형 용이

### 편리성

- 셋팅 시간 단축, 정확한 각도와 공구의 셋팅시 사용자의 편리성 극대화
- 편리한 휠과 위치 변경 용이



#### 높은 효율성

- 여러 종류의 작업에 대한 Head의 교환 용이



#### 모듈형 설계

- 요구하는 홀더의 치수에 쉽게 조정 용이



#### 좌, 우측 모듈 사용

- 빠르고 쉬운 조작법에 의한 조립

#### APPLICATION EXAMPLE:

Knurl pin



#### APPLICATION:

Material: 11SMn30  
Knurling Profile/Pitch (DIN 82): RAA/P. 0,8  
Machine: Citizen C 3L

#### APPLICATION PARAMETERS zeus® RF1

Knurling tool: 231-16M150408  
Knurling wheels: BR30° 15x4x8, P. 0,8  
Speed rate: 60 m/min  
Feed rate: 0,13 mm/rev





ZEUS° CUT KNURLING TOOL 231:

THE SPECIALIST FOR HIGH PRECISION  
RAA-PROFILES AND SMALL DIAMETERS!

Knurling profile  
on work piece  
DIN 82:

Knurling  
wheels:



RAA



RBL30°

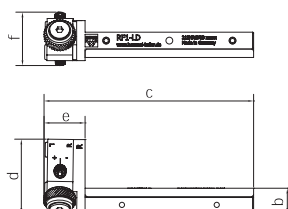


RBR30°

1 x BR30° (right-turning)  
1 x BL30° (left-turning)

1 x AA

1 x AA



## ORDER EXAMPLE:

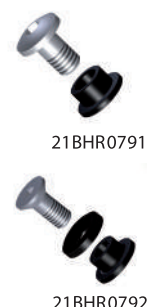
Tool holder No. **231-12 M 100306**

Product series  
Shank size 12x12 mm  
Modular  
For knurling wheels  
10x3x6 (Ø x width x bore)

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm
231-08M100306	1,5-12	8	8	94	35	14	26
231-10M100306	1,5-12	10	10	94	35	14	26
231-12M100306	1,5-12	12	12	94	35	14	26
231-16M100306	1,5-12	16	16	94	35	14	26
231-08M150408	3-50	8	8	99	35	19	26
231-10M150408	3-50	10	10	99	35	19	26
231-12M150408	3-50	12	12	99	35	19	26
231-16M150408	3-50	16	16	99	35	19	26

Knurling wheels mm (Ø x width x bore)	Spare part E-Kit
10 x 3 x 6	21BHR0791
10 x 3 x 6	21BHR0791
10 x 3 x 6	21BHR0791
10 x 3 x 6	21BHR0791
15 x 4 x 8	21BHR0792
15 x 4 x 8	21BHR0792
15 x 4 x 8	21BHR0792
15 x 4 x 8	21BHR0792



21BHR0791

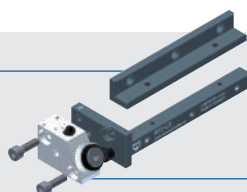
21BHR0792

## MODULAR PARTS:

### SHANK ADAPTORS:

Shank size	Part-No.
10 x 10	21BHR0833
12 x 12	21BHR0834
16 x 16	21BHR0835

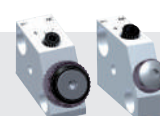
Modular shank construction for conversion to alternative shank sizes



### CUT KNURLING HEADS:

Working area	Cut knurling head	Part-No.
1,5 - 12 mm	RFK 10x3x6	21BHR0793
3 - 50 mm	RFK 15x4x8	21BHR0794

Optional: For conversion to alternative working area






## ZEUS<sup>ECO</sup> CUT KNURLING TOOLS 931



**Machine type:** Conventional and CNC – suitable for:  
• Swiss type autolathes and small autolathes

**Application:** Cut knurling (swarf removal)

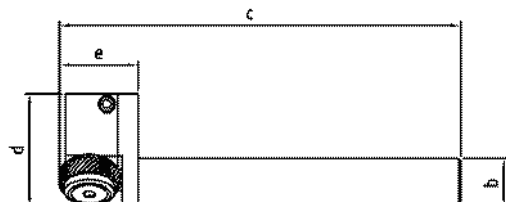
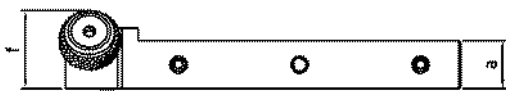
**Knurling profile on work piece DIN 82:**   
RAA

**Knurling wheels:** 1xBR30°

**Tool direction:** • Feed knurling

**Product features:** • Adjustment of the clearance angle with set screws in the shank

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	Knurling wheels (Ø x width x bore) mm	Spare Part
931-10R100306	1,5-15	10	10	98	15	17	20,5	10x3x6	21BHR0503
931-12R150408-A1	3-50	12	12	99,5	28	19,5	19,5	15x4x8	21BHR0505
931-16R150408	3-50	16	16	99	24	19,5	28	15x4x8	21BHR0505



21BHR0503



21BHR0505

## ZEUS® CUT KNURLING TOOL 231:

THE SPECIALIST FOR FIRST-CLASS VISUAL PROFILES WITH EXCEPTIONAL DEMANDS ON SURFACE QUALITY!



Machine type: Conventional and CNC – suitable for:

- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes

Application: Cut knurling (swarf removal)

Knurling profile on work piece DIN 82:

Knurling wheels:



RAA



RBL30°

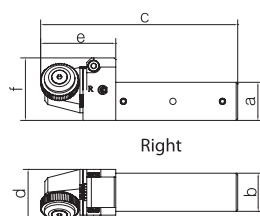


RBR30°

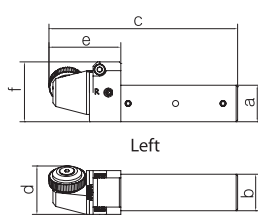
1 x BR30° (right-turning)  
1 x BL30° (left-turning)

1 x AA

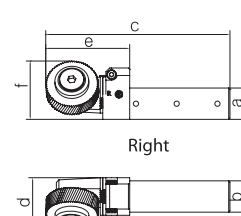
1 x AA



Right



Left



Right

(231-20M/25M250608)

(231-25M421316)

### ORDER EXAMPLE:

Tool holder No. **231-25 M 250608 - A**

Product series: 231-25 M 250608  
Shank size 25 x 25 mm  
Modular  
Model A  
For knurling wheels 25x6x8 (Ø x width x bore)

### TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm
231-20M250608-A	10-300	20	25	129	33	49	36
231-25M250608-A	10-300	25	25	129	33	49	41
231-25M421316	30-3000	25	25	147	41	67	47

Knurling wheels mm (Ø x width x bore)	Spare part E-Kit
25 x 6 x 8	21BHR0506
25 x 6 x 8	21BHR0506
42 x 13 x 16	21BHR0508



21BHR0506  
21BHR0508

### FLEXIBILITY:

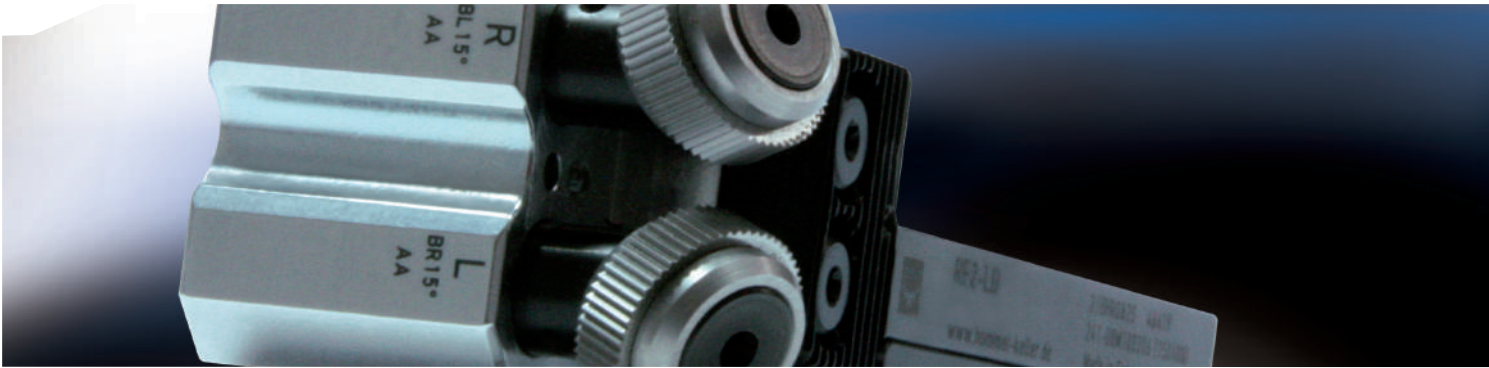
Fast and easy turning of the tool head for right- / and left-hand use

R



L





새로운 RF2-LD는 스위스 타입의 자동선반의 높은 안정성, 효율성과 생산성의 요구를 위한 제품입니다. 모듈형 시스템으로 인해 4개의 홀더 아답터와 2개의 너링 헤드로 쉽게 여러 종류의 기계와 적용 범위에 적용될 수 있습니다.

작지만 단단한 공구 디자인은 제한된 적용 공간과 뛰어난 수명으로 설계되었습니다. 작은 치수에 RGE 프로파일들을 뛰어나게 생산하기 위한 최고의 제품입니다.

## 적용시 장점

### 공정의 안정성

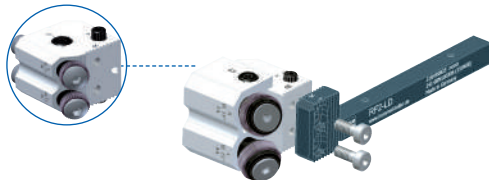
- 진동의 최소화, 프로파일의 높은 품질, 공차의 정확성
- 홀더와 Head의 사이 톱니모양 설계로 인한 안정성과 공정의 정확성 증대
- 모든 셋팅변수를 사전에 조절 가능
- 공구 교체의 컨더를 :  
휠의 정확한 장착과 정확한 휠의 위치 선정
- 의료, 전기, 자동차 산업이나 유공압 분야의 고정밀 작업 가능
- 최상의 비주얼 프로파일 작업 용이

### 효율성

- 높은 피드와 회전율로 생산 시간 단축
- 스페셜한 표면 강화로 인한 내마모성 극대화
- 모든 CNC자동선반의 및 캠에 비용절감을 위한 홀더시스템
- Cut knurling 공구 Head의 좌, 우측 변형 용이

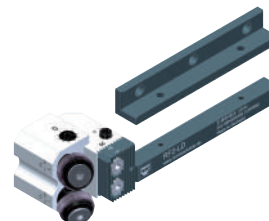
### 편리성

- 셋팅 시간 단축, 정확한 각도와 공구의 셋팅시 사용자의 편리성 극대화
- 편리한 휠과 위치 변경 용이
- 편리한 작업 셋팅과 스피들의 동시 조절 가능



#### 높은 효율성

- 여러 종류의 작업에 대한 Head의 교환 용이



#### 모듈형 설계

- 요구하는 홀더의 치수에 쉽게 조정 용이



#### 좌, 우측 모듈 사용

- 빠르고 쉬운 조작법에 의한 조립

#### APPLICATION EXAMPLE:

Knurled screw



#### APPLICATION:

Material: 9SMnPb28K  
Knurling Profile/Pitch (DIN 82): RGE30°/P. 1,0  
Machine: Boley BE42  
No. of pcs. produced/ knurling wheel: 2.000

#### APPLICATION PARAMETERS zeus® RF2:

Knurling tool: 241-16M150408  
Knurling wheel: AA 15x4x8, P. 1,0  
AA 15x4x8, P. 1,0  
Cycle time: 10 sec/piece  
Speed rate: 55 m/min  
Feed rate: 0,1 mm/rev  
Tool life knurling wheel: 330 min/knurling wheel  
Performance: 0,41 m<sup>2</sup>/ knurling wheel





ZEUS® CUT KNURLING TOOL 241:

THE SPECIALIST FOR RGE – PROFILES WITH MAXIMUM PROCESS-STABILITY ON SMALL DIAMETERS!

Knurling profile  
on work piece  
DIN 82:



RGE30°

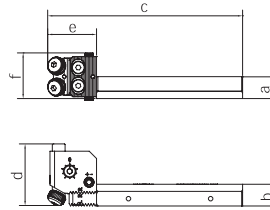


RGE45°

Knurling  
wheels:

2 x AA

1 x BL15° / 1 x BR15°



## ORDER EXAMPLE:

Tool holder No. 241-08 M 100306

Product series 241-08 M 100306  
Shank size 8 x 8 mm Modular For knurling wheels 10x3x6 (Ø x width x bore)

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm
241-08M100306	2-12	8	8	107	34	27	26
241-10M100306	2-12	10	10	107	34	27	26
241-12M100306	2-12	12	12	107	34	27	26
241-16M100306	2-12	16	16	107	34	27	29
241-08M150408	3-50	8	8	114	36	34	32
241-10M150408	3-50	10	10	114	36	34	32
241-12M150408	3-50	12	12	114	36	34	32
241-16M150408	3-50	16	16	114	36	34	32

Knurling wheels mm (Ø x width x bore)	Spare part E-Kit
10 x 3 x 6	21BHR0889
10 x 3 x 6	21BHR0889
10 x 3 x 6	21BHR0889
10 x 3 x 6	21BHR0889
15 x 4 x 8	21BHR0792
15 x 4 x 8	21BHR0792
15 x 4 x 8	21BHR0792
15 x 4 x 8	21BHR0792

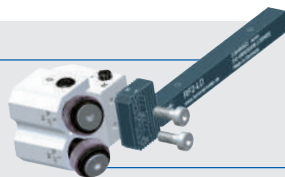


## MODULAR PARTS:

### SHANK ADAPTORS:

Shank size	Part No.
10 x 10	21BHR0833
12 x 12	21BHR0834
16 x 16	21BHR0835

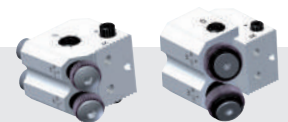
Modular shank construction for conversion to alternative shank sizes



### CUT KNURLING HEADS:

Working area	Cut knurling head	Part No.
1,5 - 12 mm	RFK 10x3x6	21BHR0831
3 - 50 mm	RFK 15x4x8	21BHR0832

Optional: For conversion to alternative working area



## ZEUS<sup>ECO</sup> CUT KNURLING TOOLS 951



Machine type: Conventional and CNC– suitable for:  
• Swiss type autolathes and small autolathes

Application: Cut knurling (swarf removal)

Knurling profile  
on work piece  
DIN 82:



Knurling  
wheels:

2xAA

1xBL15° / 1xBR15°

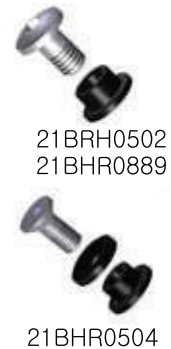
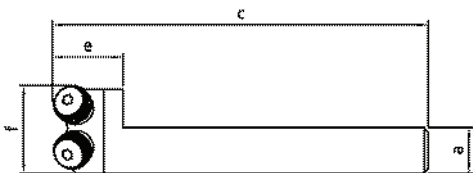
Tool  
direction:

• Feed knurling

Product  
features:

• Adjustment of the clearance angle with set screws in the shank

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	Knurling wheels (Ø x width x bore) mm	Spare Part
951-10R100306	2-15	10	10	98,5	23	18,5	20,5	10x3x6 **	21BHR0502
951-12R100306	2-15	12	12	98,5	26	18,5	23	10x3x6 **	21BHR0889
951-12R150408	3-50	12	12	108	34	28	32	15x4x8	21BHR0504
951-16R150408	3-50	16	16	108	34	28	32	15x4x8	21BHR0504



\*\* Knurling wheels 10x3x6 are available from the zeus® product programme

ZEUS® CUT KNURLING TOOL 240/241:

THE SPECIALIST FOR KNURLING APPLICATIONS WITH HIGH DEMANDS ON RIGIDITY AND SURFACE QUALITY!



Machine type: Conventional and CNC – suitable for:  
 • Automatic short-turning lathes, Universal lathes, Turning-/milling centre  
 • Multispindle automatic lathes

Application: Cut knurling (swarf removal)

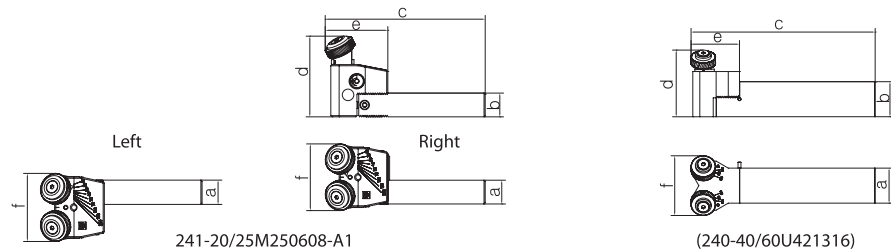
Knurling profile on work piece DIN 82:



Knurling wheels:

2 x AA

1 x BL15° / 1 x BR15°



## ORDER EXAMPLE:

Tool holder No. 241-20M250608-A1

Product series  
 Shank size 20 x 20 mm  
 Modular  
 For knurling wheels 25 x 6 x 8 (Ø x width x bore)  
 Model A1

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	b mm	c mm	d mm	e mm	f mm	Knurling wheels mm (Ø x width x bore)	Spare part E-Kit
241-20M150408-A	3-50	20	20	118	45	38	36	15 x 4 x 8	21BHR0792
241-20/25M250608-A1	10-250	20	20	134	68	54	58	25 x 6 x 8	21BHR0506

Special tool types for large working diameters*:									
240-40U421316	50-3000	40	60	319	114	86	102	42 x 13 x 16	21BHR0508
240-60U421316-A	50-3000	60	60	316	114	83	102	42 x 13 x 16	21BHR0508



21BHR0506  
 21BHR0508  
 21BHR0792

\* Please ask for product details.

## EASY HANDLING:

Easy presetting for reduced setting time



## PROCESS STABILITY:

Stability and precision







# Cut knurling Tools RF3

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

ZEUS® CUT KNURLING TOOL 291:

THE UNIVERSAL - A SAFE BET ON ALL MACHINE TYPES.  
FOR TOP PRECISION WITH MINIMAL PRESSURE!



- Machine type: Conventional and CNC – suitable for:
- Lathe / autolathes
  - Swiss type autolathes
  - Automatic short-turning lathes, Universal lathes, Turning-/milling centre
  - Multispindle automatic lathes
  - Rotary indexing machines, Indexing table type machines, Transfer machines (Work piece fixed / tool rotating)

Application: Cut knurling (swarf removal)

Knurling profile on work piece DIN 82:

Knurling wheels:



RAA

3 x BL30°  
or 3 x BR30°



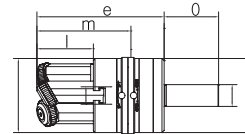
RGE30°

3 x AA



RGE45°

1 x BL15° / 2 x BR15°  
or 2 x BL15° / 1 x BR15°



## ORDER EXAMPLE

Tool holder No. 250608 - M  
Product series Model M  
Shank size Ø 12 For knurling wheels 25 x 6 x 8 (Ø x width x bore)  
Modular

## TOOL TYPES:

Tool holder No.	Working area Ø mm	a mm	d mm	e mm	h mm	j mm	k mm	l mm	m mm	Knurling wheels mm (Ø x width x bore)	Spare part E-Kit	Jaw-set
291-12M100306-A	3-15	Ø 12	Ø 52	95	45	Ø 8	Ø 40	35	70	10 x 3 x 6	21BHR0502	21BHR0882
291-12M150408-A	5-15	Ø 12	Ø 54	97	45	Ø 8	Ø 40	35	70	15 x 4 x 8	21BHR0504	21BHR0874
291-20M250608-M	7-35	Ø 20	Ø 85	108	50	Ø 16	Ø 70	40	80	25 x 6 x 8	21BHR0506	21BHR0875
291-20M250608-L	16-52	Ø 20	Ø 85	108	50	Ø 16	Ø 70	40	80	25 x 6 x 8	21BHR0506	21BHR0876
291-32M250608-M	7-60	Ø 32	Ø 110	113	60	Ø 32	Ø 100	40	80	25 x 6 x 8	21BHR0506	21BHR0875
291-32M250608-L	24-82	Ø 32	Ø 132	113	60	Ø 32	Ø 100	40	80	25 x 6 x 8	21BHR0506	21BHR0876

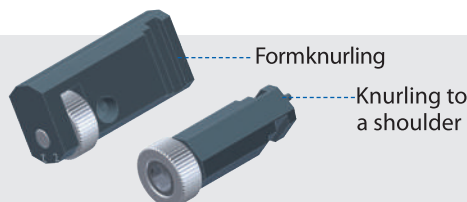
d = max. work piece Ø

m = max. work piece length (with Øi)



21BHR502  
21BHR504  
21BHR506

## MODULAR PARTS:

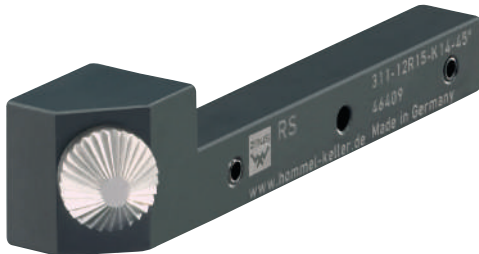


Optionally available for form knurling / knurling to a shoulder



ZEUS° SPECIAL TOOLS 311/312:

THE SPECIALIST FOR CONICAL AND FACE KNURLING!



Machine type: • Tool design according to machine requirements

Application: Conical knurling, Face knurling

Knurling profile  
on work piece  
DIN 82:



Knurling  
wheels:

RAA RBL RBR RGE RGV  
KAA KBR KBL KGV KGE

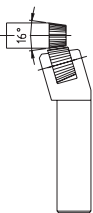
Tool

direction: • Plunge knurling

Classification: \*\*\*

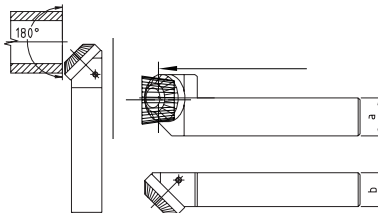
## APPLICATION 1:

Tool holder No. 312



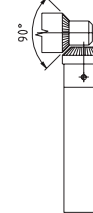
## APPLICATION 2:

Tool holder No. 311 - 45°



## APPLICATION 3:

Tool holder No. 311 - 90°



## Enquiry Form:

(Please tick/complete as required)

Required information for tool holder: ☐ 311-xxL/Rxxxxxx ☐ 312-xxL/Rxxxxxx

Full angle of work piece: \_\_\_\_°

Holder for CNC ☐ conventional ☐ sliding head autolathe ☐

With CNC / sliding head autolathe: right-turning ☐ or left-turning ☐

Required shank size (a x b): \_\_\_\_ x \_\_\_\_ mm

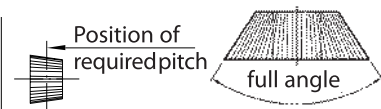
Required information for knurling wheels:

Knurling profile on component: RAA ☐ other profile: \_\_\_\_

Pitch: \_\_\_\_ mm \_\_\_\_ TPI/CP \_\_\_\_ DP

Profile angle: 90° (DIN403) ☐ or other angle: \_\_\_\_

Note:



Please submit work piece drawing!

## APPLICATION EXAMPLE:

Threaded insert



Material: 1.4305  
Knurling profile/Pitch (DIN 82): RGE30°, P. 0,6  
Machine: INDEX ABC  
No. of pcs. produced/ knurling wheel: 2.000

## APPLICATION PARAMETERS zeus° Special tools:

Knurling tool: Special tool  
Knurling wheels: GV30° 15x6x4, P. 0,6  
Cycle time: 2 sec./piece  
Speed rate: 33 m/min  
Feed rate: 0,2 mm/rev  
Tool life knurling wheel: 66 min/knurling wheel  
Performance: 0,24 m²/knurling wheel



ZEUS\* SPECIAL TOOLS 330/332/342:

THE PROFESSIONALS FOR KNURLING WITHIN A BORE!

## ZEUS\* SPECIAL TOOLS 330



Machine type:

Conventional and CNC – suitable for:

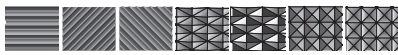
- Lathe / autolathes
- Swiss type autolathes
- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes

Application:

Knurling within a bore

Form knurling (non-cutting forming)

Knurling profile on work piece DIN 82:



RAA RBL RBR RGE RGV RKE RKV

AA BR BL GV GE KV KE

(Knurling wheels)

Tool direction:

- Plunge knurling: Suitable for all knurling profiles, patterns and markings
- Feed knurling: Suitable for RAA, RBR, RBL

Classification:

\*\*\*

Product highlights:

- Suitable for small work spaces
- Round shank with four clamping flats
- Special surface hardening for increased wear resistance

## ZEUS\* SPECIAL TOOLS 332



Machine type:

Conventional and CNC – suitable for:

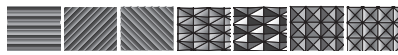
- Lathe / autolathes
- Swiss type autolathes
- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes

Application:

Knurling within a bore, Knurling to a shoulder

Form knurling (non-cutting forming)

Knurling profile on work piece DIN 82:



RAA RBL RBR RGE RGV RKE RKV

AA BR BL GV GE KV KE

(Knurling wheels)

Tool direction:

- Plunge knurling: Suitable for all knurling profiles, patterns and markings
- Feed knurling: Suitable for RAA, RBR, RBL

Classification:

\*\*\*

Product highlights:

- Suitable for small work spaces
- Shoulder pin fixed by a screw. Fitting of the knurling wheel on the pin adjustable
- Round shank with four clamping flats
- Special surface hardening for increased wear resistance

## ZEUS\* SPECIAL TOOLS 342



Machine type:

Conventional and CNC – suitable for:

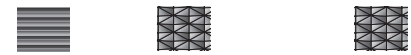
- Lathe / autolathes
- Swiss type autolathes
- Automatic short-turning lathes, Universal lathes, Turning-/milling centre
- Multispindle automatic lathes

Application:

Knurling within a bore, Knurling to a shoulder

Form knurling (non-cutting forming)

Knurling profile on work piece DIN 82:



RAA RGE30° RGE45°

2 x AA 1 x BL30° / 1 x BR30° 1 x BL45° / 1 x BR45°

(Knurling wheels)

Tool direction:

- Plunge knurling: Suitable for all knurling profiles, patterns and markings
- Feed knurling: Suitable for RAA, RBR, RBL

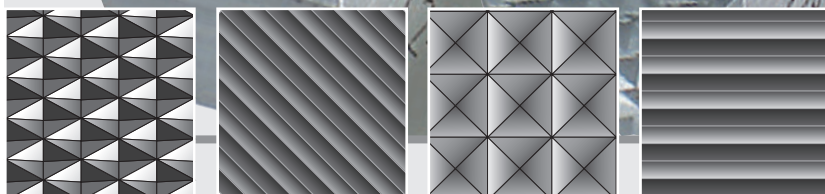
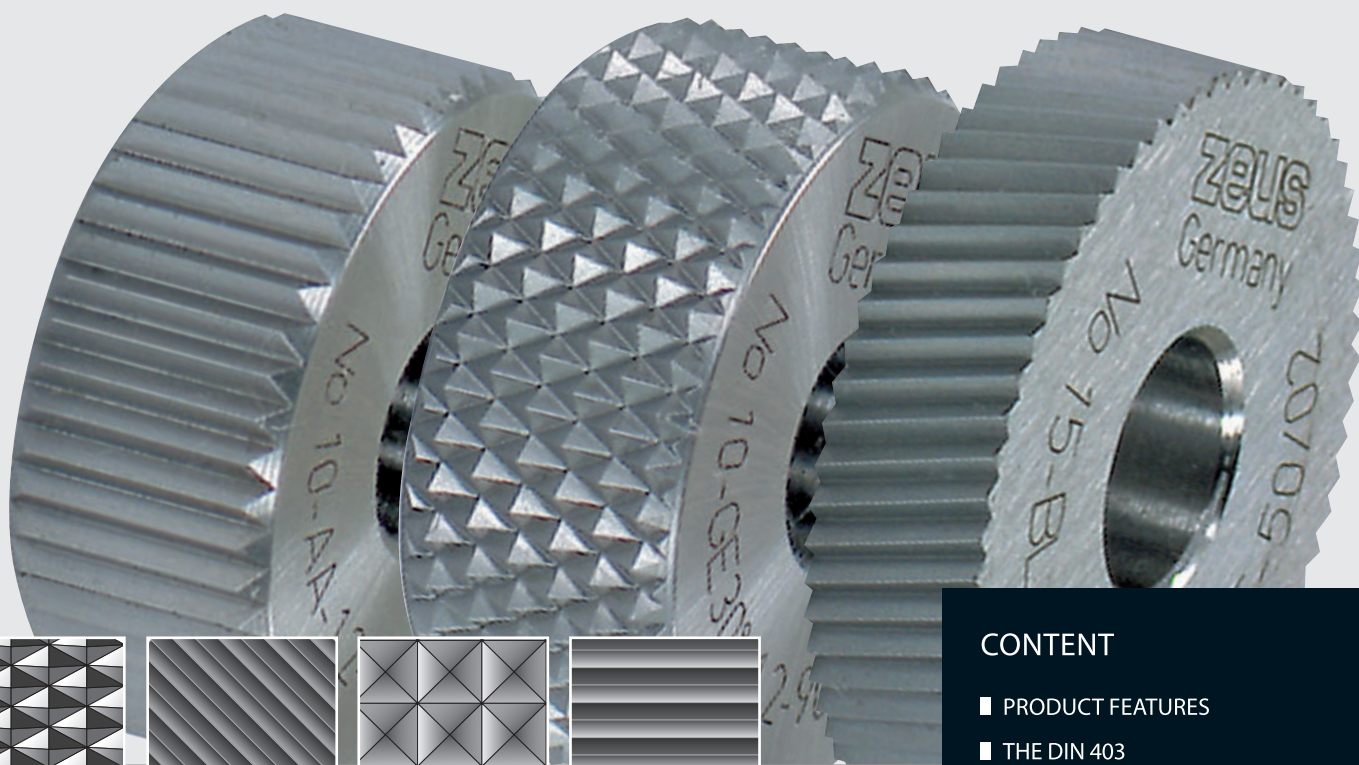
Classification:

\*\*\*

Product highlights:

- Suitable for small work spaces
- Round shank with four clamping flats
- Shoulder pin fixed by a screw. Fitting of the knurling wheel on the pin adjustable
- Integrated set screws for clearance angle adjustment
- Special surface hardening for increased wear resistance

# ZEUS KNURLING WHEELS

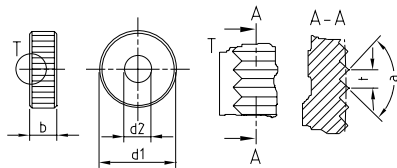


## CONTENT

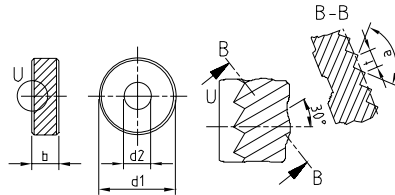
- PRODUCT FEATURES
- THE DIN 403
- THE KNURLING WHEEL'S PITCH
- KNURLING WHEELS - FORM KNURLING
- KNURLING WHEELS - CUT KNURLING
- SPECIAL/CUSTOMIZED KNURLING WHEELS

The DIN 403 is the standard for the knurling profile on the knurling wheel. The DIN 403 specifies the knurl profiles AA, BL, BR, GE, GV, KE and KV. Knurling wheels with profiles other than the ones described in the DIN 82, are classified as customized knurling wheels and are manufactured by Hommel + Keller according to customer drawings.

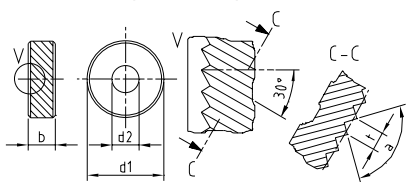
**AA** Knurling wheel with straight pattern



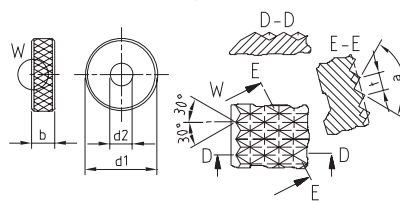
**BL** Knurling wheel, left-hand spiral



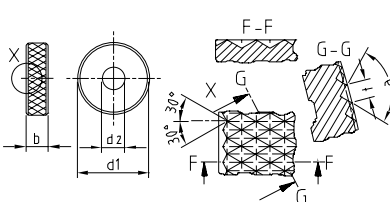
**BR** Knurling wheel, right-hand spiral



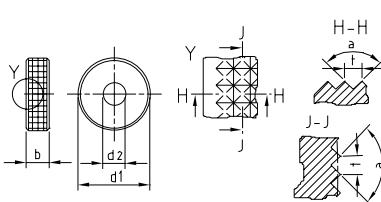
**GE** Cross-knurling wheel, points up, 30°, male



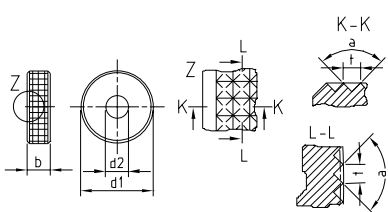
**GV** Cross-knurling wheel, points down, 30°, female



**KE** Square knurling wheel, crossed, points up, 90°, male

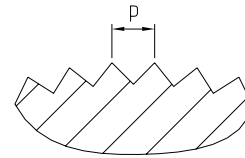


**KV** Square knurling wheel, crossed, points down, 90°, female



The appropriate knurling wheel's profile depends on the required profile on the work piece according to DIN 82 and the knurling tool applied. The product details from page 15 onwards, suggests the appropriate knurling wheel according to the application.

The knurling wheel's pitch 'p' refers to the distance between the tips of two teeth. Standard pitch sizes according to DIN 403 include:  $p=0,5/0,6/0,8/1,0/1,2/1,6$ . The Hommel + Keller product programme covers also non-standard pitch sizes. They are listed below in mm and TPI. Additional pitch sizes are available on demand.



## STANDARD PITCH SIZES:

mm	0,3	0,4	0,5	0,6	0,7	0,8	0,9
TPI	84,7	63,5	50,8	42,3	36,3	31,8	28,2
mm	1,0	1,2	1,5	1,6	1,8	2,0	
TPI	25,4	21,2	16,9	15,9	14,1	12,7	

mm	0,3	0,4	0,5	0,6	0,7	0,8	0,9
TPI	84,7	63,5	50,8	42,3	36,3	31,8	28,2
mm	1,0	1,2	1,5	1,6	1,8	2,0	
TPI	25,4	21,2	16,9	15,9	14,1	12,7	

## KNURLINGS ACCORDING TO AMERICAN NATIONAL STANDARD CP (TPI) AND DP

Apart from the DIN 82 / DIN 403 the American National Standard specifies the pitch and profile angle of the knurling application. The CP (TPI) and DP are distinguished as follows:

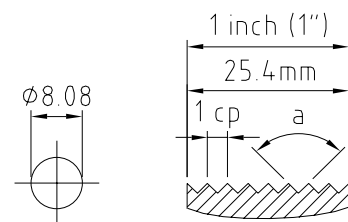
### CP (TPI) = Circular pitch (Teeth per inch)

This standard specifies the number of teeth on a length of 1 inch (1"~25,4 mm). The CP (TPI) is calculated by dividing 1 inch through the number of teeth. The profile angle is determined according to the number of teeth with either 70° or 90°.

Arithmetic example:

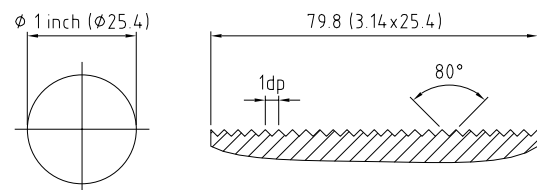
Value CP (TPI) = 20

Pitch (mm) = 1 inch (~25,4 mm) : 20 (Number of teeth) = 1,27 mm



### DP = Diametral pitch

Contrary to the CP (TPI), this standard specifies the number of teeth along the circumference of a circle with a diameter of 1 inch (1"~25,4 mm). The pitch is calculated by dividing the circumference (= 1 inch) by the number of teeth. The profile angle is generally determined with 80°.



Arithmetic example:

Value DP = 64

Pitch (mm) = 1 inch (~25,4) x  $\pi$  (3,14...) : 64 (Number of teeth) = 1.25 mm

A list of mm and CP (TPI) conversions can be found on page 63. Furthermore, the Technical Appendix contains a separate chapter on how to optimize the relation between number of teeth and work piece circumference by adjusting the pitch size.



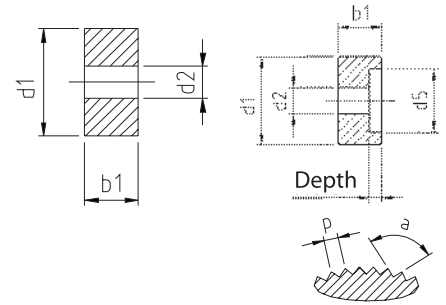


# FORM KNURLING, NON-CUTTING FORMING

누르는 타입 휠



AA BL 30° BL 45° BR 30° BR 45° GE 30° GE 45° KE



## KNURLING WHEELS WITH CHAMFER (45°) - METRIC - POWDER METAL, S590

Standard version	Dimension			Standard Pitch	Type							
	Diameter	Width	Bore		AA	BL30°	BL45°	BR30°	BR45°	GE30°	GE45°	KE
No. 11	*10	3	6	○	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	10	4	4	○	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	15	4	4	○	✓	✓	✓	✓	✓	✓	✓	✓
No. 11	*15	4	8	■	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	15	6	4	○	✓	✓	✓	✓	✓	✓	✓	✓
No. 11	15	6	6/8	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	15	6	6/11	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	20	6	6	●	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	20	8	6	●	✓	✓	✓	✓	✓	✓	✓	✓
No. 11	20	8	6/13	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	20	8	10/12	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	20	10	6	■	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	25	6	6	■	✓	✓	✓	✓	✓	☑	☑	☑
No. 11	*25	6	8	■	✓	✓	✓	✓	✓	☑	☑	☑
No. 11	25	8	6	■	✓	✓	✓	✓	✓	☑	☑	☑
No. 11	25	10	6	■	✓	✓	✓	✓	✓	☑	☑	☑

\* Chamfer 60°

Further dimensions and customized knurling wheels available on demand.

✓ = Stock item / immediate availability  
☑ = Available on demand

### STANDARD PITCH SIZES / PROFILE ANGLE 90°

●	0,3 / 0,4 / 0,5 / 0,6 / 0,7 / 0,8 / 0,9 / 1,0 / 1,2 / 1,5 / 1,6 / 1,8 / 2,0
○	0,3 / 0,4 / 0,5 / 0,6 / 0,7 / 0,8 / 0,9 / 1,0 / 1,2 / 1,5
■	0,6 / 0,8 / 1,0 / 1,2 / 1,5
□	0,6 / 0,8 / 1,0 / 1,2
☑	On demand

### SPECIAL PITCHES

Further pitch sizes and customized knurling wheels available on demand

### PRODUCT FEATURES

- Failure-free production cycles
- Reduced cutting forces
- Increased tool life
- Reduced tool and setting costs

### ALTERNATIVE TYPES

Knurling wheel variants **Powder Metal**

No.	Type	Availability
No. 13	Knurling wheel milled, without chamfer, PM	☑
No. 30	Knurling wheel ground, with chamfer, PM	☑
No. 32	Knurling wheel ground, without chamfer, PM	☑

Knurling wheel variants **Hartmetall**

No.	Type	Availability
No. 50	Knurling wheel ground, with chamfer, HM	☑
No. 52	Knurling wheel ground, without chamfer, HM	☑

Knurling wheel variants **HSS**

No.	Type	Availability
No. 10	Knurling wheel milled, with chamfer, HSS	☑
No. 12	Knurling wheel milled, without chamfer, HSS	☑

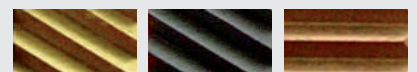
HSS = High Speed Steel, PM = Powder Metal Steel, HM = Carbide

☑ = Knurling wheel available on demand

### TOOL LIFE INCREASING FEATURES: PVD-COATINGS / SPECIAL HEAT-TREATMENT

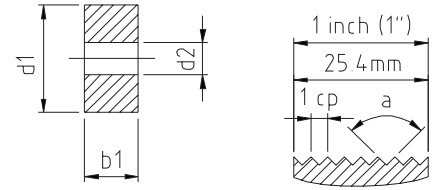
#### TYPE OF TREATMENT:

TENIFER® - nitriding | TiN-coatings | TiCN-coatings  
TiAlN-coatings | TiAlCN-coatings | Defined hardness



# FORM KNURLING, NON-CUTTING FORMING

누르는 타입 휠 (Inch)



## KNURLING WHEELS WITH CHAMFER (45°) - INCH - POWDER METAL, S590

Standard version	Dimension			Standard Pitch	Type							
	Diameter	Width	Bore		AA	BL30°	BL45°	BR30°	BR45°	GE30°	GE45°	KE
No. 11	5/16	5/32	1/8	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	1/2	3/16	3/16	○	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	1/2	1/4	3/16	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	5/8	1/4	1/4	■	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	5/8	5/16	7/32	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	3/4	1/4	1/4	■	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	3/4	3/8	1/4	■	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	3/4	1/2	1/4	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	7/8	3/8	1/4	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	1	3/8	5/16	□	✓	✓	✓	✓	✓	✓	✓	☑
No. 11	1 1/4	1/2	1/2	□	✓	✓	✓	✓	✓	✓	✓	☑

Further dimensions and customized knurling wheels available on demand.

✓ = Stock item / immediate availability  
☑ = Available on demand

	STANDARD PITCH SIZES / PROFILE ANGLE 90°	STANDARD PITCH SIZES / PROFILE ANGLE 70°	STANDARD PITCH SIZES / PROFILE ANGLE 80°
○	cp 20 / 25 / 30 / 32 / 35 / 41 / 47	cp 35 / 50 / 80	dp 96 / 128 / 160
■	cp 16 / 20 / 25 / 30 / 32 / 35 / 40 / 47	cp 35 / 50 / 80	dp 64 / 96 / 128 / 160
□	cp 16 / 24 / 29 / 33 / 40		
☑	On demand		

## SPECIAL PITCHES

Further pitch sizes and customized knurling wheels available on demand.

## ALTERNATIVE TYPES

Knurling wheel variants **Powder Metal**

No.	Type	Availability
No. 13	Knurling wheel milled, without chamfer, PM	☑
No. 30	Knurling wheel ground, with chamfer, PM	☑
No. 32	Knurling wheel ground, without chamfer, PM	☑

Knurling wheel variants **Carbide**

No.	Type	Availability
No. 50	Knurling wheel ground, with chamfer, HM	☑
No. 52	Knurling wheel ground, without chamfer, HM	☑

Knurling wheel variants **HSS**

No.	Type	Availability
No. 10	Knurling wheel milled, with chamfer, HSS	☑
No. 12	Knurling wheel milled, without chamfer, HSS	☑

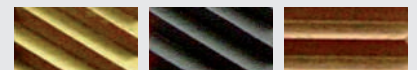
HSS = High Speed Steel, PM = Powder Metal Steel, HM = Carbide

☑ = Knurling wheel available on demand

## TOOL LIFE INCREASING FEATURES: PVD-COATINGS / SPECIAL HEAT-TREATMENT

### TYPE OF TREATMENT:

TENIFER® - nitriding | TiN-coatings | TiCN-coatings  
TiAlN-coatings | TiAlCN-coatings | Defined hardness







# FORM KNURLING, NON-CUTTING FORMING

누르는 타입 휠

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



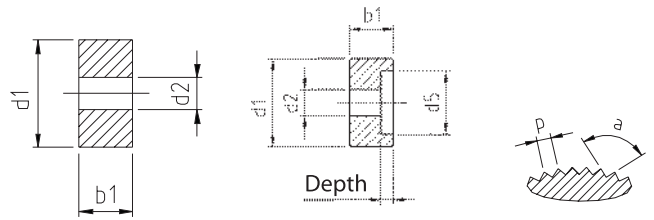
GV 30°



GV 45°



KV



## KNURLING WHEELS WITH POINTS DOWN – WITH CHAMFER (45°) – METRIC - POWDER METAL, S590

Standard version	Dimension			Standard Pitch	Type		
	Diameter	Width	Bore		GV30°	GV45°	KV
No. 21	10	4	4	○	✓	✓	☑
No. 21	15	4	4	○	✓	✓	✓
No. 21	15	6	4	■	✓	✓	☑
No. 21	15	6	6/8	■	✓	✓	☑
No. 21	15	6	6/11	■	✓	✓	☑
No. 21	20	6	6	■	✓	✓	☑
No. 21	20	8	6	●	✓	✓	✓
No. 21	20	8	6/13	■	✓	✓	☑
No. 21	20	8	10/12	■	✓	✓	☑
No. 21	20	10	6	■	✓	✓	☑
No. 21	25	6	6	■	✓	✓	☑
No. 21	25	8	6	■	✓	✓	☑
No. 21	25	10	6	■	✓	✓	☑

Further dimensions and customized knurling wheels available on demand.

✓ = Stock item / immediate availability  
☑ = Available on demand

### STANDARD PITCH SIZES / PROFILE ANGLE 90°

●	0,3 / 0,4 / 0,5 / 0,6 / 0,7 / 0,8 / 0,9 / 1,0 / 1,2 / 1,5 / 1,6 / 1,8 / 2,0
○	0,3 / 0,4 / 0,5 / 0,6 / 0,7 / 0,8 / 0,9 / 1,0 / 1,2 / 1,5
■	0,6 / 0,8 / 1,0 / 1,2 / 1,5
□	0,6 / 0,8 / 1,0 / 1,2
☑	On demand

### SPECIAL PITCHES

Further pitch sizes and customized knurling wheels available on demand.

### ALTERNATIVE TYPES

Knurling wheel variants **Pulvermetall**

No.	Type	Availability
No. 23	Knurling wheel formed, without chamfer, PM	☑

Knurling wheel variants **HSS**

No.	Type	Availability
No. 20	Knurling wheel formed, with chamfer, HSS	☑
No. 22	Knurling wheel formed, without chamfer, HSS	☑

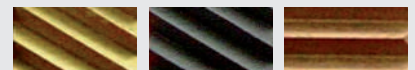
HSS = High Speed Steel, PM = Powder Metal Steel

✓ = Stock item / immediate availability  
☑ = Available on demand

### TOOL LIFE INCREASING FEATURES: PVD-COATINGS / SPECIAL HEAT-TREATMENT

#### TYPE OF TREATMENT:

TENIFER® - nitriding | TiN-coatings | TiCN-coatings  
TiAlN-coatings | TiAlCN-coatings | Defined hardness



# CUT KNURLING, SWARF REMOVAL

깎는 타입 휠



AA



BL 15°



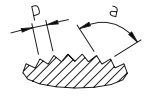
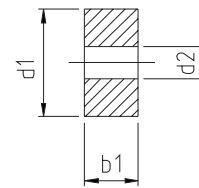
BL 30°



BR 15°



BR 30°



## KNURLING WHEEL WITHOUT CHAMFER – METRIC - POWDER METAL, S590

Standard version	Dimension			Standard Pitch	Type				
	Diameter	Width	Bore		AA	BL30°	BL15°	BR30°	BR15°
No. 16	8,9	2,5	4	○	✓	✓	✓	✓	✓
No. 16	10	3	6	○	✓	✓	✓	✓	✓
No. 16	14,5	3	5	○	✓	✓	✓	✓	✓
No. 16	15	4	8	○	✓	✓	✓	✓	✓
No. 16	21,5	5	8	●	✓	✓	✓	✓	✓
No. 16	25	6	8	●	✓	✓	✓	✓	✓
No. 16	32	13	16	■	✓	✓	✓	✓	✓
No. 16	42	13	16	■	✓	✓	✓	✓	✓

Further dimensions and customized knurling wheels available on demand.

✓ = Stock item / immediate availability  
 ☑ = Available on demand

### STANDARD PITCH SIZES / PROFILE ANGLE 90°

●	0,3 / 0,4 / 0,5 / 0,6 / 0,7 / 0,8 / 0,9 / 1,0 / 1,2 / 1,5 / 1,6 / 1,8 / 2,0
○	0,3 / 0,4 / 0,5 / 0,6 / 0,7 / 0,8 / 0,9 / 1,0 / 1,2 / 1,5
■	0,6 / 0,8 / 1,0 / 1,2 / 1,5
□	0,6 / 0,8 / 1,0 / 1,2
☑	On demand

## SPECIAL PITCHES

Further pitch sizes and customized knurling wheels available on demand.

## ALTERNATIVE TYPES

Knurling wheel variants **Powder Metal**

No.	Type	Availability
No. 18	Knurling wheel milled, 10° chamfer, PM	☑
No. 35	Knurling wheel ground, without chamfer, PM	☑
No. 37	Knurling wheel ground, 10° chamfer, PM	☑

Knurling wheel variants **HM**

No.	Type	Availability
No. 55	Knurling wheel ground, without chamfer, HM	☑
No. 57	Knurling wheel ground, 10° chamfer, HM	☑

Knurling wheel variants **HSS**

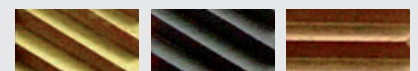
No.	Type	Availability
No. 15	Knurling wheel milled, without chamfer, HSS	☑
No. 17	Knurling wheel milled, without chamfer, HSS	☑

HSS = High Speed Steel, PM = Powder Metal Steel, HM = Carbide

## TOOL LIFE INCREASING FEATURES: PVD-COATINGS / SPECIAL HEAT-TREATMENT

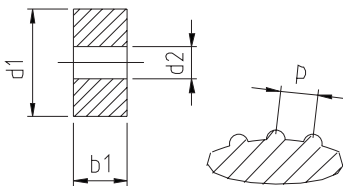
### TYPE OF TREATMENT:

TENIFER® - nitriding | TiN-coatings | TiCN-coatings  
 TiAlN-coatings | TiAlCN-coatings | Defined hardness

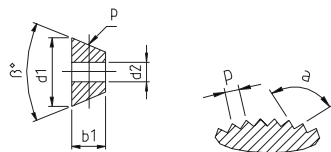
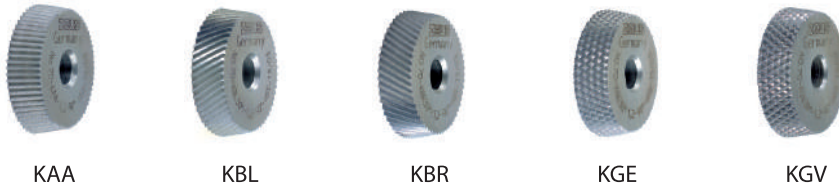


The zeus® product range includes special knurling wheels such as bead-knurling wheels, conical, convex and concave knurling wheels. For special applications we develop also customized knurling wheels according to individual requirements.

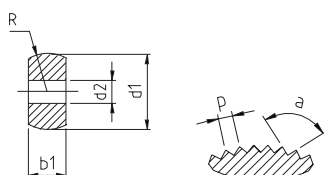
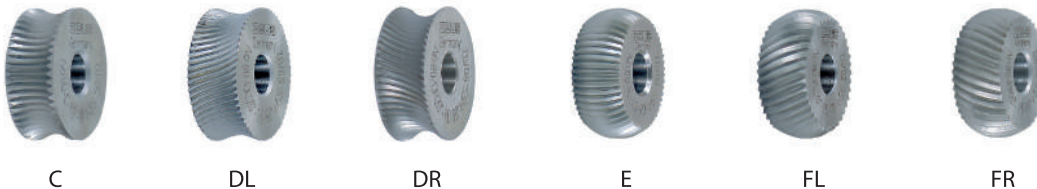
## ■ NO. 60 – BEAD-KNURLING WHEELS



## ■ NO. 70 – CONICAL KNURLING WHEELS



## ■ NO. 80 – CONVEX / CONCAVE KNURLING WHEELS



## ■ REVOLVING SYSTEM – zeus® MARKING ROLL No. 40 / No. 40-A / No. 40-K



No. 40: for identical text

- The design is based on the diameter of the workpiece

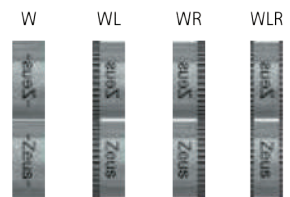
Possible types of marking No. 40, No. 40-A, No. 40-K:



No. 40-A: exchangeable characters



No. 40-K: for marking of tapered workpieces and flat faces.



## ■ SPRING-RETURN SYSTEM – zeus® MARKING ROLL No. 41



- The design is independent of the workpiece diameter

Possible types of marking:



## ■ SPRING-RETURN SYSTEM – zeus® MARKING ROLL No. 42



- The design is independent of the workpiece diameter
- Exchangeable segments

Possible types of marking:



## ■ SPRING-RETURN SYSTEM – zeus® MARKING ROLL No. 43



- The design is independent of the workpiece diameter
- Exchangeable segments
- Marking up to a shoulder

Possible types of marking:



## ■ SPRING-RETURN SYSTEM – zeus® MARKING ROLL No. 44



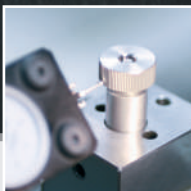
- The design is independent of the workpiece diameter
- Marking up to a shoulder

Possible types of marking:



More information on page 47 (marking rolls) and in the catalogue zeus® Marking Technology.

# TECHNICAL APPENDIX



## CONTENT

- MATERIAL DISPLACEMENT
- SPEED / FEED RATES
- KNURLING OPTIMIZATION
- CONVERSION TABLE
- INFLUENCING FACTORS



# MATERIAL DISPLACEMENT THROUGH FORM KNURLING

누르는 타입을 사용시 변형 정보



## Our experience values for the increase in work piece diameter through form knurling

저희의 경험을 통해 얻은 누르는 타입을 사용시 소재의 변화에 대한 자료입니다.

Knurling profile according to DIN 82: RAA (Profile on work piece)

Knurling wheels according to DIN 403: AA (Profile for knurling wheels)



RAA

Pitch		0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,2	1,5	1,6	1,8	2,0
Material	Work Piece-Ø	Increase in work piece diameter-Ø in mm												
Free-cutting Steel	5	0,08	0,14	0,18	0,22	0,27	0,29	0,33	0,35	0,50	-	-	-	-
	15	0,08	0,14	0,18	0,23	0,30	0,40	0,41	0,44	0,50	0,60	0,65	0,67	0,70
	25	0,08	0,15	0,23	0,24	0,28	0,35	0,38	0,44	0,53	0,62	0,70	0,70	0,98
Stainless Steel	5	0,10	0,15	0,20	0,25	0,28	0,30	0,35	0,42	0,41	-	-	-	-
	15	0,10	0,15	0,19	0,25	0,30	0,34	0,40	0,45	0,51	0,60	-	-	-
	25	0,10	0,14	0,20	0,26	0,31	0,33	0,38	0,43	0,50	0,62	-	-	-
Brass	5	0,08	0,12	0,18	0,20	0,21	0,22	0,23	0,25	0,28	-	-	-	-
	15	0,10	0,14	0,20	0,26	0,28	0,29	0,31	0,35	0,41	0,44	0,48	0,50	0,55
	25	0,10	0,15	0,20	0,25	0,28	0,30	0,32	0,36	0,43	0,46	0,50	0,53	0,53
Aluminium	5	0,09	0,15	0,19	0,23	0,28	0,30	0,34	0,41	0,40	-	-	-	-
	15	0,10	0,15	0,19	0,26	0,29	0,33	0,39	0,45	0,51	0,57	0,65	-	-
	25	0,09	0,15	0,19	0,26	0,29	0,32	0,37	0,45	0,52	0,59	0,65	0,78	0,75

Knurling profile according to DIN 82: RBL 30°/RBR 30° (Profile on work piece)

Knurling wheels according to DIN 403: BR 30°/BL 30° (Profile for knurling wheels)



RBL 30°



RBR 30°

Pitch		0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,2	1,5	1,6	1,8	2,0
Material	Work Piece-Ø	Increase in work piece diameter-Ø in mm												
Free-cutting Steel	5	0,11	0,15	0,20	0,24	0,28	0,34	0,38	0,45	0,55	-	-	-	-
	15	0,11	0,15	0,22	0,26	0,30	0,35	0,42	0,45	0,52	0,67	0,73	0,75	0,85
	25	0,11	0,14	0,23	0,25	0,28	0,36	0,42	0,45	0,56	0,70	0,72	0,78	0,90
Stainless Steel	5	0,09	0,14	0,19	0,25	0,31	0,34	0,39	0,45	0,52	-	-	-	-
	15	0,12	0,20	0,23	0,31	0,35	0,40	0,45	0,51	0,62	0,66	0,73	0,85	0,97
	25	0,12	0,18	0,24	0,27	0,37	0,39	0,43	0,49	0,59	0,80	0,84	0,93	0,96
Brass	5	0,10	0,14	0,20	0,23	0,24	0,28	0,30	0,33	0,37	-	-	-	-
	15	0,10	0,15	0,21	0,23	0,24	0,31	0,36	0,41	0,47	0,53	0,55	0,64	0,63
	25	0,11	0,15	0,22	0,22	0,25	0,30	0,35	0,40	0,45	0,55	0,61	0,62	0,68
Aluminium	5	0,12	0,14	0,21	0,24	0,29	0,34	0,39	0,41	0,51	-	-	-	-
	15	0,12	0,18	0,23	0,26	0,36	0,40	0,43	0,50	0,56	0,56	0,61	0,74	0,75
	25	0,12	0,16	0,25	0,28	0,37	0,39	0,46	0,50	0,58	0,77	0,82	0,84	0,96

Knurling profile according to DIN 82: RGE 30° (Profile on work piece)

Knurling wheels according to DIN 403: BR30°+BL30° (Profile for knurling wheels)



RGE 30°

Pitch		0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,2	1,5	1,6	1,8	2,0
Material	Work Piece-Ø	Increase in work piece diameter-Ø in mm												
Free-cutting Steel	5	0,12	0,16	0,20	0,25	0,33	0,41	0,45	0,55	0,65	-	-	-	-
	15	0,13	0,22	0,30	0,32	0,35	0,41	0,43	0,52	0,62	0,67	0,81	0,86	0,95
	25	0,12	0,18	0,28	0,32	0,35	0,38	0,43	0,55	0,67	0,77	0,87	0,98	0,98
Stainless Steel	5	0,11	0,20	0,25	0,30	0,36	0,39	0,41	0,55	0,55	-	-	-	-
	15	0,10	0,14	0,21	0,24	0,29	0,34	0,40	0,43	0,53	0,66	0,72	0,70	0,88
	25	0,11	0,13	0,20	0,25	0,28	0,32	0,41	0,44	0,52	0,67	0,70	0,71	0,83
Brass	5	0,12	0,13	0,16	0,20	0,24	0,28	0,30	0,32	0,38	-	-	-	-
	15	0,12	0,16	0,18	0,24	0,28	0,30	0,37	0,39	0,40	0,48	0,52	0,55	0,63
	25	0,12	0,17	0,22	0,23	0,27	0,30	0,34	0,38	0,41	0,48	0,50	0,63	0,63
Aluminium	5	0,10	0,15	0,21	0,25	0,33	0,36	0,41	0,50	0,57	-	-	-	-
	15	0,11	0,14	0,20	0,25	0,28	0,33	0,39	0,43	0,54	0,67	0,71	0,76	0,89
	25	0,11	0,15	0,22	0,25	0,29	0,34	0,40	0,44	0,53	0,68	0,69	0,71	0,88

Note: These values are guidelines only. Minor deviations may occur depending on material. Applies only to form knurling.



# APPROXIMATE VALUES FOR SPEED AND FEED RATE

추천 절삭 조건

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

## Cut Knurling

Material	Work Piece-Ø	Knurling Wheel Ø [mm]	Vc [m/min]		f [mm/U]					
					Radial		Axial			
			from	to	from	to	Pitch			
Free-cutting Steel	< 10	10 / 15	40	70	0,04	0,08	> 0,3 < 0,5	> 0,5 < 1,0	> 1,0 < 1,5	> 1,5 < 2,0
	10 - 40	15 / 25	50	90	0,05	0,10	0,14	0,09	0,06	0,05
	40 - 100	25 / 32 / 42	65	110	0,05	0,10	0,20	0,13	0,10	0,07
	100 - 250	25 / 32 / 42	65	110	0,05	0,10	0,25	0,18	0,12	0,08
	> 250	32 / 42	80	100	0,05	0,10	0,30	0,20	0,13	0,09
Stainless Steel	< 10	10 / 15	22	40	0,04	0,08	0,32	0,21	0,14	0,10
	10 - 40	15 / 25	30	50	0,05	0,10	0,12	0,08	0,05	0,04
	40 - 100	25 / 32 / 42	35	60	0,05	0,10	0,17	0,11	0,09	0,06
	100 - 250	25 / 32 / 42	35	60	0,05	0,10	0,21	0,15	0,10	0,07
	> 250	32 / 42	45	55	0,05	0,10	0,26	0,17	0,11	0,08
Brass	< 10	10 / 15	55	100	0,04	0,08	0,27	0,18	0,12	0,09
	10 - 40	15 / 25	70	125	0,05	0,10	0,15	0,09	0,06	0,05
	40 - 100	25 / 32 / 42	90	155	0,05	0,10	0,21	0,14	0,11	0,07
	100 - 250	25 / 32 / 42	90	155	0,05	0,10	0,26	0,19	0,13	0,08
	> 250	32 / 42	115	140	0,05	0,10	0,32	0,21	0,14	0,09
Aluminium	< 10	10 / 15	70	120	0,04	0,08	0,34	0,22	0,15	0,11
	10 - 40	15 / 25	80	150	0,05	0,10	0,18	0,11	0,08	0,06
	40 - 100	25 / 32 / 42	110	160	0,05	0,10	0,25	0,16	0,13	0,09
	100 - 250	25 / 32 / 42	110	160	0,05	0,10	0,31	0,23	0,15	0,10
	> 250	32 / 42	130	150	0,05	0,10	0,38	0,25	0,16	0,11

## Form Knurling

Material	Work Piece-Ø	Knurling Wheel Ø [mm]	Vc [m/min]		f [mm/U]					
					Radial		Axial			
			from	to	from	to	Pitch			
Free-cutting Steel	< 10	10 / 15	20	50	0,04	0,08	> 0,3 < 0,5	> 0,5 < 1,0	> 1,0 < 1,5	> 1,5 < 2,0
	10 - 40	15 / 20	25	55	0,05	0,10	0,20	0,13	0,08	0,07
	40 - 100	20 / 25	30	60	0,05	0,10	0,28	0,18	0,14	0,10
	100 - 250	20 / 25	30	60	0,05	0,10	0,35	0,25	0,17	0,11
	> 250	25	30	60	0,05	0,10	0,42	0,28	0,18	0,13
Stainless Steel	< 10	10 / 15	15	40	0,04	0,08	0,45	0,29	0,20	0,14
	10 - 40	15 / 20	20	50	0,05	0,10	0,14	0,09	0,06	0,05
	40 - 100	20 / 25	25	50	0,05	0,10	0,20	0,13	0,10	0,07
	100 - 250	20 / 25	25	50	0,05	0,10	0,25	0,18	0,12	0,08
	> 250	25	25	50	0,05	0,10	0,29	0,20	0,13	0,09
Brass	< 10	10 / 15	30	75	0,04	0,08	0,31	0,21	0,14	0,10
	10 - 40	15 / 20	40	85	0,05	0,10	0,22	0,14	0,09	0,08
	40 - 100	20 / 25	45	90	0,05	0,10	0,31	0,20	0,15	0,11
	100 - 250	20 / 25	45	90	0,05	0,10	0,39	0,28	0,18	0,12
	> 250	25	45	90	0,05	0,10	0,46	0,31	0,20	0,14
Aluminium	< 10	10 / 15	25	60	0,04	0,08	0,49	0,32	0,22	0,15
	10 - 40	15 / 20	30	65	0,05	0,10	0,12	0,08	0,05	0,04
	40 - 100	20 / 25	35	70	0,05	0,10	0,17	0,11	0,08	0,06
	100 - 250	20 / 25	35	70	0,05	0,10	0,21	0,15	0,10	0,07
	> 250	25	35	70	0,05	0,10	0,25	0,17	0,11	0,08

Note: These values are approximate values only.

Sufficient cooling and lubrication is necessary to prevent chips from being rolled in and to increase tool life of knurling wheels.



# ARNO®

## WERKZEUGE

We have a passion for precision.



### Tools and Indexable Inserts for Turning

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

# ISO 사각홀더 규격 선정법

1. DIAMETAL

2. BIMU

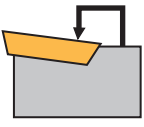
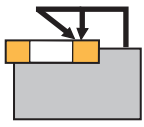
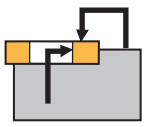
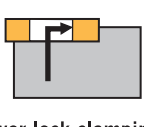
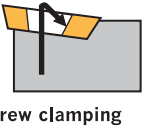
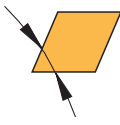

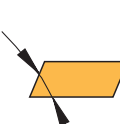





















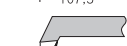



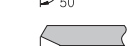



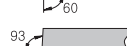



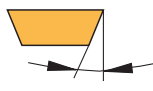
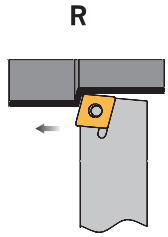
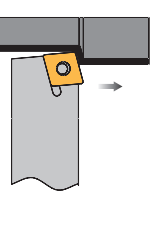
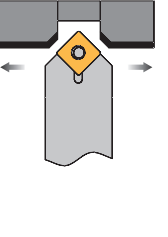
3. IFANGER

4. ZEUS

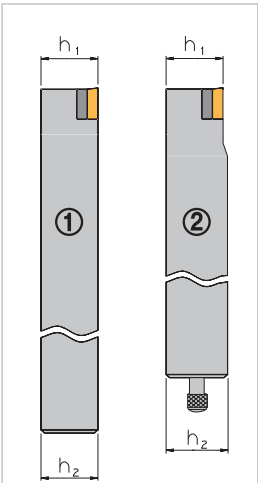
5. ARNO

6. Whiz Cut

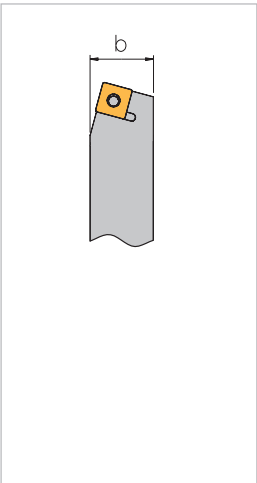
7. SPHINX

 <b>C</b> Top clamping   <b>D</b> Top and hole clamping   <b>M</b> Top and hole clamping   <b>P</b> Lever lock clamping   <b>S</b> Screw clamping	 80° <b>C</b>  55° <b>D</b>  75° <b>E</b>  86° <b>M</b>  35° <b>V</b>   85° <b>A</b>  82° <b>B</b>  55° <b>K</b>   <b>H</b>  <b>L</b>  <b>O</b>  <b>P</b>  <b>R</b>  <b>S</b>  <b>T</b>  <b>W</b>	 <b>A</b>  <b>B</b>  <b>C</b>  <b>D</b>  <b>E</b>  <b>F</b>  <b>G</b>  <b>H</b>  <b>J</b>  <b>K</b>  <b>L</b>  <b>M</b>  <b>N</b>  <b>R</b>  <b>S</b>  <b>T</b>  <b>U</b>  <b>V</b>  <b>W</b>  <b>Y</b>	  3° <b>A</b> 5° <b>B</b> 7° <b>C</b> 15° <b>D</b> 20° <b>E</b> 25° <b>F</b> 30° <b>G</b> 0° <b>N</b> 11° <b>P</b>  Others → <b>O</b>	 <b>R</b>   <b>L</b>   <b>N</b>
<b>P</b>	<b>C</b>	<b>L</b>	<b>N</b>	<b>L</b>
Clamping method 클램핑 방식	Insert shape 인서트 형상	Style 홀더 형상	Clearance angle 인서트 여유각	Holder execution 홀더 방향

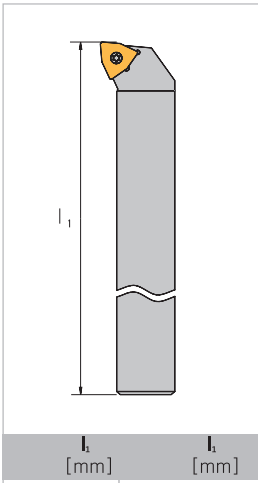
# ISO-Designation System for Tool Holders



Height of cutting edge „h<sub>1</sub>“ in mm.  
For tool holders ① the height of the cutting edge „h<sub>1</sub>“ is equal to the height of the shank „h<sub>2</sub>“.  
For tool holders ② the height of the cutting edge „h<sub>1</sub>“ is unequal to the height of the shank „h<sub>2</sub>“.

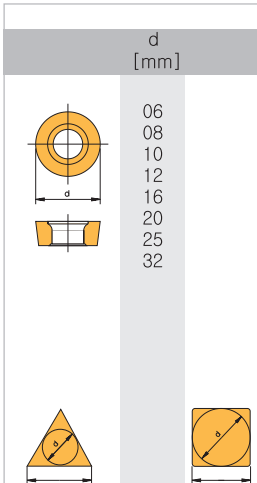


Width „b“ in mm.  
For cartridges the dimension „b“ does not exist. It is replaced by the letters „CA“.



	l <sub>1</sub> [mm]	l <sub>1</sub> [mm]
A	32	M 150
B	40	N 160
C	50	P 170
D	60	Q 180
E	70	R 200
F	80	S 250
G	90	T 300
H	100	U 350
J	110	V 400
K	125	W 450
L	140	Y 500

Special length → X



d [mm]			
06	08	10	12
16	20	25	32
d [mm] [inch] [mm] [mm]			
06	5/32	3,97	03
08	3/16	4,76	04
09	7/32	5,56	05
11	1/4	6,35	06
16	3/8	9,525	09
22	1/2	12,7	12
27	5/8	15,875	15
33	3/4	19,05	19
44	1	25,4	25

Special product information  
can be indicated by an  
internal company coding  
system at the 10th position.

20

Shank height

높이

20

Shank width

두께

K

Length

길이

12

Insert size

인서트 규격

...

Additional coding system

추가설명

- 1. DIAMETAL
- 2. BIMU
- 3. IFANGER
- 4. ZEUS
- 5. ARNO
- 6. Whiz Cut
- 7. SPHINX

# External Machining - Overview

## Screw Clamping - Positive

1. DIAMETAL

2. BIMU

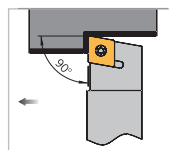
3. IFANGER

4. ZEUS

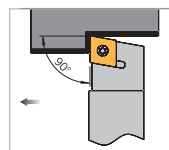
5. ARNO

6. Whiz Cut

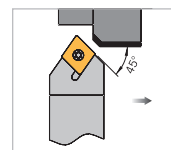
7. SPHINX



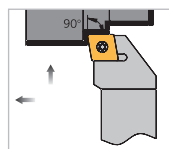
SCAC  
R/L



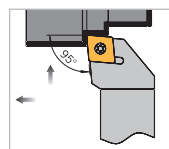
SCAP  
R/L



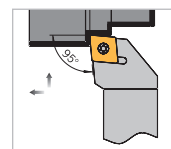
SCDC  
L



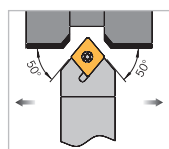
SCFC  
R/L



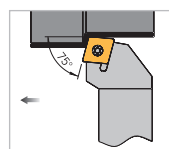
SCLC  
R/L



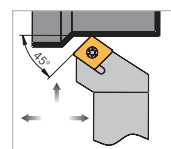
SCLP  
R/L



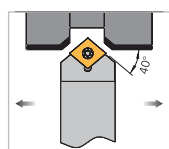
SCMC  
N



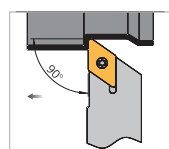
SCRC  
R/L



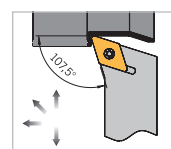
SCSC  
R/L



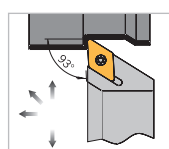
SCXP  
N



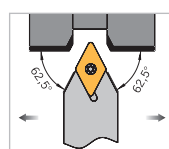
SDAC  
R/L



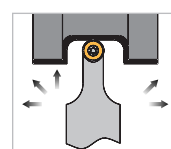
SDHC  
R/L



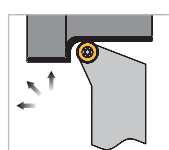
SDJC  
R/L



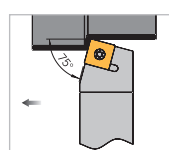
SDNC  
N



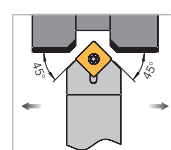
SRDC  
N



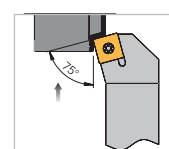
SRGC  
R/L



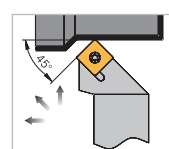
SSBC  
R/L



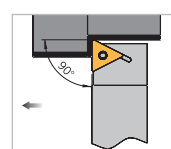
SSDC  
N



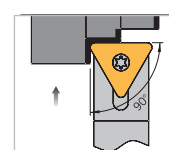
SSKC  
R/L



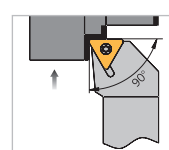
SSSC  
R/L



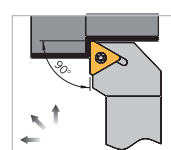
STAC  
R/L



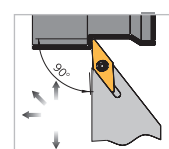
STCC  
N



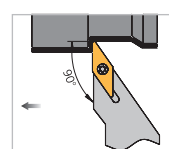
STFC  
R/L



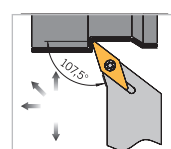
STGC  
R/L



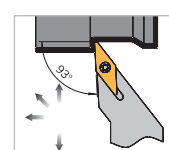
SVAC  
R/L



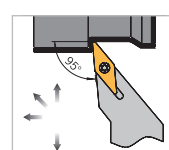
SVG  
C R/L



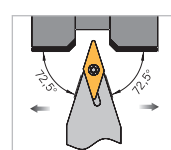
SVHC  
R/L



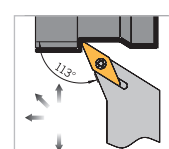
SVJC  
R/L



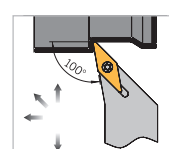
SVLC  
R/L



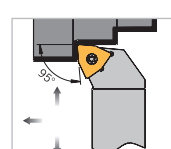
SVVC  
N



SVXC  
R/L



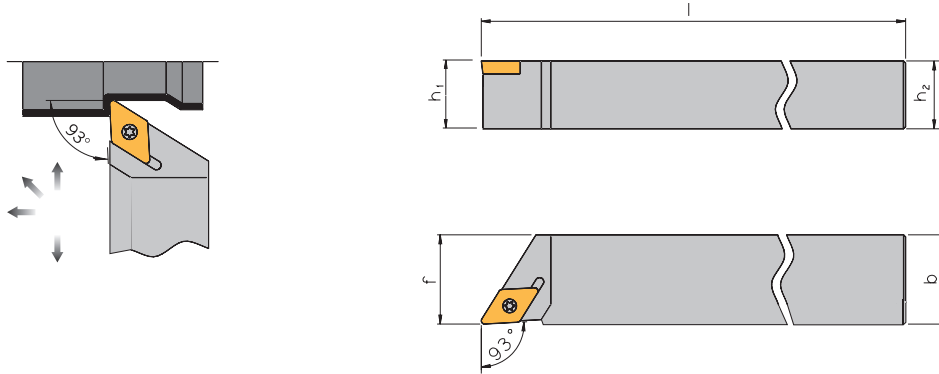
SVZC  
R/L



SWLC  
R/L

# Tool Holders - Screw Clamping

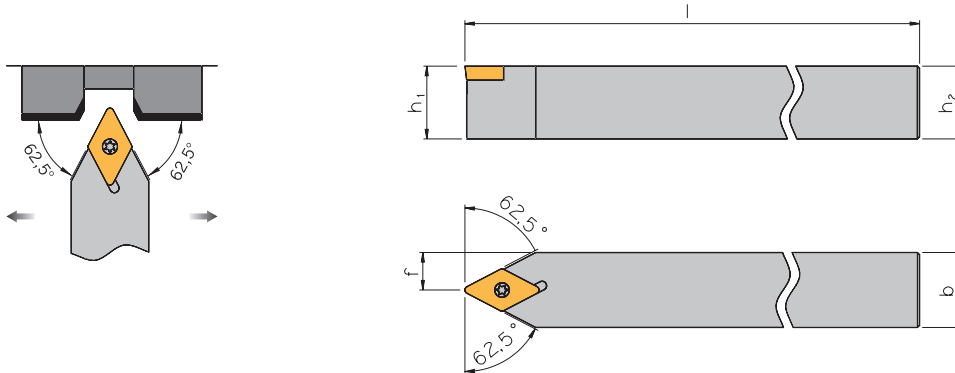
## SDJC R/L



### Holder

규격	$h_1 / h_2$	b	l	f	사용가능 인서트
SDJC R/L 0808 X07-A	8	8	115	8,0	DC.. 0702..
SDJC R/L 1010 X07-A	10	10	115	10,0	DC.. 0702..
SDJC R/L 1212 X07-A	12	12	130	12,0	DC.. 0702..
SDJC R/L 1212 X11-A	12	12	130	12,0	DC.. 11T3..
SDJC R/L 1616 X07-A	16	16	130	16,0	DC.. 0702..
SDJC R/L 1616 X11-A	16	16	130	16,0	DC.. 11T3..
SDJC R/L 2020 X11-A	20	20	120	20,0	DC.. 11T3..

## SDNC N



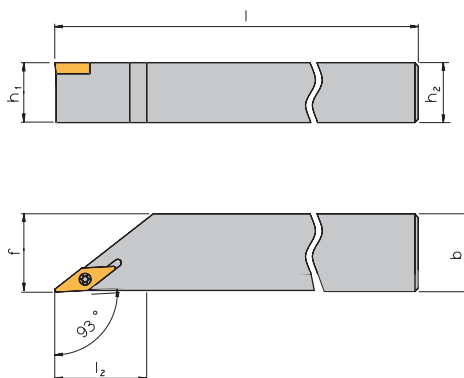
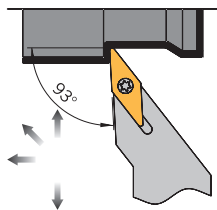
### Holder

규격	$h_1 / h_2$	b	l	f	사용가능 인서트
SDNC N 0808 X07-A	8	8	115	4,0	DC.. 0702..
SDNC N 1010 X07-A	10	10	115	5,0	DC.. 0702..
SDNC N 1212 X07-A	12	12	130	6,0	DC.. 0702..
SDNC N 1212 X11-A	12	12	130	6,0	DC.. 11T3..
SDNC N 1616 X11-A	16	16	130	8,0	DC.. 11T3..
SDNC N 2020 X11-A	20	20	120	10,0	DC.. 11T3..

## Spare Parts

For holder	Screw	Key
SDNC N.. X07-A	SS 1751	KS 1751
SDNC N.. X11-A	V-M4-2400	KS 1111

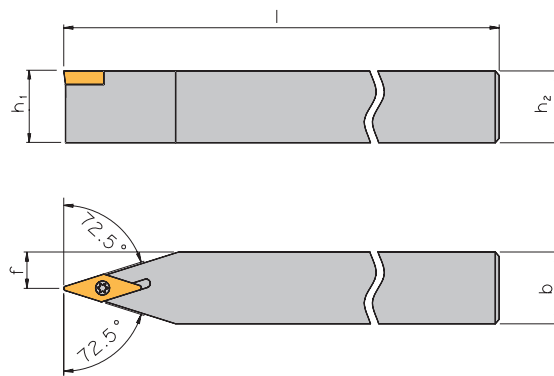
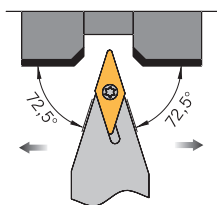
Remark: All flats are ground

**SVJC R/L 93°****Holder**

규격	$h_1 / h_2$	b	l	f	사용가능 인서트
SVJC R/L 0808 X11-A	8	8	115	8,0	VC.. 1103..
SVJC R/L 1010 X11-A	10	10	115	10,0	VC.. 1103..
SVJC R/L 1212 X11-A	12	12	130	12,0	VC.. 1103..
SVJC R/L 1212 X16-A	12	12	130	12,0	VC.. 1604..
SVJC R/L 1616 X11-A	16	16	130	16,0	VC.. 1103..
SVJC R/L 1616 X16-A	16	16	130	16,0	VC.. 1604..
SVJC R/L 2020 X16-A	20	20	120	20,0	VC.. 1604..

**Spare Parts**

For holder	Screw	Key
SVJC R/L.. X11-A	SS 1751	KS 1751
SVJC R/L.. X16-A	V-M4-2700	KS 1111

**SVVC N 72,5°****Holder**

규격	$h_1 / h_2$	b	l	f	사용가능 인서트
SVVC N 0808 X11-A	8	8	115	4,0	VC.. 1103..
SVVC N 1010 X11-A	10	10	115	5,0	VC.. 1103..
SVVC N 1212 X11-A	12	12	130	6,0	VC.. 1103..
SVVC N 1212 X16-A	12	12	130	6,0	VC.. 1604..
SVVC N 1616 X11-A	16	16	130	8,0	VC.. 1103..
SVVC N 1616 X16-A	16	16	130	8,0	VC.. 1604..
SVVC N 2020 X16-A	20	20	120	10,0	VC.. 1604..

**Spare Parts**

For holder	Screw	Key
SVVC N.. X11-A	SS 1751	KS 1751
SVVC N.. X16-A	V-M4-2700	KS 1111

Remark: All flats are ground

# ISO 내경 TOOLS (HOLDER)





# ISO 내경홀더 규격 선정법

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

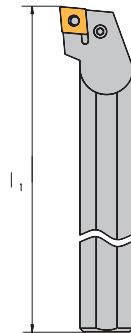
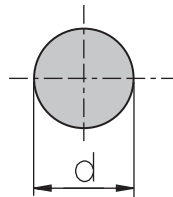
A  
스틸 유압 홀더

B  
스틸 저진동 홀더

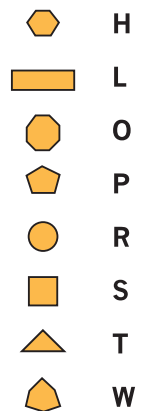
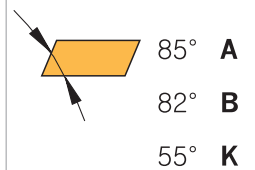
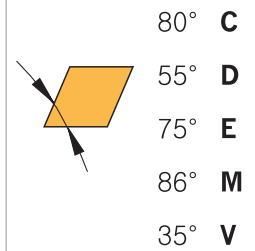
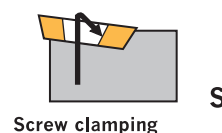
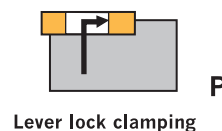
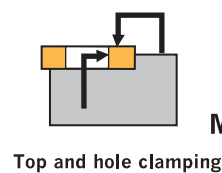
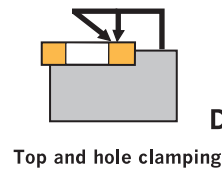
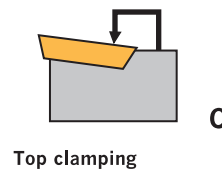
C  
초경 홀더

E  
초경 유압 홀더

S  
스틸 홀더



d [mm]	l1 [mm]	l1 [mm]
08	A 32	M 150
10	B 40	N 160
12	C 50	P 170
16	D 60	Q 180
20	E 70	R 200
25	F 80	S 250
32	G 90	T 300
40	H 100	U 350
50	J 110	V 400
60	K 125	W 450
	L 140	Y 500
	Special length→ X	



S

32

U

P

C

Type of shank

Shank-Ø

Length

Clamping  
method

Shape

홀더 유형

홀더 외경 Ø

길이

클램핑 방식

인서트 형상

# 1. DIAMETAL

## 2. BIMU

### 3. IFANGER

## 4. ZEUS

## 5. ARNO

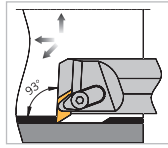
## 6. Whiz Cut

## 7. SPHINX

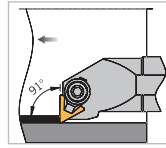
# Internal Machining – Overview

1. DIAMETAL

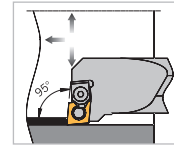
## Top Clamping – Positive



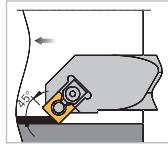
ACKUC  
R/L



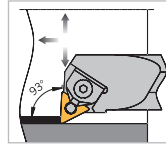
CTFP  
R/L



MCLC  
R/L



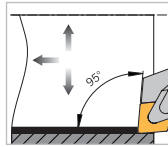
MSSC  
R/L



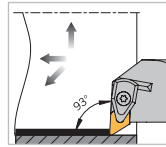
MTUC  
R/L

2. BIMU

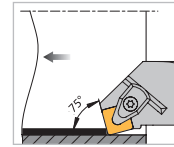
## Top Clamping – Negative



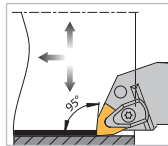
DCLN  
R/L



DDUN  
R/L



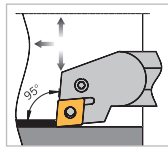
DSKN  
R/L



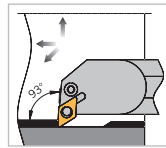
DWLN  
R/L

3. IFANGER

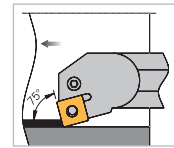
## Lever Lock Clamping – Negative



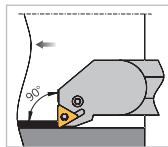
PCLN  
R/L



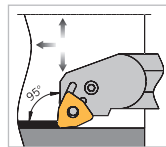
PDUN  
R/L



PSKN  
R/L



PTFN  
R/L



PWLN  
R/L

4. ZEUS

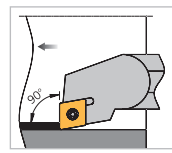
5. ARNO

6. Whiz Cut

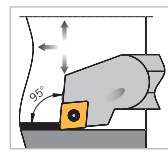
7. SPHINX

# Internal Machining – Overview

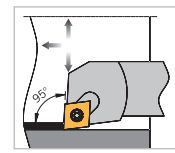
## Screw Clamping – Positive



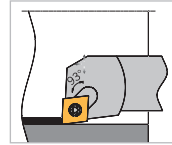
SCFC  
R/L



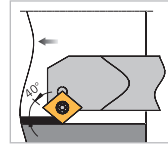
SCLC  
R/L



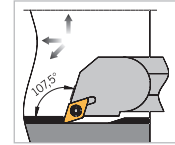
SCLD  
R/L



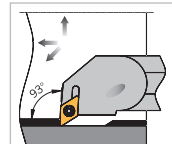
SCUP  
R/L



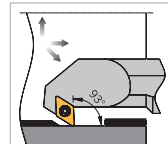
SCXP  
R/L



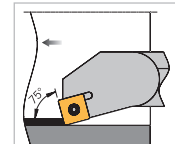
SDQC  
R/L



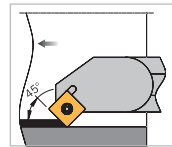
SDUC  
R/L



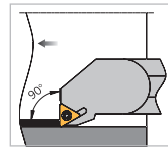
SDXC  
R/L



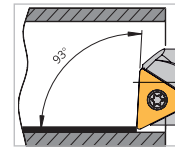
SSKC  
R/L



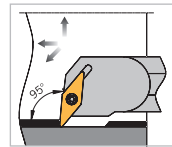
SSSC  
R/L



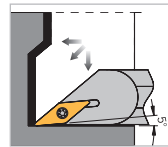
STFC  
R/L



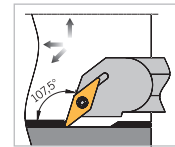
STUC  
R/L



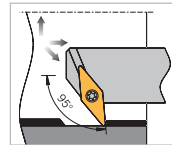
SVLC  
R/L



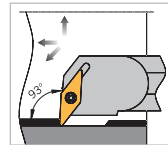
SVOC  
R/L



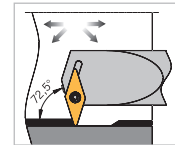
SVQC  
R/L



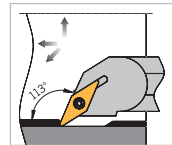
SV95C  
R/L



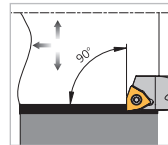
SVUC  
R/L



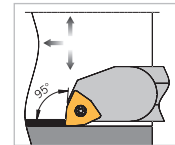
SVVC  
R/L



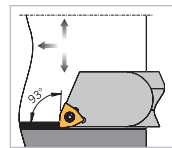
SVXC  
R/L



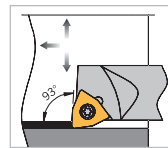
SWFC  
R/L



SWLC  
R/L



SWUC  
R/L



SWUC  
R/L

※ 전체적인 홀더의 세부사항들을 카다록에 넣지 못하였으나 홀더 모양을 보시고 문의하여 주시면 세부 규격들에 대한 안내를 드리겠습니다.

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

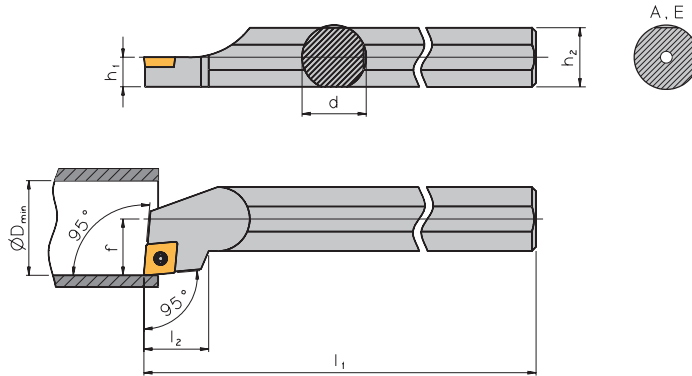
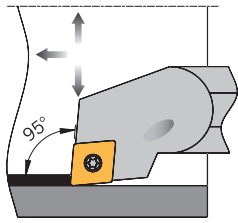
6. Whiz Cut

7. SPHINX

# Boring Bars - Screw Clamping

## SCLC R/L 95°

ARNO HOFER



## Boring Bars Steel (스틸)

규격	d	h <sub>1</sub>	h <sub>2</sub>	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
S08H SCLC R/L 06	8	3,5	7	100	—	5	11,0	CC.. 0602..
S10K SCLC R/L 06	10	4,5	9	125	10	7	13,0	CC.. 0602..
S12Q SCLC R/L 06	12	5,5	11	180	10	9	16,0	CC.. 0602..
S16R SCLC R/L 09	16	7,5	15	200	16	11	20,0	CC.. 09T3..
S20S SCLC R/L 09	20	9,0	18	250	16	13	25,0	CC.. 09T3..
S25T SCLC R/L 09	25	11,5	23	300	16	17	31,5	CC.. 09T3..
S32U SCLC R/L 12	32	15,0	30	350	22	22	40,0	CC.. 1204..
S40V SCLC R/L 12	40	18,5	37	400	22	27	49,0	CC.. 1204..

## Boring Bars - Steel Shank with Coolant Through (스틸 유압)

규격	d	h <sub>1</sub>	h <sub>2</sub>	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
A08F SCLC R/L 06	8	4,0	7,5	80	—	5	11,0	CC.. 0602..
A10H SCLC R/L 06	10	5,0	9,5	100	10	7	13,0	CC.. 0602..
A12K SCLC R/L 06	12	6,0	11,5	125	10	9	16,0	CC.. 0602..
A16M SCLC R/L 09	16	8,0	15,5	150	16	11	20,0	CC.. 09T3..
A20Q SCLC R/L 09	20	10,0	19,0	180	16	13	25,0	CC.. 09T3..
A25R SCLC R/L 09	25	12,5	24,0	200	16	17	31,5	CC.. 09T3..
A32S SCLC R/L 12	32	16,0	31,0	250	22	22	40,0	CC.. 1204..
A40T SCLC R/L 12	40	20,0	38,5	300	22	27	49,0	CC.. 1204..

Remark: A-execution with cylindrical part at the end of the shank

## Boring Bars - Carbide Shank with Coolant Through (초경 유압 보링바)

규격	d	h <sub>1</sub>	h <sub>2</sub>	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
E08H SCLC R/L 06	8	4,0	7,5	100	—	5	11,0	CC.. 0602..
E10K SCLC R/L 06	10	5,0	9,5	125	10	7	14,0	CC.. 0602..
E12Q SCLC R/L 06	12	6,0	11,5	180	10	9	17,0	CC.. 0602..
E16R SCLC R/L 09	16	8,0	15,5	200	16	11	21,0	CC.. 09T3..
E20S SCLC R/L 09	20	10,0	19,0	250	16	13	25,0	CC.. 09T3..
E25T SCLC R/L 09	25	12,5	24,0	300	16	17	31,5	CC.. 09T3..
E32U SCLC R/L 12	32	16,0	31,0	350	22	22	40,0	CC.. 1204..

## Spare Parts

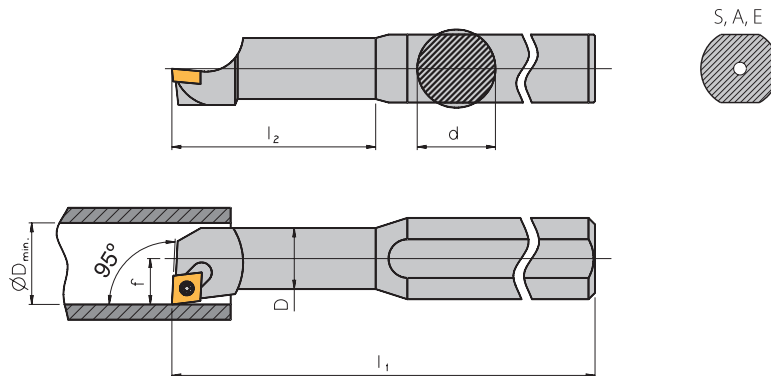
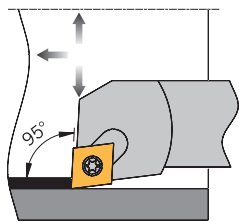
For boring bar	Support pad	Bushing	Screw	Key	Spare part set ④
.. 08-12.. SCLC R/L 06	—	—	SS 1754	KS 1751	S 1754
.. 16-20.. SCLC R/L 09	—	—	SS 1114	KS 1111	S 2314
.. 25.. SCLC R/L 09	—	—	SS 1111	KS 1111	S 1111
.. 32-40.. SCLC R/L 12	US 1221	GBS 1221-K	SS 1221	KS 1115	S 1221

④ Spare part set consists of: 3 screws + 1 key. Depending on type of toolholder also 1 support pad + 1 bushing

# Boring Bars - Screw Clamping

## SCLD R/L 95°

ARNO Kofler



### Boring Bars - Recessed Steel Shank 단진홀더

규격	d	D	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
S0408H SCLD R/L 04	8	4	100	16	2,4	4,8	CD.. 0401..
S0508H SCLD R/L 04	8	5	100	20	2,9	5,8	CD.. 0401..
S0608H SCLD R/L 04	8	6	100	24	3,4	6,8	CD.. 0401..

### Boring Bars - Recessed Steel Shank with Coolant Through (스틸 유압)

규격	d	D	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
A0408H SCLD R/L 04	8	4	100	16	2,4	4,8	CD.. 0401..
A0508H SCLD R/L 04	8	5	100	20	2,9	5,8	CD.. 0401..
A0608H SCLD R/L 04	8	6	100	24	3,4	6,8	CD.. 0401..

### Boring Bars - Recessed Carbide Shank with Coolant Through (초경 유압 보링바)

규격	d	D	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
E0408H SCLD R/L 04	8	4	100	24	2,4	4,8	CD.. 0401..
E0508H SCLD R/L 04	8	5	100	30	2,9	5,8	CD.. 0401..
E0608H SCLD R/L 04	8	6	100	36	3,4	6,8	CD.. 0401..

### Spare Parts

For boring bar	Screw	Key
.. SCLD R/L 04	T1,8.03	KS 2505

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

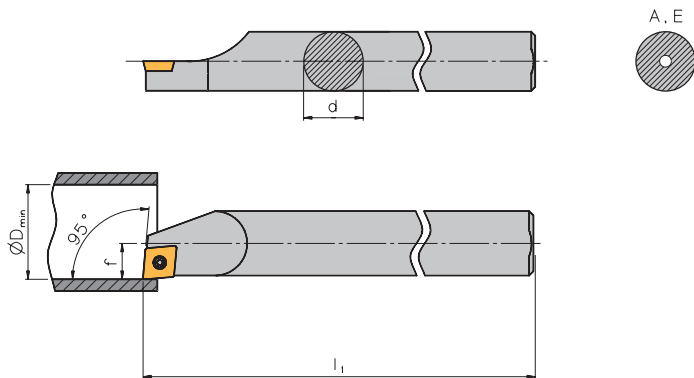
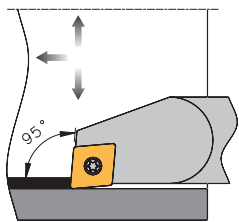
6. Whiz Cut

7. SPHINX

# Boring Bars - Screw Clamping

## SCLD R/L 95°

ARNO HOFER



### Boring Bars Steel (스틸)

규격	d	$l_1$	f	$D_{min}$	사용가능 인서트
S04E SCLD R/L 04	4	70	2,4	4,8	CD.. 0401..
S05E SCLD R/L 04	5	70	2,9	5,8	CD.. 0401..
S06F SCLD R/L 04	6	80	3,4	6,8	CD.. 0401..

### Boring Bars - Steel Shank with Coolant Through (스틸 유압)

규격	d	$l_1$	f	$D_{min}$	사용가능 인서트
A04E SCLD R/L 04	4	70	2,4	4,8	CD.. 0401..
A05E SCLD R/L 04	5	70	2,9	5,8	CD.. 0401..
A06F SCLD R/L 04	6	80	3,4	6,8	CD.. 0401..

### Boring Bars - Carbide Shank with Coolant Through (초경 유압 보링바)

규격	d	$l_1$	f	$D_{min}$	사용가능 인서트
E04F SCLD R/L 04	4	80	2,4	4,8	CD.. 0401..
E05F SCLD R/L 04	5	80	2,9	5,8	CD.. 0401..
E06G SCLD R/L 04	6	95	3,4	6,8	CD.. 0401..

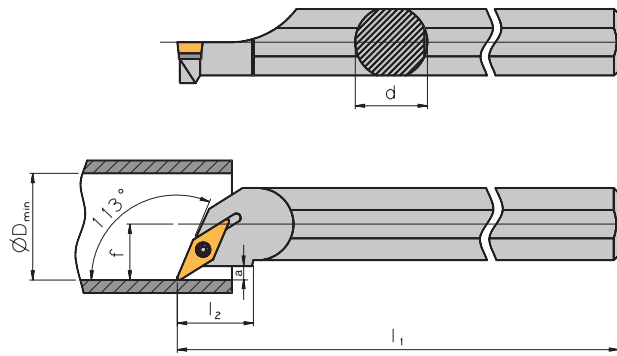
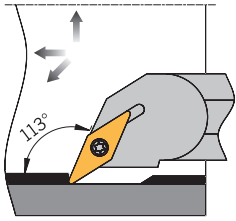
### Spare Parts

For boring bar	Screw	Key
.. SCLD R/L 04	T 1,8.03	KS 1886



## SVXC R/L

ARNO Kofler



Right hand execution shown

### Boring Bars - Steel Shank (스틸)

규격	d	a	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	PG	사용가능 인서트
S10H SVXC R/L 07	10	3	100	22	7	12,5	8	VC.. 0702..
S12K SVXC R/L 07	12	3	125	28	9	15,5	8	VC.. 0702..
S16M SVXC R/L 07	16	3	150	36	11	19,5	8	VC.. 0702..

### Boring Bars - Steel Shank with Coolant Through (스틸유압)

규격	d	a	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	PG	사용가능 인서트
A10H SVXC R/L 07	10	3	100	22	7	12,5	8	VC.. 0702..
A12K SVXC R/L 07	12	3	125	28	9	15,5	8	VC.. 0702..
A16M SVXC R/L 07	16	3	150	36	11	19,5	8	VC.. 0702..

### Boring Bars - Carbide Shank with Coolant Through (초경유압)

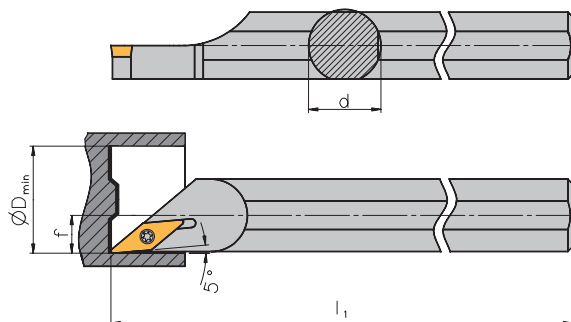
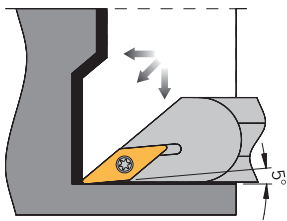
규격	d	a	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	PG	사용가능 인서트
E10H SVXC R/L 07	10	3	100	32	7	12,5	30	VC.. 0702..
E12K SVXC R/L 07	12	3	125	40	9	15,5	30	VC.. 0702..
E16M SVXC R/L 07	16	3	150	55	11	19,5	30	VC.. 0702..

### Spare Parts

For boring bar	Screw	Key
.. SVXC R/L 07	SS 5140	KS 1886

## SVOC R/L 95°

ARNO Kofler



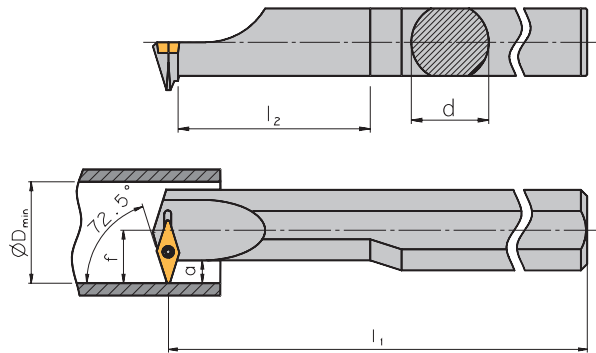
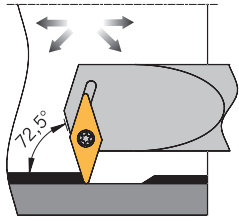
### Boring Bars - Steel Shank with Coolant Through (스틸유압)

규격	d	l <sub>1</sub>	f	D <sub>min</sub>	사용가능 인서트
A10H SVOC R/L 07	10	100	5,5	13	VC.. 0702..
A12K SVOC R/L 07	12	125	6,5	13	VC.. 0702..
A16M SVOC R/L 11	16	150	8,5	17	VC.. 1103..
A20Q SVOC R/L 11	20	180	10,5	22	VC.. 1103..
A25R SVOC R/L 11	25	200	13,0	26	VC.. 1103..
A32S SVOC R/L 16	32	250	16,5	38	VC.. 1604..
A40T SVOC R/L 16	40	300	21,0	42	VC.. 1604..

# Boring Bars - Screw Clamping

## SVVC R/L 72,5°

ARNO HOFER



## Boring Bars - Steel Shank (유압)

규격	d	a	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
S10H SVVC R/L 07	10	6	100	22	8	13,5	VC.. 0702..
S12K SVVC R/L 07	12	6	125	28	9	15,5	VC.. 0702..
S16M SVVC R/L 07	16	5	150	36	11	17,5	VC.. 0702..

## Boring Bars - Steel Shank with Coolant Through (스틸유압)

규격	d	a	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
A10H SVVC R/L 07	10	6	100	22	8	13,5	VC.. 0702..
A12K SVVC R/L 07	12	6	125	28	9	15,5	VC.. 0702..
A16M SVVC R/L 07	16	5	150	36	11	17,5	VC.. 0702..

## Boring Bars - Carbide Shank with Coolant Through (초경유압)

규격	d	a	l <sub>1</sub>	l <sub>2</sub>	f	D <sub>min</sub>	사용가능 인서트
E10H SVVC R/L 07	10	6	100	32	8	13,5	VC.. 0702..
E12K SVVC R/L 07	12	6	125	40	9	15,5	VC.. 0702..
E16M SVVC R/L 07	16	5	150	55	11	17,5	VC.. 0702..

## Spare Parts

For boring bar	Screw	Key
.. SVVC R/L 07	SS 5140	KS 1886

# ISO TOOLS (INSERT)



1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

# ISO 인서트 규격 선정법

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

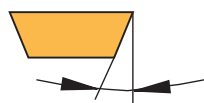
6. Whiz Cut

7. SPHINX

80° **C**  
55° **D**  
75° **E**  
86° **M**  
35° **V**

85° **A**  
82° **B**  
55° **K**

**H**  
**L**  
**O**  
**P**  
**R**  
**S**  
**T**  
**W**



3° **A**  
5° **B**  
7° **C**  
15° **D**  
20° **E**  
25° **F**  
30° **G**  
0° **N**  
11° **P**

특수형상 → **O**

**C**

Insert shape

인서트 형상

**N**

Clearance angle

여유각

**M**

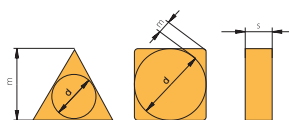
Tolerance

공 차

**G**

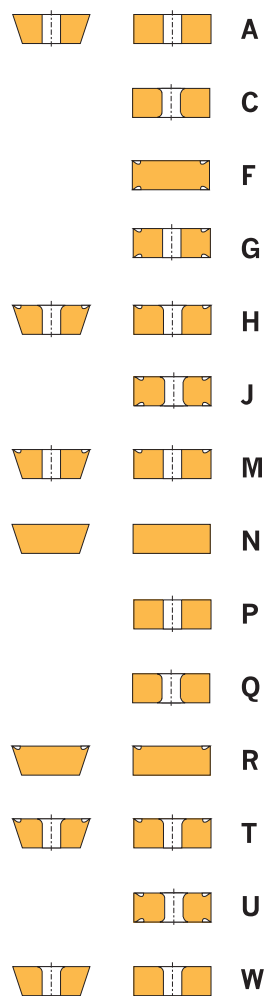
Type of insert

인서트유형



공차범위 [mm]			공차
d ±	m ±	s ±	
0,025	0,005	0,025	<b>A</b>
0,025	0,013	0,025	<b>C</b>
0,025	0,025	0,025	<b>E</b>
0,013	0,005	0,025	<b>F</b>
0,025	0,025	0,05-0,13	<b>G</b>
0,013	0,013	0,025	<b>H</b>
0,05-0,15	0,005	0,025	<b>J</b>
0,05-0,15	0,013	0,025	<b>K</b>
0,05-0,15	0,025	0,025	<b>L</b>
0,05-0,15	0,08-0,2	0,05-0,13	<b>M</b>
0,05-0,15	0,08-0,2	0,025	<b>N</b>
0,08-0,25	0,13-0,38	0,13	<b>U</b>

특수형상 → **X**



특수형상 → **X**

C

D

R

S

T

V

W

(Dimension l in brackets)

d (mm)	C	D	R	S	T	V	W
3.97					06 (6.35)	07 (6.92)	02 (2.70)
5.56	05 (5.6)				09 (9.6)		03 (3.8)
6.0			06				
6.35	06 (6.45)	07 (7.75)			11 (11.0)	11 (11.1)	04 (4.3)
7.94						13 (13.1)	
8.0			08				
9.525	09 (9.67)	11 (11.6)		09 (9.525)	16 (16.5)	16 (16.5)	06 (6.5)
10.0			10				
12.0			12				
12.70	12 (12.9)	15 (15.5)		12 (12.7)	22 (22.0)	22 (22.1)	08 (8.72)
15.875	16 (16.1)			15 (15.875)			
19.05	19 (19.3)			19 (19.05)			

16

Edge length

절삭날 길이

s [mm]	Kennzahl
1.59	01
1.98	T1
2.38	02
3.18	03
3.97	T3
4.76	04
5.56	05
6.35	06
7.94	07
9.52	09

06

Insert thickness

인서트 두께

r [mm]	
0.2	02
0.4	04
0.8	08
1.2	12
1.6	16
2.4	24
0	00

OO: Round insert (inch)

MO: Round insert (metr.)

08

Corner radius

코너 R

F

날카로운

E

등근

T

각진

S

각지고 등근

E

Edge condition

코너모양

R

L

N

N

Cutting direction

절삭방향

Special chipbreaker shapes can be indicated by an internal company coding system at the 10th position.

e.g. - NM2

- AM

- ACB

NMG

Additional coding system

추가설명

# Indexable Inserts - High Positive

1. DIAMETAL

2. BIMU

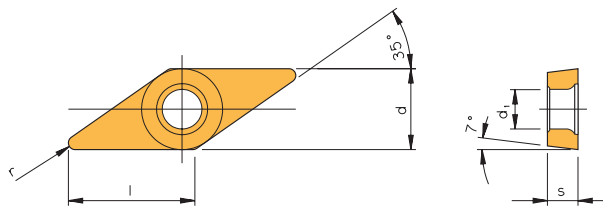
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



VC..



규격	l	d	s	d <sub>1</sub>	r
VCGT 0702005FN-ALU	6,921	3,970	2,38	2,2	0,05
VCGT 070201EN-ALU	6,921	3,970	2,38	2,2	0,1
VCGT 070201FN-ALU	6,921	3,970	2,38	2,2	0,1
VCGT 070202EN-ALU	6,921	3,970	2,38	2,2	0,2
VCGT 070202FN-ALU	6,921	3,970	2,38	2,2	0,2
VCGT 070204EN-ALU	6,921	3,970	2,38	2,2	0,4
VCGT 070204FN-ALU	6,921	3,970	2,38	2,2	0,4
VCGT 1103005FN-ALU	11,10	6,350	3,18	2,9	0,05
VCGT 110301EN-ALU	11,10	6,350	3,18	2,9	0,1
VCGT 110301FN-ALU	11,10	6,350	3,18	2,9	0,1
VCGT 110302EN-ALU	11,10	6,350	3,18	2,9	0,2
VCGT 110302FN-ALU	11,10	6,350	3,18	2,9	0,2
VCGT 110304EN-ALU	11,10	6,350	3,18	2,9	0,4
VCGT 110304FN-ALU	11,10	6,350	3,18	2,9	0,4
VCGT 110308EN-ALU	11,10	6,350	3,18	2,9	0,8
VCGT 110308FN-ALU	11,10	6,350	3,18	2,9	0,8
VCGT 1303005FN-ALU	13,10	7,940	3,18	3,2	0,05
VCGT 130301EN-ALU	13,10	7,940	3,18	3,2	0,1
VCGT 130301FN-ALU	13,10	7,940	3,18	3,2	0,1
VCGT 130302EN-ALU	13,10	7,940	3,18	3,2	0,2
VCGT 130302FN-ALU	13,10	7,940	3,18	3,2	0,2
VCGT 130304EN-ALU	13,10	7,940	3,18	3,2	0,4
VCGT 130304FN-ALU	13,10	7,940	3,18	3,2	0,4
VCGT 130308EN-ALU	13,10	7,940	3,18	3,2	0,8
VCGT 130308FN-ALU	13,10	7,940	3,18	3,2	0,8
VCGT 160401FN-ALU	16,60	9,525	4,76	4,4	0,1
VCGT 160402EN-ALU	16,60	9,525	4,76	4,4	0,2
VCGT 160402FN-ALU	16,60	9,525	4,76	4,4	0,2
VCGT 160404EN-ALU	16,60	9,525	4,76	4,4	0,4
VCGT 160404FN-ALU	16,60	9,525	4,76	4,4	0,4
VCGT 160408EN-ALU	16,60	9,525	4,76	4,4	0,8
VCGT 160408FN-ALU	16,60	9,525	4,76	4,4	0,8
VCGT 160412EN-ALU	16,60	9,525	4,76	4,4	1,2
VCGT 160412FN-ALU	16,60	9,525	4,76	4,4	1,2
VCGT 220520EN-ALU	22,10	12,700	5,56	5,5	2,0
VCGT 220520FN-ALU	22,10	12,700	5,56	5,5	2,0
VCGT 220530FN-ALU	22,10	12,700	5,56	5,5	3,0

Grade availability											
coated									uncoated		
AM15C	AP5210 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)	AK10	AK20	Designation
		X	X	X	X	X	X	X	X	X	VCGT 0702005FN-ALU
X											VCGT 070201EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 070201FN-ALU
X											VCGT 070202EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 070202FN-ALU
X											VCGT 070204EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 070204FN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 1103005FN-ALU
X											VCGT 110301EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 110301FN-ALU
X											VCGT 110302EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 110302FN-ALU
X											VCGT 110304EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 110304FN-ALU
X											VCGT 110308EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 110308FN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 1303005FN-ALU
X											VCGT 130301EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 130301FN-ALU
X											VCGT 130302EN-ALU
	X	X	X	X	X	X	X	X	X	X	VCGT 130302FN-ALU
X											VCGT 130304EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 130304FN-ALU
X											VCGT 130308EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 130308FN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 160401FN-ALU
X											VCGT 160402EN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 160402FN-ALU
X											VCGT 160404EN-ALU
	X	X	X	X	X	X	X	X	X	X	VCGT 160404FN-ALU
											VCGT 160408EN-ALU
X											VCGT 160408FN-ALU
	X	X	X	X	X	X	X	X	X	X	VCGT 160412EN-ALU
X											VCGT 160412FN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 220520EN-ALU
											VCGT 220520FN-ALU
		X	X	X	X	X	X	X	X	X	VCGT 220530FN-ALU
		X	X	X	X	X	X	X	X	X	
P	○	●	●	●	○	○	○	○			P
M	●	○	●	●	○	○	○	○			M
K	●	●	○	○	○	○			○	○	K
N					●	●	●	●	●	●	N
S		●	○	○							S
H			○	○							H

X 구매가능  
● 강력추천  
○ 추천



# Indexable Inserts - High Positive

1. DIAMETAL

2. BIMU

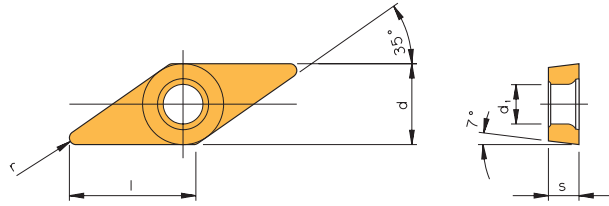
3. IFANGER

4. ZEUS

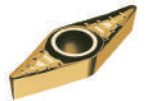
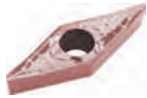
5. ARNO

6. Whiz Cut

7. SPHINX



VC..



규격	l	d	s	d <sub>1</sub>	r
VCGT 110302FN-AWI	11,10	6,350	3,18	2,9	0,2
VCGT 110304FN-AWI	11,10	6,350	3,18	2,9	0,4
VCGT 110308FN-AWI	11,10	6,350	3,18	2,9	0,8
VCGT 160404FN-AWI	16,60	9,525	4,76	4,4	0,4
VCGT 160408FN-AWI	16,60	9,525	4,76	4,4	0,8
VCGT 110304FN-ACB	11,10	6,350	3,18	2,9	0,4
VCGT 110308FN-ACB	11,10	6,350	3,18	2,9	0,8
VCGT 130304FN-ACB	13,10	7,940	3,18	3,2	0,4
VCGT 130308FN-ACB	13,10	7,940	3,18	3,2	0,8
VCGT 160404FN-ACB	16,60	9,525	4,76	4,4	0,4
VCGT 160408FN-ACB	16,60	9,525	4,76	4,4	0,8
VCGT 160412FN-ACB	16,60	9,525	4,76	4,4	1,2
VCGT 220520FN-ACB	22,10	12,700	5,56	5,5	2,0
VCGT 220530FN-ACB	22,10	12,700	5,56	5,5	3,0
VCGT 0702005FN-ASF	6,921	3,970	2,38	2,2	0,05
VCGT 070201FN-ASF	6,921	3,970	2,38	2,2	0,1
VCGT 070202EN-ASF	6,921	3,970	2,38	2,2	0,2
VCGT 070202FN-ASF	6,921	3,970	2,38	2,2	0,2
VCGT 070204EN-ASF	6,921	3,970	2,38	2,2	0,4
VCGT 070204FN-ASF	6,921	3,970	2,38	2,2	0,4
VCGT 1103005FN-ASF	11,10	6,350	3,18	2,9	0,05
VCGT 110301EN-ASF	11,10	6,350	3,18	2,9	0,1
VCGT 110301FN-ASF	11,10	6,350	3,18	2,9	0,1
VCGT 110302EN-ASF	11,10	6,350	3,18	2,9	0,2
VCGT 110302FN-ASF	11,10	6,350	3,18	2,9	0,2
VCGT 110304EN-ASF	11,10	6,350	3,18	2,9	0,4
VCGT 110304FN-ASF	11,10	6,350	3,18	2,9	0,4
VCGT 1303005FN-ASF	13,10	7,940	3,18	3,2	0,05
VCGT 130301EN-ASF	13,10	7,940	3,18	3,2	0,1
VCGT 130301FN-ASF	13,10	7,940	3,18	3,2	0,1
VCGT 130302EN-ASF	13,10	7,940	3,18	3,2	0,2
VCGT 130302FN-ASF	13,10	7,940	3,18	3,2	0,2
VCGT 130304EN-ASF	13,10	7,940	3,18	3,2	0,4
VCGT 130304FN-ASF	13,10	7,940	3,18	3,2	0,4
VCGT 160401FN-ASF	16,60	9,525	4,76	4,4	0,1
VCGT 160402EN-ASF	16,60	9,525	4,76	4,4	0,2
VCGT 160402FN-ASF	16,60	9,525	4,76	4,4	0,2
VCGT 160404EN-ASF	16,60	9,525	4,76	4,4	0,4
VCGT 160404FN-ASF	16,60	9,525	4,76	4,4	0,4
VCGT 160408EN-ASF	16,60	9,525	4,76	4,4	0,8
VCGT 160408FN-ASF	16,60	9,525	4,76	4,4	0,8
VCXT 110302FN-AEC	11,10	6,350	3,18	2,9	0,2
VCXT 110304FN-AEC	11,10	6,350	3,18	2,9	0,4
VCXT 160404FN-AEC	16,60	9,525	4,76	4,4	0,4
VCXT 160408FN-AEC	16,60	9,525	4,76	4,4	0,8
VCXT 160412FN-AEC	16,60	9,525	4,76	4,4	1,2
VCXT 220530FN-AEC	22,10	12,700	5,56	5,5	3,0

Grade availability																		
coated														uncoated				
AM5015 (PG22)	AM5025 (PG22)	AM5110 (PG22)	AM5120 (PG22)	AM5220 (PG22)	AP5210 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)	AK10	AK20	Designation			
						X		X					X		VCGT 110302FN-AWI			
						X		X					X		VCGT 110304FN-AWI			
						X		X					X		VCGT 110308FN-AWI			
						X		X					X		VCGT 160404FN-AWI			
						X		X					X		VCGT 160408FN-AWI			
					X	X	X	X	X	X	X	X	X	X	VCGT 110304FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 110308FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 130304FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 130308FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 160404FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 160408FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 160412FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 220520FN-ACB			
						X	X	X	X	X	X	X	X	X	VCGT 220530FN-ACB			
						X	X	X	X				X	X	VCGT 0702005FN-ASF			
		X				X	X	X	X				X	X	VCGT 070201FN-ASF			
													X		VCGT 070202EN-ASF			
		X				X	X	X	X		X		X	X	VCGT 070202FN-ASF			
													X		VCGT 070204EN-ASF			
				X		X	X	X	X				X	X	VCGT 070204FN-ASF			
	X					X	X	X	X				X	X	VCGT 1103005FN-ASF			
			X			X	X	X	X				X	X	VCGT 110301EN-ASF			
	X	X		X		X	X	X	X				X	X	VCGT 110301FN-ASF			
			X	X		X	X	X	X				X		VCGT 110302EN-ASF			
	X	X				X	X	X	X				X	X	VCGT 110302FN-ASF			
			X	X		X	X	X	X		X		X	X	VCGT 110304EN-ASF			
			X	X		X	X	X	X			X	X	X	VCGT 110304FN-ASF			
						X	X	X	X				X	X	VCGT 1303005FN-ASF			
													X		VCGT 130301EN-ASF			
	X					X	X	X	X				X	X	VCGT 130301FN-ASF			
													X		VCGT 130302EN-ASF			
	X					X	X	X	X				X	X	VCGT 130302FN-ASF			
						X	X	X	X				X		VCGT 130304EN-ASF			
						X	X	X	X				X	X	VCGT 130304FN-ASF			
	X	X				X	X	X	X				X	X	VCGT 160401FN-ASF			
						X	X	X	X				X		VCGT 160402EN-ASF			
	X	X				X	X	X	X				X	X	VCGT 160402FN-ASF			
						X	X	X	X				X	X	VCGT 160404EN-ASF			
	X					X	X	X	X		X		X	X	VCGT 160404FN-ASF			
	X					X	X	X	X			X	X	X	VCGT 160408EN-ASF			
						X	X	X	X				X	X	VCGT 160408FN-ASF			
													X		VCXT 110302FN-AEC			
													X		VCXT 110304FN-AEC			
													X		VCXT 160404FN-AEC			
													X		VCXT 160408FN-AEC			
													X		VCXT 160412FN-AEC			
														X	VCXT 220530FN-AEC			
P	AM5015 (PG22)	AM5025 (PG22)	AM5110 (PG22)	AM5120 (PG22)	AM5220 (PG22)	AP5210 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)	AK10	AK20	P	X	구매가능
M	●	●	○	○	●	●	●	●	○	○	○	○				M	●	강력추천
K	○		○	○	○	○	○	○	○	○	○	○		○	○	K	○	추천
N			○	○	○				●	●	●	●	●	●	●	N		
S	●	●	●	●	●	●	○	○								S		
H	○		○	○	○		○	○								H		

# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

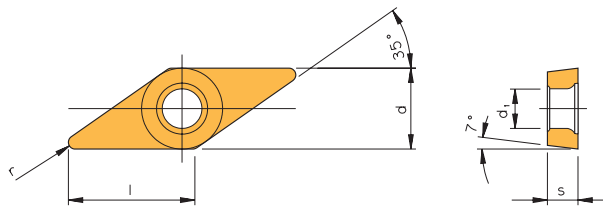
3. IFANGER

4. ZEUS

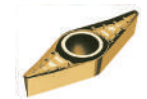
5. ARNO

6. Whiz Cut

7. SPHINX



VC..



규격	l	d	s	d <sub>1</sub>	r
VC070202EN	6.92	3.970	2.38	2.2	0.2
VC070204EN	6.92	3.970	2.38	2.2	0.4
VC070202FR	6.92	3.970	2.38	2.2	0.2
VC110304FN-ACB	11.10	6.350	3.18	2.8	0.4
VC160404FN-ALU	16.50	9.525	4.76	4.4	0.4
VC160408FN-ALU	16.50	9.525	4.76	4.4	0.8
VC130304FN-AS	13.10	7.940	3.18	3.2	0.4
VC070202EN-ASF	6.92	3.970	2.38	2.2	0.2
VC070204EN-ASF	6.92	3.970	2.38	2.2	0.4
VC070204FN-ASF	6.92	3.970	2.38	2.2	0.4
VC1103005FN-ASF	11.10	6.350	3.18	2.8	0.05
VC110301EN-ASF	11.10	6.350	3.18	2.8	0.1
VC110301FN-ASF	11.10	6.350	3.18	2.8	0.1
VC110302EN-ASF	11.10	6.350	3.18	2.8	0.2
VC110302FN-ASF	11.10	6.350	3.18	2.8	0.2
VC110304EN-ASF	11.10	6.350	3.18	2.8	0.4
VC110304FN-ASF	11.10	6.350	3.18	2.8	0.4
VC130302EN-ASF	13.10	7.940	3.18	3.2	0.2
VC130304EN-ASF	13.10	7.940	3.18	3.2	0.4
VC160402EN-ASF	16.50	9.525	4.76	4.4	0.2
VC160404EN-ASF	16.50	9.525	4.76	4.4	0.4
VC160408EN-ASF	16.50	9.525	4.76	4.4	0.8
VC1103002FL-PF2	11.10	6.350	3.18	2.8	0.02
VC1103002FR-PF2	11.10	6.350	3.18	2.8	0.02
VC1103008FL-PF2	11.10	6.350	3.18	2.8	0.08
VC1103008FR-PF2	11.10	6.350	3.18	2.8	0.08
VC110301FL-PF2	11.10	6.350	3.18	2.8	0.1
VC110301FR-PF2	11.10	6.350	3.18	2.8	0.1
VC110302FL-PF2	11.10	6.350	3.18	2.8	0.2
VC110302FR-PF2	11.10	6.350	3.18	2.8	0.2
VC1103005FN-PS	11.10	6.350	3.18	2.8	0.05
VC110301FN-PS	11.10	6.350	3.18	2.8	0.1
VC110302FN-PS	11.10	6.350	3.18	2.8	0.2
VC110304FN-PS	11.10	6.350	3.18	2.8	0.4
VC1604005FN-PS	16.50	9.525	4.76	4.4	0.05
VC160401FN-PS	16.50	9.525	4.76	4.4	0.1
VC160402FN-PS	16.50	9.525	4.76	4.4	0.2
VC160404FN-PS	16.50	9.525	4.76	4.4	0.4
VC110302FN-Z	11.10	6.350	3.18	2.8	0.2

Grade availability														Designation
AM5015	AM5025	AM5110	coated		AP5210	AL10	AM15C	AK1010	uncoated		AK20			
							X				X	VCGT 070202EN		
							X					VCGT 070204EN		
							X				X	VCGT 070202FR		
						X						VCGT 110304FN-ACB		
						X						VCGT 160404FN-ALU		
						X						VCGT 160408FN-ALU		
							X			X	X	VCGT 130304FN-AS		
												VCGT 070202EN-ASF		
												VCGT 070204EN-ASF		
												VCGT 070204FN-ASF		
												VCGT 1103005FN-ASF		
												VCGT 110301EN-ASF		
												VCGT 110301FN-ASF		
												VCGT 110302EN-ASF		
												VCGT 110302FN-ASF		
												VCGT 110304EN-ASF		
												VCGT 110304FN-ASF		
												VCGT 130302EN-ASF		
												VCGT 130304EN-ASF		
												VCGT 160402EN-ASF		
												VCGT 160404EN-ASF		
												VCGT 160408EN-ASF		
												VCGT 1103002FL-PF2		
												VCGT 1103002FR-PF2		
												VCGT 1103008FL-PF2		
												VCGT 1103008FR-PF2		
												VCGT 110301FL-PF2		
												VCGT 110301FR-PF2		
												VCGT 110302FL-PF2		
												VCGT 110302FR-PF2		
												VCGT 1103005FN-PS		
												VCGT 110301FN-PS		
												VCGT 110302FN-PS		
												VCGT 110304FN-PS		
												VCGT 1604005FN-PS		
												VCGT 160401FN-PS		
												VCGT 160402FN-PS		
												VCGT 160404FN-PS		
												VCGT 110302FN-Z		

# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

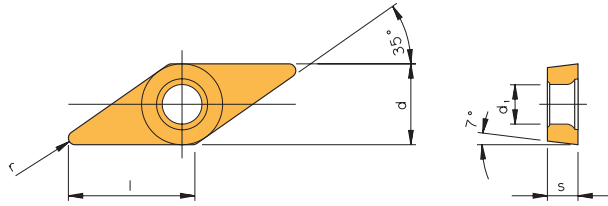
3. IFANGER

4. ZEUS

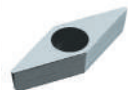
5. ARNO

6. Whiz Cut

7. SPHINX



VC..



규격	l	d	s	d <sub>1</sub>	r
VCGW 070201EN	6.92	3,970	2,38	2,2	0,1
VCGW 070202EN	6.92	3,970	2,38	2,2	0,2
VCGW 110301FN	11,10	6,350	3,18	2,8	0,1
VCGW 110302EN	11,10	6,350	3,18	2,8	0,2
VCGW 110302FN	11,10	6,350	3,18	2,8	0,2
VCGW 110304FN	11,10	6,350	3,18	2,8	0,4
VCGW 130302FN	13,10	7,940	3,18	3,2	0,2
VCGW 130304FN	13,10	7,940	3,18	3,2	0,4
VCGW 160402FN	16,50	9,525	4,76	4,4	0,2
VCGW 160404FN	16,50	9,525	4,76	4,4	0,4
VCGW 160408FN	16,50	9,525	4,76	4,4	0,8
VCGW 220530FN	22,10	12,700	5,56	5,5	3,0
VCGX 110300FL*	11,10	6,350	3,18	2,8	0,0
VCGX 110300FR*	11,10	6,350	3,18	2,8	0,0
VCGX 110301FL	11,10	6,350	3,18	2,8	0,1
VCGX 110301FR	11,10	6,350	3,18	2,8	0,1
VCGX 110302FL	11,10	6,350	3,18	2,8	0,2
VCGX 110302FR	11,10	6,350	3,18	2,8	0,2
VCGX 110304FL	11,10	6,350	3,18	2,8	0,4
VCGX 110304FR	11,10	6,350	3,18	2,8	0,4
VCGX 130301FR	13,10	7,940	3,18	3,2	0,1
VCGX 130302FL	13,10	7,940	3,18	3,2	0,2
VCGX 130302FR	13,10	7,940	3,18	3,2	0,2
VCGX 130304FL	13,10	7,940	3,18	3,2	0,4
VCGX 130304FR	13,10	7,940	3,18	3,2	0,4
VCMT 110302EN-AM	11,10	6,350	3,18	2,8	0,2
VCMT 110304EN-AM	11,10	6,350	3,18	2,8	0,4
VCMT 110308EN-AM	11,10	6,350	3,18	2,8	0,8
VCMT 160404EN-AM	16,50	9,525	4,76	4,4	0,4
VCMT 160408EN-AM	16,50	9,525	4,76	4,4	0,8
VCMT 160412EN-AM	16,50	9,525	4,76	4,4	1,2
VCMT 110302EN-PM1	11,10	6,350	3,18	2,8	0,2
VCMT 110304EN-PM1	11,10	6,350	3,18	2,8	0,4
VCMT 160404EN-PM1	16,50	9,525	4,76	4,4	0,4
VCMT 160408EN-PM1	16,50	9,525	4,76	4,4	0,8
VCMT 110302EN-PS2	11,10	6,350	3,18	2,8	0,2
VCMT 110304EN-PS2	11,10	6,350	3,18	2,8	0,4
VCMT 160404EN-PS2	16,50	9,525	4,76	4,4	0,4
VCXT 110302EN-AEC	11,10	6,350	3,18	2,8	0,2
VCXT 110304EN-AEC	11,10	6,350	3,18	2,8	0,4
VCXT 160404EN-AEC	16,50	9,525	4,76	4,4	0,4
VCXT 160408EN-AEC	16,50	9,525	4,76	4,4	0,8

\* = Corner radius 0,03 mm

[illegible]

Indexable Inserts - Carbide

1.DIAMETAL

2. BIMU

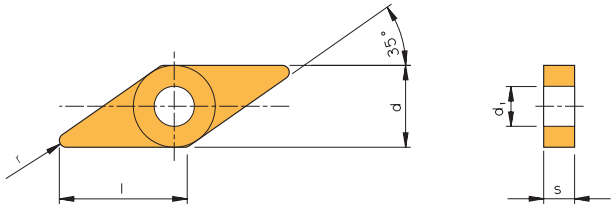
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



VN..



규격	l	d	s	d <sub>1</sub>	r
VNGP 160402FN-EX	16,50	9,525	4,76	3,81	0,2
VNGP 160404FN-EX	16,50	9,525	4,76	3,81	0,4
VNMG 160404EN-NM2	16,50	9,525	4,76	3,81	0,4
VNMG 160404EN-NS1	16,50	9,525	4,76	3,81	0,4
VNMG 160408EN-NMR	16,50	9,525	4,76	3,81	0,8



Grade availability								
coated			uncoated					
AM2110	AM2130	AM5025	AP2110	AP2120	AP2320	AK1020	Designation	
		X					VNGP 160402FN-EX	
		X				X	VNGP 160404FN-EX	
	X				X		VNMG 160404EN-NM2	
X			X	X			VNMG 160404EN-NS1	
	X						VNMG 160408EN-NMR	
P			●	●	●		X	구매가능
M	●	●					●	강력추천
K			○			○	○	추천
N						●		
S		●						
H								

# Indexable Inserts - High Positive

1. DIAMETAL

2. BIMU

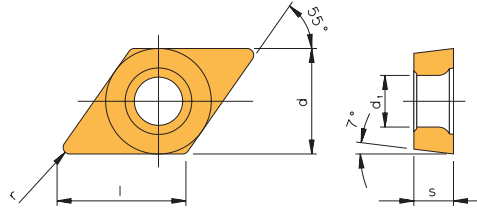
3. IFANGER

4. ZEUS

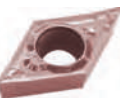
5. ARNO

6. Whiz Cut

7. SPHINX



DC..



규격	l	d	s	d <sub>1</sub>	r
DCGT 0702005FN-ALU	7,75	6,350	2,38	2,8	0,05
DCGT 070201EN-ALU	7,75	6,350	2,38	2,8	0,1
DCGT 070201FN-ALU	7,75	6,350	2,38	2,8	0,1
DCGT 070202EN-ALU	7,75	6,350	2,38	2,8	0,2
DCGT 070202FN-ALU	7,75	6,350	2,38	2,8	0,2
DCGT 070204EN-ALU	7,75	6,350	2,38	2,8	0,4
DCGT 070204FN-ALU	7,75	6,350	2,38	2,8	0,4
DCGT 11T3005FN-ALU	11,60	9,525	3,97	4,4	0,05
DCGT 11T301EN-ALU	11,60	9,525	3,97	4,4	0,1
DCGT 11T301FN-ALU	11,60	9,525	3,97	4,4	0,1
DCGT 11T302EN-ALU	11,60	9,525	3,97	4,4	0,2
DCGT 11T302FN-ALU	11,60	9,525	3,97	4,4	0,2
DCGT 11T304EN-ALU	11,60	9,525	3,97	4,4	0,4
DCGT 11T304FN-ALU	11,60	9,525	3,97	4,4	0,4
DCGT 11T308EN-ALU	11,60	9,525	3,97	4,4	0,8
DCGT 11T308FN-ALU	11,60	9,525	3,97	4,4	0,8
DCGT 11T312FN-ALU	11,60	9,525	3,97	4,4	1,2
DCGT 070202FN-AWI	7,75	6,350	2,38	2,8	0,2
DCGT 070204FN-AWI	7,75	6,350	2,38	2,8	0,4
DCGT 070208FN-AWI	7,75	6,350	2,38	2,8	0,8
DCGT 11T302FN-AWI	11,60	9,525	3,97	4,4	0,2
DCGT 11T304FN-AWI	11,60	9,525	3,97	4,4	0,4
DCGT 11T308FN-AWI	11,60	9,525	3,97	4,4	0,8
DCGT 070204FN-ACB	7,75	6,350	2,38	2,8	0,4
DCGT 11T304EN-ACB	11,60	9,525	3,97	4,4	0,4
DCGT 11T304FN-ACB	11,60	9,525	3,97	4,4	0,4
DCGT 11T308EN-ACB	11,60	9,525	3,97	4,4	0,8
DCGT 11T308FN-ACB	11,60	9,525	3,97	4,4	0,8
DCGT 0702005FN-ASF	7,75	6,350	2,38	2,8	0,05
DCGT 070201EN-ASF	7,75	6,350	2,38	2,8	0,1
DCGT 070201FN-ASF	7,75	6,350	2,38	2,8	0,1
DCGT 070202EN-ASF	7,75	6,350	2,38	2,8	0,2
DCGT 070202FN-ASF	7,75	6,350	2,38	2,8	0,2
DCGT 070204EN-ASF	7,75	6,350	2,38	2,8	0,4
DCGT 070204FN-ASF	7,75	6,350	2,38	2,8	0,4
DCGT 11T3005FN-ASF	11,60	9,525	3,97	4,4	0,05
DCGT 11T301EN-ASF	11,60	9,525	3,97	4,4	0,1
DCGT 11T301FN-ASF	11,60	9,525	3,97	4,4	0,1
DCGT 11T302EN-ASF	11,60	9,525	3,97	4,4	0,2
DCGT 11T302FN-ASF	11,60	9,525	3,97	4,4	0,2
DCGT 11T304EN-ASF	11,60	9,525	3,97	4,4	0,4
DCGT 11T304FN-ASF	11,60	9,525	3,97	4,4	0,4
DCGT 11T308EN-ASF	11,60	9,525	3,97	4,4	0,8
DCGT 11T308FN-ASF	11,60	9,525	3,97	4,4	0,8
DCXT 070202EN-AEC	7,75	6,350	2,38	2,8	0,2
DCXT 070204EN-AEC	7,75	6,350	2,38	2,8	0,4
DCXT 11T302EN-AEC	11,60	9,525	3,97	4,4	0,2
DCXT 11T304EN-AEC	11,60	9,525	3,97	4,4	0,4
DCXT 11T308EN-AEC	11,60	9,525	3,97	4,4	0,8

Grade availability																
coated														uncoated		
	AM15C	AM5015 (PG22)	AM5025 (PG22)	AM5110 (PG22)	AM5120+ (PG22)	AP5210 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)	AK10	AK20	Designation
							X	X	X	X	X	X	X	X	X	DCGT 0702005FN-ALU
	X						X	X	X	X	X	X	X	X	X	DCGT 070201EN-ALU
	X						X	X	X	X	X	X	X	X	X	DCGT 070201FN-ALU
							X	X	X	X	X	X	X	X	X	DCGT 070202EN-ALU
	X						X	X	X	X	X	X	X	X	X	DCGT 070202FN-ALU
						X	X	X	X	X	X	X	X	X	X	DCGT 070204EN-ALU
							X	X	X	X	X	X	X	X	X	DCGT 070204FN-ALU
	X													X	X	DCGT 11T3005FN-ALU
	X						X	X	X	X	X	X	X	X	X	DCGT 11T301EN-ALU
	X						X	X	X	X	X	X	X	X	X	DCGT 11T301FN-ALU
							X	X	X	X	X	X	X	X	X	DCGT 11T302EN-ALU
	X						X	X	X	X	X	X	X	X	X	DCGT 11T302FN-ALU
	X															DCGT 11T304EN-ALU
						X	X	X	X	X	X	X	X	X	X	DCGT 11T304FN-ALU
	X						X	X	X	X	X	X	X			DCGT 11T308EN-ALU
							X	X	X	X	X	X	X	X	X	DCGT 11T308FN-ALU
							X	X	X	X	X	X	X	X	X	DCGT 11T312FN-ALU
							X		X					X		DCGT 070202FN-AWI
							X		X					X		DCGT 070204FN-AWI
							X		X					X		DCGT 070208FN-AWI
							X		X					X		DCGT 11T302FN-AWI
							X		X					X		DCGT 11T304FN-AWI
	X						X		X					X		DCGT 11T308FN-AWI
						X	X	X	X	X	X	X	X	X	X	DCGT 070204FN-ACB
					X										X	DCGT 11T304EN-ACB
						X	X	X	X	X	X	X	X	X	X	DCGT 11T304FN-ACB
					X										X	DCGT 11T308EN-ACB
						X	X	X	X	X	X	X	X	X	X	DCGT 11T308FN-ACB
							X	X	X	X				X	X	DCGT 0702005FN-ASF
	X						X								X	DCGT 070201EN-ASF
							X	X	X	X				X	X	DCGT 070201FN-ASF
	X		X				X	X	X	X				X	X	DCGT 070202EN-ASF
				X			X	X	X	X		X		X	X	DCGT 070202FN-ASF
	X		X				X	X	X	X				X	X	DCGT 070204EN-ASF
				X			X	X	X	X		X		X	X	DCGT 070204FN-ASF
	X						X	X	X	X				X	X	DCGT 11T3005FN-ASF
							X	X	X	X				X	X	DCGT 11T301EN-ASF
	X		X				X	X	X	X				X	X	DCGT 11T301FN-ASF
							X	X	X	X				X	X	DCGT 11T302EN-ASF
	X		X				X	X	X	X		X		X	X	DCGT 11T302FN-ASF
							X	X	X	X				X	X	DCGT 11T304EN-ASF
	X		X				X	X	X	X		X		X	X	DCGT 11T304FN-ASF
				X			X	X	X	X				X	X	DCGT 11T308EN-ASF
	X		X				X	X	X	X				X	X	DCGT 11T308FN-ASF
				X			X	X	X	X				X	X	DCGT 11T308FN-ASF
														X		DCXT 070202EN-AEC
														X		DCXT 070204EN-AEC
														X		DCXT 11T302EN-AEC
														X		DCXT 11T304EN-AEC
														X		DCXT 11T308EN-AEC
	AM15C	AM5015 (PG22)	AM5025 (PG22)	AM5110 (PG22)	AM5120+ (PG22)	AP5210 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)	AK10	AK20	
P	○	●		○		●	●	●	○	○	○	○				P X 구매가능
M	●	●	●	●	○	○	●	●	○	○	○	○				M ● 강력추천
K	●	○		○		●	○	○	○	○	○	○		○	○	K ○ 추천
N					●				●	●	●	●	●	●	●	N
S		●	●	●	●	●	○	○								S
H	○			○			○	○								H

# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

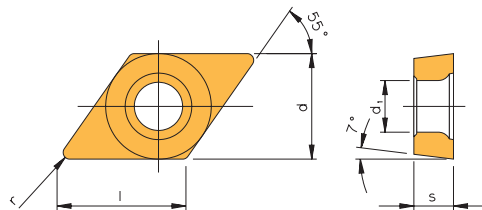
3. IFANGER

4. ZEUS

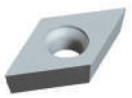
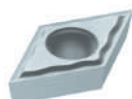
5. ARNO

6. Whiz Cut

7. SPHINX



DC..



규격	l	d	s	d <sub>1</sub>	r
DCGT 0702005FN-PS	7,75	6,35	2,38	2,8	0,05
DCGT 070201FN-PS	7,75	6,35	2,38	2,8	0,1
DCGT 070202FN-PS	7,75	6,35	2,38	2,8	0,2
DCGT 070204FN-PS	7,75	6,35	2,38	2,8	0,4
DCGT 11T3005FN-PS	11,60	9,525	3,97	4,4	0,05
DCGT 11T301FN-PS	11,60	9,525	3,97	4,4	0,1
DCGT 11T302FN-PS	11,60	9,525	3,97	4,4	0,2
DCGT 11T304FN-PS	11,60	9,525	3,97	4,4	0,4
DCGT 070201EN-ASF	7,75	6,35	2,38	2,8	0,1
DCGT 070202EN-ASF	7,75	6,35	2,38	2,8	0,2
DCGT 070202FN-ASF	7,75	6,35	2,38	2,8	0,2
DCGT 070204EN-ASF	7,75	6,35	2,38	2,8	0,4
DCGT 070204FN-ASF	7,75	6,35	2,38	2,8	0,4
DCGT 11T301EN-ASF	11,60	9,525	3,97	4,4	0,1
DCGT 11T302EN-ASF	11,60	9,525	3,97	4,4	0,2
DCGT 11T304EN-ASF	11,60	9,525	3,97	4,4	0,4
DCGT 11T304FN-ASF	11,60	9,525	3,97	4,4	0,4
DCGT 11T308EN-ASF	11,60	9,525	3,97	4,4	0,8
DCGW 070202FN	7,75	6,35	2,38	2,8	0,2
DCGW 070204FN	7,75	6,35	2,38	2,8	0,4
DCGW 11T302FN	11,60	9,525	3,97	4,4	0,2
DCGW 11T304FN	11,60	9,525	3,97	4,4	0,4
DCGW 11T308FN	11,60	9,525	3,97	4,4	0,8
DCGX 070200FL	7,75	6,35	2,38	2,8	0,0
DCGX 070200FR	7,75	6,35	2,38	2,8	0,0
DCGX 070201FL	7,75	6,35	2,38	2,8	0,1
DCGX 070201FR	7,75	6,35	2,38	2,8	0,1
DCGX 070202FL	7,75	6,35	2,38	2,8	0,2
DCGX 070202FR	7,75	6,35	2,38	2,8	0,2
DCGX 11T300FL	11,60	9,525	3,97	4,4	0,0
DCGX 11T300FR	11,60	9,525	3,97	4,4	0,0
DCGX 11T301FL	11,60	9,525	3,97	4,4	0,1
DCGX 11T301FR	11,60	9,525	3,97	4,4	0,1
DCGX 11T302FL	11,60	9,525	3,97	4,4	0,2
DCGX 11T302FR	11,60	9,525	3,97	4,4	0,2
DCGX 11T304FL	11,60	9,525	3,97	4,4	0,4
DCGX 11T304FR	11,60	9,525	3,97	4,4	0,4

Grade availability							
	coated			uncoated			
AM5015	AM5025	AM5110	AK1010	AK1020	AK20	Designation	
			X	X		DCGT 0702005FN-PS	
	X		X	X		DCGT 070201FN-PS	
	X		X	X		DCGT 070202FN-PS	
	X		X	X		DCGT 070204FN-PS	
	X		X	X		DCGT 11T3005FN-PS	
	X		X	X		DCGT 11T301FN-PS	
	X		X	X		DCGT 11T302FN-PS	
	X		X	X		DCGT 11T304FN-PS	
X						DCGT 070201EN-ASF	
X	X					DCGT 070202EN-ASF	
		X				DCGT 070202FN-ASF	
X	X					DCGT 070204EN-ASF	
		X				DCGT 070204FN-ASF	
X						DCGT 11T301EN-ASF	
X	X					DCGT 11T302EN-ASF	
X	X					DCGT 11T304EN-ASF	
		X				DCGT 11T304FN-ASF	
X	X					DCGT 11T308EN-ASF	
				X		DCGW 070202FN	
				X		DCGW 070204FN	
				X		DCGW 11T302FN	
				X		DCGW 11T304FN	
				X		DCGW 11T308FN	
	X				X	DCGX 070200FL	
	X				X	DCGX 070200FR	
	X				X	DCGX 070201FL	
	X				X	DCGX 070201FR	
	X				X	DCGX 070202FL	
	X				X	DCGX 070202FR	
	X				X	DCGX 11T300FL	
	X				X	DCGX 11T300FR	
	X				X	DCGX 11T301FL	
	X				X	DCGX 11T301FR	
	X				X	DCGX 11T302FL	
	X				X	DCGX 11T302FR	
	X				X	DCGX 11T304FL	
	X				X	DCGX 11T304FR	
P	●	○				P X 구매가능	
M	●	●				M ● 강력추천	
K	○	○	○	○	○	K ○ 추천	
N			○	●	●	N	
S	●	●	●			S	
H	○	○				H	

# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

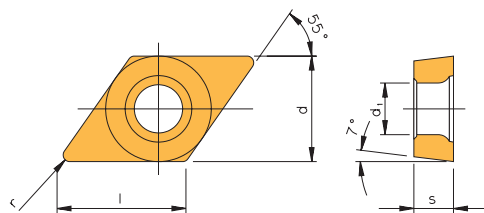
3. IFANGER

4. ZEUS

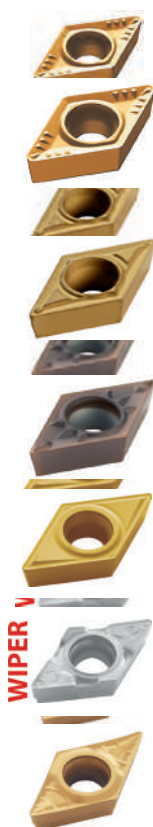
5. ARNO

6. Whiz Cut

7. SPHINX



DC..



규격	l	d	s	d <sub>1</sub>	r
DCMT 070202EN-AM	7,75	6,35	2,38	2,8	0,2
DCMT 070204EN-AM	7,75	6,35	2,38	2,8	0,4
DCMT 070208EN-AM	7,75	6,35	2,38	2,8	0,8
DCMT 11T302EN-AM	11,60	9,525	3,97	4,4	0,2
DCMT 11T304EN-AM	11,60	9,525	3,97	4,4	0,4
DCMT 11T308EN-AM	11,60	9,525	3,97	4,4	0,8
DCMT 070202EN-PM1	7,75	6,35	2,38	2,8	0,2
DCMT 070204EN-PM1	7,75	6,35	2,38	2,8	0,4
DCMT 11T302EN-PM1	11,60	9,525	3,97	4,4	0,2
DCMT 11T304EN-PM1	11,60	9,525	3,97	4,4	0,4
DCMT 11T308EN-PM1	11,60	9,525	3,97	4,4	0,8
DCMT 070202EN-PS2	7,75	6,35	2,38	2,8	0,2
DCMT 070204EN-PS2	7,75	6,35	2,38	2,8	0,4
DCMT 11T302EN-PS2	11,60	9,525	3,97	4,4	0,2
DCMT 11T304EN-PS2	11,60	9,525	3,97	4,4	0,4
DCMT 11T304EN-PMS	11,60	9,525	3,97	4,4	0,4
DCMX 11T304EN-WMS	11,60	9,525	3,97	4,4	0,4
DCXT 070202EN-AEC	7,75	6,35	2,38	2,8	0,2
DCXT 070204EN-AEC	7,75	6,35	2,38	2,8	0,4
DCXT 11T302EN-AEC	11,60	9,525	3,97	4,4	0,2
DCXT 11T304EN-AEC	11,60	9,525	3,97	4,4	0,4
DCXT 11T308EN-AEC	11,60	9,525	3,97	4,4	0,8

Grade availability														
	AK2110	AM2030	AM2110	AM2130	AM5020	coated		AM5130	AP2110	AP2310	AP2320	AP2335	uncoated	
						AM5110	AM5120						AK10	Designation
				X			X			X	X	X		DCMT 070202EN-AM
				X			X			X	X	X		DCMT 070204EN-AM
				X			X			X	X	X		DCMT 070208EN-AM
				X			X			X	X	X		DCMT 11T302EN-AM
				X			X			X	X	X		DCMT 11T304EN-AM
				X			X			X	X	X		DCMT 11T308EN-AM
	X			X		X	X		X		X			DCMT 070202EN-PM1
	X			X		X	X		X		X			DCMT 070204EN-PM1
				X		X	X			X	X			DCMT 11T302EN-PM1
	X		X	X		X	X			X	X			DCMT 11T304EN-PM1
	X			X		X	X			X	X			DCMT 11T308EN-PM1
				X		X	X			X	X			DCMT 070202EN-PS2
				X		X	X			X	X			DCMT 070204EN-PS2
				X		X	X			X	X			DCMT 11T302EN-PS2
				X		X	X			X	X			DCMT 11T304EN-PS2
								X						DCMT 11T304EN-PMS
		X												DCMX 11T304EN-WMS
					X								X	DCXT 070202EN-AEC
					X								X	DCXT 070204EN-AEC
					X								X	DCXT 11T302EN-AEC
					X								X	DCXT 11T304EN-AEC
					X								X	DCXT 11T308EN-AEC
	AK2110	AM2030	AM2110	AM2130	AM5020	AM5110	AM5120	AM5130	AP2110	AP2310	AP2320	AP2335	AK10	
P	O				O	O	O	O	●	●	●	●		P
M		●	●	●	●	●	●	●						M
K	●					O	O	O	O				O	K
N						O	O	O					●	N
S		O				●	●	●						S
H						O	O	O						H

X 구매가능  
● 강력추천  
○ 추천



# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

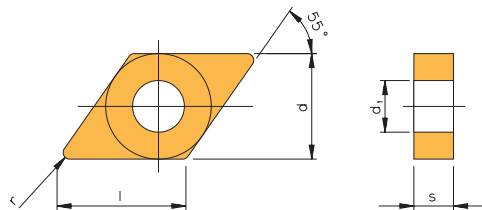
3. IFANGER

4. ZEUS

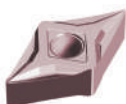
5. ARNO

6. Whiz Cut

7. SPHINX



DN..



규격	l	d	s	d <sub>1</sub>	r
DNGP 110402FN-EX	11,60	9,525	4,76	3,81	0,2
DNGP 110404FN-EX	11,60	9,525	4,76	3,81	0,4
DNGP 150602FN-EX	15,50	12,700	6,35	5,2	0,2
DNGP 150604FN-EX	15,50	12,700	6,35	5,2	0,4
DNGP 150608FN-EX	15,50	12,700	6,35	5,2	0,8
DNMG 110404EN-NM2	11,60	9,525	4,76	3,81	0,4
DNMG 110408EN-NM2	11,60	9,525	4,76	3,81	0,8
DNMG 150604EN-NM2	15,50	12,700	6,35	5,2	0,4
DNMG 150608EN-NM2	15,50	12,700	6,35	5,2	0,8
DNMG 150612EN-NM2	15,50	12,700	6,35	5,2	1,2
DNMG 150604EL-K	15,50	12,700	6,35	5,2	0,4
DNMG 150604ER-K	15,50	12,700	6,35	5,2	0,4
DNMG 150608EL-K	15,50	12,700	6,35	5,2	0,8
DNMG 150608ER-K	15,50	12,700	6,35	5,2	0,8
DNMG 150604EN-NMR	15,50	12,700	6,35	5,2	0,4
DNMG 150608EN-NMR	15,50	12,700	6,35	5,2	0,8
DNMG 150612EN-NMR	15,50	12,700	6,35	5,2	1,2
DNMG 150604EN-NS1	15,50	12,700	6,35	5,2	0,4
DNMG 150608EN-NS1	15,50	12,700	6,35	5,2	0,8
DNMG 150604EN-VA	15,50	12,700	6,35	5,2	0,4
DNMG 150608EN-VA	15,50	12,700	6,35	5,2	0,8
DNMG 150608EN-NMG1	15,50	12,700	6,35	5,2	0,8
DNMG 150612EN-NMG1	15,50	12,700	6,35	5,2	1,2
DNMP 150604ER	15,50	12,700	6,35	5,2	0,4
DNMP 150608ER	15,50	12,700	6,35	5,2	0,8



[illegible]

# Indexable Inserts - High Positive

1. DIAMETAL

2. BIMU

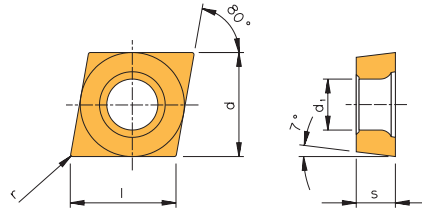
3. IFANGER

4. ZEUS

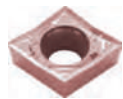
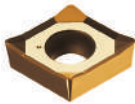
5. ARNO

6. Whiz Cut

7. SPHINX



CC..



규격	l	d	s	d <sub>1</sub>	r
CCGT 0602005FN-ALU	6,45	6,350	2,38	2,8	0,05
CCGT 060201EN-ALU	6,45	6,350	2,38	2,8	0,1
CCGT 060201FN-ALU	6,45	6,350	2,38	2,8	0,1
CCGT 060202EN-ALU	6,45	6,350	2,38	2,8	0,2
CCGT 060202FN-ALU	6,45	6,350	2,38	2,8	0,2
CCGT 060204EN-ALU	6,45	6,350	2,38	2,8	0,4
CCGT 060204FN-ALU	6,45	6,350	2,38	2,8	0,4
CCGT 09T301EN-ALU	9,67	9,525	3,97	4,4	0,1
CCGT 09T301FN-ALU	9,67	9,525	3,97	4,4	0,1
CCGT 09T302EN-ALU	9,67	9,525	3,97	4,4	0,2
CCGT 09T302FN-ALU	9,67	9,525	3,97	4,4	0,2
CCGT 09T304EN-ALU	9,67	9,525	3,97	4,4	0,4
CCGT 09T304FN-ALU	9,67	9,525	3,97	4,4	0,4
CCGT 09T308EN-ALU	9,67	9,525	3,97	4,4	0,8
CCGT 09T308FN-ALU	9,67	9,525	3,97	4,4	0,8
CCGT 120401EN-ALU	12,90	12,700	4,76	5,5	0,1
CCGT 120401FN-ALU	12,90	12,700	4,76	5,5	0,1
CCGT 120402EN-ALU	12,90	12,700	4,76	5,5	0,2
CCGT 120402FN-ALU	12,90	12,700	4,76	5,5	0,2
CCGT 120404EN-ALU	12,90	12,700	4,76	5,5	0,4
CCGT 120404FN-ALU	12,90	12,700	4,76	5,5	0,4
CCGT 120408EN-ALU	12,90	12,700	4,76	5,5	0,8
CCGT 120408FN-ALU	12,90	12,700	4,76	5,5	0,8
CCGT 060202FN-AWI	6,45	6,350	2,38	2,8	0,2
CCGT 060204FN-AWI	6,45	6,350	2,38	2,8	0,4
CCGT 060208FN-AWI	6,45	6,350	2,38	2,8	0,8
CCGT 09T302FN-AWI	9,67	9,525	3,97	4,4	0,2
CCGT 09T304FN-AWI	9,67	9,525	3,97	4,4	0,4
CCGT 09T308FN-AWI	9,67	9,525	3,97	4,4	0,8
CCGT 120404FN-AWI	12,90	12,700	4,76	5,5	0,4
CCGT 120408FN-AWI	12,90	12,700	4,76	5,5	0,4

Grade availability												
coated									uncoated		Designation	
AM15C	AP5210 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)	AK10	AK20		
X		X	X	X	X	X	X	X	X	X	CCGT 0602005FN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 060201EN-ALU	
X											CCGT 060202EN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 060202FN-ALU	
X											CCGT 060204EN-ALU	
	X	X	X	X	X	X	X	X	X	X	CCGT 060204FN-ALU	
X											CCGT 09T301EN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 09T301FN-ALU	
X											CCGT 09T302EN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 09T302FN-ALU	
X											CCGT 09T304EN-ALU	
	X	X	X	X	X	X	X	X	X	X	CCGT 09T304FN-ALU	
X											CCGT 09T308EN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 09T308FN-ALU	
X											CCGT 120401EN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 120401FN-ALU	
X											CCGT 120402EN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 120402FN-ALU	
X											CCGT 120404EN-ALU	
	X	X	X	X	X	X	X	X	X	X	CCGT 120404FN-ALU	
X											CCGT 120408EN-ALU	
		X	X	X	X	X	X	X	X	X	CCGT 120408FN-ALU	
		X		X					X		CCGT 060202FN-AWI	
		X		X					X		CCGT 060204FN-AWI	
		X		X					X		CCGT 060208FN-AWI	
		X		X					X		CCGT 09T302FN-AWI	
		X		X					X		CCGT 09T304FN-AWI	
		X		X					X		CCGT 09T308FN-AWI	
		X		X					X		CCGT 120404FN-AWI	
		X		X					X		CCGT 120408FN-AWI	

P	○	●	●	●	○	○	○	○				P
M	●		●	●	○	○	○	○				M
K	●	●	○	○	○	○			○	○		K
N					●	●	●	●	●	●		N
S		●	○	○								S
H			○	○								H

X 구매가능  
 ● 강력추천  
 ○ 추천

# Indexable Inserts - High Positive

1. DIAMETAL

2. BIMU

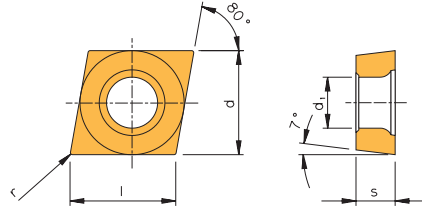
3. IFANGER

4. ZEUS

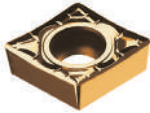
5. ARNO

6. Whiz Cut

7. SPHINX



CC..



규격	l	d	s	d <sub>1</sub>	r
CCGT 060204FN-ACB	6.45	6.350	2.38	2.8	0.4
CCGT 09T304EN-ACB	9.67	9.525	3.97	4.4	0.4
CCGT 09T304FN-ACB	9.67	9.525	3.97	4.4	0.4
CCGT 09T308EN-ACB	9.67	9.525	3.97	4.4	0.8
CCGT 09T308FN-ACB	9.67	9.525	3.97	4.4	0.8
CCGT 120404EN-ACB	12.90	12.700	4.76	5.5	0.4
CCGT 120404FN-ACB	12.90	12.700	4.76	5.5	0.4
CCGT 120408EN-ACB	12.90	12.700	4.76	5.5	0.8
CCGT 120408FN-ACB	12.90	12.700	4.76	5.5	0.8
CCGT 0602005FN-ASF	6.45	6.350	2.38	2.8	0.05
CCGT 060201EN-ASF	6.45	6.350	2.38	2.8	0.1
CCGT 060201FN-ASF	6.45	6.350	2.38	2.8	0.1
CCGT 060202EN-ASF	6.45	6.350	2.38	2.8	0.2
CCGT 060202FN-ASF	6.45	6.350	2.38	2.8	0.2
CCGT 060204EN-ASF	6.45	6.350	2.38	2.8	0.4
CCGT 060204FN-ASF	6.45	6.350	2.38	2.8	0.4
CCGT 09T3005FN-ASF	9.67	9.525	3.97	4.4	0.05
CCGT 09T301FN-ASF	9.67	9.525	3.97	4.4	0.1
CCGT 09T302EN-ASF	9.67	9.525	3.97	4.4	0.2
CCGT 09T302FN-ASF	9.67	9.525	3.97	4.4	0.2
CCGT 09T304EN-ASF	9.67	9.525	3.97	4.4	0.4
CCGT 09T304FN-ASF	9.67	9.525	3.97	4.4	0.4
CCGT 09T308FN-ASF	9.67	9.525	3.97	4.4	0.8
CCXT 060202EN-AEC	6.45	6.350	2.38	2.8	0.2
CCXT 060204EN-AEC	6.45	6.350	2.38	2.8	0.4
CCXT 09T302EN-AEC	9.67	9.525	3.97	4.4	0.2
CCXT 09T304EN-AEC	9.67	9.525	3.97	4.4	0.4
CCXT 09T308EN-AEC	9.67	9.525	3.97	4.4	0.8
CCXT 120404EN-AEC	12.90	12.700	4.76	5.5	0.4
CCXT 120408EN-AEC	12.90	12.700	4.76	5.5	0.8

## Grade availability

coated													uncoated		Designation
AM5015 (PG22)	AM5025 (PG22)	AM5110 (PG22)	AM5120+ (PG22)	AP5210 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)		AK10	AK20	
				X	X	X	X	X	X	X	X		X	X	CCGT 060204FN-ACB
			X											X	CCGT 09T304EN-ACB
				X	X	X	X	X	X	X	X		X	X	CCGT 09T304FN-ACB
			X											X	CCGT 09T308EN-ACB
				X	X	X	X	X	X	X	X		X	X	CCGT 09T308FN-ACB
			X											X	CCGT 120404EN-ACB
					X	X	X	X	X	X	X		X	X	CCGT 120404FN-ACB
			X											X	CCGT 120408EN-ACB
					X	X	X	X	X	X	X		X	X	CCGT 120408FN-ACB
					X	X	X	X					X	X	CCGT 0602005FN-ASF
X														X	CCGT 060201EN-ASF
					X	X	X	X					X	X	CCGT 060201FN-ASF
X	X													X	CCGT 060202EN-ASF
		X			X	X	X	X		X			X	X	CCGT 060202FN-ASF
X	X													X	CCGT 060204EN-ASF
		X			X	X	X	X		X			X	X	CCGT 060204FN-ASF
					X	X	X	X					X	X	CCGT 09T3005FN-ASF
					X	X	X	X					X	X	CCGT 09T301FN-ASF
X	X													X	CCGT 09T302EN-ASF
					X	X	X	X					X	X	CCGT 09T302FN-ASF
X	X													X	CCGT 09T304EN-ASF
		X			X	X	X	X					X	X	CCGT 09T304FN-ASF
		X			X	X	X	X					X	X	CCGT 09T308FN-ASF
													X		CCXT 060202EN-AEC
													X		CCXT 060204EN-AEC
													X		CCXT 09T302EN-AEC
													X		CCXT 09T304EN-AEC
													X		CCXT 09T308EN-AEC
													X		CCXT 120404EN-AEC
													X		CCXT 120408EN-AEC

P	●		○		●	●	●	○	○	○	○		P	X 구매가능
M	●	●	●	○	○	●	●	○	○	○	○		M	● 강력추천
K	○		○		●	○	○	○	○			○	K	○ 추천
N			○	●				●	●	●	●	●	N	
S	●	●	●	●	●	○	○						S	
H	○		○			○	○						H	

# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

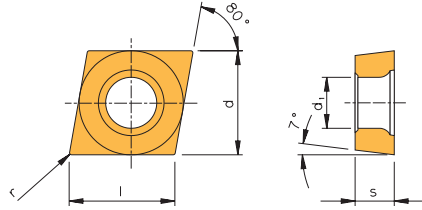
3. IFANGER

4. ZEUS

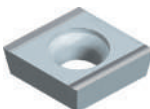
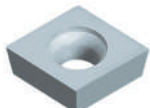
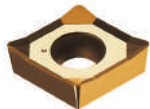
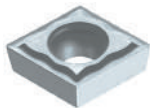
5. ARNO

6. Whiz Cut

7. SPHINX



CC..



규격	l	d	s	d <sub>1</sub>	r
CCGT 0602005FN-PS	6.45	6.350	2.38	2.8	0.05
CCGT 060201FN-PS	6.45	6.350	2.38	2.8	0.1
CCGT 060202FN-PS	6.45	6.350	2.38	2.8	0.2
CCGT 060204FN-PS	6.45	6.350	2.38	2.8	0.4
CCGT 09T3005FN-PS	9.67	9.525	3.97	4.4	0.05
CCGT 09T301FN-PS	9.67	9.525	3.97	4.4	0.1
CCGT 09T302FN-PS	9.67	9.525	3.97	4.4	0.2
CCGT 09T304FN-PS	9.67	9.525	3.97	4.4	0.4
CCGT 060204FN-ALU	6.45	6.350	2.38	2.8	0.4
CCGT 120404FN-ALU	12.90	12.70	4.76	5.5	0.4
CCGT 060204FN-ACB	6.45	6.350	2.38	2.8	0.4
CCGT 09T304EN-ACB	9.67	9.525	3.97	4.4	0.4
CCGT 09T304FN-ACB	9.67	9.525	3.97	4.4	0.4
CCGT 09T308EN-ACB	9.67	9.525	3.97	4.4	0.8
CCGT 09T308FN-ACB	9.67	9.525	3.97	4.4	0.8
CCGT 120404EN-ACB	12.90	12.70	4.76	5.5	0.4
CCGT 120408EN-ACB	12.90	12.70	4.76	5.5	0.8
CCGT 060201EN-ASF	6.45	6.350	2.38	2.8	0.1
CCGT 060202EN-ASF	6.45	6.350	2.38	2.8	0.2
CCGT 060202FN-ASF	6.45	6.350	2.38	2.8	0.2
CCGT 060204EN-ASF	6.45	6.350	2.38	2.8	0.4
CCGT 060204FN-ASF	6.45	6.350	2.38	2.8	0.4
CCGT 09T302EN-ASF	9.67	9.525	3.97	4.4	0.2
CCGT 09T304EN-ASF	9.67	9.525	3.97	4.4	0.4
CCGT 09T304FN-ASF	9.67	9.525	3.97	4.4	0.4
CCGT 09T308FN-ASF	9.67	9.525	3.97	4.4	0.8
CCGW 060202FN	6.45	6.350	2.38	2.8	0.2
CCGW 060204FN	6.45	6.350	2.38	2.8	0.4
CCGW 09T304FN	9.67	9.525	3.97	4.4	0.4
CCGW 09T308FN	9.67	9.525	3.97	4.4	0.8
CCGX 060200FL	6.45	6.350	2.38	2.8	0.0
CCGX 060200FR	6.45	6.350	2.38	2.8	0.0
CCGX 060201FL	6.45	6.350	2.38	2.8	0.1
CCGX 060201FR	6.45	6.350	2.38	2.8	0.1
CCGX 060202FL	6.45	6.350	2.38	2.8	0.2
CCGX 060202FR	6.45	6.350	2.38	2.8	0.2
CCGX 060204FL	6.45	6.350	2.38	2.8	0.4
CCGX 060204FR	6.45	6.350	2.38	2.8	0.4
CCGX 09T300FL	9.67	9.525	3.97	4.4	0.0
CCGX 09T300FR	9.67	9.525	3.97	4.4	0.0
CCGX 09T301FL	9.67	9.525	3.97	4.4	0.1
CCGX 09T301FR	9.67	9.525	3.97	4.4	0.1
CCGX 09T302FL	9.67	9.525	3.97	4.4	0.2
CCGX 09T302FR	9.67	9.525	3.97	4.4	0.2
CCGX 09T304FL	9.67	9.525	3.97	4.4	0.4
CCGX 09T304FR	9.67	9.525	3.97	4.4	0.4



Grade availability									
	AM5015	AM5025	coated AM5110	AM5120+	AP5210		uncoated AK1010	AK1020	AK20
									Designation
							X	X	CCGT 0602005FN-PS
		X					X	X	CCGT 060201FN-PS
		X					X	X	CCGT 060202FN-PS
		X					X	X	CCGT 060204FN-PS
		X					X	X	CCGT 09T3005FN-PS
		X					X	X	CCGT 09T301FN-PS
		X					X	X	CCGT 09T302FN-PS
		X					X	X	CCGT 09T304FN-PS
					X				CCGT 060204FN-ALU
					X				CCGT 120404FN-ALU
					X				CCGT 060204FN-ACB
				X					CCGT 09T304EN-ACB
				X	X				CCGT 09T304FN-ACB
				X					CCGT 09T308EN-ACB
				X	X				CCGT 09T308FN-ACB
				X					CCGT 120404EN-ACB
				X					CCGT 120408EN-ACB
	X								CCGT 060201EN-ASF
	X	X							CCGT 060202EN-ASF
			X						CCGT 060202FN-ASF
	X	X							CCGT 060204EN-ASF
			X						CCGT 060204FN-ASF
	X	X							CCGT 09T302EN-ASF
	X	X							CCGT 09T304EN-ASF
			X						CCGT 09T304FN-ASF
			X						CCGT 09T308FN-ASF
								X	CCGW 060202FN
								X	CCGW 060204FN
								X	CCGW 09T304FN
								X	CCGW 09T308FN
		X							CCGX 060200FL
		X							CCGX 060200FR
		X							CCGX 060201FL
		X							CCGX 060201FR
		X							CCGX 060202FL
		X							CCGX 060202FR
		X							CCGX 060204FL
		X							CCGX 060204FR
		X							CCGX 09T300FL
		X							CCGX 09T300FR
		X							CCGX 09T301FL
		X							CCGX 09T301FR
		X							CCGX 09T302FL
		X							CCGX 09T302FR
		X							CCGX 09T304FL
		X							CCGX 09T304FR
P	●		○		●				
M	●	●	●	○	○				
K	○		○		●	○	○	○	
N			○	●		●	●	●	
S	●	●	●	●	●				
H	○		○						

X 구매가능  
● 강력추천  
○ 추천

# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

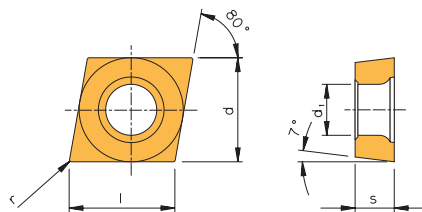
3. IFANGER

4. ZEUS

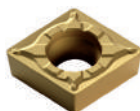
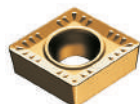
5. ARNO

6. Whiz Cut

7. SPHINX



CC..



규격

l

d

s

d<sub>1</sub>

r

CCMT 060202EN-AM

6,45

6,350

2,38

2,8

0,2

CCMT 060204EN-AM

6,45

6,350

2,38

2,8

0,4

CCMT 060208EN-AM

6,45

6,350

2,38

2,8

0,8

CCMT 09T302EN-AM

9,67

9,525

3,97

4,4

0,2

CCMT 09T304EN-AM

9,67

9,525

3,97

4,4

0,4

CCMT 09T308EN-AM

9,67

9,525

3,97

4,4

0,8

CCMT 120404EN-AM

12,90

12,70

4,76

5,5

0,4

CCMT 120408EN-AM

12,90

12,70

4,76

5,5

0,8

CCMT 060202EN-PM1

6,45

6,350

2,38

2,8

0,2

CCMT 060204EN-PM1

6,45

6,350

2,38

2,8

0,4

CCMT 09T302EN-PM1

9,67

9,525

3,97

4,4

0,2

CCMT 09T304EN-PM1

9,67

9,525

3,97

4,4

0,4

CCMT 09T308EN-PM1

9,67

9,525

3,97

4,4

0,8

CCMT 120404EN-PM1

12,90

12,70

4,76

5,5

0,4

CCMT 120408EN-PM1

12,90

12,70

4,76

5,5

0,8

CCMT 060202EN-PS2

6,45

6,350

2,38

2,8

0,2

CCMT 060204EN-PS2

6,45

6,350

2,38

2,8

0,4

CCMT 09T302EN-PS2

9,67

9,525

3,97

4,4

0,2

CCMT 09T304EN-PS2

9,67

9,525

3,97

4,4

0,4

CCXT 060202EN-AEC

6,45

6,350

2,38

2,8

0,2

CCXT 060204EN-AEC

6,45

6,350

2,38

2,8

0,4

CCXT 09T302EN-AEC

9,67

9,525

3,97

4,4

0,2

CCXT 09T304EN-AEC

9,67

9,525

3,97

4,4

0,4

CCXT 09T308EN-AEC

9,67

9,525

3,97

4,4

0,8

CCXT 120404EN-AEC

12,90

12,70

4,76

5,5

0,4

CCXT 120408EN-AEC

12,90

12,70

4,76

5,5

0,8

Grade availability												Designation
coated												
AK2110	AM2110	AM2130	AM5020	AM5110	AM5120	AP2110	AP2120	AP2310	AP2320	AP2335		
		X			X			X	X	X	CCMT 060202EN-AM	
		X			X			X	X	X	CCMT 060204EN-AM	
		X			X			X	X	X	CCMT 060208EN-AM	
		X		X	X			X	X	X	CCMT 09T302EN-AM	
		X			X			X	X	X	CCMT 09T304EN-AM	
		X			X			X	X	X	CCMT 09T308EN-AM	
		X			X			X	X	X	CCMT 120404EN-AM	
		X			X			X	X	X	CCMT 120408EN-AM	
X		X		X	X	X	X				CCMT 060202EN-PM1	
X		X		X	X			X	X		CCMT 060204EN-PM1	
		X		X	X			X	X		CCMT 09T302EN-PM1	
X	X	X		X	X	X			X		CCMT 09T304EN-PM1	
X		X		X	X	X			X		CCMT 09T308EN-PM1	
		X							X		CCMT 120404EN-PM1	
		X					X				CCMT 120408EN-PM1	
		X		X	X			X	X		CCMT 060202EN-PS2	
		X		X	X			X	X		CCMT 060204EN-PS2	
		X		X	X			X	X		CCMT 09T302EN-PS2	
		X		X	X			X	X		CCMT 09T304EN-PS2	
			X								CCXT 060202EN-AEC	
			X								CCXT 060204EN-AEC	
			X								CCXT 09T302EN-AEC	
			X								CCXT 09T304EN-AEC	
			X								CCXT 09T308EN-AEC	
			X								CCXT 120404EN-AEC	
			X								CCXT 120408EN-AEC	
P	○		○	○	○	●	●	●	●	●	P X 구매가능	
M		●	●	●	●						M ● 강력추천	
K	●			○	○	○					K ○ 추천	
N				○	○						N	
S				●	●						S	
H				○	○						H	

# Indexable Inserts - High Positive

1. DIAMETAL

2. BIMU

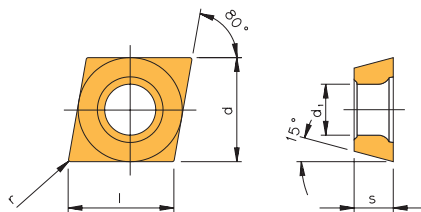
3. IFANGER

4. ZEUS

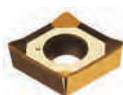
5. ARNO

6. Whiz Cut

7. SPHINX



CD..



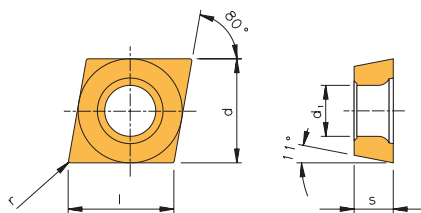
규격	l	d	s	d <sub>1</sub>	r	Grade availability		
						coated		uncoated
						AL20	AT20	AK20
CDGT 0401005FN-ALU	4.03	3.97	1.0	2.1	0.05	X	X	X
CDGT 040101FN-ALU	4.03	3.97	1.0	2.1	0.1	X	X	X
CDGT 040102FN-ALU	4.03	3.97	1.0	2.1	0.2	X	X	X
CDGT 040104FN-ALU	4.03	3.97	1.0	2.1	0.4	X	X	X

X 구매가능

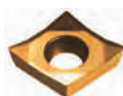
● 강력추천

○ 추천

	P	M	K	N	S	H
●	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○



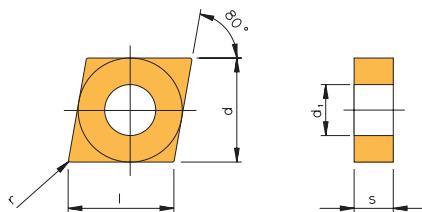
CP..



규격	l	d	s	d <sub>1</sub>	r
CPGT 05T1005FN-ALU	5.60	5.560	1.98	2.5	0.05
CPGT 05T101EN-ALU	5.60	5.560	1.98	2.5	0.1
CPGT 05T101FN-ALU	5.60	5.560	1.98	2.5	0.1
CPGT 05T102EN-ALU	5.60	5.560	1.98	2.5	0.2
CPGT 05T102FN-ALU	5.60	5.560	1.98	2.5	0.2
CPGT 05T104EN-ALU	5.60	5.560	1.98	2.5	0.4
CPGT 05T104FN-ALU	5.60	5.560	1.98	2.5	0.4
CPGT 05T1005FN-ASF	5.60	5.560	1.98	2.5	0.05
CPGT 05T101FN-ASF	5.60	5.560	1.98	2.5	0.1
CPGT 05T102EN-ASF	5.60	5.560	1.98	2.5	0.2
CPGT 05T102FN-ASF	5.60	5.560	1.98	2.5	0.2
CPGT 05T104EN-ASF	5.60	5.560	1.98	2.5	0.4
CPGT 05T104FN-ASF	5.60	5.560	1.98	2.5	0.4



CN..



규격	l	d	s	d <sub>1</sub>	r	Grade availability		
						coated		uncoated
						AT20	PVD2	AK20
CNGM 160612FN-ALU	16,10	15,875	6,35	6,35	1,2	X	X	X
CNGM 190612FN-ALU	19,30	19,050	6,35	7,93	1,2	X	X	X

X 구매가능  
● 강력추천  
○ 추천

P	○	○	
M	○	○	
K	○		○
N	●	●	●
S			
H			

Grade availability												
coated										uncoated		
	AM15C	AM5025 (PG22)	AL10	AL20	AT10	AT20	PVD1	PVD2	AD2 (PG21)	AK10	AK20	Designation
			X	X	X	X	X	X	X	X	X	CPGT 05T1005FN-ALU
	X											CPGT 05T101EN-ALU
			X	X	X	X	X	X	X	X	X	CPGT 05T101FN-ALU
	X											CPGT 05T102EN-ALU
			X	X	X	X	X	X	X	X	X	CPGT 05T102FN-ALU
	X											CPGT 05T104EN-ALU
			X	X	X	X	X	X	X	X	X	CPGT 05T104FN-ALU
			X	X	X	X				X	X	CPGT 05T1005FN-ASF
		X	X	X	X	X				X	X	CPGT 05T101FN-ASF
											X	CPGT 05T102EN-ASF
			X	X	X	X				X	X	CPGT 05T102FN-ASF
		X									X	CPGT 05T104EN-ASF
			X	X	X	X				X	X	CPGT 05T104FN-ASF
P	○		●	●	○	○	○	○				P X 구매가능
M	●	●	●	●	○	○	○	○				M ● 강력추천
K	●		○	○	○	○				○	○	K ○ 추천
N					●	●	●	●	●	●	●	N
S		●	○	○								S
H			○	○								H

# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

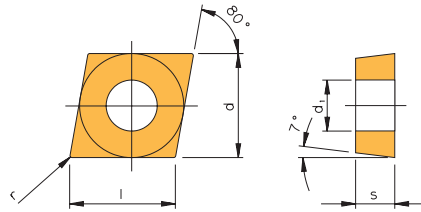
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



## CCMX



WIPER

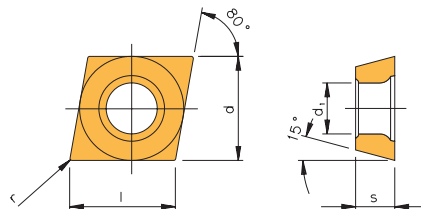
규격	l	d	s	d <sub>1</sub>	r	Grade availability		
						coated		
						AM2030	AP2030	AM35C
CCMX 120404EN	12,90	12,700	4,76	5,5	0,4			X
CCMX 120408EN	12,90	12,700	4,76	5,5	0,8			X
CCMX 09T304EN-WMS	9,67	9,525	3,97	4,4	0,4	X		
CCMX 09T308EN-WMS	9,67	9,525	3,97	4,4	0,8		X	

X 구매가능

● 강력추천

○ 추천

P		●	●
M	●	○	○
K		○	
N			
S	○		
H			



## CD..



규격	l	d	s	d <sub>1</sub>	r	Grade availability	
						coated	uncoated
						AM15C	AK20
CDGT 040101FL	4,03	3,97	1,0	2,1	0,1	X	
CDGT 040101FR	4,03	3,97	1,0	2,1	0,1	X	
CDGT 040102FL	4,03	3,97	1,0	2,1	0,2	X	X
CDGT 040102FR	4,03	3,97	1,0	2,1	0,2	X	X
CDGT 040104FL	4,03	3,97	1,0	2,1	0,4	X	
CDGT 040104FR	4,03	3,97	1,0	2,1	0,4	X	
CDGW 040102EN	4,03	3,97	1,0	2,1	0,2	X	X

Attention: Designation does not correspond with ISO-designation

X 구매가능

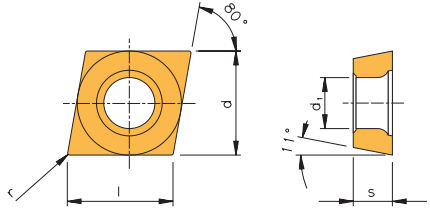
● 강력추천

○ 추천

P	○	
M	●	
K	○	○
N		●
S		
H		

# Indexable Inserts - Carbide

CP..



구 격	l	d	s	d <sub>1</sub>	r	Grade availability			
						AM5025	coated		uncoated
							AM15C	AM25C	AK20
CPET 05T102FR	5,60	5,56	1,98	2,5	0,2		X		
CPGT 05T102EN	5,60	5,56	1,98	2,5	0,2		X		
CPGT 05T104EN	5,60	5,56	1,98	2,5	0,4		X		
CPGT 05T102EN-ASF	5,60	5,56	1,98	2,5	0,2	X			
CPGT 05T104EN-ASF	5,60	5,56	1,98	2,5	0,4	X			
CPGW 05T102EN	5,60	5,56	1,98	2,5	0,2		X		
CPMT 05T102EN	5,60	5,56	1,98	2,5	0,2	X		X	X
CPMT 05T104EN	5,60	5,56	1,98	2,5	0,4	X		X	

X 구매가능

● 강력추천

○ 추천

P		○	●	
M	●	●		
K		○	○	○
N				●
S	●			
H				



# Indexable Inserts - Carbide

1. DIAMETAL

2. BIMU

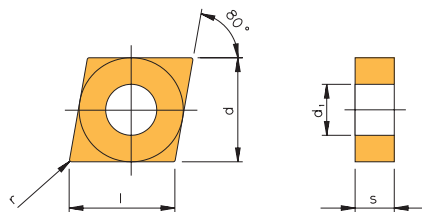
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



CN..



규격	l	d	s	d <sub>1</sub>	r
CNGP 120402FN-EX	12,90	12,70	4,76	5,5	0,2
CNGP 120404FN-EX	12,90	12,70	4,76	5,5	0,4
CNGP 120408FN-EX	12,90	12,70	4,76	5,5	0,8
CNMA 120408EN	12,90	12,70	4,76	5,5	0,8
CNMG 090304EN-NA	9,67	9,525	3,18	4,4	0,4
CNMG 090308EN-NA	9,67	9,525	3,18	4,4	0,8
CNMG 120404EN-NM2	12,90	12,70	4,76	5,5	0,4
CNMG 120408EN-NM2	12,90	12,70	4,76	5,5	0,8
CNMG 120412EN-NM2	12,90	12,70	4,76	5,5	1,2
CNMG 160608EN-NM2	16,10	15,875	6,35	6,35	0,8
CNMG 120408EN-NMG1	12,90	12,70	4,76	5,5	0,8
CNMG 120412EN-NMG1	12,90	12,70	4,76	5,5	1,2
CNMG 160612EN-NMG1	16,10	15,875	6,35	6,35	1,2
CNMG 190612EN-NMG1	19,30	19,05	6,35	7,94	1,2
CNMG 190616EN-NMG1	19,30	19,05	6,35	7,94	1,6
CNMG 120404EN-NMR	12,90	12,70	4,76	5,5	0,4
CNMG 120408EN-NMR	12,90	12,70	4,76	5,5	0,8
CNMG 120412EN-NMR	12,90	12,70	4,76	5,5	1,2
CNMG 120404EN-NS1	12,90	12,700	4,76	5,5	0,4
CNMG 120408EN-NS1	12,90	12,700	4,76	5,5	0,8
CNMG 120404EN-VA	12,90	12,70	4,76	5,5	0,4
CNMG 120408EN-VA	12,90	12,70	4,76	5,5	0,8
CNMM 120408EN-NR1	12,90	12,70	4,76	5,5	0,8
CNMM 120412EN-NR1	12,90	12,70	4,76	5,5	1,2
CNMM 160612EN-NR1	16,10	15,875	6,35	6,35	1,2
CNMM 190616EN-NR1	19,30	19,05	6,35	7,94	1,6

		Grade availability																		Designation
		coated																uncoated		
		AK2010	AK2110	AK2320	AM2035	AM2110	AM2130	AM5025	AM5120	AP2025	AP2035	AP2110	AP2120	AP2135	AP2310	AP2320	AP2335	AK1010	AK1020	
								X										X	X	CNGP 120402FN-EX
								X										X	X	CNGP 120404FN-EX
								X										X	X	CNGP 120408FN-EX
		X																		CNMA 120408EN
										X										CNMG 090304EN-NA
										X										CNMG 090308EN-NA
							X		X			X				X				CNMG 120404EN-NM2
							X		X						X	X				CNMG 120408EN-NM2
							X		X							X				CNMG 120412EN-NM2
							X									X	X			CNMG 160608EN-NM2
			X				X		X							X				CNMG 120408EN-NMG1
		X					X		X						X	X	X			CNMG 120412EN-NMG1
			X				X							X		X				CNMG 160612EN-NMG1
							X		X							X	X			CNMG 190612EN-NMG1
							X						X	X						CNMG 190616EN-NMG1
						X	X		X											CNMG 120404EN-NMR
						X	X		X											CNMG 120408EN-NMR
							X		X											CNMG 120412EN-NMR
						X						X	X							CNMG 120404EN-NS1
						X						X	X							CNMG 120408EN-NS1
					X				X		X							X	X	CNMG 120404EN-VA
					X				X									X	X	CNMG 120408EN-VA
							X						X				X			CNMM 120408EN-NR1
							X						X	X			X			CNMM 120412EN-NR1
							X						X				X			CNMM 160612EN-NR1
							X						X	X			X			CNMM 190616EN-NR1
P	O	AK2010	AK2110	AK2320	AM2035	AM2110	AM2130	AM5025	AM5120	AP2025	AP2035	AP2110	AP2120	AP2135	AP2310	AP2320	AP2335	AK1010	AK1020	P
M			O	O	●	●	●	●	●	O	O	●	●	●	●	●	●			M
K	●		●	●					O	●								O	O	K
N									O									●	●	N
S					●			●	●											S
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강력추천

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추천

Recommended Cutting Data (추천절삭 조건)

Turning – Carbide

coated

ISO	Material		Tensile strength [N/mm²]	Cutting speed Vc [m/min]										
				AK2010	AK2110	AK2310	AK2320	AM2030	AM2035	AM2110	AM2130	AM5015	AM5020	AM5025
P	Unalloyed steel and cast steel	ca. 0,15% C	350	–	220-380	220-380	200-340	170-220	180-230	–	–	220-320	180-230	180-230
		ca. 0,45% C	650	–	190-330	190-330	180-290	160-180	170-190	–	–	180-290	170-190	170-190
		ca. 0,75% C	1000	–	160-280	160-280	150-240	120-140	130-150	–	–	150-250	130-150	130-150
	Low alloyed steel and cast steel		600	–	180-300	180-300	170-260	160-180	170-190	–	–	180-280	170-190	170-190
			900	–	160-260	160-260	150-240	80-140	90-150	–	–	170-250	90-150	90-150
			1200	–	120-220	120-220	120-220	60-120	70-130	–	–	150-220	70-130	70-130
	High alloyed steel, high alloyed tool steel and cast steel	annealed	700	–	140-220	140-220	140-200	110-190	120-200	–	–	80-160	120-200	120-200
		hardened and tempered	1100	–	70-130	70-130	70-120	40-90	50-100	–	–	40-130	50-100	50-100
	Stainless steel and cast steel	ferritic / martensitic, annealed	700	–	140-220	140-220	140-220	130-170	140-180	–	–	60-180	140-180	140-180
		martensitic, hardened and tempered	1000	–	70-130	70-130	70-110	100-150	110-140	–	–	40-140	110-140	110-140
M	Stainless steel and cast steel	austenitic and austenitic/ferritic	450-600	–	–	–	–	100-180	100-180	120-200	100-140	80-160	120-200	120-200
		chilled	600-900	–	–	–	–	70-140	70-140	70-180	70-140	40-130	90-160	90-160
K	Cast iron	pearlitic, ferritic	500-700	150-210	250-380	250-380	250-340	–	–	–	–	180-300	–	120-160
		pearlitic, martensitic	700-850	220-350	190-300	190-300	190-250	–	–	–	–	160-280	–	90-130
			800-1100	–	–	–	–	–	–	–	–	120-240	–	–
	Cast iron with nodular graphite	ferritic	550	220-380	220-300	220-300	200-260	–	–	–	–	140-230	–	120-160
		pearlitic	800	200-350	150-230	150-230	150-200	–	–	–	–	120-170	–	120-180
	Malleable cast iron	ferritic	450	200-400	200-300	200-300	200-260	–	–	–	–	150-210	–	140-220
		pearlitic	750	180-320	170-230	170-230	170-200	–	–	–	–	150-210	–	110-160
N	Aluminum alloys, long chipping	not heat treatable	200	–	–	–	–	–	–	–	–	–	–	–
		heat treatable, heat treated	350	–	–	–	–	–	–	–	–	–	–	–
	Casted aluminum alloys	≤ 12% Si, hardened	250	–	–	–	–	–	–	–	–	–	–	–
		≤ 12% Si, heat treatable, hardened	300	–	–	–	–	–	–	–	–	–	–	–
		≤ 12% Si, not heat treatable	450	–	–	–	–	–	–	–	–	–	–	–
	Copper and copper alloys (brass / bronze)	Lead alloys, Pb > 1%	400	–	–	–	–	–	–	–	–	200-500	–	–
		Brass, bronze	300	–	–	–	–	–	–	–	–	200-500	–	–
		Aluminum bronze	500	–	–	–	–	–	–	–	–	160-450	–	–
		Copper and electrolyte copper	200	–	–	–	–	–	–	–	–	100-320	–	–
	Nonferrous materials	Duroplastics		–	–	–	–	–	–	–	–	160-600	–	–
		Reinforced plastics		–	–	–	–	–	–	–	–	100-300	–	–
		Hard rubber		–	–	–	–	–	–	–	–	–	–	–
S	High temperature resistant alloys	Fe-alloyed annealed	700	–	–	–	–	20-40	20-40	–	–	20-60	–	20-50
		Fe-alloyed hardened	950	–	–	–	–	15-35	15-35	–	–	20-60	–	20-50
		Ni- oder Co- based annealed	800	–	–	–	–	8-25	8-25	–	–	15-50	–	15-40
		Ni- oder Co- based casting	1100	–	–	–	–	4-15	4-15	–	–	15-40	–	10-25
		Ni- oder Co- based hardened	1200	–	–	–	–	4-15	4-15	–	–	15-40	–	20-35
	Titanium alloys, high strength	Pure titanium	500-700	–	–	–	–	80-130	80-130	–	–	90-180	–	80-140
	Alpha- and beta-alloys, hardened		700-1000	–	–	–	–	15-35	15-35	–	–	40-80	–	25-45
H	Hardened steel	hardened and tempered	1000-1350	–	–	–	–	–	–	–	–	30-50	–	–
		hardened and tempered	1350-1700	–	–	–	–	–	–	–	–	10-25	–	–
	Hard cast iron	casting	1350	–	–	–	–	–	–	–	–	40-70	–	–
	Hardened cast iron	hardened and tempered	1900	–	–	–	–	–	–	–	–	10-25	–	–

The datas cutting speeds given are approximate values. It is necessary to adjust them to the individual machining operation.

# Recommended Cutting Data (추천절삭 조건)

## Turning – Carbide

coated

ISO	Material		Tensile strength [N/mm²]	Cutting speed Vc [m/min]										
				AM5110	AM5120	AM5120+	AM5130	AM5220	AP2025	AP2030	AP2035	AP2110	AP2120	AP2135
P	Unalloyed steel and cast steel	ca. 0,15% C	350	220-350	220-320	180-280	170-240	180-280	190-240	190-240	180-230	300-400	250-350	180-270
		ca. 0,45% C	650	180-310	180-290	160-250	160-220	160-250	170-200	170-200	170-190	260-350	210-300	170-230
		ca. 0,75% C	1000	150-270	150-250	120-220	140-200	120-220	130-160	130-160	130-150	240-300	180-230	160-210
	Low alloyed steel and cast steel		600	180-300	180-260	-	170-220	160-250	170-200	170-200	170-190	220-300	180-270	160-220
			900	170-270	150-220	-	170-200	140-230	100-160	100-160	90-150	180-260	160-220	140-180
			1200	150-240	80-190	-	150-200	120-200	80-140	80-140	70-130	120-220	100-200	100-160
	High alloyed steel, high alloyed tool steel and cast steel	annealed	700	80-180	80-150	-	80-150	70-150	130-170	130-170	120-200	150-220	130-200	130-180
		hardened and tempered	1100	40-140	40-130	-	40-120	35-120	80-130	80-130	50-100	70-150	70-140	70-120
	Stainless steel and cast steel	ferritic / martensitic, annealed	700	40-180	40-150	50-160	40-160	50-160	130-180	130-180	140-180	-	-	-
		martensitic, hardened and tempered	1000	40-160	40-140	40-140	40-160	40-140	110-160	110-160	110-160	-	-	-
M	Stainless steel and cast steel	austenitic and austenitic/ferritic	450-600	80-180	80-160	70-150	80-150	70-150	100-170	100-170	110-190	-	-	-
		chilled	600-900	40-140	40-130	35-120	40-120	35-120	-	-	80-150	-	-	-
K	Cast iron	pearlitic, ferritic	500-700	180-350	180-300	180-300	180-240	180-300	130-200	130-200	-	160-230	-	-
		pearlitic, martensitic	700-850	160-300	160-280	160-280	160-220	160-280	120-180	120-180	-	150-200	-	-
			800-1100	120-270	120-240	120-240	120-200	120-240	-	-	-	-	-	-
	Cast iron with nodular graphite	ferritic	550	140-230	140-230	-	140-200	140-230	120-170	120-170	-	160-210	-	-
		pearlitic	800	120-170	120-170	-	110-160	120-170	120-190	120-190	-	130-170	-	-
	Malleable cast iron	ferritic	450	150-210	150-210	-	130-190	150-210	150-230	150-230	-	150-210	-	-
		pearlitic	750	150-210	150-210	-	130-190	150-210	120-170	120-170	-	150-210	-	-
	N	Aluminum alloys, long chipping	not heat treatable	200	-	-	-	-	-	-	-	-	-	-
heat treatable, heat treated			350	-	-	-	-	-	-	-	-	-	-	-
Casted aluminum alloys		≤ 12% Si, hardened	250	-	-	-	-	-	-	-	-	-	-	-
		≤ 12% Si, heat treatable, heat treated	300	-	-	-	-	-	-	-	-	-	-	-
		≤ 12% Si, not heat treatable	450	-	-	-	-	-	-	-	-	-	-	-
Copper and copper alloys (brass / bronze)		Lead alloys, Pb > 1%	400	200-650	200-500	150-500	200-500	-	-	-	-	-	-	-
		Brass, bronze	300	200-650	200-500	150-500	200-500	-	-	-	-	-	-	-
		Aluminum bronze	500	160-350	160-300	120-400	150-220	-	-	-	-	-	-	-
		Copper and electrolyte copper	200	120-220	120-200	120-250	120-220	-	-	-	-	-	-	-
Nonferrous materials		Duroplastics		160-600	160-600	-	140-500	-	-	-	-	-	-	-
		Reinforced plastics		100-300	100-300	100-300	100-300	-	-	-	-	-	-	-
		Hard rubber		-	-	-	-	-	-	-	-	-	-	-
S	High temperature resistant alloys	Fe-alloyed annealed	700	20-70	20-60	20-60	20-50	20-60	20-40	-	20-40	-	-	-
		Fe-alloyed hardened	950	20-70	20-60	20-60	20-50	20-60	15-35	-	15-35	-	-	-
		Ni- oder Co- based annealed	800	15-60	15-50	15-50	15-40	15-50	10-30	-	8-25	-	-	-
		Ni- oder Co- based casting	1100	15-50	15-40	15-40	15-40	15-40	5-18	-	4-15	-	-	-
		Ni- oder Co- based hardened	1200	15-50	15-40	15-40	15-40	15-40	5-18	-	4-15	-	-	-
	Titanium alloys, high strength	Pure titanium	500-700	100-210	90-180	-	80-170	-	80-130	-	80-130	-	-	-
	Alpha- and beta-alloys, hardened		700-1000	40-90	40-80	-	40-70	-	20-40	-	15-35	-	-	-
H	Hardened steel	hardened and tempered	1000-1350	30-55	30-50	-	30-45	-	-	-	-	-	-	-
		hardened and tempered	1350-1700	15-25	10-25	-	15-25	-	-	-	-	-	-	-
	Hard cast iron	casting	1350	40-80	40-70	-	40-65	-	-	-	-	-	-	-
	Hardened cast iron	hardened and tempered	1900	15-30	10-25	-	15-25	-	-	-	-	-	-	-

The datas cutting speeds given are approximate values. It is necessary to adjust them to the individual machining operation.

Recommended Cutting Data (추천절삭 조건)

Turning – Carbide

coated

ISO	Material		Tensile strength [N/mm²]	Cutting speed Vc [m/min]											
				AP2310	AP2320	AP2335	AP5210	AL10	AM15C	AM25C	AM350	AM35C	AR27C	AR270	AR370
P	Unalloyed steel and cast steel	ca. 0,15% C	350	300-400	250-350	180-270	220-370	220-320	220-320	150-260	180-230	170-240	200-270	200-260	190-240
		ca. 0,45% C	650	260-350	210-300	170-230	180-330	180-290	180-250	140-210	170-190	150-200	180-230	180-220	170-200
		ca. 0,75% C	1000	240-300	180-230	160-210	150-290	150-250	140-200	120-180	100-140	80-150	120-180	120-180	100-150
	Low alloyed steel and cast steel		600	220-300	180-270	160-220	180-320	180-280	180-250	140-210	170-190	150-200	210-260	180-220	170-200
			900	180-260	160-220	140-180	170-290	170-250	160-220	130-190	90-150	80-160	120-190	120-180	100-160
			1200	120-220	100-200	100-160	150-260	150-220	140-200	120-180	70-130	60-140	120-160	120-150	80-140
	High alloyed steel, high alloyed tool steel and cast steel	annealed	700	150-220	130-200	130-180	80-180	-	140-230	120-200	120-200	110-170	140-200	140-180	130-170
		hardened and tempered	1100	70-150	70-140	70-120	40-150	-	110-200	100-160	50-100	60-130	100-160	100-150	80-130
	Stainless steel and cast steel	ferritic / martensitic, annealed	700	-	-	-	40-140	170-290	170-260	140-240	140-180	110-180	170-230	170-220	130-180
		martensitic, hardened and tempered	1000	-	-	-	40-120	140-280	110-200	110-200	110-160	90-160	130-190	130-180	110-160
M	Stainless steel and cast steel	austenitic and austenitic/ferritic	450-600	-	-	-	70-150	140-280	210-250	100-170	120-190	100-170	150-220	150-200	100-170
		chilled	600-900	-	-	-	35-120	-	100-170	80-150	80-150	-	-	-	-
K	Cast iron	pearlitic, ferritic	500-700	-	-	-	180-350	180-300	210-250	170-230	-	-	120-180	-	-
		pearlitic, martensitic	700-850	-	-	-	160-300	160-280	90-130	90-120	-	-	120-180	-	-
			800-1100	-	-	-	120-270	120-240	90-130	90-120	-	-	100-150	-	-
	Cast iron with nodular graphite	ferritic	550	-	-	-	140-230	140-230	210-250	170-230	-	-	120-170	120-160	-
		pearlitic	800	-	-	-	120-170	120-170	90-130	90-120	-	-	120-190	120-180	-
	Malleable cast iron	ferritic	450	-	-	-	150-210	150-210	210-250	170-230	-	-	150-230	-	-
		pearlitic	750	-	-	-	150-210	150-210	90-130	90-120	-	-	120-170	-	-
	N	Aluminum alloys, long chipping	not heat treatable	200	-	-	-	-	-	-	-	-	-	-	-
heat treatable, heat treated			350	-	-	-	-	-	-	-	-	-	-	-	-
Casted aluminum alloys		≤ 12% Si, hardened	250	-	-	-	-	-	-	-	-	-	-	-	-
		≤ 12% Si, heat treatable, heat treated	300	-	-	-	-	-	-	-	-	-	-	-	-
		≤ 12% Si, not heat treatable	450	-	-	-	-	-	-	-	-	-	-	-	-
Copper and copper alloys (brass / bronze)		Lead alloys, Pb > 1%	400	-	-	-	-	-	-	-	-	-	-	-	-
		Brass, bronze	300	-	-	-	-	-	-	-	-	-	-	-	-
		Aluminum bronze	500	-	-	-	-	-	-	-	-	-	-	-	-
		Copper and electrolyte copper	200	-	-	-	-	-	-	-	-	-	-	-	-
Nonferrous materials		Duroplastics		-	-	-	-	-	-	-	-	-	-	-	-
		Reinforced plastics		-	-	-	-	-	-	-	-	-	-	-	-
		Hard rubber		-	-	-	-	-	-	-	-	-	-	-	-
S	High temperature resistant alloys	Fe-alloyed annealed	700	-	-	-	20-70	20-50	-	-	20-40	-	-	20-50	20-40
		Fe-alloyed hardened	950	-	-	-	20-70	20-50	-	-	15-35	-	-	20-50	15-35
		Ni- oder Co- based annealed	800	-	-	-	15-60	15-40	-	-	8-25	-	-	15-40	10-30
		Ni- oder Co- based casting	1100	-	-	-	15-50	15-30	-	-	4-15	-	-	10-25	5-18
		Ni- oder Co- based hardened	1200	-	-	-	15-50	15-30	-	-	4-15	-	-	20-35	5-18
	Titanium alloys, high strength	Pure titanium	500-700	-	-	-	-	-	-	-	-	-	-	20-60	-
	Alpha- and beta-alloys, hardened		700-1000	-	-	-	-	-	-	-	-	-	-	25-45	-
H	Hardened steel	hardened and tempered	1000-1350	-	-	-	-	-	-	-	-	-	-	-	-
		hardened and tempered	1350-1700	-	-	-	-	-	-	-	-	-	-	-	-
	Hard cast iron	casting	1350	-	-	-	-	-	-	-	-	-	-	-	-
	Hardened cast iron	hardened and tempered	1900	-	-	-	-	-	-	-	-	-	-	-	-

The datas cutting speeds given are approximate values. It is necessary to adjust them to the individual machining operation.

# Recommended Cutting Data (추천절삭 조건)

## Turning – High Positive Inserts

coated

ISO	Material		Tensile strength [N/mm²]	Cutting speed Vc [m/min]							
				AM15C	AM5015	AM5025	AM5110	AM5120	AM5120+	AM5220	AP5210
P	Unalloyed steel and cast steel	ca. 0,15% C	350	220-320	220-320	180-280	220-350	220-320	180-280	180-280	220-370
		ca. 0,45% C	650	180-250	180-290	160-250	180-310	180-290	160-250	160-250	180-330
		ca. 0,75% C	1000	140-200	150-250	120-220	150-270	150-250	120-220	120-220	150-290
	Low alloyed steel and cast steel		600	180-250	180-280	160-250	180-300	180-280	-	160-250	180-320
			900	160-220	170-250	140-230	170-270	170-250	-	140-230	170-290
			1200	140-200	150-220	120-200	150-240	150-220	-	120-200	150-260
	High alloyed steel, high alloyed tool steel and cast steel	annealed	700	140-230	80-160	70-150	80-180	80-160	-	70-150	80-180
		hardened and tempered	1100	110-200	40-130	35-120	40-140	40-130	-	35-120	40-150
	Stainless steel and cast steel	ferritic / martensitic, annealed	700	170-260	60-180	50-160	40-180	40-150	50-160	50-160	40-140
		martensitic, hardened and tempered	1000	110-200	40-140	40-140	40-160	40-130	40-140	40-140	40-120
M	Stainless steel and cast steel	austenitic and austenitic/ferritic	450-600	210-250	80-160	70-150	80-180	80-160	70-150	70-150	
		chilled	600-900	100-170	40-130	35-120	40-140	40-130	35-120	35-120	
K	Cast iron	pearlitic, ferritic	500-700	210-250	180-300	180-300	180-350	180-300	180-300	180-350	
		pearlitic, martensitic	700-850	90-130	160-280	160-280	160-300	160-280	160-280	160-300	
			800-1100	90-130	120-240	120-240	120-270	120-240	120-240	120-270	
	Cast iron with nodular graphite	ferritic	550	210-250	140-230	130-210	140-230	140-230	-	140-230	140-230
		pearlitic	800	90-130	120-170	110-150	120-170	120-170	-	120-170	120-170
	Malleable cast iron	ferritic	450	210-250	150-210	130-200	150-210	150-210	-	150-210	150-210
		pearlitic	750	90-130	150-210	130-200	150-210	150-210	-	150-210	150-210
N	Aluminum alloys, long chipping	not heat treatable	200	-	-	-	-	-	-	-	-
		heat treatable, heat treated	350	-	-	-	-	-	-	-	-
	Casted aluminum alloys	≤ 12% Si, hardened	250	-	-	-	-	-	-	-	-
		≤ 12% Si, heat treatable, heat treated	300	-	-	-	-	-	-	-	-
		≤ 12% Si, not heat treatable	450	-	-	-	-	-	-	-	-
	Copper and copper alloys (brass / bronze)	Lead alloys, Pb > 1%	400	-	200-500	200-400	200-650	200-500	150-500	-	-
		Brass, bronze	300	-	200-500	200-400	200-650	200-500	150-500	-	-
		Aluminum bronze	500	-	160-450	160-400	160-350	160-450	120-400	-	-
		Copper and electrolyte copper	200	-	100-320	100-300	120-220	100-320	120-250	-	-
	Nonferrous materials	Duroplastics		-	160-600	-	160-600	160-600	-	-	-
		Reinforced plastics		-	100-300	-	100-300	100-300	100-300	-	-
		Hard rubber		-	-	-	-	80-250	-	-	-
S	High temperature resistant alloys	Fe-alloyed annealed	700	-	20-60	20-60	20-70	20-60	20-60	20-60	20-70
		Fe-alloyed hardened	950	-	20-60	20-60	20-70	20-60	20-60	20-60	20-70
		Ni- oder Co- based annealed	800	-	15-50	15-50	15-60	15-50	15-50	15-50	15-60
		Ni- oder Co- based casting	1100	-	15-40	15-40	15-50	15-40	15-40	15-40	15-50
		Ni- oder Co- based hardened	1200	-	15-40	15-40	15-50	15-40	15-40	15-40	15-50
	Titanium alloys, high strength	Pure titanium	500-700	-	90-180	90-170	100-210	90-180	-	-	-
	Alpha- and beta-alloys, hardened		700-1000	-	40-80	35-70	40-90	40-80	-	-	-
H	Hardened steel	hardened and tempered	1000-1350	-	30-50	30-50	-	30-50	-	-	-
		hardened and tempered	1350-1700	-	10-25	10-25	-	10-25	-	-	-
	Hard cast iron	casting	1350	-	40-70	40-70	-	40-70	-	-	-
	Hardened cast iron	hardened and tempered	1900	-	10-25	10-25	-	10-25	-	-	-

The datas cutting speeds given are approximate values. It is necessary to adjust them to the individual machining operation.

Recommended Cutting Data (추천절삭 조건)

Turning – High Positive Inserts

coated

ISO	Material		Tensile strength [N/mm²]	Cutting speed Vc [m/min]						
				AL10	AL20	AT10	AT20	PVD1	PVD2	AD2
P	Unalloyed steel and cast steel	ca. 0,15% C	350	220-320	180-280	220-320	180-280	200-290	160-250	-
		ca. 0,45% C	650	180-290	160-250	180-290	160-250	160-260	140-220	-
		ca. 0,75% C	1000	150-250	120-220	150-250	120-220	130-230	110-180	-
	Low alloyed steel and cast steel		600	180-280	160-250	180-280	160-250	160-250	140-220	-
			900	170-250	140-230	170-250	140-230	150-230	130-200	-
			1200	150-220	120-200	150-220	120-200	130-200	110-190	-
	High alloyed steel, high alloyed tool steel and cast steel	annealed	700	-	-	-	-	-	-	-
		hardened and tempered	1100	-	-	-	-	-	-	-
	Stainless steel and cast steel	ferritic / martensitic, annealed	700	170-290	160-280	170-290	160-280	150-260	130-220	-
		martensitic, hardened and tempered	1000	140-280	130-280	140-280	130-280	120-250	110-200	-
M	Stainless steel and cast steel	austenitic and austenitic/ferritic	450-600	140-280	140-240	140-280	140-240	120-250	120-200	-
		chilled	600-900	-	-	-	-	-	-	-
K	Cast iron	pearlitic, ferritic	500-700	180-300	160-270	180-300	160-270	160-270	-	-
		pearlitic, martensitic	700-850	160-280	140-250	160-280	140-250	140-250	-	-
			800-1100	120-240	110-220	120-240	110-220	110-220	-	-
	Cast iron with nodular graphite	ferritic	550	140-230	130-210	140-230	130-210	120-210	-	-
		pearlitic	800	120-170	110-150	120-170	110-150	110-150	-	-
	Malleable cast iron	ferritic	450	150-210	130-200	150-210	130-200	130-180	-	-
		pearlitic	750	150-210	130-200	150-210	130-200	130-180	-	-
N	Aluminum alloys, long chipping	not heat treatable	200	-	-	850-1300	850-1300	750-1200	750-1200	650-2000
		heat treatable, heat treated	350	-	-	400-900	400-900	350-800	350-800	300-2000
	Casted aluminum alloys	≤ 12% Si, hardened	250	-	-	260-800	260-800	230-700	230-700	650-2000
		≤ 12% Si, heat treatable, heat treated	300	-	-	200-550	200-550	180-500	180-500	300-2000
		≤ 12% Si, not heat treatable	450	-	-	200-500	200-500	180-450	180-450	200-2000
	Copper and copper alloys (brass / bronze)	Lead alloys, Pb > 1%	400	-	-	-	-	-	-	250-800
		Brass, bronze	300	-	-	-	-	-	-	250-800
		Aluminum bronze	500	-	-	-	-	-	-	250-800
		Copper and electrolyte copper	200	-	-	-	-	-	-	130-400
	Nonferrous materials	Duroplastics		-	-	-	-	-	-	-
		Reinforced plastics		-	-	-	-	-	-	-
		Hard rubber		-	-	-	-	-	-	-
S	High temperature resistant alloys	Fe-alloyed annealed	700	20-50	20-50	20-50	20-50	15-45	15-45	-
		Fe-alloyed hardened	950	20-50	20-50	20-50	20-50	15-45	15-45	-
		Ni- oder Co- based annealed	800	15-40	15-40	15-40	15-40	10-35	10-35	-
		Ni- oder Co- based casting	1100	15-30	15-30	15-30	15-30	10-25	10-25	-
		Ni- oder Co- based hardened	1200	15-30	15-30	15-30	15-30	10-25	10-25	-
	Titanium alloys, high strength	Pure titanium	500-700	-	-	-	-	-	-	-
	Alpha- and beta-alloys, hardened		700-1000	-	-	-	-	-	-	-
H	Hardened steel	hardened and tempered	1000-1350	-	-	-	-	-	-	-
		hardened and tempered	1350-1700	-	-	-	-	-	-	-
	Hard cast iron	casting	1350	-	-	-	-	-	-	-
	Hardened cast iron	hardened and tempered	1900	-	-	-	-	-	-	-

The datas cutting speeds given are approximate values. It is necessary to adjust them to the individual machining operation.



# Recommended Cutting Data (추천절삭 조건)

## Turning – Carbide and High Positive Inserts

uncoated

ISO	Material		Tensile strength [N/mm <sup>2</sup> ]	Cutting speed Vc [m/min]			
				AK1010	AK1020	AK10	AK20
P	Unalloyed steel and cast steel	ca. 0,15% C	350	-	-	-	-
		ca. 0,45% C	650	-	-	-	-
		ca. 0,75% C	1000	-	-	-	-
	Low alloyed steel and cast steel		600	-	-	-	-
			900	-	-	-	-
			1200	-	-	-	-
	High alloyed steel, high alloyed tool steel and cast steel	annealed	700	-	-	-	-
		hardened and tempered	1100	-	-	-	-
	Stainless steel and cast steel	ferritic / martensitic, annealed	700	-	-	-	-
		martensitic, hardened and tempered	1000	-	-	-	-
M	Stainless steel and cast steel	austenitic and austenitic/ferritic	450 - 600	-	-	-	-
		chilled	600 - 900	-	-	-	-
K	Cast iron	pearlitic, ferritic	500 - 700	120 - 160	120 - 160	120 - 160	120 - 160
		pearlitic, martensitic	700 - 850	90 - 140	90 - 140	90 - 140	90 - 140
			800 - 1100	80 - 140	80 - 140	80 - 140	80 - 140
	Cast iron with nodular graphite	ferritic	550	130 - 170	130 - 170	130 - 170	130 - 170
		pearlitic	800	90 - 130	90 - 130	90 - 130	90 - 130
	Malleable cast iron	ferritic	450	140 - 200	140 - 200	140 - 200	140 - 200
		pearlitic	750	120 - 160	120 - 160	120 - 160	120 - 160
N	Aluminum alloys, long chipping	not heat treatable	200	300 - 2500	300 - 2500	300 - 2500	300 - 2500
		heat treatable, heat treated	350	200 - 2000	200 - 2000	200 - 2000	200 - 2000
	Casted aluminum alloys	≤ 12% Si, hardened	250	400 - 1500	400 - 1500	400 - 1500	400 - 1500
		≤ 12% Si, heat treatable, heat treated	300	400 - 1500	400 - 1500	400 - 1500	400 - 1500
		≤ 12% Si, not heat treatable	450	200 - 800	200 - 800	200 - 800	200 - 800
	Copper and copper alloys (brass / bronze)	Lead alloys, Pb > 1%	400	250 - 600	250 - 600	250 - 600	250 - 600
		Brass, bronze	300	200 - 600	200 - 600	200 - 600	200 - 600
		Aluminum bronze	500	150 - 400	150 - 400	150 - 400	150 - 400
		Copper and electrolyte copper	200	150 - 300	150 - 300	150 - 300	150 - 300
	Nonferrous materials	Duroplastics		80 - 180	80 - 180	80 - 180	80 - 180
		Reinforced plastics		60 - 150	60 - 150	60 - 150	60 - 150
		Hard rubber		100 - 250	100 - 250	100 - 250	100 - 250
S	High temperature resistant alloys	Fe-alloyed annealed	700	15 - 40	-	15 - 40	-
		Fe-alloyed hardened	950	8 - 28	-	8 - 28	-
		Ni- oder Co- based annealed	800	10 - 30	-	10 - 30	-
		Ni- oder Co- based casting	1100	8 - 25	-	8 - 25	-
		Ni- oder Co- based hardened	1200	8 - 25	-	8 - 25	-
	Titanium alloys, high strength	Pure titanium	500 - 700	60 - 120	60 - 120	60 - 120	-
	Alpha- and beta-alloys, hardened		700 - 1000	30 - 80	30 - 80	30 - 80	30 - 80
H	Hardened steel	hardened and tempered	1000 - 1350	-	-	-	-
		hardened and tempered	1350 - 1700	-	-	-	-
	Hard cast iron	casting	1350	-	-	-	-
	Hardened cast iron	hardened and tempered	1900	-	-	-	-

The datas cutting speeds given are approximate values. It is necessary to adjust them to the individual machining operation.

# SA Grooving and Parting system

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

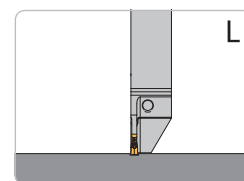
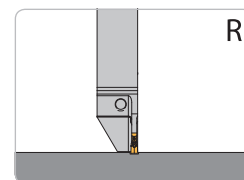
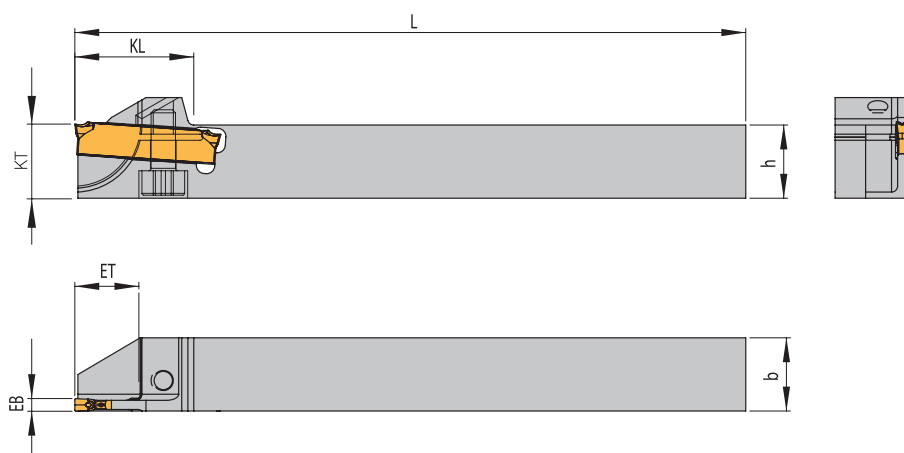
6. Whiz Cut

7. SPHINX



## Monoblock holders

### HSA-U



Right-hand execution shown

For sliding head auto lathes (with clamping from below)

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	KL	KT	Insert
HSA 1212U-L-SA24015-20	1,5	10,0	20	–	12	12	110	19,5	12	SA 24-15...
HSA 1212U-R-SA24015-20	1,5	10,0	20	–	12	12	110	19,5	12	SA 24-15...
HSA 1212U-R-SA2402-06	2,0	3,0	6	–	12	12	110	19,5	12	SA 24-20...
HSA 1212U-L-SA2402-12	2,0	6,0	12	–	12	12	110	19,5	12	SA 24-20...
HSA 1212U-R-SA2402-12	2,0	6,0	12	–	12	12	110	19,5	12	SA 24-20...
HSA 1212U-L-SA2402-20	2,0	10,0	20	–	12	12	110	19,5	12	SA 24-20...
HSA 1212U-R-SA2402-20	2,0	10,0	20	–	12	12	110	19,5	12	SA 24-20...
HSA 1616U-L-SA2402-32	2,0	16,0	32	–	16	16	110	25,5	16	SA 24-20...
HSA 1616U-R-SA2402-32	2,0	16,0	32	–	16	16	110	25,5	16	SA 24-20...

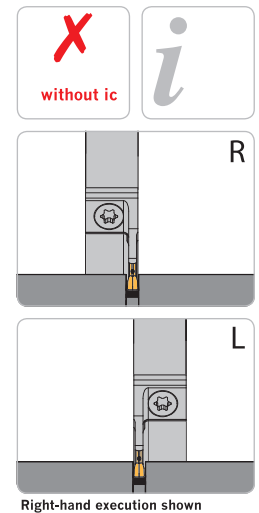
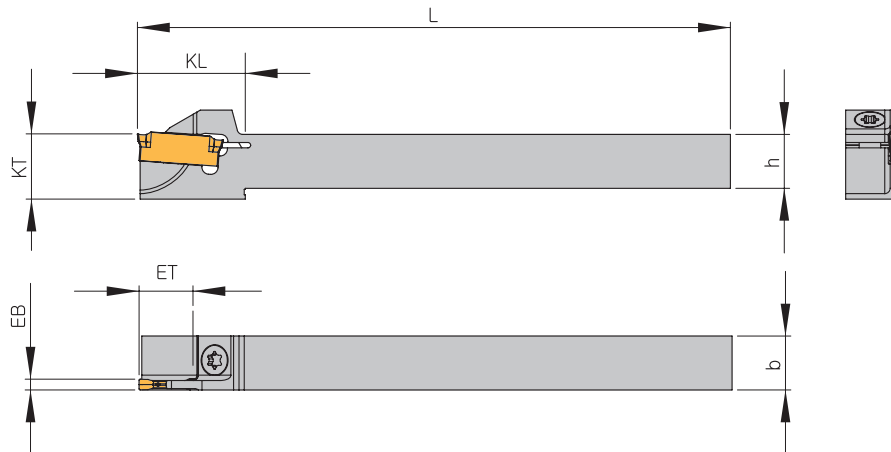
D<sub>max</sub> = Maximum diameter in solid

### Spare parts

Holder	Screw	Key
HSA 0808... – HSA 2020...	AS0022	KS8000

## Monoblock holders

### HSA



## For sliding head auto lathes

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	KL	KT	Insert
HSA 0808L-SA24015-12	1,5	6,0	12	—	8	8	110	16	10	SA 24-15...
HSA 0808R-SA24015-12	1,5	6,0	12	—	8	8	110	16	10	SA 24-15...
HSA 0808L-SA24015-16	1,5	8,0	16	—	8	8	110	18	10	SA 24-15...
HSA 0808R-SA24015-16	1,5	8,0	16	—	8	8	110	18	10	SA 24-15...
HSA 1010L-SA1602-20	2,0	10,0	20	—	10	10	110	20	12	SA 16-20...
HSA 1010R-SA1602-20	2,0	10,0	20	—	10	10	110	20	12	SA 16-20...
HSA 1010L-SA24015-20	1,5	10,0	20	—	10	10	110	20	12	SA 24-15...
HSA 1010R-SA24015-20	1,5	10,0	20	—	10	10	110	20	12	SA 24-15...
HSA 1010L-SA2402-20	2,0	10,0	20	—	10	10	110	20	12	SA 24-20...
HSA 1010R-SA2402-20	2,0	10,0	20	—	10	10	110	20	12	SA 24-20...
HSA 1212L-SA1602-20	2,0	10,0	20	—	12	12	110	—	—	SA 16-20...
HSA 1212R-SA1602-20	2,0	10,0	20	—	12	12	110	—	—	SA 16-20...
HSA 1212L-SA1603-26	3,0	13,0	26	—	12	12	110	—	—	SA 16-30...
HSA 1212R-SA1603-26	3,0	13,0	26	—	12	12	110	—	—	SA 16-30...
HSA 1212L-SA24015-20	1,5	10,0	20	—	12	12	110	—	—	SA 24-15...
HSA 1212R-SA24015-20	1,5	10,0	20	—	12	12	110	—	—	SA 24-15...
HSA 1212L-SA24015-32	1,5	16,0	32	—	12	12	110	26	16	SA 24-15...
HSA 1212R-SA24015-32	1,5	16,0	32	—	12	12	110	26	16	SA 24-15...
HSA 1212L-SA2402-20	2,0	10,0	20	—	12	12	110	—	—	SA 24-20...
HSA 1212R-SA2402-20	2,0	10,0	20	—	12	12	110	—	—	SA 24-20...
HSA 1212L-SA2402-26	2,0	13,0	26	—	12	12	110	—	—	SA 24-20...
HSA 1212R-SA2402-26	2,0	13,0	26	—	12	12	110	—	—	SA 24-20...
HSA 1212L-SA2402-32	2,0	16,0	32	—	12	12	110	26	16	SA 24-20...
HSA 1212R-SA2402-32	2,0	16,0	32	—	12	12	110	26	16	SA 24-20...
HSA 1616L-SA1602-20	2,0	10,0	20	—	16	16	110	—	—	SA 16-20...
HSA 1616R-SA1602-20	2,0	10,0	20	—	16	16	110	—	—	SA 16-20...
HSA 1616L-SA1602-26	2,0	13,0	26	—	16	16	110	—	—	SA 16-20...
HSA 1616R-SA1602-26	2,0	13,0	26	—	16	16	110	—	—	SA 16-20...
HSA 1616L-SA1603-26	3,0	13,0	26	—	16	16	110	—	—	SA 16-30...
HSA 1616R-SA1603-26	3,0	13,0	26	—	16	16	110	—	—	SA 16-30...
HSA 1616L-SA24015-32	1,5	16,0	32	—	16	16	110	—	—	SA 24-15...
HSA 1616R-SA24015-32	1,5	16,0	32	—	16	16	110	—	—	SA 24-15...
HSA 1616L-SA2402-26	2,0	13,0	26	—	16	16	110	—	—	SA 24-20...
HSA 1616R-SA2402-26	2,0	13,0	26	—	16	16	110	—	—	SA 24-20...
HSA 1616L-SA2402-32	2,0	16,0	32	—	16	16	110	—	—	SA 24-20...
HSA 1616R-SA2402-32	2,0	16,0	32	—	16	16	110	—	—	SA 24-20...
HSA 1616L-SA24025-32	2,5	16,0	32	—	16	16	110	—	—	SA 24-25...
HSA 1616R-SA24025-32	2,5	16,0	32	—	16	16	110	—	—	SA 24-25...

# Monoblock holders

## For sliding head auto lathes

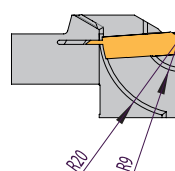
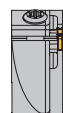
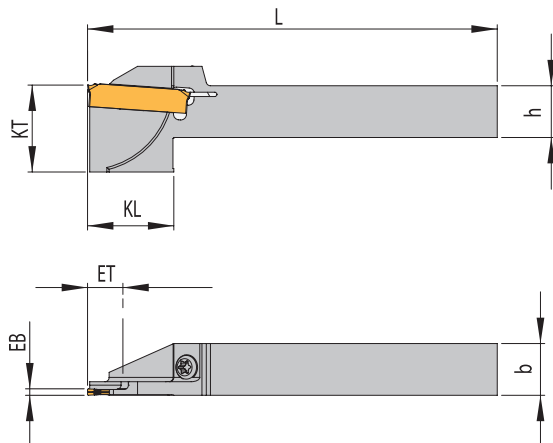
Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	KL	KT	Insert
HSA 1616L-SA2403-20	3,0	10,0	20	–	16	16	110	–	–	SA 24-30...
HSA 1616R-SA2403-20	3,0	10,0	20	–	16	16	110	–	–	SA 24-30...
HSA 1616L-SA2403-26	3,0	13,0	26	–	16	16	110	–	–	SA 24-30...
HSA 1616R-SA2403-26	3,0	13,0	26	–	16	16	110	–	–	SA 24-30...
HSA 1616L-SA2403-32	3,0	16,0	32	–	16	16	110	–	–	SA 24-30...
HSA 1616R-SA2403-32	3,0	16,0	32	–	16	16	110	–	–	SA 24-30...
HSA 2020L-SA2402-20	2,0	10,0	20	–	20	20	110	–	–	SA 24-20...
HSA 2020R-SA2402-20	2,0	10,0	20	–	20	20	110	–	–	SA 24-20...
HSA 2020L-SA2402-32	2,0	16,0	32	–	20	20	110	25,5	20	SA 24-20...
HSA 2020R-SA2402-32	2,0	16,0	32	–	20	20	110	25,5	20	SA 24-20...
HSA 2020L-SA2403-32	3,0	16,0	32	–	20	20	110	–	–	SA 24-30...
HSA 2020R-SA2403-32	3,0	16,0	32	–	20	20	110	–	–	SA 24-30...

D<sub>max</sub> = Maximum diameter in solid

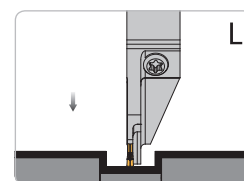
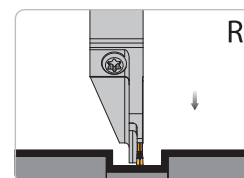
## Spare parts

Holder	Screw	Key
HSA 0808... – HSA 2020...	AS0022	KS8000

## HSA



without ic



Right-hand execution shown

## For Traub TNL12

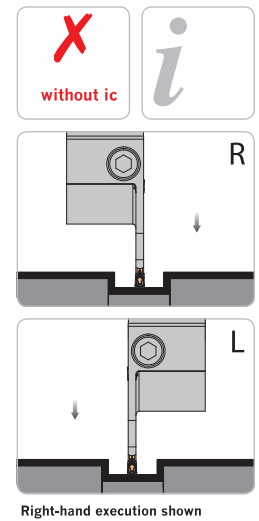
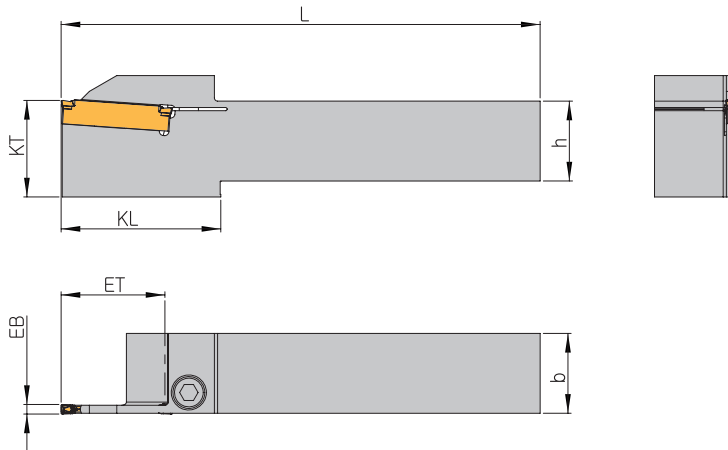
Designation	EB	ET	D <sub>max</sub>	h	b	L	KL	KT	Insert
HSA 1212R-SA24015-S1-16	1,5	8,0	16	12	12	95	20	12	SA 24-15...

## Spare parts

Holder	Screw	Key
HSA 1212... – HSA 24015...	AS0022	KS8000

## Monoblock holders

### HSA



## Monoblock holder

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	KL	KT	Insert
HSA 1616L-SA24015-44	1,5	22,0	44	61	16	16	125	40	20	SA 24-15...
HSA 1616R-SA24015-44	1,5	22,0	44	61	16	16	125	40	20	SA 24-15...
HSA 1616L-SA2402-44	2,0	22,0	44	61	16	16	125	40	20	SA 24-20...
HSA 1616R-SA2402-44	2,0	22,0	44	61	16	16	125	40	20	SA 24-20...
HSA 1616L-SA2403-44	3,0	22,0	44	61	16	16	125	40	20	SA 24-30...
HSA 1616R-SA2403-44	3,0	22,0	44	61	16	16	125	40	20	SA 24-30...
HSA 2020L-SA24015-44	1,5	22,0	44	61	20	20	125	-	-	SA 24-15...
HSA 2020R-SA24015-44	1,5	22,0	44	61	20	20	125	-	-	SA 24-15...
HSA 2020L-SA2402-44	2,0	22,0	44	61	20	20	125	-	-	SA 24-20...
HSA 2020R-SA2402-44	2,0	22,0	44	61	20	20	125	-	-	SA 24-20...
HSA 2020L-SA24025-44	2,5	22,0	44	61	20	20	125	-	-	SA 24-25...
HSA 2020R-SA24025-44	2,5	22,0	44	61	20	20	125	-	-	SA 24-25...
HSA 2020L-SA2403-44	3,0	22,0	44	61	20	20	125	-	-	SA 24-30...
HSA 2020R-SA2403-44	3,0	22,0	44	61	20	20	125	-	-	SA 24-30...
HSA 2020L-SA2404-44	4,0	22,0	44	61	20	20	125	-	-	SA 24-40...
HSA 2020R-SA2404-44	4,0	22,0	44	61	20	20	125	-	-	SA 24-40...
HSA 2020L-SA3502-52	2,0	26,0	52	68	20	20	150	44	30	SA 35-20...
HSA 2020R-SA3502-52	2,0	26,0	52	68	20	20	150	44	30	SA 35-20...
HSA 2020L-SA3502-65	2,0	32,5	65	80	20	20	150	50	30	SA 35-20...
HSA 2020R-SA3502-65	2,0	32,5	65	80	20	20	150	50	30	SA 35-20...
HSA 2020L-SA3503-52	3,0	26,0	52	68	20	20	150	44	30	SA 35-30...
HSA 2020R-SA3503-52	3,0	26,0	52	68	20	20	150	44	30	SA 35-30...
HSA 2020L-SA3503-65	3,0	32,5	65	80	20	20	150	50	30	SA 35-30...
HSA 2020R-SA3503-65	3,0	32,5	65	80	20	20	150	50	30	SA 35-30...
HSA 2020L-SA3504-52	4,0	26,0	52	68	20	20	150	44	30	SA 35-40...
HSA 2020R-SA3504-52	4,0	26,0	52	68	20	20	150	44	30	SA 35-40...
HSA 2020L-SA3504-65	4,0	32,5	65	80	20	20	150	50	30	SA 35-40...
HSA 2020R-SA3504-65	4,0	32,5	65	80	20	20	150	50	30	SA 35-40...
HSA 2020L-SA3506-65	6,0	32,5	65	80	20	20	150	50	30	SA 35-60...
HSA 2020R-SA3506-65	6,0	32,5	65	80	20	20	150	50	30	SA 35-60...
HSA 2525L-SA2402-44	2,0	22,0	44	61	25	25	150	-	-	SA 24-20...
HSA 2525R-SA2402-44	2,0	22,0	44	61	25	25	150	-	-	SA 24-20...
HSA 2525L-SA2403-44	3,0	22,0	44	61	25	25	150	-	-	SA 24-30...
HSA 2525R-SA2403-44	3,0	22,0	44	61	25	25	150	-	-	SA 24-30...
HSA 2525L-SA2404-44	4,0	22,0	44	61	25	25	150	-	-	SA 24-40...
HSA 2525R-SA2404-44	4,0	22,0	44	61	25	25	150	-	-	SA 24-40...
HSA 2525L-SA3502-52	2,0	26,0	52	68	25	25	150	44	30	SA 35-20...
HSA 2525R-SA3502-52	2,0	26,0	52	68	25	25	150	44	30	SA 35-20...

# Monoblock holders

## Monoblock holder

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	KL	KT	Insert
HSA 2525L-SA3502-65	2,0	32,5	65	80	25	25	150	50	30	SA 35-20...
HSA 2525R-SA3502-65	2,0	32,5	65	80	25	25	150	50	30	SA 35-20...
HSA 2525L-SA3503-52	3,0	26,0	52	68	25	25	150	44	30	SA 35-30...
HSA 2525R-SA3503-52	3,0	26,0	52	68	25	25	150	44	30	SA 35-30...
HSA 2525L-SA3503-65	3,0	32,5	65	80	25	25	150	50	30	SA 35-30...
HSA 2525R-SA3503-65	3,0	32,5	65	80	25	25	150	50	30	SA 35-30...
HSA 2525L-SA3504-52	4,0	26,0	52	68	25	25	150	44	30	SA 35-40...
HSA 2525R-SA3504-52	4,0	26,0	52	68	25	25	150	44	30	SA 35-40...
HSA 2525L-SA3504-65	4,0	32,5	65	80	25	25	150	50	30	SA 35-40...
HSA 2525R-SA3504-65	4,0	32,5	65	80	25	25	150	50	30	SA 35-40...
HSA 2525L-SA3506-65	6,0	32,5	65	80	25	25	150	50	30	SA 35-60...
HSA 2525R-SA3506-65	6,0	32,5	65	80	25	25	150	50	30	SA 35-60...
HSA 2525R-SA3508-65	8,0	32,5	65	80	25	25	170	50	30	SA 35-80...
HSA 2525L-SA3508-65	8,0	32,5	65	80	25	25	170	50	30	SA 35-80...
HSA 3225L-SA2403-44	3,0	22,0	44	61	32	25	170	–	–	SA 24-30...
HSA 3225R-SA2403-44	3,0	22,0	44	61	32	25	170	–	–	SA 24-30...
HSA 3225L-SA2404-44	4,0	22,0	44	61	32	25	170	–	–	SA 24-40...
HSA 3225R-SA2404-44	4,0	22,0	44	61	32	25	170	–	–	SA 24-40...
HSA 3225L-SA3503-65	3,0	32,5	65	80	32	25	170	50	32	SA 35-30...
HSA 3225R-SA3503-65	3,0	32,5	65	80	32	25	170	50	32	SA 35-30...
HSA 3225L-SA3504-65	4,0	32,5	65	80	32	25	170	–	–	SA 35-40...
HSA 3225R-SA3504-65	4,0	32,5	65	80	32	25	170	–	–	SA 35-40...
HSA 3232L-SA3506-65	6,0	32,5	65	80	32	32	170	–	–	SA 35-60...
HSA 3232L-SA3508-65	8,0	32,5	65	80	32	32	170	–	–	SA 35-80...
HSA 3232L-SA4010-75	10,0	37,5	75	90	32	32	170	–	–	SA 40-100...
HSA 3232R-SA3506-65	6,0	32,5	65	80	32	32	170	–	–	SA 35-60...
HSA 3232R-SA3508-65	8,0	32,5	65	80	32	32	170	–	–	SA 35-80...
HSA 3232R-SA4010-75	10,0	37,5	75	90	32	32	170	–	–	SA 40-100...

D<sub>max</sub> = Maximum diameter in solid

D<sub>R</sub> = Maximum diameter for tube material

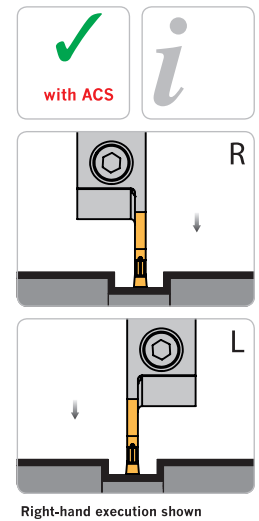
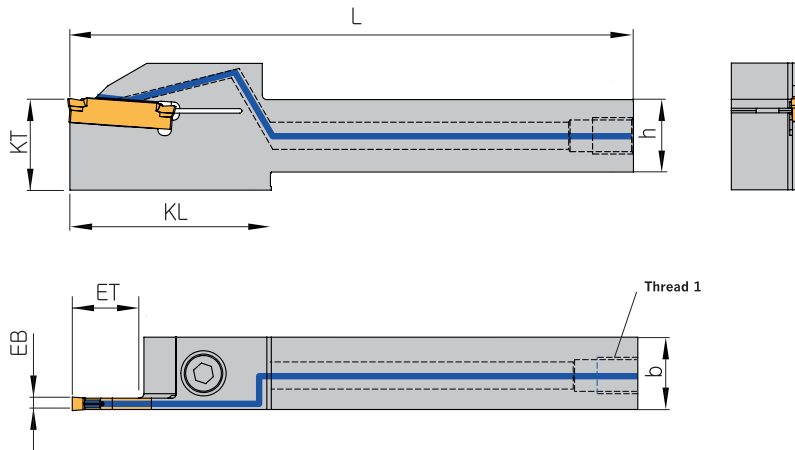
## Spare parts

Holder	Screw
HSA 1616... – HSA 3225...-SA24... D <sub>min</sub> 44	DIN 912 – M5x16 –12.9
HSA 12020... – HSA 3225...-SA35... D <sub>min</sub> 52/65	DIN 912 – M6x20 –12.9



## Monoblock holders

### HSA-ACS1-H



## Monoblock holder with through tool coolant access from the back

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	L <sub>4</sub>	KL	KT	Thread 1	Thread 2	Insert
HSA 1616L-SA2403-32-ACS1-H1	3,0	16,0	32,0	—	16	16	110	—	—	—	M8x1	—	SA 24-30...
HSA 1616R-SA2403-32-ACS1-H1	3,0	16,0	32,0	—	16	16	110	—	—	—	M8x1	—	SA 24-30...
HSA 1616L-SA2403-44-ACS1-H1	3,0	22,0	44,0	61	16	16	125	—	40	20	M8x1	—	SA 24-30...
HSA 1616R-SA2403-44-ACS1-H1	3,0	22,0	44,0	61	16	16	125	—	40	20	M8x1	—	SA 24-30...
HSA 2020L-SA2403-32-ACS1-H1	3,0	22,0	32,0	—	20	20	125	—	—	—	M8x1	—	SA 24-30...
HSA 2020R-SA2403-32-ACS1-H1	3,0	22,0	32,0	—	20	20	125	—	—	—	M8x1	—	SA 24-30...
HSA 2020L-SA2403-44-ACS1-H1	3,0	22,0	44,0	61	20	20	125	—	—	—	M8x1	—	SA 24-30...
HSA 2020R-SA2403-44-ACS1-H1	3,0	22,0	44,0	61	20	20	125	—	—	—	M8x1	—	SA 24-30...
HSA 2525L-SA2403-44-ACS1-H1	3,0	22,0	44,0	61	25	25	150	—	—	—	M8x1	—	SA 24-30...
HSA 2525R-SA2403-44-ACS1-H1	3,0	22,0	44,0	61	25	25	150	—	—	—	M8x1	—	SA 24-30...
HSA 2020L-SA3503-52-ACS1-H1	3,0	26,0	52,0	68	20	20	150	—	44	44	M8x1	—	SA 35-30...
HSA 2020R-SA3503-52-ACS1-H1	3,0	26,0	52,0	68	20	20	150	—	44	44	M8x1	—	SA 35-30...
HSA 2020L-SA3503-65-ACS1-H1	3,0	32,5	65,0	80	20	20	150	—	50	50	M8x1	—	SA 35-30...
HSA 2020R-SA3503-65-ACS1-H1	3,0	32,5	65,0	80	20	20	150	—	50	50	M8x1	—	SA 35-30...
HSA 2525L-SA3503-52-ACS1-H1	3,0	26,0	52,0	68	25	25	150	—	44	44	M8x1	—	SA 35-30...
HSA 2525R-SA3503-52-ACS1-H1	3,0	26,0	52,0	68	25	25	150	—	44	44	M8x1	—	SA 35-30...
HSA 2525L-SA3503-65-ACS1-H1	3,0	32,5	65,0	80	25	25	150	—	50	50	M8x1	—	SA 35-30...
HSA 2525R-SA3503-65-ACS1-H1	3,0	32,5	65,0	80	25	25	150	—	50	50	M8x1	—	SA 35-30...
HSA 1616L-SA2403-32-ACS1-H2	3,0	16,0	32	—	16	16	110	—	—	—	G 1/8"	—	SA 24-30...
HSA 1616R-SA2403-32-ACS1-H2	3,0	16,0	32	—	16	16	110	—	—	—	G 1/8"	—	SA 24-30...
HSA 1616L-SA2403-44-ACS1-H2	3,0	22,0	44	61	16	16	125	—	40	20	G 1/8"	—	SA 24-30...
HSA 1616R-SA2403-44-ACS1-H2	3,0	22,0	44	61	16	16	125	—	40	20	G 1/8"	—	SA 24-30...
HSA 2020L-SA2403-32-ACS1-H2	3,0	22,0	32	—	20	20	125	—	—	—	G 1/8"	—	SA 24-30...
HSA 2020R-SA2403-32-ACS1-H2	3,0	22,0	32	—	20	20	125	—	—	—	G 1/8"	—	SA 24-30...
HSA 2020L-SA2403-44-ACS1-H2	3,0	22,0	44	61	20	20	125	—	—	—	G 1/8"	—	SA 24-30...
HSA 2020R-SA2403-44-ACS1-H2	3,0	22,0	44	61	20	20	125	—	—	—	G 1/8"	—	SA 24-30...
HSA 2525L-SA2403-44-ACS1-H2	3,0	22,0	44	61	25	25	150	—	—	—	G 1/8"	—	SA 24-30...
HSA 2525R-SA2403-44-ACS1-H2	3,0	22,0	44	61	25	25	150	—	—	—	G 1/8"	—	SA 24-30...
HSA 2020L-SA3503-52-ACS1-H2	3,0	26,0	52	68	20	20	150	—	44	30	G 1/8"	—	SA 35-30...
HSA 2020R-SA3503-52-ACS1-H2	3,0	26,0	52	68	20	20	150	—	44	30	G 1/8"	—	SA 35-30...
HSA 2020L-SA3503-65-ACS1-H2	3,0	33,0	65	80	20	20	150	—	50	30	G 1/8"	—	SA 35-30...
HSA 2020R-SA3503-65-ACS1-H2	3,0	33,0	65	80	20	20	150	—	50	30	G 1/8"	—	SA 35-30...
HSA 2525L-SA3503-52-ACS1-H2	3,0	26,0	52	68	25	25	150	—	44	30	G 1/8"	—	SA 35-30...

## Monoblock holders

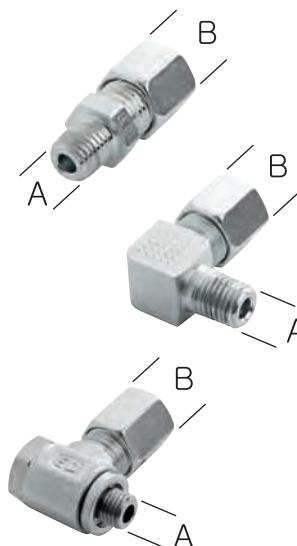
### Monoblock holder with through tool coolant access from the back

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	L <sub>4</sub>	KL	KT	Thread 1	Thread 2	Insert
HSA 2525R-SA3503-52-ACS1-H2	3,0	26,0	52	68	25	25	150	–	44	30	G 1/8"	–	SA 35-30...
HSA 2525L-SA3503-65-ACS1-H2	3,0	33,0	65	80	25	25	150	–	50	30	G 1/8"	–	SA 35-30...
HSA 2525R-SA3503-65-ACS1-H2	3,0	33,0	65	80	25	25	150	–	50	30	G 1/8"	–	SA 35-30...
HSA 1616L-SA2403-32-ACS1-H3	3,0	16,0	32	–	16	16	110	–	–	–	G 1/4"	–	SA 24-30...
HSA 1616R-SA2403-32-ACS1-H3	3,0	16,0	32	–	16	16	110	–	–	–	G 1/4"	–	SA 24-30...
HSA 1616L-SA2403-44-ACS1-H3	3,0	22,0	44	61	16	16	125	–	40	20	G 1/4"	–	SA 24-30...
HSA 1616R-SA2403-44-ACS1-H3	3,0	22,0	44	61	16	16	125	–	40	20	G 1/4"	–	SA 24-30...
HSA 2020L-SA2403-32-ACS1-H3	3,0	22,0	32	–	20	20	125	–	–	–	G 1/4"	–	SA 24-30...
HSA 2020R-SA2403-32-ACS1-H3	3,0	22,0	32	–	20	20	125	–	–	–	G 1/4"	–	SA 24-30...
HSA 2020L-SA2403-44-ACS1-H3	3,0	22,0	44	61	20	20	125	–	–	–	G 1/4"	–	SA 24-30...
HSA 2020R-SA2403-44-ACS1-H3	3,0	22,0	44	61	20	20	125	–	–	–	G 1/4"	–	SA 24-30...
HSA 2525L-SA2403-44-ACS1-H3	3,0	22,0	44	61	25	25	150	–	–	–	G 1/4"	–	SA 24-30...
HSA 2525R-SA2403-44-ACS1-H3	3,0	22,0	44	61	25	25	150	–	–	–	G 1/4"	–	SA 24-30...
HSA 2020L-SA3503-52-ACS1-H3	3,0	26,0	52	68	20	20	150	–	44	30	G 1/4"	–	SA 35-30...
HSA 2020R-SA3503-52-ACS1-H3	3,0	26,0	52	68	20	20	150	–	44	30	G 1/4"	–	SA 35-30...
HSA 2020L-SA3503-65-ACS1-H3	3,0	33,0	65	80	20	20	150	–	50	30	G 1/4"	–	SA 35-30...
HSA 2020R-SA3503-65-ACS1-H3	3,0	33,0	65	80	20	20	150	–	50	30	G 1/4"	–	SA 35-30...
HSA 2525L-SA3503-52-ACS1-H3	3,0	26,0	52	68	25	25	150	–	44	30	G 1/4"	–	SA 35-30...
HSA 2525R-SA3503-52-ACS1-H3	3,0	26,0	52	68	25	25	150	–	44	30	G 1/4"	–	SA 35-30...
HSA 2525L-SA3503-65-ACS1-H3	3,0	33,0	65	80	25	25	150	–	50	30	G 1/4"	–	SA 35-30...
HSA 2525R-SA3503-65-ACS1-H3	3,0	33,0	65	80	25	25	150	–	50	30	G 1/4"	–	SA 35-30...

Remark: Accessories must be ordered separately.

## Accessories

Designation	A	B
KA 001	M8 x 1	Ø 6 mm
KA 002	1/8"	Ø 6 mm
KA 003	1/4"	Ø 10 mm
KA 004	M8 x 1	Ø 6 mm
KA 005	1/8"	Ø 6 mm
KA 006	M8 x 1	Ø 6 mm
KA 007	1/8"	Ø 6 mm
KA 008	1/4"	Ø 10 mm



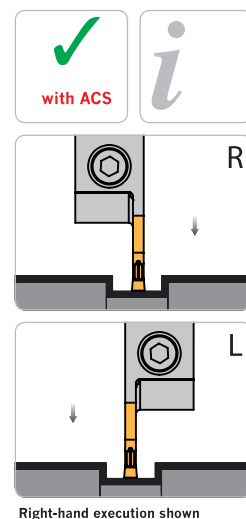
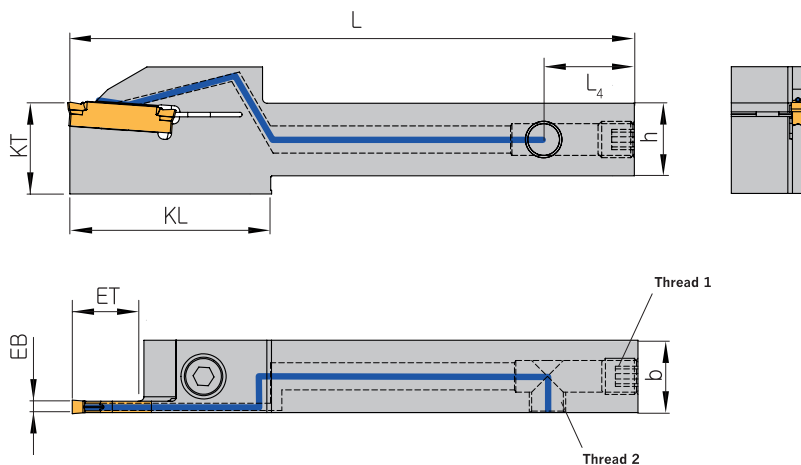
## Spare parts

Holder	Screw	Key
HSA 1616... - HSA 2020...-SA24...-32-ACS1...	AS0022	KS8000
HSA 1616... - HSA 2525...-SA24...-44-ACS1...	DIN912-M5x16-12.9	Inbus 4 mm
HSA 2020... - HSA 2525...-SA35...-52-ACS1...	DIN912-M6x20-12.9	Inbus 5 mm
HSA 2020... - HSA 2525...-SA35...-65-ACS1...	DIN912-M6x20-12.9	Inbus 5 mm

\* Allen key

## Monoblock holders

### HSA-ACS1-S



## Monoblock holder with through tool coolant access from the side

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	L <sub>4</sub>	KL	KT	Thread 1	Thread 2	Insert
HSA 1616L-SA2403-32-ACS1-S1	3,0	16,0	32	—	16	16	110	20	—	—	M8x1	M8x1	SA 24-30...
HSA 1616R-SA2403-32-ACS1-S1	3,0	16,0	32	—	16	16	110	20	—	—	M8x1	M8x1	SA 24-30...
HSA 1616L-SA2403-44-ACS1-S1	3,0	22,0	44	61	16	16	125	20	40	20	M8x1	M8x1	SA 24-30...
HSA 1616R-SA2403-44-ACS1-S1	3,0	22,0	44	61	16	16	125	20	40	20	M8x1	M8x1	SA 24-30...
HSA 2020L-SA2403-32-ACS1-S1	3,0	22,0	32	—	20	20	125	20	—	—	M8x1	M8x1	SA 24-30...
HSA 2020R-SA2403-32-ACS1-S1	3,0	22,0	32	—	20	20	125	20	—	—	M8x1	M8x1	SA 24-30...
HSA 2020L-SA2403-44-ACS1-S1	3,0	22,0	44	61	20	20	125	20	—	—	M8x1	M8x1	SA 24-30...
HSA 2020R-SA2403-44-ACS1-S1	3,0	22,0	44	61	20	20	125	20	—	—	M8x1	M8x1	SA 24-30...
HSA 2525L-SA2403-44-ACS1-S1	3,0	22,0	44	61	25	25	150	20	—	—	M8x1	M8x1	SA 24-30...
HSA 2525R-SA2403-44-ACS1-S1	3,0	22,0	44	61	25	25	150	20	—	—	M8x1	M8x1	SA 24-30...
HSA 2020L-SA3503-52-ACS1-S1	3,0	26,0	52	68	20	20	150	20	44	30	M8x1	M8x1	SA 35-30...
HSA 2020R-SA3503-52-ACS1-S1	3,0	26,0	52	68	20	20	150	20	44	30	M8x1	M8x1	SA 35-30...
HSA 2020L-SA3503-65-ACS1-S1	3,0	33,0	65	80	20	20	150	20	50	30	M8x1	M8x1	SA 35-30...
HSA 2020R-SA3503-65-ACS1-S1	3,0	33,0	65	80	20	20	150	20	50	30	M8x1	M8x1	SA 35-30...
HSA 2525L-SA3503-52-ACS1-S1	3,0	26,0	52	68	25	25	150	20	44	30	M8x1	M8x1	SA 35-30...
HSA 2525R-SA3503-52-ACS1-S1	3,0	26,0	52	68	25	25	150	20	44	30	M8x1	M8x1	SA 35-30...
HSA 2525L-SA3503-65-ACS1-S1	3,0	33,0	65	80	25	25	150	20	50	30	M8x1	M8x1	SA 35-30...
HSA 2525R-SA3503-65-ACS1-S1	3,0	33,0	65	80	25	25	150	20	50	30	M8x1	M8x1	SA 35-30...
HSA 1616L-SA2403-32-ACS1-S2	3,0	16,0	32	—	16	16	110	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 1616R-SA2403-32-ACS1-S2	3,0	16,0	32	—	16	16	110	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 1616L-SA2403-44-ACS1-S2	3,0	22,0	44	61	16	16	125	20	40	20	M8x1	G 1/8"	SA 24-30...
HSA 1616R-SA2403-44-ACS1-S2	3,0	22,0	44	61	16	16	125	20	40	20	M8x1	G 1/8"	SA 24-30...
HSA 2020L-SA2403-32-ACS1-S2	3,0	22,0	32	—	20	20	125	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 2020R-SA2403-32-ACS1-S2	3,0	22,0	32	—	20	20	125	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 2020L-SA2403-44-ACS1-S2	3,0	22,0	44	61	20	20	125	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 2020R-SA2403-44-ACS1-S2	3,0	22,0	44	61	20	20	125	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 2525L-SA2403-44-ACS1-S2	3,0	22,0	44	61	25	25	150	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 2525R-SA2403-44-ACS1-S2	3,0	22,0	44	61	25	25	150	20	—	—	M8x1	G 1/8"	SA 24-30...
HSA 2020L-SA3503-52-ACS1-S2	3,0	26,0	52	68	20	20	150	20	44	30	M8x1	G 1/8"	SA 35-30...
HSA 2020R-SA3503-52-ACS1-S2	3,0	26,0	52	68	20	20	150	20	44	30	M8x1	G 1/8"	SA 35-30...
HSA 2020L-SA3503-65-ACS1-S2	3,0	33,0	65	80	20	20	150	20	50	30	M8x1	G 1/8"	SA 35-30...
HSA 2020R-SA3503-65-ACS1-S2	3,0	33,0	65	80	20	20	150	20	50	30	M8x1	G 1/8"	SA 35-30...
HSA 2525L-SA3503-52-ACS1-S2	3,0	26,0	52	68	25	25	150	20	44	30	M8x1	G 1/8"	SA 35-30...

## Monoblock holders

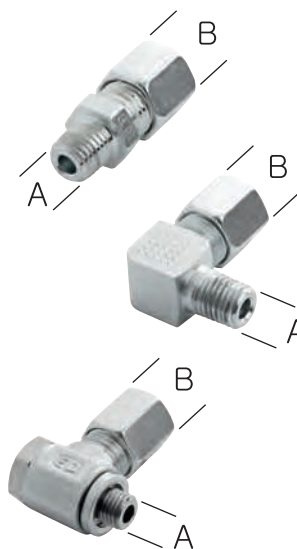
### Monoblock holder with through tool coolant access from the side

Designation	EB	ET	D <sub>max</sub>	D <sub>R</sub>	h	b	L	L <sub>4</sub>	KL	KT	Thread 1	Thread 2	Insert
HSA 2525R-SA3503-52-ACS1-S2	3,0	26,0	52	68	25	25	150	20	44	30	M8x1	G 1/8"	SA 35-30...
HSA 2525L-SA3503-65-ACS1-S2	3,0	33,0	65	80	25	25	150	20	50	30	M8x1	G 1/8"	SA 35-30...
HSA 2525R-SA3503-65-ACS1-S2	3,0	33,0	65	80	25	25	150	20	50	30	M8x1	G 1/8"	SA 35-30...

Remark: Accessories must be ordered separately.

### Accessories

Designation		A	B
KA 001	Coolant supply – straight	M8x1	Ø 6 mm
KA 002		1/8"	Ø 6 mm
KA 003		1/4"	Ø 10 mm
KA 004	Coolant supply – angled and fixed	M8x1	Ø 6 mm
KA 005		1/8"	Ø 6 mm
KA 006	Swivelling screw-fitting	M8x1	Ø 6 mm
KA 007		1/8"	Ø 6 mm
KA 008		1/4"	Ø 10 mm



### Spare parts

Holder	Screw	Key
HSA 1616... - HSA 2020...-SA24...-32-ACS1...	AS0022	KS8000
HSA 1616... - HSA 2525...-SA24...-44-ACS1...	DIN912-M5x16-12.9	Inbus* 4 mm
HSA 2020... - HSA 2525...-SA35...-52-ACS1...	DIN912-M6x20-12.9	Inbus* 5 mm
HSA 2020... - HSA 2525...-SA35...-65-ACS1...	DIN912-M6x20-12.9	Inbus* 5 mm

\* Allen key

# SA Part-off and grooving system

가공 절삭 추천

## Chipbreakers

F1



연한 재질에 탁월한 제품

- 구성인선 형성 최소화
- 얇은 소재에 적합

T1



칩 배출에 탁월한 제품

- 강, SUS용
- 얇은 제품 가공에 적합

S1



부드러운 절삭 가공 제품

- 특히, SUS에 적합
- 강용 제품의 문제 해결에 적합

M1



C형상의 네거티브 제품

- 중, 고강도 재질용
- 모든 재질에 적합
- 원소재 절단시 우선 추천 제품

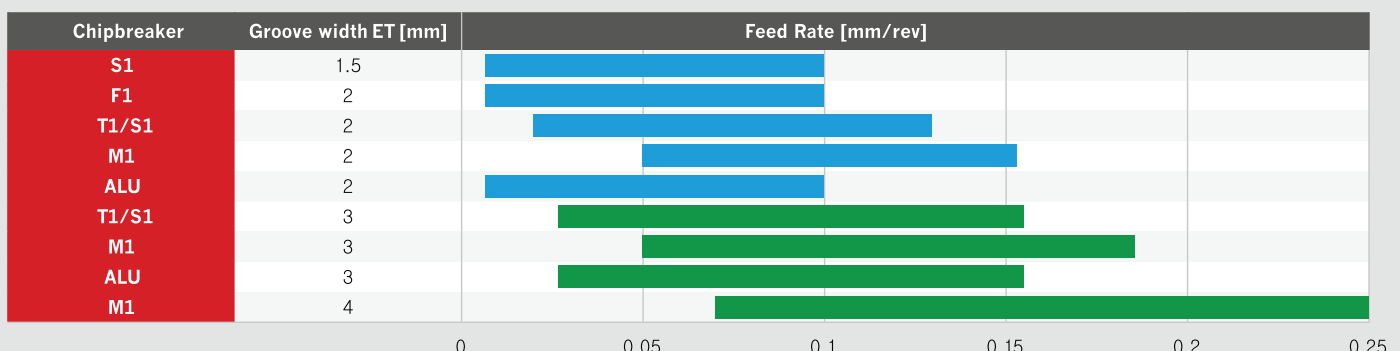
ALU



날카로운 날 형상 제품

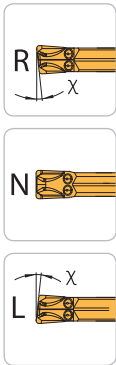
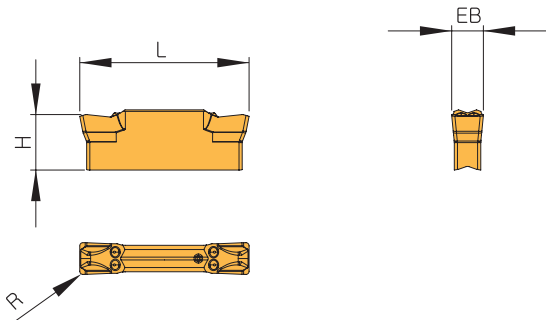
- ALU 나 비철합금 제품 가공시 우선 추천 제품
- 날끝 연마금 인서트
- High positive 디자인
- 폴리싱된 칩브레이커

## Application recommendations



# Inserts

## SA16



Designation	EB	H	L	R	X	Grades				
						coated				uncoated
						AM5040	AP2220	AP5020	AP5030	AN1015
SA16-2001L-S1-12**	2,0	5,5	16,00	0,1	12°	●				
SA16-2001R-S1-12**	2,0	5,5	16,00	0,1	12°	●				
SA16-2001L-T1-15**	2,0	5,5	16,00	0,1	15°			●		
SA16-2001R-T1-15**	2,0	5,5	16,00	0,1	15°			●		
SA16-2002N-F1	2,0	5,5	16,00	0,2	0°		●	●		
SA16-2002N-S1	2,0	5,5	16,00	0,2	0°	●		●		
SA16-2002N-T1	2,0	5,5	16,00	0,2	0°		●	●		
SA16-3002L-S1-12**	3,0	5,5	16,00	0,2	12°	●				
SA16-3002R-S1-12**	3,0	5,5	16,00	0,2	12°	●				
SA16-3003L-M1	3,0	5,5	16,00	0,3	6°		●	●		
SA16-3003R-M1	3,0	5,5	16,00	0,3	6°		●	●		
SA16-3003L-S1	3,0	5,5	16,00	0,3	6°	●				
SA16-3003R-S1	3,0	5,5	16,00	0,3	6°	●				
SA16-3003L-T1	3,0	5,5	16,00	0,3	6°		●	●		
SA16-3003R-T1	3,0	5,5	16,00	0,3	6°		●	●		
SA16-3003N-M1	3,0	5,5	16,00	0,3	0°		●	●		
SA16-3003N-S1	3,0	5,5	16,00	0,3	0°	●		●		
SA16-3003N-T1	3,0	5,5	16,00	0,3	0°		●	●		

Remark: When using left- or right-handed inserts the holder may be needing modification.

\*\* Ground version

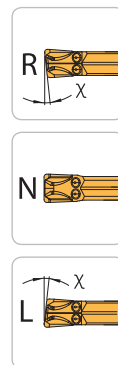
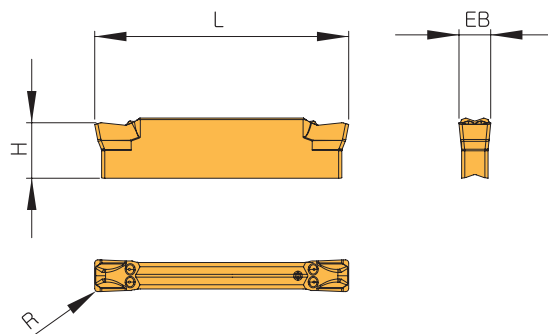
● Main application

○ Secondary application

P	○	●	●	
M	●	○	○	
K		●		
N			○	
S			○	
H				

# Inserts

## SA24



Designation	EB	H	L	R	χ	Grades				uncoated
						coated				
						AM5040	AP2220	AP5020	AP5030	
AN1015										
SA24-1502N-S1	1,5	5,5	24,00	0,2	0°			●		
SA24-1502N-T1	1,5	5,5	24,00	0,2	0°			●		
SA24-2000R-T1-15**	2,0	5,5	24,00	0,0	15°			●		
SA24-2001L-S1-12**	2,0	5,5	24,00	0,1	12°	●				
SA24-2001R-S1-12**	2,0	5,5	24,00	0,1	12°	●				
SA24-2001L-S1-15**	2,0	5,5	24,00	0,1	15°			●		
SA24-2001R-S1-15**	2,0	5,5	24,00	0,1	15°			●		
SA24-2001L-T1-15**	2,0	5,5	24,00	0,1	15°			●		
SA24-2001R-T1-15**	2,0	5,5	24,00	0,1	15°			●		
SA24-2002L-S1-8**	2,0	5,5	24,00	0,2	8°			●		
SA24-2002R-S1-8**	2,0	5,5	24,00	0,2	8°			●		
SA24-2002N-F1	2,0	5,5	24,00	0,2	0°		●	●		
SA24-2002N-M1	2,0	5,5	24,00	0,2	0°		●	●		
SA24-2002N-S1	2,0	5,5	24,00	0,2	0°	●	●	●	●	
SA24-2002N-T1	2,0	5,5	24,00	0,2	0°		●	●		
SA24-2503N-S1	2,5	5,5	24,00	0,3	0°	●		●		
SA24-2503N-T1	2,5	5,5	24,00	0,3	0°			●		
SA24-3002L-S1-12**	3,0	5,5	24,00	0,2	12°	●				
SA24-3002R-S1-12**	3,0	5,5	24,00	0,2	12°	●				
SA24-3003L-M1	3,0	5,5	24,00	0,3	6°		●	●		
SA24-3003R-M1	3,0	5,5	24,00	0,3	6°		●	●		
SA24-3003L-S1	3,0	5,5	24,00	0,3	6°	●				
SA24-3003R-S1	3,0	5,5	24,00	0,3	6°	●				
SA24-3003L-T1	3,0	5,5	24,00	0,3	6°		●	●		
SA24-3003R-T1	3,0	5,5	24,00	0,3	6°		●	●		
SA24-3003N-M1	3,0	5,5	24,00	0,3	0°		●	●		
SA24-3003N-S1	3,0	5,5	24,00	0,3	0°	●		●		
SA24-3003N-T1	3,0	5,5	24,00	0,3	0°		●	●		
SA24-4004N-M1	4,0	5,5	24,00	0,4	0°		●	●		
SA24-4004N-S1	4,0	5,5	24,00	0,4	0°	●				

Remark: When using left- or right-handed inserts the holder may be needing modification.

\*\* Ground version

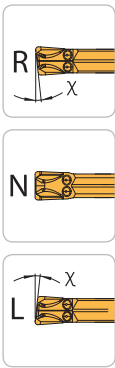
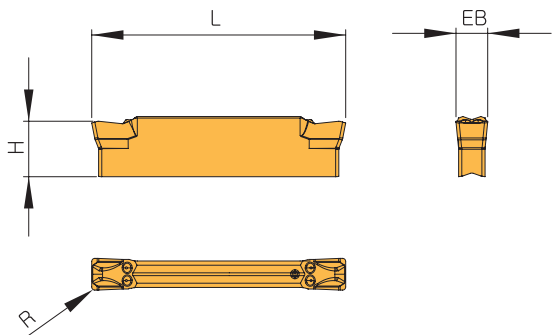
● Main application

○ Secondary application

P	○	●	●	●	
M	●	○	○	○	
K		●			
N			○		
S			○		
H					

Inserts

SA24



Grades										uncoated
coated										
Designation	EB	H	L	R	χ	AM5040	AP2220	AP5020	AP5030	AN1015
SA24-4004N-T1	4,0	5,5	24,00	0,4	0°			●		
SA24-5005N-M1	5,0	7,5	24,00	0,5	0°			●		
SA24-5005N-S1	5,0	7,5	24,00	0,5	0°			●		
SA24-5005N-T1	5,0	7,5	24,00	0,5	0°			●		
SA24-2001L-ALU-15**	2,0	5,5	24,00	0,1	15°					●
SA24-2001R-ALU-15**	2,0	5,5	24,00	0,1	15°					●
SA24-2002N-ALU**	2,0	5,5	24,00	0,2	0°					●
SA24-3002L-ALU-15**	3,0	5,5	24,00	0,2	15°					●
SA24-3002R-ALU-15**	3,0	5,5	24,00	0,2	15°					●
SA24-3003N-ALU**	3,0	5,5	24,00	0,3	0°					●

Remark: When using left- or right-handed inserts the holder may be needing modification.

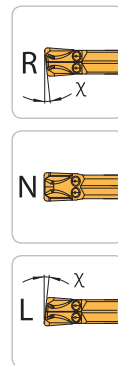
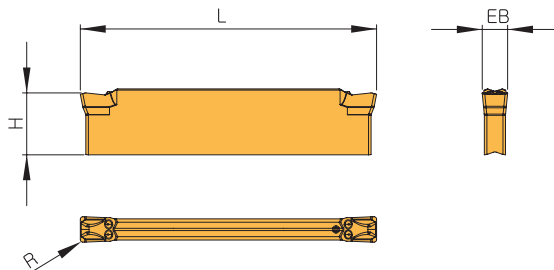
\*\*Ground version

● Main application	P	○	●	●	
○ Secondary application	M	●	○	○	
	K		●		○
	N			○	●
	S			○	○
	H				



# Inserts

## SA35



						Grades				
						coated				uncoated
Designation	EB	H	L	R	χ	AM5040	AP2220	AP5020	AP5030	AN1015
SA35-2001L-S1-12**	2.0	7.5	35.00	0.1	12°	●				
SA35-2001R-S1-12**	2.0	7.5	35.00	0.1	12°	●				
SA35-2002L-M1	2.0	7.5	35.00	0.2	6°			●		
SA35-2002R-M1	2.0	7.5	35.00	0.2	6°			●		
SA35-2002N-F1	2.0	7.5	35.00	0.2	0°		●	●		
SA35-2002N-M1	2.0	7.5	35.00	0.2	0°			●		
SA35-2002N-S1	2.0	7.5	35.00	0.2	0°	●		●		
SA35-2002N-T1	2.0	7.5	35.00	0.2	0°		●	●		
SA35-3002L-S1-12**	3.0	7.5	35.00	0.2	12°	●				
SA35-3002R-S1-12**	3.0	7.5	35.00	0.2	12°	●				
SA35-3003L-M1	3.0	7.5	35.00	0.3	6°		●	●		
SA35-3003R-M1	3.0	7.5	35.00	0.3	6°		●	●		
SA35-3003L-S1	3.0	7.5	35.00	0.3	6°			●		
SA35-3003R-S1	3.0	7.5	35.00	0.3	6°			●		
SA35-3003L-T1	3.0	7.5	35.00	0.3	6°		●	●		
SA35-3003R-T1	3.0	7.5	35.00	0.3	6°		●	●		
SA35-3003N-M1	3.0	7.5	35.00	0.3	0°	●	●	●		
SA35-3003N-S1	3.0	7.5	35.00	0.3	0°	●		●	●	
SA35-3003N-T1	3.0	7.5	35.00	0.3	0°		●	●		
SA35-4004N-M1	4.0	7.5	35.00	0.4	0°		●	●		
SA35-4004N-M1	4.0	7.5	35.00	0.4	0°			●		
SA35-4004N-S1	4.0	7.5	35.00	0.4	0°	●				
SA35-4004N-T1	4.0	7.5	35.00	0.4	0°			●		
SA35-6006N-M1	6.0	7.5	35.00	0.6	0°			●		
SA35-2001L-ALU-15**	2.0	7.5	35.00	0.1	15°					●
SA35-2001R-ALU-15**	2.0	7.5	35.00	0.1	15°					●
SA35-2002N-ALU**	2.0	7.5	35.00	0.2	0°					●
SA35-3002L-ALU-15**	3.0	7.5	35.00	0.2	15°					●
SA35-3002R-ALU-15**	3.0	7.5	35.00	0.2	15°					●
SA35-3003N-ALU**	3.0	7.5	35.00	0.3	0°					●
SA35-4004N-ALU**	4.0	7.5	35.00	0.4	0°					●

Remark: When using left- or right-handed inserts the holder may be needing modification.

\*\* Ground version

● Main application

○ Secondary application

P	○	●	●	●	
M	●	○	○	○	
K		●			○
N				○	●
S				○	○
H					

# SA Part-off and grooving system

## Application recommendations

### 추천 절삭 조건

ISO	Material		Brinell-Hardness HB	Cutting speed V <sub>c</sub> [m/min]				
				AM5040	AN1015	AP5020	AP2220	AP5030
P	Unalloyed steel and cast steel	< 0.15 % C / hardened and tempered	125	120 – 200		120 – 220	130 – 250	120 – 200
		0.15 - 0.45 % C / hardened and tempered	150 – 250	80 – 150		80 – 150	110 – 180	80 – 150
		> 0.45 % C / hardened and tempered	300	60 – 140		60 – 140	70 – 150	60 – 140
	Low alloyed steel and cast steel	annealed	180	80 – 160		80 – 170	120 – 190	80 – 170
		hardened and tempered	250 – 300	60 – 130		60 – 130	110 – 150	60 – 130
		hardened and tempered	350	60 – 120		60 – 120	70 – 130	60 – 120
	High alloyed steel, high alloyed tool Steel and cast steel	annealed	200	80 – 140		80 – 140	90 – 140	80 – 140
		hardened and tempered	350	50 – 120		50 – 120	70 – 130	50 – 120
Stainless steel	ferritic, annealed	200	60 – 160		60 – 170	110 – 200	60 – 170	
	Cast steel	martensitic, hardened and tempered	325	50 – 100		50 – 100	60 – 130	50 – 100
M	Stainless steel	ferritic, martensitic annealed	200	60 – 160		60 – 180	100 – 200	60 – 170
		austenitic, chilled	180	50 – 150		50 – 150	80 – 170	50 – 150
		Duplex, chilled	230	50 – 100		50 – 100	60 – 120	50 – 100
		martensitic/austenitic, chilled	330	50 – 90		50 – 90	120 – 150	50 – 90
K	Cast iron	pearlitic/ferritic	180	120 – 160		100 – 160		
		pearlitic/martensitic	260	90 – 140		130 – 200		
	Cast iron with nodular graphite	ferritic	160	130 – 170		100 – 160		
		pearlitic	–	90 – 130		120 – 220		
	Malleable cast iron	ferritic	130	140 – 200		90 – 180		
		pearlitic	230	120 – 160				
N	Aluminium alloys long chipping	not heat treatable	60	300 – 500		100 – 500		
		heat treatable, heat treated	100	200 – 300		100 – 300		
	Casted aluminium alloys	≤ 12 % Si, heat treated	80	100 – 500		100 – 500		
		≤ 12 % Si, heat treatable, heat treated	90	100 – 300		100 – 300		
		≤ 12 % Si, not heat treatable	130	100 – 200		100 – 200		
	Copper and copper alloys, (Brass / Bronze)	Lead alloys, Pb > 1 %	–	250 – 500		100 – 500		
		Brass, Bronze	–	200 – 500		100 – 500		
		Aluminium bronze	90	150 – 300		100 – 300		
		Copper and elektrolyte copper	100	150 – 300		100 – 300		
	Non ferrous materials	Duroplastic	100	80 – 180		80 – 180		
Re-inforced plastics		–	60 – 150		60 – 150			
Hard rubber		–	100 – 200		100 – 220			
S	High temperature resistant alloys	Fe-alloyed, annealed	200	30 – 45		20 – 50		
		Fe-alloyed, heat treated	280	20 – 35		20 – 40		
		Ni- or Co-alloyed, annealed	250	15 – 25		15 – 25		
		Ni- or Co-alloyed 30 – 58 HRC, casting	–	10 – 20		10 – 20		
		Ni- or Co-alloyed 1500 – 2200 Nmm², heat treated	–	10 – 20		10 – 20		
	Titanium alloys	Pure titan	R <sub>m</sub> 440	60 – 120		50 – 120		
Alpha- and Beta-alloys	heat treated	R <sub>m</sub> 1050	30 – 50		30 – 50			
H	Hardened steel	hardened and tempered	55 HRC					
		hardened and tempered	60 HRC					
	Hard cast iron	casting	400					
	Hardened cast iron	hardened and tempered	55 HRC					

1. DIAMETAL

2. BIMU

3. IFANGER

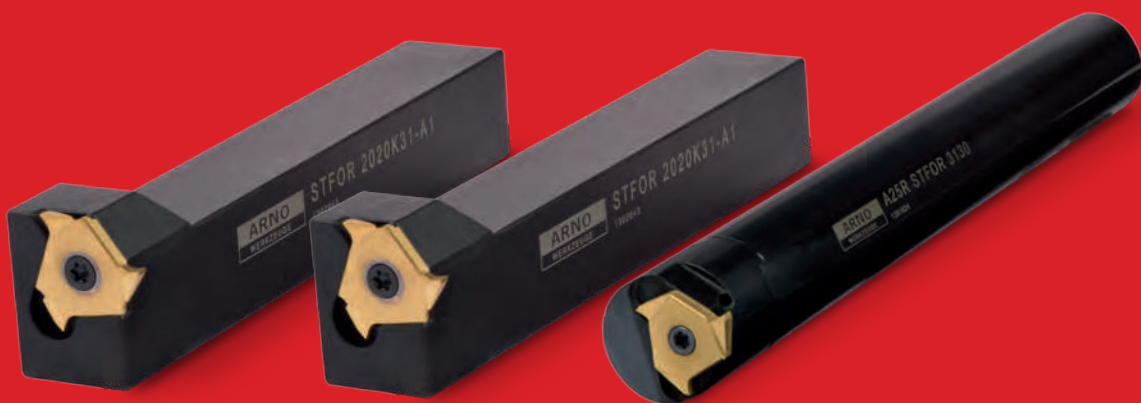
4. ZEUS

5. ARNO

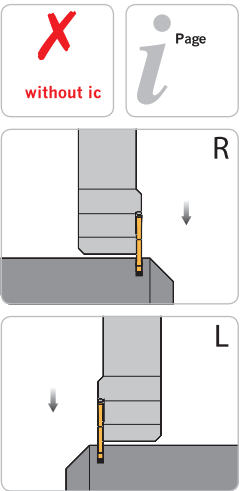
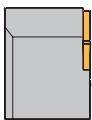
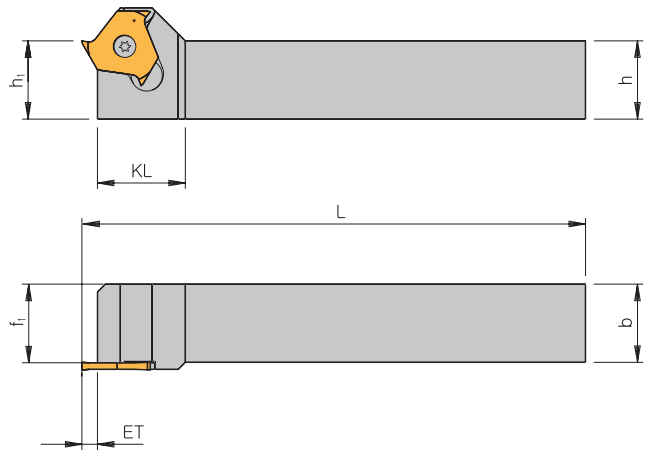
6. Whiz Cut

7. SPHINX

# GROOVING SYSTEM FOR EXTERNAL AND INTERNAL GROOVING



## Radial grooving



Right-hand execution shown

규격	ET	h	b	L	f <sub>1</sub>	h <sub>1</sub>	KL	Insert
STGO R/L 1010 E17-A7	2,0 ❶	10	10	72,5	10,0	10	17,5	TN MU 17...
STGO R/L 1212 F17-A7	2,0 ❶	12	12	82,5	12,0	12	17,5	TN MU 17...
STGO R/L 1616 J17-A7	2,0 ❶	16	16	112,5	16,0	16	17,5	TN MU 17...
STGO R/L 1616 J17-A7/3❸	2,0 ❶	16	16	112,5	14,8	16	17,5	TN MU 17...
STGO R/L 2020 K17-A7	2,0 ❶	20	20	127,5	20,0	20	17,5	TN MU 17...
STGO R/L 2020 K17-A7/3❸	2,0 ❶	20	20	127,5	18,8	20	17,5	TN MU 17...
STGO R/L 2525 M17-A7	2,0 ❶	25	25	152,5	25,0	25	17,5	TN MU 17...
STGO R/L 2525 M17-A7/3❸	2,0 ❶	25	25	152,5	23,8	25	17,5	TN MU 17...
STGO R/L 1616 J31-A7	3,5 ❷	16	16	114,0	16,0	16	22,5	TN MU 31...
STGO R/L 1616 J31-A7/4❹	3,5 ❷	16	16	114,0	13,8	16	22,5	TN MU 31...
STGO R/L 2020 K31-A7	3,5 ❷	20	20	129,0	20,0	20	22,5	TN MU 31...
STGO R/L 2020 K31-A7/4❹	3,5 ❷	20	20	129,0	17,8	20	22,5	TN MU 31...
STGO R/L 2525 M31-A7	3,5 ❷	25	25	154,0	25,0	25	22,5	TN MU 31...
STGO R/L 2525 M31-A7/4❹	3,5 ❷	25	25	154,0	22,8	25	22,5	TN MU 31...

❶ Cutting depth is limited by the dimension "t" if cutting with EB < 1,6 mm for inserts.

❷ Cutting depth is limited by the dimension "t" if cutting with EB < 1,85 mm for inserts.

❸ For the toolholder STGO R/L.../3 inserts TN MU 1730F R/L, TN MU 1731F R/L, TN MU 1735F R/L and TN MU 1740F R/L must be used!

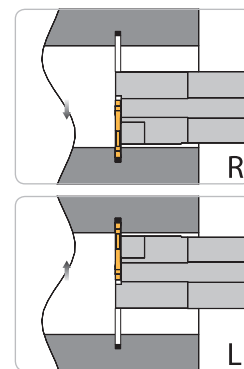
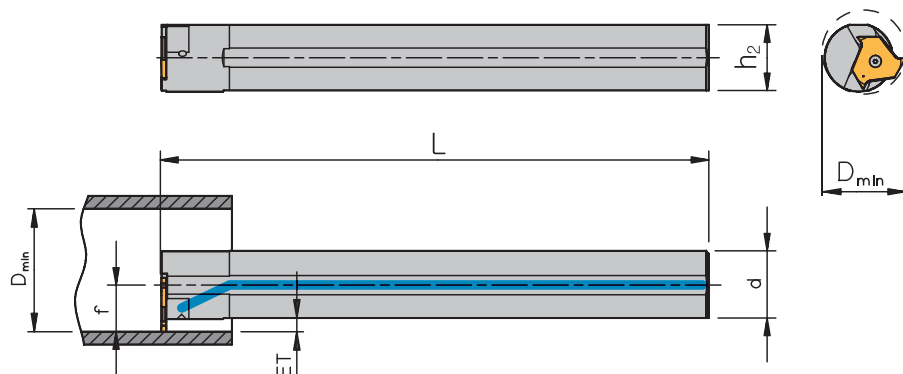
❹ For the toolholder STGO R/L.../4 inserts TN MU 3140F R/L, TN MU 3145F R/L and TN MU 3150F R/L must be used!

Remark: Our tool-system can also be used for special profiles up to grooving width 7 mm.

## Spare parts

Holder	Screw	Key
STGO R/L ... K17-...	AS 0007	KS 1751
STGO R/L ... K31-...	AS 0002	KS 1111

## Internal grooving



Right-hand execution shown

규격	D <sub>min</sub>	ET	d	h <sub>2</sub>	L	f	Insert
A12K STFO R/L 1716 ①	16	2 ①	12	11	127	8,5	TN MU 17...
A12K STFOL 1716/3 ①	16	2 ①	12	11	128	8,5	TN MU 17...
A16M STFO R/L 1716 ①	16	2 ①	16	15	152	8,5	TN MU 17...
A16M STFO R/L 1716/3 ①	16	2 ①	16	15	153	8,5	TN MU 17...
A20Q STFO R/L 1716 ①	16	2 ①	20	19	182	8,5	TN MU 17...
A20Q STFO R/L 1725	23	2 ①	20	19	182	12,5	TN MU 17...
A20Q STFO R/L 1725/3 ①	23	2 ①	20	19	183	12,5	TN MU 17...
A25R STFO R/L 3130	30	4 ②	25	24	202	17,0	TN MU 31...
A25R STFO R/L 3130/4 ④	30	4 ②	25	24	204	17,0	TN MU 31...
A32S STFO R/L 3137	37	4 ②	32	30	252	20,5	TN MU 31...
A32S STF R/L 3137/4 ④	37	4 ②	32	30	254	20,5	TN MU 31...

① Cutting depth is limited by the dimension "t" if cutting with EB < 1,6 mm for inserts.

② Cutting depth is limited by the dimension "t" if cutting with EB < 1,85 mm for inserts.

③ For the toolholder STFO R/L.../3 inserts TN MU 1730F R/L, TN MU 1731F R/L, TN MU 1735F R/L and TN MU 1740F R/L must be used!

④ For the toolholder STFO R/L.../4 inserts TN MU 3140F R/L, TN MU 3145F R/L and TN MU 3150F R/L must be used!

⑤ Only up to range of width EB = 2 mm

Remark: With the support for the TN MU..., cutting edge 0,5 mm over centre.

Please note: Holder right-hand-design -> Left-hand insert, Holder left-hand-design -> Right-hand insert

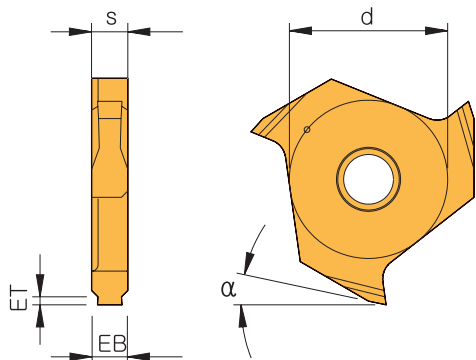
## Spare parts

Holder	Screw	Key
STFO R/L ... K17-...	AS 0007	KS 1751
STFO R/L ... K31-...	AS 0002	KS 1111

Inserts

TNMU 17

Inserts for circlip grooves to DIN 471/472 full profil



						Grades				
						coated		uncoated		
Designation	EB+ 0,05	ET	d	s	α	AM17C	PVD2	AK10	AK20	CERMET
TNMU 1711F R/L-V020	1,15	0,20	7,5	1,77	12°	●		●		
TNMU 1711F R/L-V025	1,15	0,25	7,5	1,77	12°	●		●		
TNMU 1711F R/L-V030	1,15	0,30	7,5	1,77	12°	●		●		
TNMU 1711F R/L-V035	1,15	0,35	7,5	1,77	12°	●		●		
TNMU 1711F R/L-V040	1,15	0,40	7,5	1,77	12°	●		●		
TNMU 1713F R/L-V055	1,35	0,55	7,5	2,07	12°	●		●		
TNMU 1716F R/L-V070	1,65	0,70	7,5	2,57	12°	●		●		
TNMU 1716F R/L-V085	1,65	0,85	7,5	2,57	12°	●		●		
TNMU 1716F R/L-V100	1,65	1,00	7,5	2,57	12°	●		●		
TNMU 1718F R/L-V100	1,90	1,00	7,5	3,07	12°	●		●		
TNMU 1718F R/L-V125	1,90	1,25	7,5	3,07	12°	●		●		

● Main application

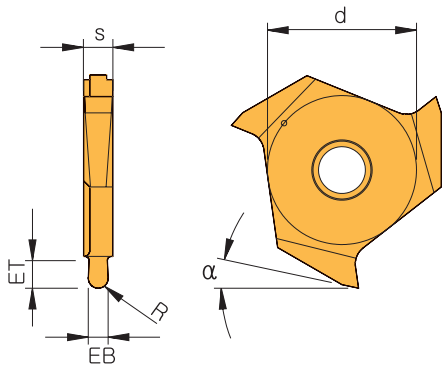
○ Secondary application

P	●	
M	●	
K		●
N		●
S	○	○
H		

Inserts

TNMU 17

Full radius inserts

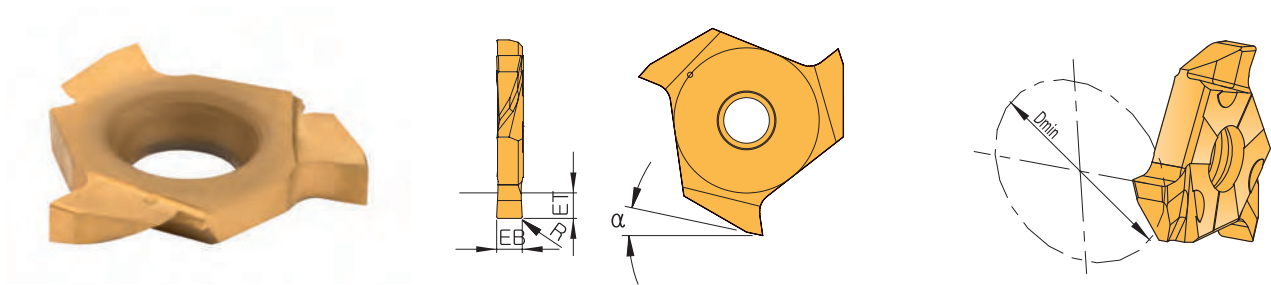


							Grades				
							coated		uncoated		
Designation	EB± 0,02	R	ET	d	s	α	AM17C	PVD2	AK10	AK20	CERMET
TNMU 1710F R/L-R05	1,0	0,5	1,00	7,5	1,52	12°	●	●	●	●	
TNMU 1720F R/L-R10	2,0	1,0	1,50	7,5	2,57	12°	●	●	●	●	●
							● Main application				
							P	○			●
							M	○			○
							○ Secondary application				
							K		●	●	○
							N	●	●	●	
							S	○	○	○	
							H				

Inserts

TNMU 17

Inserts axial



						Grades				
						coated		uncoated		
Designation	EB	R	ET	D <sub>min</sub>	α	AM17C	PVD2	AK10	AK20	CERMET
TNMU 1710F R/L-AX10	1,0	0,1	1,50	10	12°		●		●	
TNMU 1715F R/L-AX10	1,5	0,1	2,00	10	12°		●		●	
TNMU 1720F R/L-AX10	2,0	0,2	2,00	10	12°		●		●	

● Main application

○ Secondary application

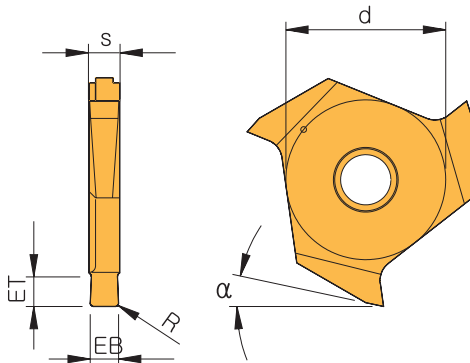
P		○	
M		○	
K			●
N	●		●
S			○
H			



Inserts

TN MU 17

Inserts with straight dimensions



Grades												
							coated		uncoated			
Designation	EB± 0,02	R	ET	d	s	α	AM17C	PVD2	AK10	AK20	CERMET	
TN MU 1715F R/L	1,5	0,1	1,80	7,5	1,77	12°	●	●	●	●		
TN MU 1720F R/L	2,0	0,1	1,80	7,5	2,07	12°	●	●	●	●	●	
TN MU 1725F R/L	2,5	0,2	1,80	7,5	2,57	12°	●	●	●	●	●	
TN MU 1730F R/L	3,0	0,2	1,80	7,5	3,07	12°	●	●	●	●		
TN MU 1735F R/L	3,5	0,2	1,80	7,5	3,57	12°	●		●			
TN MU 1740F R/L	4,0	0,2	1,80	7,5	4,37	12°	●		●			

Remark: For inserts from TN MU 1730F R/L the toolholder STGO R/L ..../3 must be used!

● Main application	P	●	○				●
	M	●	○				○
○ Secondary application	K			●	●		○
	N		●	●	●		
	S	○		○	○		
	H						

## Grooving

ISO	Material		Tensile strength (N/mm²)	Cutting speed V <sub>c</sub> (m/min)				
				coated		uncoated		CERMET
				AM17C	PVD2	AK10	AK20	
P	Unalloyed steel and cast steel	< 0.15 % C / hardened and tempered	350	140-180	100-130	—	—	130-400
		0.15 - 0.45 %C/hardened and tempered	650	110-160	—	—	—	120-350
		> 0.45% C / hardened and tempered	1000	80-120	60-100	—	—	80-275
	Low alloyed steel and cast steel	annealed	600	90-130	70-110	—	—	100-250
		hardened and tempered	900	80-120	60-100	—	—	90-230
			1200	70-90	50-70	—	—	60-150
	High alloyed steel	annealed	700	90-140	70-110	—	—	80-180
	High alloyed tool steel and cast steel	hardened	1100	70-90	50-70	—	—	60-140
M	Stainless steel	ferritic, annealed	700	160-220	130-200	—	—	80-220
		martensitic, hardened and tempered	1000	70-110	60-90	—	—	70-180
K	Cast iron	austenitic and austenitic / ferritic, chilled	450-600	100-160	130-200	—	—	100-250
		pearlitic / ferritic	600-900	70-120	60-90	—	—	80-180
			500-700	180-220	140-180	100-180	100-180	—
	Cast iron with nodular graphite	pearlitic / martensitic	700-850	140-180	110-140	90-120	90-120	—
			800-1100	160-180	100-140	80-120	80-120	—
		ferritic	550	160-200	120-160	100-140	100-160	220-300
	Malleable cast iron	pearlitic	800	120-180	100-140	80-120	70-120	180-230
		ferritic	450	180-240	140-200	70-90	80-180	250-350
N	Aluminium alloys long chipping	not heat treatable	200	100-1000	100-800	650-1000	100-800	—
		heat treatable, heat treated	350	100-800	100-600	300-700	80-800	—
	Casted aluminium alloys	≤ 12 % Si, heat treated	250	100-500	100-400	200-600	80-800	—
		≤ 12 % Si, heat treatable, heat treated	300	100-500	100-400	150-400	—	—
		≤ 12 % Si, not heat treatable	450	100-500	100-400	100-300	—	—
	Copper and copper alloys (Brass / Bronze)	Lead alloys, Pb > 1 %	400	80-300	80-300	250-600	80-250	—
		Brass, Bronze	300	—	150-600	205-400	150-500	—
		Aluminium bronze	500	—	100-400	250-500	100-300	—
		Copper and electrolyte copper	200	—	80-300	130-300	80-250	—
S	Non-ferrous materials	Duroplastic	—	80-500	80-400	80-500	100-500	—
		Re-inforced plastics	—	80-200	80-160	60-150	50-150	—
		Hard rubber	—	—	100-300	100-250	100-300	—
H	High temperature resistant alloys	Fe-alloyed, annealed	700	30-50	25-40	10-30	30-40	—
		Fe-alloyed, heat treated	950	25-30	20-28	15-30	25-35	—
		Ni- or Co-alloyed, annealed	800	15-25	12-20	15-30	15-25	—
		Ni- or Co-alloyed, casting	1100	10-25	8-16	—	10-20	—
		Ni- or Co-alloyed, heat treated	1200	10-20	8-20	—	10-20	—
	Titanium alloys	Pure titan	500-700	—	—	15-50	100-150	—
H	Alpha- and Beta-alloys	heat treated	700-1000	—	—	40-70	40-70	—
	Hardened steel	hardened	55 HRC	—	—	—	—	—
			60 HRC	—	—	—	—	—
	Hard cast iron	casting	41 HRC	—	—	—	—	—
H	Hardened cast iron	hardened	55 HRC	—	—	—	—	—
			55 HRC	—	—	—	—	—

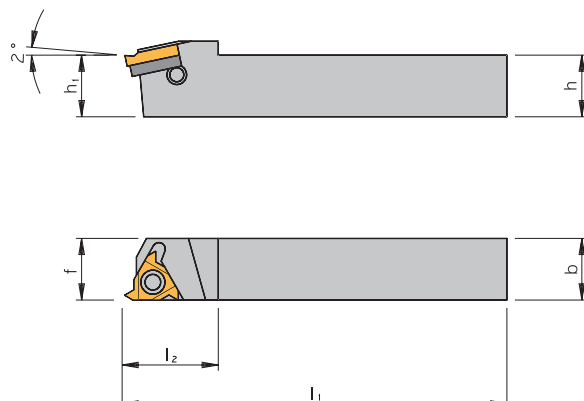
The recommended cutting data are only approximate values.  
It may be necessary to adjust them to each individual machining application.

# THREAD TURNING



# Threading Tool Holders

## External Thread



Type  
Standard

## Holder

	규격	$h = h_1 = b$	f	$l_1$	$l_2$
11	NL8-2 R/L	8	11	136,4	17,5
11	NL10-2 R/L	10	11	70,0	17,5
11	NL12-2 R/L	12	12	80,0	17,5
16	NL12-3 R/L	12	16	83,2	22,0
16	AL3/8-3 R/L	9,52	16	63,6	20,5
16	AL12-3 R/L	12	16	83,2	22,0
16	AL16-3 R/L	16	16	100,0	20,5
16	AL20-3 R/L	20	20	128,6	30,0
16	AL25-3 R/L	25	25	153,6	30,0
16	AL32-3 R/L	32	32	173,6	30,0
22	AL25-4 R/L	25	25	155,7	36,0
22	AL32-4 R/L	32	32	175,7	36,0
22	AL40-4 R/L	40	40	205,7	36,0
27	AL25-5 R/L	25	32	151,6	35,0
27	AL32-5 R/L	32	32	176,6	40,0
27	AL40-5 R/L	40	40	206,6	40,0
27	AL50-5 R/L	50	50	256,6	40,0

## Spare Parts

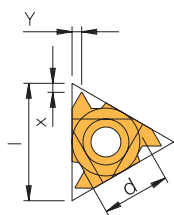
	Clamping screw	Screw and washer for support pad	Key	Support pad R	Support pad L
11	SN2T	—	KS 1751	—	—
16	SA3T	SY3T	KS 2510	YE3	YI3
22	SA4T	SY4T	KS 2520	YE4	YI4
27	SA5T	SY5T	KS 2525	YE5	YI5

Dimensions in mm

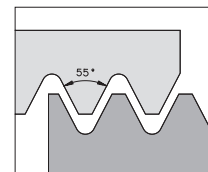
# Partial Profile

55°

## External Thread



Right hand execution shown



### Type Standard

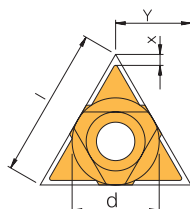
Pitch									Grade availability				
	[mm]	[TPI]	Left hand	Right hand	d	r	x	y	coated			uncoated	Holder
									AL100	AM7C	AM15C	AK20	
11	0.5-1.5	48-16		<b>11ER-T-A55</b>	6,35	0,05	0,8	0,9	X	X	X	X	NL...-2
11	0.5-1.5	48-16	<b>11EL-T-A55</b>		6,35	0,05	0,8	0,9	X		X	X	NL...-2
16	0.5-1.5	48-16		<b>16ER-T-A55</b>	9,525	0,05	0,8	0,9	X	X	X	X	NL...-2
16	0.5-1.5	48-16	<b>16EL-T-A55</b>		9,525	0,05	0,8	0,9	X		X	X	NL...-2
16	1,75-3,0	14-8		<b>16ER-T-G55</b>	9,525	0,21	1,2	1,7	X	X	X	X	NL...-2
16	1,75-3,0	14-8	<b>16EL-T-G55</b>		9,525	0,21	1,2	1,7	X	X	X		NL...-2
16	0.5-3,0	48-8		<b>16ER-T-AG55</b>	9,525	0,07	1,2	1,7	X	X	X	X	NL...-2
16	0.5-3,0	48-8	<b>16EL-T-AG55</b>		9,525	0,07	1,2	1,7	X	X	X	X	NL...-2
16	0.5-1.5	48-16		<b>16ER-T-A55-SB</b>	9,525	0,05	0,6	0,8	X				AL...-3
16	1,75-3,0	14-8		<b>16ER-T-G55-SB</b>	9,525	0,21	1,1	1,5	X				AL...-3
16	0.5-3,0	48-8		<b>16ER-T-AG55-SB</b>	9,525	0,07	0,9	1,5	X				AL...-3

X 구매가능

● 강력추천

○ 추천

P	●		○	
M	●	●	●	
K	○	○		●
N				●
S	○			
H				



### Type U

Pitch								Grade availability			
	[mm]	[TPI]	Left / right	d	r	x	y	AL100	AM7C	AM15C	Holder
22	5.5-8,0	4,5-3,25	<b>22UEI-T-U55</b>	12,7	0,60	0,9	11,0		X	X	AL...-4U
27	6,5-9,0	4-2,75	<b>27UEI-T-U55</b>	15,88	0,80	1,2	13,7	X			AL...-5U

X 구매가능

● 강력추천

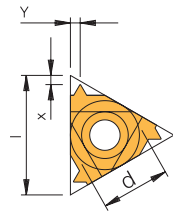
○ 추천

P	●		○
M	●	●	●
K	○	○	
N			
S	○		
H			

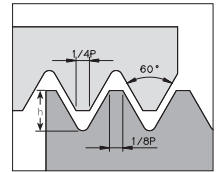
Metric


ISO

## External Thread



Right hand execution shown

Type  
Standard


	Pitch	Grade availability										Holder	
	[mm]	Left hand	Right hand	d	h <sub>min</sub>	x	y	coated			uncoated		
								AL100	AM7C	AM15C	AK20		AK20P
11	0,25		11ER-V-ISO0,25	6,35	0,14	0,4	0,2	X					NL...2
11	0,3		11ER-V-ISO0,30	6,35	0,19	0,7	0,3	X					NL...2
11	0,35		11ER-V-ISO0,35	6,35	0,21	0,8	0,4	X	X	X			NL...2
11	0,35	11EL-V-ISO0,35		6,35	0,21	0,8	0,4	X			X		NL...2
11	0,4		11ER-V-ISO0,40	6,35	0,25	0,7	0,4	X	X	X	X		NL...2
11	0,45		11ER-V-ISO0,45	6,35	0,28	0,7	0,4	X	X	X			NL...2
11	0,45	11EL-V-ISO0,45		6,35	0,28	0,7	0,4	X			X		NL...2
11	0,5		11ER-V-ISO0,50	6,35	0,31	0,6	0,4	X	X	X	X	X	NL...2
11	0,5	11EL-V-ISO0,50		6,35	0,31	0,6	0,4	X		X	X		NL...2
11	0,6		11ER-V-ISO0,60	6,35	0,37	0,6	0,6	X		X	X		NL...2
11	0,7		11ER-V-ISO0,70	6,35	0,43	0,6	0,6	X	X	X	X		NL...2
11	0,75		11ER-V-ISO0,75	6,35	0,46	0,6	0,6	X	X	X	X		NL...2
11	0,75	11EL-V-ISO0,75		6,35	0,46	0,6	0,6	X			X		NL...2
11	0,8		11ER-V-ISO0,80	6,35	0,49	0,6	0,6	X	X	X	X		NL...2
11	0,8	11EL-V-ISO0,80		6,35	0,49	0,6	0,6	X		X			NL...2
11	1,0		11ER-V-ISO1,00	6,35	0,61	0,7	0,7	X	X	X	X	X	NL...2
11	1,0	11EL-V-ISO1,00		6,35	0,61	0,7	0,7	X	X	X	X		NL...2
11	1,25		11ER-V-ISO1,25	6,35	0,77	0,8	0,9	X	X	X	X		NL...2
11	1,25	11EL-V-ISO1,25		6,35	0,77	0,8	0,9	X		X	X		NL...2
11	1,5		11ER-V-ISO1,50	6,35	0,92	0,8	1,0	X	X	X	X		NL...2
11	1,5	11EL-V-ISO1,50		6,35	0,92	0,8	1,0	X		X	X		NL...2
11	1,75		11ER-V-ISO1,75	6,35	1,07	0,8	1,1	X	X	X	X		NL...2
11	1,75	11EL-V-ISO1,75		6,35	1,07	0,8	1,1	X					NL...2
16	0,25		16ER-V-ISO0,25	9,525	0,14	0,4	0,2	X	X	X	X	X	AL...3
16	0,25	16EL-V-ISO0,25		9,525	0,14	0,4	0,2					X	AL...3
16	0,35		16ER-V-ISO0,35	9,525	0,21	0,8	0,4	X	X	X	X	X	AL...3
16	0,35	16EL-V-ISO0,35		9,525	0,21	0,8	0,4	X			X		AL...3
16	0,4		16ER-V-ISO0,40	9,525	0,25	0,7	0,4	X	X	X	X	X	AL...3
16	0,4	16EL-V-ISO0,40		9,525	0,25	0,7	0,4	X		X	X		AL...3
16	0,45		16ER-V-ISO0,45	9,525	0,28	0,7	0,4	X	X	X	X		AL...3
16	0,45	16EL-V-ISO0,45		9,525	0,28	0,7	0,4	X		X			AL...3
16	0,5		16ER-V-ISO0,50	9,525	0,31	0,6	0,4	X	X	X	X	X	AL...3
16	0,5	16EL-V-ISO0,50		9,525	0,31	0,6	0,4	X	X	X	X	X	AL...3
16	0,6		16ER-V-ISO0,60	9,525	0,37	0,6	0,6	X	X	X	X		AL...3
16	0,6	16EL-V-ISO0,60		9,525	0,37	0,6	0,6	X	X	X	X		AL...3
16	0,7		16ER-V-ISO0,70	9,525	0,43	0,6	0,6	X	X	X	X	X	AL...3
16	0,7	16EL-V-ISO0,70		9,525	0,43	0,6	0,6	X	X	X	X		AL...3
16	0,75		16ER-V-ISO0,75	9,525	0,46	0,6	0,6	X	X	X	X	X	AL...3
16	0,75	16EL-V-ISO0,75		9,525	0,46	0,6	0,6	X	X	X	X	X	AL...3
16	0,8		16ER-V-ISO0,80	9,525	0,49	0,6	0,6	X	X	X	X	X	AL...3
16	0,8	16EL-V-ISO0,80		9,525	0,49	0,6	0,6	X	X	X	X		AL...3
16	1,0		16ER-V-ISO1,00	9,525	0,61	0,7	0,7	X	X	X	X	X	AL...3
16	1,0	16EL-V-ISO1,00		9,525	0,61	0,7	0,7	X	X	X	X	X	AL...3
16	1,25		16ER-V-ISO1,25	9,525	0,77	0,8	0,9	X	X	X	X	X	AL...3
16	1,25	16EL-V-ISO1,25		9,525	0,77	0,8	0,9	X	X	X	X		AL...3
16	1,5		16ER-V-ISO1,50	9,525	0,92	0,8	1,0	X	X	X	X	X	AL...3
16	1,5	16EL-V-ISO1,50		9,525	0,92	0,8	1,0	X	X	X	X	X	AL...3
16	1,75		16ER-V-ISO1,75	9,525	1,07	0,9	1,2	X	X	X	X	X	AL...3
16	1,75	16EL-V-ISO1,75		9,525	1,07	0,9	1,2	X	X	X	X		AL...3
16	2,0		16ER-V-ISO2,00	9,525	1,23	1,0	1,3	X	X	X	X	X	AL...3
16	2,0	16EL-V-ISO2,00		9,525	1,23	1,0	1,3	X	X	X	X		AL...3
16	2,5		16ER-V-ISO2,50	9,525	1,53	1,1	1,5	X	X	X	X	X	AL...3
16	2,5	16EL-V-ISO2,50		9,525	1,53	1,1	1,5	X	X	X	X		AL...3
16	3,0		16ER-V-ISO3,00	9,525	1,84	1,2	1,6	X	X	X	X	X	AL...3
16	3,0	16EL-V-ISO3,00		9,525	1,84	1,2	1,6	X	X	X	X	X	AL...3
16	3,5		16ER-V-ISO3,50	9,525	2,15	1,6	1,9	X	X	X			AL...3
16	3,5	16EL-V-ISO3,50		9,525	2,15	1,6	1,9	X					AL...3
16	0,5		16ER-V-ISO0,50-SB	9,525	0,31	1,2	0,5	X					AL...3
16	0,75		16ER-V-ISO0,75-SB	9,525	0,46	1,2	0,5	X					AL...3
16	0,8		16ER-V-ISO0,80-SB	9,525	0,49	1,2	0,5	X					AL...3
16	1,0		16ER-V-ISO1,00-SB	9,525	0,61	0,7	0,8	X					AL...3
16	1,25		16ER-V-ISO1,25-SB	9,525	0,77	0,7	0,8	X					AL...3

Dimensions in mm

## External Thread

Type  
Standard

Dimensions in mm

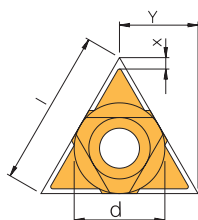
								Grade availability					
Pitch								coated			uncoated		
	[mm]	Left hand	Right hand	d	h <sub>min</sub>	x	y	AL100	AM7C	AM15C	AK20	AK20P	Holder
16	1,5		16ER-V-ISO1,50-SB	9,525	0,92	0,7	0,8	X					AL...-3
16	1,75		16ER-V-ISO1,75-SB	9,525	1,07	1,2	1,5	X					AL...-3
16	2,0		16ER-V-ISO2,00-SB	9,525	1,23	1,2	1,5	X					AL...-3
16	2,5		16ER-V-ISO2,50-SB	9,525	1,53	1,2	1,5	X					AL...-3
16	3,0		16ER-V-ISO3,00-SB	9,525	1,84	1,3	1,5	X					AL...-3
22	3,5		22ER-V-ISO3,50	12,7	2,15	1,6	2,3	X	X	X	X		AL...-4
22	3,5	22EL-V-ISO3,50		12,7	2,15	1,6	2,3	X	X	X	X		AL...-4
22	4,0		22ER-V-ISO4,00	12,7	2,45	1,6	2,3	X	X	X	X		AL...-4
22	4,0	22EL-V-ISO4,00		12,7	2,45	1,6	2,3	X	X	X	X		AL...-4
22	4,5		22ER-V-ISO4,50	12,7	2,76	1,7	2,4	X	X	X	X		AL...-4
22	4,5	22EL-V-ISO4,50		12,7	2,76	1,7	2,4	X	X	X			AL...-4
22	5,0		22ER-V-ISO5,00	12,7	3,07	1,7	2,5	X	X	X	X		AL...-4
22	5,0	22EL-V-ISO5,00		12,7	3,07	1,7	2,5	X	X	X			AL...-4
22	6,0		22ER-V-ISO6,00	12,7	3,68	2,0	2,9	X	X	X	X		AL...-4
22	6,0	22EL-V-ISO6,00		12,7	3,68	2,0	2,9	X	X	X	X		AL...-4
27	5,5		27ER-V-ISO5,50	15,88	3,37	1,9	2,7	X	X	X	X		AL...-5
27	5,5	27EL-V-ISO5,50		15,88	3,37	1,9	2,7	X					AL...-5
27	6,0		27ER-V-ISO6,00	15,88	3,68	2,0	2,9	X	X	X	X		AL...-5
27	6,0	27EL-V-ISO6,00		15,88	3,68	2,0	2,9	X		X			AL...-5


X 구매가능

● 강력추천

○ 추천

P	●		○	
M	●	●	●	
K	○	○		● ●
N				● ●
S	○			
H				

Type  
U

							Grade availability			
Pitch		Left / right	d	h <sub>min</sub>	x	y	coated			uncoated
	[mm]						AL100	AM7C	AM15C	AK20
22	5,0	<b>22UEN-V-ISO5,00</b>	12,7	3,07	2,2	11,0	X			
22	5,5	<b>22UEN-V-ISO5,50</b>	12,7	3,37	2,3	11,0	X		X	X
22	6,0	<b>22UEN-V-ISO6,00</b>	12,7	3,68	2,6	11,0	X	X	X	X
27	8,0	<b>27UEN-V-ISO8,00</b>	15,88	4,91	2,4	13,7	X		X	X

X 구매가능

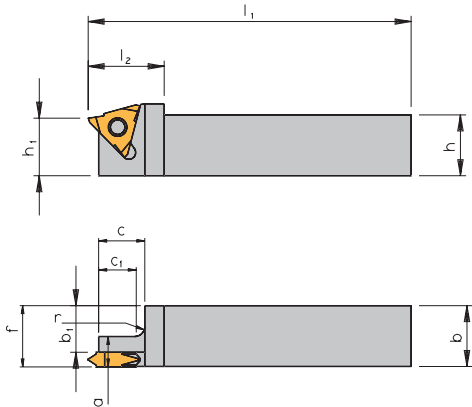
● 강력추천

○ 추천

P	●		○	
M	●	●	●	
K	○	○		● ●
N				● ●
S	○			
H				


# Threading Tool Holders

## External Thread




Type  
Slim Throat

## Holder

	규격	$h = h_1 = b$	$f$	$a$	$b_1$	$c$	$c_1$	$l_1$	$l_2$	$r$
11 V	NL8-2V R/L	8	10	7	4,8	12,5	11,5	60,0	14,0	1
11 V	NL10-2V R/L	10	10	7	6,8	12,5	11,5	70,0	14,0	1
11 V	NL12-2V R/L	12	12	7	8,8	14,5	11,5	80,0	14,0	3
11 V	NL16-2V R/L	16	16	7	12,8	14,5	11,5	100,0	14,0	3
16 V	NL10-3V R/L	10	14	7	6,4	14,5	11,5	70,0	18,5	3
16 V	NL12-3V R/L	12	14	7	8,4	14,5	11,5	80,0	18,5	3
16 V	NL16-3V R/L	16	16	7	12,4	14,5	11,5	100,0	25,0	3
16 V	NL20-3V R/L	20	20	7	16,4	16,5	11,5	125,0	30,0	3
16 V	NL25-3V R/L	25	25	7	21,4	16,5	11,5	150,0	30,0	5
16 V	NL32-3V R/L	32	32	7	28,4	16,5	11,5	170,0	30,0	5
16 V	NL40-3V R/L	40	40	7	36,4	16,5	11,5	200,0	30,0	5
22 V	NL25-4V R/L	25	25	12	20,2	16,5	11,5	150,0	30,0	5
22 V	NL32-4V R/L	32	32	12	27,2	16,5	11,5	170,0	30,0	5
22 V	NL40-4V R/L	40	40	12	35,2	16,5	11,5	200,0	30,0	5

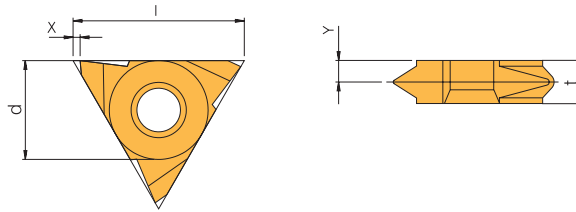
## Spare Parts

	Clamping screw	Key
11V	SN2T	KS 1751
16V	SN3T	KS 2510
22V	SN4T	KS 2520

Dimensions in mm



## External Thread



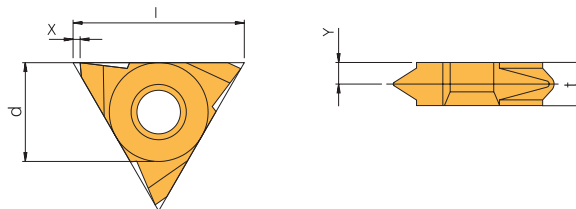
Right hand execution shown

### Type Slim Throat

Pitch										Grade availability				
	[mm]	[TPI]	Left hand	Right hand	d	r	x	y	t	coated			uncoated	Holder
										AL100	AM7C	AM15C	AK20	
11	0.5-1.5	48-16		11VER-T-A60	6.35	0.05	0.69	2.3	3.2	X	X	X	X	NL...-2V
11	0.5-1.5	48-16	11VEL-T-A60		6.35	0.05	0.69	2.3	3.2	X	X	X	X	NL...-2V
16	0.5-1.5	48-16		16VER-T-A60	9.525	0.05	1.1	2.7	3.6	X	X	X	X	NL...-3V
16	0.5-1.5	48-16	16VEL-T-A60		9.525	0.05	1.1	2.7	3.6	X	X	X	X	NL...-3V
16	1.75-3.0	14-8		16VER-T-G60	9.525	0.27	1.1	1.9	3.6	X	X	X	X	NL...-3V
16	1.75-3.0	14-8	16VEL-T-G60		9.525	0.27	1.1	1.9	3.6	X	X	X	X	NL...-3V
16	0.5-3.0	48-8		16VER-T-AG60	9.525	0.08	1.1	1.9	3.6	X	X	X	X	NL...-3V
16	0.5-3.0	48-8	16VEL-T-AG60		9.525	0.08	1.1	1.9	3.6	X	X	X	X	NL...-3V
22	3.5-5.0	7-5		22VER-T-N60	12.7	0.53	1.1	2.3	4.8	X	X	X	X	NL...-4V
22	3.5-5.0	7-5	22VEL-T-N60		12.7	0.53	1.1	2.3	4.8	X	X	X	X	NL...-4V


X 구매가능  
● 강력추천  
○ 추천

P	●		○	
M	●	●	●	
K	○	○		●
N				●
S	○			
H				



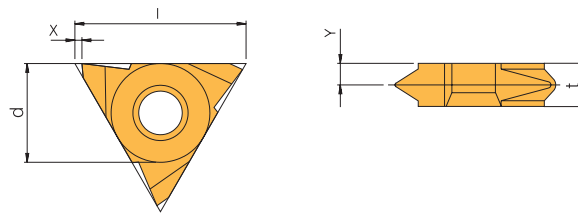
Right hand execution shown

### Type V

Pitch										Grade availability				
	[mm]	[TPI]	Left hand	Right hand	d	r	x	y	t	coated			uncoated	Holder
										AL100	AM15C		AK20	
27	6.0-10.0	4-2.5		27VER-T-V60	15.88	0.75	0.6	5.2	10	X	X		X	NL...-5V-10
27	6.0-10.0	4-2.5	27VEL-T-V60		15.88	0.75	0.6	5.2	10	X	X			NL...-5V-10


X 구매가능  
● 강력추천  
○ 추천

P	●		○	
M	●	●	●	
K	○			●
N				●
S	○			
H				



### Type

#### Slim Throat

Pitch		Grade availability												
		coated									uncoated		Holder	
	[mm]	Left hand	Right hand	d	h <sub>min</sub>	x	y	t	AL100	AM7C	AM15C	AK20		AK20P
11	0,75		11VER-V-ISO0,75	6,35	0,46	0,7	2,6	3,2	X	X	X			NL...-2V
11	0,75	11VEL-V-ISO0,75		6,35	0,46	0,7	2,6	3,2	X					NL...-2V
11	1,0		11VER-V-ISO1,00	6,35	0,61	0,7	2,5	3,2	X	X	X		X	NL...-2V
11	1,0	11VEL-V-ISO1,00		6,35	0,61	0,7	2,5	3,2	X	X	X			NL...-2V
11	1,5		11VER-V-ISO1,50	6,35	0,92	0,7	2,2	3,2	X	X	X			NL...-2V
11	1,5	11VEL-V-ISO1,50		6,35	0,92	0,7	2,2	3,2	X	X	X			NL...-2V
11	1,75		11VER-V-ISO1,75	6,35	1,07	0,7	2,1	3,2	X		X	X		NL...-2V
11	2,0		11VER-V-ISO2,00	6,35	1,23	0,7	1,9	3,2		X	X	X		NL...-2V
11	2,0	11VEL-V-ISO2,00		6,35	1,23	0,7	1,9	3,2		X	X			NL...-2V
16	0,35		16VER-V-ISO0,35	9,525	0,20	1,1	3,25	3,6	X			X		NL...-3V
16	0,35	16VEL-V-ISO0,35		9,525	0,20	1,1	3,25	3,6	X					NL...-3V
16	0,4		16VER-V-ISO0,40	9,525	0,25	1,1	3,2	3,6			X	X		NL...-3V
16	0,5		16VER-V-ISO0,50	9,525	0,31	1,1	3,0	3,6	X	X	X	X	X	NL...-3V
16	0,5	16VEL-V-ISO0,50		9,525	0,31	1,1	3,0	3,6	X	X		X		NL...-3V
16	0,75		16VER-V-ISO0,75	9,525	0,46	1,1	3,0	3,6	X	X	X	X		NL...-3V
16	0,75	16VEL-V-ISO0,75		9,525	0,46	1,1	3,0	3,6		X	X	X		NL...-3V
16	0,8		16VER-V-ISO0,80	9,525	0,49	1,1	3,0	3,6	X	X	X			NL...-3V
16	0,8	16VEL-V-ISO0,80		9,525	0,49	1,1	3,0	3,6			X			NL...-3V
16	1,0		16VER-V-ISO1,00	9,525	0,61	1,1	2,9	3,6	X	X	X	X	X	NL...-3V
16	1,0	16VEL-V-ISO1,00		9,525	0,61	1,1	2,9	3,6	X	X	X	X		NL...-3V
16	1,25		16VER-V-ISO1,25	9,525	0,77	1,1	2,7	3,6	X	X	X	X		NL...-3V
16	1,25	16VEL-V-ISO1,25		9,525	0,77	1,1	2,7	3,6		X	X			NL...-3V
16	1,5		16VER-V-ISO1,50	9,525	0,92	1,1	2,6	3,6	X	X	X	X	X	NL...-3V
16	1,5	16VEL-V-ISO1,50		9,525	0,92	1,1	2,6	3,6	X	X	X	X		NL...-3V
16	1,75		16VER-V-ISO1,75	9,525	1,07	1,1	2,45	3,6	X	X	X	X		NL...-3V
16	1,75	16VEL-V-ISO1,75		9,525	1,07	1,1	2,45	3,6	X	X	X	X		NL...-3V
16	2,0		16VER-V-ISO2,00	9,525	1,23	1,1	2,3	3,6	X	X	X	X		NL...-3V
16	2,0	16VEL-V-ISO2,00		9,525	1,23	1,1	2,3	3,6	X	X	X	X	X	NL...-3V
16	2,5		16VER-V-ISO2,50	9,525	1,53	1,1	2,1	3,6	X	X	X	X		NL...-3V
16	2,5	16VEL-V-ISO2,50		9,525	1,53	1,1	2,1	3,6	X					NL...-3V
16	3,0		16VER-V-ISO3,00	9,525	1,84	1,1	2,0	3,6	X	X	X	X		NL...-3V

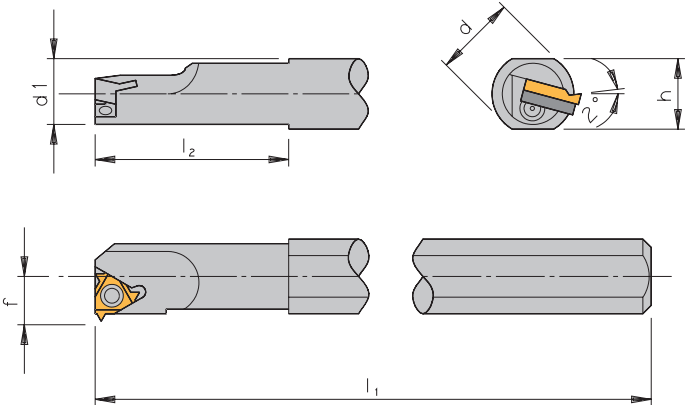
X 구매가능  
● 강력추천  
○ 추천

P	●		○	
M	●	●	●	
K	○	○		● ●
N				● ●
S	○			
H				


# Threading Tool Holders

Internal Thread  
without coolant through


Type  
Standard



## Holder

	규격	h	l <sub>1</sub>	l <sub>2</sub>	d	d <sub>1</sub>	f	min. bore-Ø
11	NVR10D-2 R/L	—	100	—	10	10.0	7.3	13.0
11	NVR10-2 R/L	18.0	180	25	20	10.0	7.3	13.0
11	NVR13-2 R/L	18.0	180	32	20	13.0	8.9	16.0
16	NVR13-3 R/L	18.0	180	32	20	12.7	10.3	17.0
16	NVR16-3 R/L	18.0	180	40	20	16.0	11.5	20.0
16	NVR16D-3 R/L	15.2	150	32	16	16.0	11.3	20.0
16	AVR20-3 R/L	18.0	180	40	20	20.0	13.4	24.0
16	AVR25-3 R/L	29.0	250	60	32	25.0	16.3	29.0
16	AVR25D-3 R/L	22.6	200	45	25	24.6	16.1	29.0
16	AVR32-3 R/L	29.0	250	60	32	32.0	19.6	36.0
16	AVR40-3 R/L	36.0	300	60	40	40.0	23.8	44.0
22	NVR20-4 R/L	18.0	180	50	20	20.0	15.6	27.0
22	AVR25-4 R/L	29.0	250	60	32	25.0	17.4	32.0
22	AVR25D-4 R/L	22.6	200	45	25	24.6	17.2	32.0
22	AVR32-4 R/L	29.0	250	60	32	32.0	21.5	39.0
22	AVR40-4 R/L	36.0	300	60	40	40.0	25.8	47.0
22	AVR50-4 R/L	45.0	350	75	50	50.0	30.8	57.0
27	AVR32-5 R/L	29.0	250	60	32	32.0	22.4	40.0
27	AVR40-5 R/L	36.0	300	60	40	40.0	26.4	48.0
27	AVR50-5 R/L	45.0	350	75	50	50.0	31.4	58.0
27	AVR60-5 R/L	54.0	400	75	60	60.0	36.4	69.0

## Spare Parts

	Clamping screw	Screw and washer for support pad	Key	Support pad R	Support pad L
11	SN2T	—	KS 1751	—	—
16 ❶	SA3T	SY3T	KS 2510	YI3	YE3
22 ❷	SA4T	SY4T	KS 2520	YI4	YE4
27	SA5T	SY5T	KS 2525	YI5	YE5

❶ NVR 16-3 R/L uses clamping screw SN3T.  
❷ NVR 20-4 R/L uses clamping screw SN4T.

Dimensions in mm

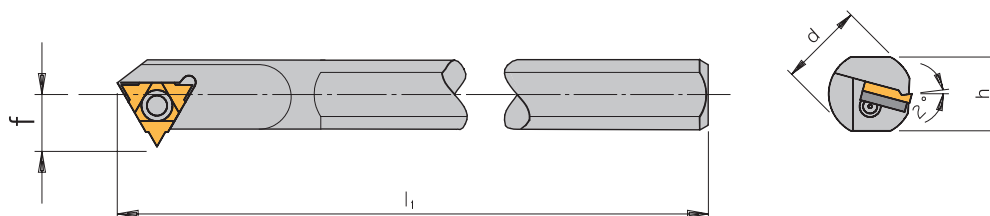
# Threading Tool Holders

## Internal Thread

with coolant through

Type

U for regular threads



## Holder

규격	h	l <sub>1</sub>	l <sub>2</sub>	d	d <sub>1</sub>	min. bore-Ø	Degree
6,0 U NVRC8-6,0U 156/003 R/L	18	180	24	20	8,0	5,86	4,0
11 U NVRC10-2U 156/004 R/L	18	180	32	20	10,0	7,40	4,0
11 U NVRC11-2U 156/002 R/L	18	180	32	20	11,2	7,30	3,0
16 U NVRC11-3U 156/020 R/L	18	180	32	20	11,0	8,23	4,5
16 U NVRC14-3U 156/018 R/L	18	180	38	20	13,4	9,99	4,5
16 U NVRC15-3U 156/019 R/L	18	180	38	20	15,4	10,99	4,0
22 U NVRC20-4U 156/011 R/L	18	180	40	20	19,2	13,68	4,0
22 U NVRC25-4U 156/013 R/L	29	250	60	32	25,0	17,63	3,5
22 U NVRC32-4U 156/014 R/L	29	250	60	32	29,7	18,76	3,3
27 U NVRC32-5U 156/015 R/L	29	250	60	32	31,6	20,96	3,2

## Spare Parts

Clamping screw	Key
6,0 U SN6MT	KS 1886
11 U SM2T8	KS 1751
16 U SN3T	KS 2510
22 U SN4T	KS 2520
27 U SN5T	KS 2525

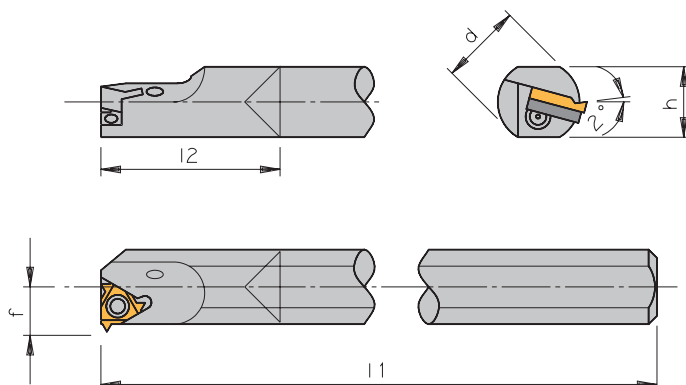
Dimensions in mm

# Threading Tool Holders

## Internal Thread

with coolant through

Type  
Standard  
with carbide shank

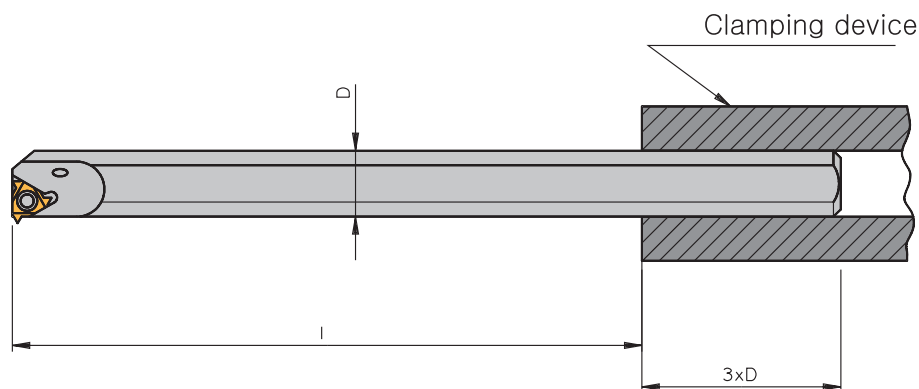


### Holder

규격	d	h	f	l <sub>1</sub>	l <sub>2</sub>	min. bore-Ø
11 CNVRC10-2 R/L	10	9,5	7,3	150	19	13,0
11 CNVRC12-2 R/L	12	11,7	8,3	180	25	15,0
16 CNVRC16-3 R/L	16	15,6	11,5	200	27	20,0
22 CNVRC20-4 R/L	20	19,5	13,8	250	35	25,0

### Spare Parts

Clamping screw	Screw and washer for support pad	Key	Support pad R	Support pad L
11 SN2T	-	KS 1751	-	-
16 (d 16) SN3T	-	KS 2510	-	-
16 (d 20) SA3T	SY3T	KS 2510	YI3	YE3
22 SN4T	-	KS 2520	-	-

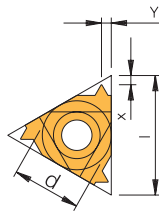


Dimensions in mm

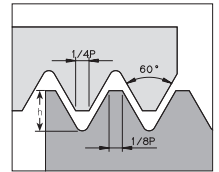
Metric


ISO

## Internal Thread



Right hand execution shown


Type  
Standard

	Pitch		Grade availability										Holder
	[mm]	Left hand	Right hand	d	h <sub>min</sub>	x	y	coated			uncoated		
								AL100	AM7C	AM15C	AK20	AK20P	
11	0,35		11IR-V-ISO0,35	6,35	0,20	0,8	0,3	X	X	X	X		NVR...-2
11	0,35	11IL-V-ISO0,35		6,35	0,20	0,8	0,3	X					NVR...-2
11	0,4		11IR-V-ISO0,40	6,35	0,23	0,8	0,4	X		X			NVR...-2
11	0,45		11IR-V-ISO0,45	6,35	0,26	0,8	0,4	X			X		NVR...-2
11	0,5		11IR-V-ISO0,50	6,35	0,29	0,6	0,4	X	X	X	X	X	NVR...-2
11	0,5	11IL-V-ISO0,50		6,35	0,29	0,6	0,4	X	X	X	X	X	NVR...-2
11	0,6		11IR-V-ISO0,60	6,35	0,35	0,6	0,6	X			X		NVR...-2
11	0,7		11IR-V-ISO0,70	6,35	0,40	0,6	0,6	X	X	X	X		NVR...-2
11	0,7	11IL-V-ISO0,70		6,35	0,40	0,6	0,6		X				NVR...-2
11	0,75		11IR-V-ISO0,75	6,35	0,43	0,6	0,6	X	X	X	X	X	NVR...-2
11	0,75	11IL-V-ISO0,75		6,35	0,43	0,6	0,6	X		X	X	X	NVR...-2
11	0,8		11IR-V-ISO0,80	6,35	0,46	0,6	0,6	X	X	X	X		NVR...-2
11	0,8	11IL-V-ISO0,80		6,35	0,46	0,6	0,6	X		X			NVR...-2
11	1		11IR-V-ISO1,00	6,35	0,58	0,6	0,7	X	X	X	X	X	NVR...-2
11	1	11IL-V-ISO1,00		6,35	0,58	0,6	0,7	X	X	X	X	X	NVR...-2
11	1,25		11IR-V-ISO1,25	6,35	0,72	0,8	0,9	X	X	X	X	X	NVR...-2
11	1,25	11IL-V-ISO1,25		6,35	0,72	0,8	0,9	X		X	X		NVR...-2
11	1,5		11IR-V-ISO1,50	6,35	0,87	0,8	1,0	X	X	X	X	X	NVR...-2
11	1,5	11IL-V-ISO1,50		6,35	0,87	0,8	1,0	X	X	X	X		NVR...-2
11	1,75		11IR-V-ISO1,75	6,35	1,01	0,9	1,1	X	X	X	X		NVR...-2
11	1,75	11IL-V-ISO1,75		6,35	1,01	0,9	1,1	X		X			NVR...-2
11	2		11IR-V-ISO2,00	6,35	1,15	0,9	1,1	X	X	X	X	X	NVR...-2
11	2	11IL-V-ISO2,00		6,35	1,15	0,9	1,1	X	X	X	X		NVR...-2
11	2,5		11IR-V-ISO2,50	6,35	1,44	0,8	1,1	X	X	X	X		NVR...-2
11	2,5	11IL-V-ISO2,50		6,35	1,44	0,8	1,1	X	X	X			NVR...-2
11	0,5		11IR-V-ISO0,50-SB	6,35	0,29	1,2	0,5	X					NVR...-2
11	0,75		11IR-V-ISO0,75-SB	6,35	0,43	1,2	0,5	X					NVR...-2
11	0,8		11IR-V-ISO0,80-SB	6,35	0,46	1,2	0,5	X					NVR...-2
11	1		11IR-V-ISO1,00-SB	6,35	0,58	0,7	0,8	X					NVR...-2
11	1,25		11IR-V-ISO1,25-SB	6,35	0,72	0,7	0,8	X					NVR...-2
11	1,5		11IR-V-ISO1,50-SB	6,35	0,87	0,7	0,8	X					NVR...-2
16	0,35		16IR-V-ISO0,35	9,525	0,20	0,8	0,3	X		X	X		AVR...-3
16	0,35	16IL-V-ISO0,35		9,525	0,20	0,8	0,3				X		AVR...-3
16	0,4		16IR-V-ISO0,40	9,525	0,23	0,8	0,4	X	X	X	X		AVR...-3
16	0,4	16IL-V-ISO0,40		9,525	0,23	0,8	0,4	X					AVR...-3
16	0,45		16IR-V-ISO0,45	9,525	0,26	0,8	0,4	X					AVR...-3
16	0,45	16IL-V-ISO0,45		9,525	0,26	0,8	0,4	X					AVR...-3
16	0,5		16IR-V-ISO0,50	9,525	0,29	0,6	0,4	X	X	X	X	X	AVR...-3
16	0,5	16IL-V-ISO0,50		9,525	0,29	0,6	0,4	X	X	X	X		AVR...-3
16	0,6		16IR-V-ISO0,60	9,525	0,35	0,6	0,6	X	X	X	X		AVR...-3
16	0,6	16IL-V-ISO0,60		9,525	0,35	0,6	0,6	X	X	X			AVR...-3
16	0,7		16IR-V-ISO0,70	9,525	0,40	0,6	0,6	X	X	X	X		AVR...-3
16	0,7	16IL-V-ISO0,70		9,525	0,40	0,6	0,6	X	X	X			AVR...-3
16	0,75		16IR-V-ISO0,75	9,525	0,43	0,6	0,6	X	X	X	X	X	AVR...-3
16	0,75	16IL-V-ISO0,75		9,525	0,43	0,6	0,6	X	X	X	X		AVR...-3
16	0,8		16IR-V-ISO0,80	9,525	0,46	0,6	0,6	X	X	X	X		AVR...-3
16	0,8	16IL-V-ISO0,80		9,525	0,46	0,6	0,6	X	X	X	X		AVR...-3
16	1,0		16IR-V-ISO1,00	9,525	0,58	0,6	0,7	X	X	X	X	X	AVR...-3
16	1,0	16IL-V-ISO1,00		9,525	0,58	0,6	0,7	X	X	X	X	X	AVR...-3
16	1,25		16IR-V-ISO1,25	9,525	0,72	0,8	0,9	X	X	X	X	X	AVR...-3
16	1,25	16IL-V-ISO1,25		9,525	0,72	0,8	0,9	X	X	X	X		AVR...-3
16	1,5		16IR-V-ISO1,50	9,525	0,87	0,8	1,0	X	X	X	X	X	AVR...-3
16	1,5	16IL-V-ISO1,50		9,525	0,87	0,8	1,0	X	X	X	X	X	AVR...-3
16	1,75		16IR-V-ISO1,75	9,525	1,01	0,9	1,2	X	X	X	X	X	AVR...-3
16	1,75	16IL-V-ISO1,75		9,525	1,01	0,9	1,2	X	X	X			AVR...-3
16	2,0		16IR-V-ISO2,00	9,525	1,15	1,0	1,3	X	X	X	X	X	AVR...-3
16	2,0	16IL-V-ISO2,00		9,525	1,15	1,0	1,3	X	X	X	X		AVR...-3
16	2,5		16IR-V-ISO2,50	9,525	1,44	1,1	1,5	X	X	X	X	X	AVR...-3
16	2,5	16IL-V-ISO2,50		9,525	1,44	1,1	1,5	X	X	X	X		AVR...-3
16	3,0		16IR-V-ISO3,00	9,525	1,73	1,1	1,5	X	X	X	X	X	AVR...-3
16	3,0	16IL-V-ISO3,00		9,525	1,73	1,1	1,5	X	X	X	X		AVR...-3

Dimensions in mm

## Internal Thread

Type **Standard**

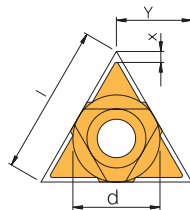
								Grade availability						
	Pitch							coated			uncoated		Holder	
	[mm]	Left hand	Right hand	d	h <sub>min</sub>	x	y	AL100	AM7C	AM15C	AK20	AK20P		
16	3,5		16IR-V-ISO3,50	9,525	2,02	1,2	1,5	X	X	X			AVR...-3	
16	3,5	16IL-V-ISO3,50		9,525	2,02	1,2	1,5	X		X			AVR...-3	
16	1,0		16IR-V-ISO1,00-SB	9,525	0,58	0,7	0,8	X					AVR...-3	
16	1,25		16IR-V-ISO1,25-SB	9,525	0,72	0,7	0,8	X					AVR...-3	
16	1,5		16IR-V-ISO1,50-SB	9,525	0,87	0,7	0,8	X					AVR...-3	
16	1,75		16IR-V-ISO1,75-SB	9,525	1,01	1,1	1,5	X					AVR...-3	
16	2,0		16IR-V-ISO2,00-SB	9,525	1,15	1,1	1,5	X					AVR...-3	
16	2,5		16IR-V-ISO2,50-SB	9,525	1,44	1,1	1,5	X					AVR...-3	
16	3,0		16IR-V-ISO3,00-SB	9,525	1,73	1,1	1,5	X					AVR...-3	
22	3,5		22IR-V-ISO3,50	12,7	2,02	1,6	2,3	X	X	X	X		AVR...-4	
22	3,5	22IL-V-ISO3,50		12,7	2,02	1,6	2,3	X	X	X			AVR...-4	
22	4,0		22IR-V-ISO4,00	12,7	2,31	1,6	2,3	X	X	X	X		AVR...-4	
22	4,0	22IL-V-ISO4,00		12,7	2,31	1,6	2,3	X	X	X	X		AVR...-4	
22	4,5		22IR-V-ISO4,50	12,7	2,60	1,6	2,4	X	X	X	X		AVR...-4	
22	4,5	22IL-V-ISO4,50		12,7	2,60	1,6	2,4	X	X	X			AVR...-4	
22	5,0		22IR-V-ISO5,00	12,7	2,89	1,6	2,3	X	X	X	X		AVR...-4	
22	5,0	22IL-V-ISO5,00		12,7	2,89	1,6	2,3	X	X	X			AVR...-4	
22	5,5		22IR-V-ISO5,50	12,7	3,17	1,6	2,3	X	X	X	X		AVR...-4	
22	5,5	22IL-V-ISO5,50		12,7	3,17	1,6	2,3		X	X			AVR...-4	
22	6,0		22IR-V-ISO6,00	12,7	3,46	1,8	2,5	X	X	X	X		AVR...-4	
22	6,0	22IL-V-ISO6,00		12,7	3,46	1,8	2,5	X			X		AVR...-4	
27	4,5		27IR-V-ISO4,50	15,88	2,60	1,6	2,4	X	X				AVR...-5	
27	5,0		27IR-V-ISO5,00	15,88	2,89	1,6	2,3	X					AVR...-5	
27	5,5		27IR-V-ISO5,50	15,88	3,17	1,6	2,3	X	X	X	X		AVR...-5	
27	5,5	27IL-V-ISO5,50		15,88	3,17	1,6	2,3	X		X			AVR...-5	
27	6,0		27IR-V-ISO6,00	15,88	3,46	1,8	2,5	X	X	X	X		AVR...-5	
27	6,0	27IL-V-ISO6,00		15,88	3,46	1,8	2,5	X		X			AVR...-5	


X 구매가능

● 강력추천

○ 추천

P	●		○	
M	●	●	●	
K	○	○		● ●
N				● ●
S	○			
H				

Type **U**

							Grade availability				
Pitch							coated			uncoated	
	[mm]	Left / right	d	h <sub>min</sub>	x	y	AL100	AM7C	AM15C	AK20	Holder
22	5,5	22UIN-V-ISO5,50	12,7	3,17	2,4	11,0	X				AVR...-4U
22	6	22UIN-V-ISO6,00	12,7	3,46	2,1	11,0	X		X		AVR...-4U
27	8	27UIN-V-ISO8,00	15,88	4,62	2,4	13,7	X		X		AVR...-5U

X 구매가능

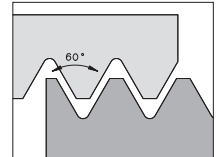
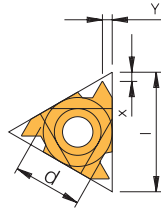
● 강력추천

○ 추천

P	●		○	
M	●	●	●	
K	○	○		●
N				●
S	○			
H				

# Internal Thread

Type **Standard**

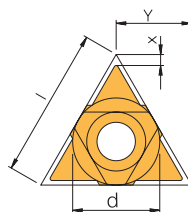


Pitch									Grade availability				
	[mm]	[TPI]	Left hand	Right hand	d	r	x	y	coated			uncoated	Holder
									AL100	AM7C	AM15C	AK20	
11	0,5-1,5	48-16		<b>11IR-T-A60</b>	6,35	0,05	0,8	0,9	X	X	X	X	NVR..-2
11	0,5-1,5	48-16	<b>11IL-T-A60</b>		6,35	0,05	0,8	0,9	X	X	X	X	NVR..-2
16	0,5-1,5	48-16		<b>16IR-T-A60</b>	9,525	0,05	0,8	0,9	X	X	X	X	AVR..-3
16	0,5-1,5	48-16	<b>16IL-T-A60</b>		9,525	0,05	0,8	0,9	X	X	X	X	AVR..-3
16	1,75-3,0	14-8		<b>16IR-T-G60</b>	9,525	0,16	1,2	1,7	X	X	X	X	AVR..-3
16	1,75-3,0	14-8	<b>16IL-T-G60</b>		9,525	0,16	1,2	1,7	X	X	X	X	AVR..-3
16	0,5-3,0	48-8		<b>16IR-T-AG60</b>	9,525	0,05	1,2	1,7	X	X	X	X	AVR..-3
16	0,5-3,0	48-8	<b>16IL-T-AG60</b>		9,525	0,05	1,2	1,7	X	X	X	X	AVR..-3
16	0,5-1,5	48-16		<b>16IR-T-A60-SB</b>	9,525	0,05	0,6	0,8	X				AVR..-3
16	1,75-3,0	14-8		<b>16IR-T-G60-SB</b>	9,525	0,16	1,0	1,5	X				AVR..-3
16	0,5-3,0	48-8		<b>16IR-T-AG60-SB</b>	9,525	0,05	0,9	1,5	X				AVR..-3
22	3,5-5,0	7-5		<b>22IR-T-N60</b>	12,7	0,30	1,7	2,5	X	X	X	X	AVR..-4
22	3,5-5,0	7-5	<b>22IL-T-N60</b>		12,7	0,30	1,7	2,5	X	X	X	X	AVR..-4
27	5,5-6,0	4,5-4		<b>27IR-T-Q60</b>	15,88	0,30	1,8	2,7	X		X	X	AVR..-5
27	5,5-6,0	4,5-4	<b>27IL-T-Q60</b>		15,88	0,30	1,8	2,7	X			X	AVR..-5

X 구매가능  
● 강력추천  
○ 추천

P	●		○	
M	●	●		
K	○	○		●
N				●
S	○			
H				

Type **U**



Pitch									Grade availability				
	[mm]	[TPI]	Left / right	d	r	x	y		coated			uncoated	Holder
									AL100	AM15C		AK20	
22	5,5-8,0	4,5-3,25	<b>22UEI-T-U60</b>	12,7	0,30	0,6	11,0		X	X			AVR..-4U
27	6,5-9,0	4-2,75	<b>27UEI-T-U60</b>	15,88	0,37	1,0	13,7			X		X	AVR..-5U

X 구매가능  
● 강력추천  
○ 추천

P	●		○	
M	●	●		
K	○			●
N				●
S	○			
H				



Recommended Cutting Data (추천 절삭 조건)

Thread Turning (나사가공)

ISO	Material		Tensile strength [N/mm²]	Cutting Speed Vc [m/min]				
				AL100	AM7C	AM15C	AK20(P)	HSS-TiN
P	Unalloyed steel and cast steel	ca. 0,15% C	350	115-190	-	140-200	-	20-50
		ca. 0,45% C	650	100-190	-	130-180	-	20-40
		ca. 0,75% C	1000	70-160	-	80-160	-	15-25
	Low alloyed steel and cast steel		600	85-145	-	100-155	-	20-45
			900	75-140	-	90-145	-	10-25
			1200	70-135	-	80-135	-	10-25
	High alloyed steel, high alloyed tool steel and cast steel	annealed	700	70-110	-	70-115	-	-
		hardened and tempered	1100	50-100	-	50-100	-	-
Stainless steel and cast steel	ferritic / martensitic, annealed	700	75-140	-	-	-	25-50	
	martensitic, hardened and tempered	1000	60-120	-	-	-	20-40	
M	Stainless steel and cast steel	austenitic and austenitic/ferritic	450-60070	-130	70-150	70-120	-	-
		chilled	600-90040	-110	40-120	40-90	-	-
K	Cast iron	pearlitic, ferritic	500-70070	-130	-	-	-	-
		pearlitic, martensitic	700-85060	-120	-	-	-	-
			800-110060	-115	-	-	-	-
	Cast iron with nodular graphite	ferritic	550	125-160	-	-	-	-
		pearlitic	800	90-120	-	-	-	-
	Malleable cast iron	ferritic	450	80-180	-	70-150	70-95	-
pearlitic		750	-	-	-	-	-	
N	Aluminum alloys, long chipping	not heat treatable	200	100-365	-	100-240	100-250	30-60
		heat treatable, heat treated	350	80-220	-	80-170	80-160	25-50
	Casted aluminum alloys	≤ 12% Si, hardened	250	200-400	-	-	80-120	25-50
		≤ 12% Si, heat treatable, hardened	300	200-280	-	-	70-100	20-40
		≤ 12% Si, not heat treatable	450	60-180	-	-	50-120	15-30
	Copper and copper alloys (brass / bronze)	Lead alloys, Pb > 1%	400	80-200	120-200	100-250	110-190	15-35
		Brass, bronze	300	80-225	-	80-200	70-170	15-35
		Aluminum bronze	500	-	-	-	-	15-30
		Copper and electrolyte copper	200	120-240	120-300	100-250	110-190	15-35
	Nonferrous materials	Duroplastics		-	-	-	-	-
Reinforced plastics			-	-	-	-	-	
Hard rubber			-	-	-	-	-	
S	High temperature resistant alloys	Fe-alloyed annealed	700	45-60	-	-	30-50	-
		Fe-alloyed hardened	950	30-50	-	-	25-40	-
		Ni- oder Co- based annealed	800	20-30	-	-	20-30	-
		Ni- oder Co- based casting	1100	-	-	-	-	-
		Ni- oder Co- based hardened	1200	15-25	-	-	15-25	-
	Titanium alloys, high strength	Pure titanium	500-7001	40-170	-	-	60-100	-
	Alpha- and beta-alloys, hardened		700-100050	-70	-	-	40-60	-
H	Hardened steel	hardened and tempered	1000-1350	-	-	-	-	-
		hardened and tempered	1350-1700	-	-	-	-	-
	Hard cast iron	casting	1350	-	-	-	-	-
	Hardened cast iron	hardened and tempered	1900	45-60	-	45-60	-	-

The datas cutting speeds given are approximate values. It is necessary to adjust them to the individual machining operation.

# SHARK CUT



1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

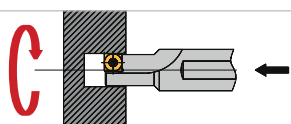
7. SPHINX

**SHARK-CUT® Standard:**Turning and boring  $\geq \varnothing 8 \text{ mm}$ 

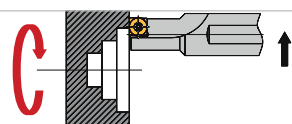
1,5 x D

2,25 x D

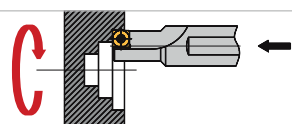
3 x D



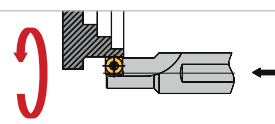
Drilling with flat bottom face



Facing operations



Turning of internal profiles



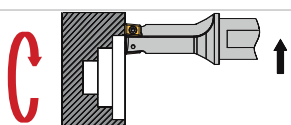
Turning of external profiles

**SHARK-CUT® Rebore:**2 flute  $\geq \varnothing 12 \text{ mm}$ 3 flute  $\geq \varnothing 24 \text{ mm}$ 

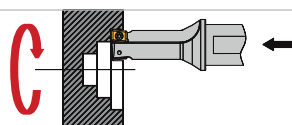
2,25 x D



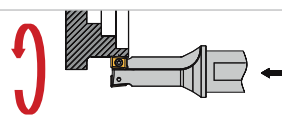
2,25 x D



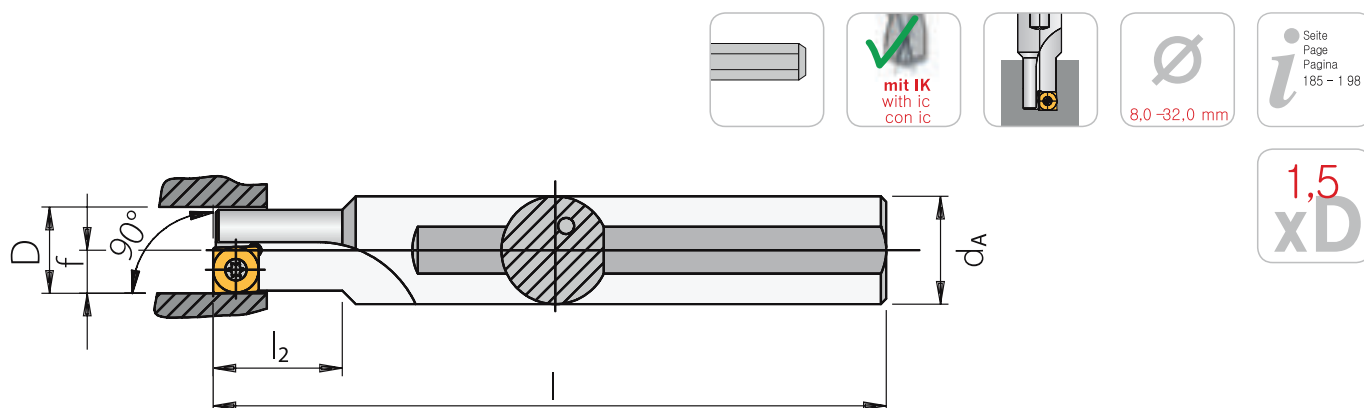
Facing operations



Turning of internal profiles



Turning of external profiles

Drilling depth up to  $1.5 \times D$ 

## Holder

규격	D	l	$l_2$	$d_A$	f	Insert
SC08R/L-0012G-04*	8	80	12,0	12	4,0	LPET / LPNT 0401..
SC10R/L-0015G-05	10	90	15,0	12	5,0	LPET / LPNT 0502..
SC12R/L-0018G-06	12	100	18,0	16	6,0	LPET / LPNT 0602..
SC14R/L-0021G-07	14	110	21,0	16	7,0	LPET / LPNT 0703..
SC16R/L-0024G-08	16	125	24,0	20	8,0	LPET / LPNT 0803..
SC18R/L-0027G-09	18	135	27,0	25	9,0	LPET / LPNT 09T3..
SC20R/L-0030G-10	20	150	30,0	25	10,0	LPET / LPNT 10T3..
SC25R/L-0038G-13	25	180	37,5	32	12,5	LPET / LPNT 1304..
SC32R/L-0048G-17	32	200	48,0	40	16,0	LPET / LPNT 1705..

\* Right-hand holder → Right-hand indexable insert

Left-hand holder → Left-hand indexable insert

Dimensions in mm

Drilling depth up to  $2.25 \times D$ 

1. DIAMETAL

2. BIMU

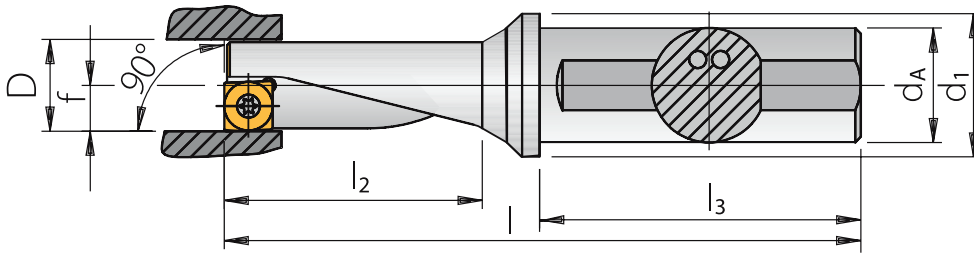
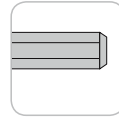
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



## Holder

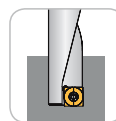
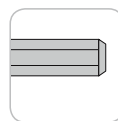
규격	D	l	l <sub>2</sub>	l <sub>3</sub>	d <sub>1</sub>	d <sub>A</sub>	f	Insert
SC08R/L-0018SP-04*	8	60,0	18,0	38	12	10	4,0	LPET / LPNT 0401..
SC10R/L-0023SP-05	10	69,5	22,5	42	16	12	5,0	LPET / LPNT 0502..
SC12R/L-0027SP-06	12	78,0	27,0	45	20	16	6,0	LPET / LPNT 0602..
SC14R/L-0032SP-07	14	83,5	31,5	45	20	16	7,0	LPET / LPNT 0703..
SC16R/L-0036SP-08	16	94,0	36,0	50	25	20	8,0	LPET / LPNT 0803..
SC18R/L-0041SP-09	18	109,5	40,5	56	32	25	9,0	LPET / LPNT 09T3..
SC20R/L-0045SP-10	20	111,0	45,0	56	32	25	10,0	LPET / LPNT 10T3..
SC25R/L-0057SP-13	25	129,0	56,5	60	40	32	12,5	LPET / LPNT 1304..
SC32R/L-0072SP-17	32	158,0	72,0	70	50	40	16,0	LPET / LPNT 1705..

\* Right-hand holder → Right-hand indexable insert

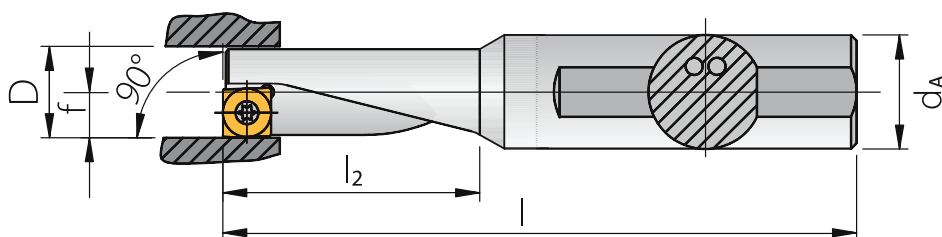
Left-hand holder → Left-hand indexable insert

Dimensions in mm

## Drilling depth up to 3 x D



Vibration damped!



## Holder

규격	D	l	l <sub>2</sub>	d <sub>A</sub>	f	Insert
SC08R/L-0024SP-04*	8	80	24	12	4,0	LPET / LPNT 0401..
SC10R/L-0030SP-05	10	85	30	12	5,0	LPET / LPNT 0502..
SC12R/L-0036SP-06	12	95	36	16	6,0	LPET / LPNT 0602..
SC14R/L-0042SP-07	14	100	42	16	7,0	LPET / LPNT 0703..
SC16R/L-0048SP-08	16	110	48	20	8,0	LPET / LPNT 0803..
SC18R/L-0054SP-09	18	125	54	25	9,0	LPET / LPNT 09T3..
SC20R/L-0060SP-10	20	130	60	25	10,0	LPET / LPNT 10T3..
SC25R/L-0075SP-13	25	150	75	32	12,5	LPET / LPNT 1304..
SC32R/L-0096SP-17	32	185	96	40	16,0	LPET / LPNT 1705..

\* Right-hand holder → Right-hand indexable insert  
 Left-hand holder → Left-hand indexable insert

Dimensions in mm

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

Drilling depth up to  $2.25 \times D$  – 2 flute

1. DIAMETAL

2. BIMU

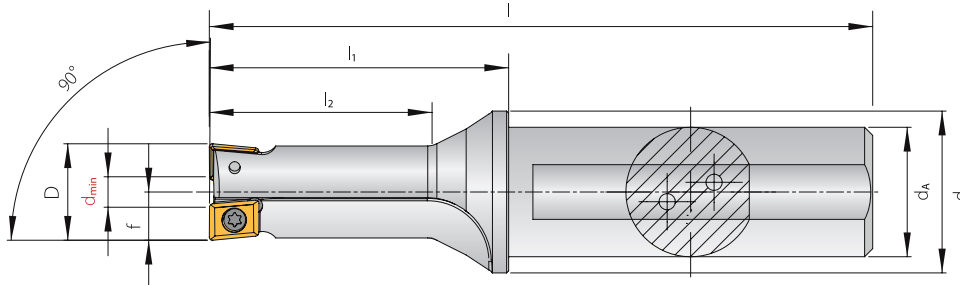
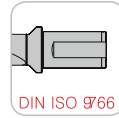
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

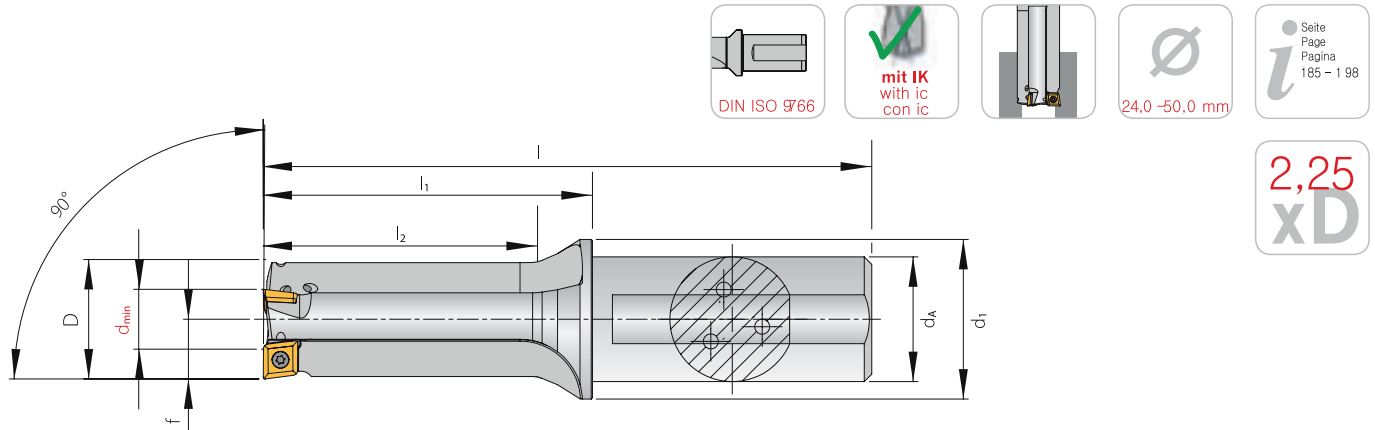


## Holder

규격	D	d <sub>min</sub>	l	l <sub>1</sub>	l <sub>2</sub>	d <sub>1</sub>	d <sub>A</sub>	f	z	Insert
SCR1204R02-002 7G-04*	12,0	4,0	82	37	27	20	16	5,0	2	LPET / LPNT 040 1..
SCR1305R02-0029G -04*	13,0	5,0	84	39	29	20	16	6,0	2	LPET / LPNT 040 1..
SCR1406R02-0032G -04*	14,0	6,0	86	41	32	20	16	7,0	2	LPET / LPNT 040 1..
SCR1507R02-0034G -04*	15,0	7,0	88	43	34	20	16	8,0	2	LPET / LPNT 040 1..
SCR1606R02-0036G -05	16,0	6,0	97	47	36	25	20	7,0	2	LPET / LPNT 0502..
SCR1707R02-0038G -05	17,0	7,0	99	49	38	25	20	8,0	2	LPET / LPNT 0502..
SCR17575R02-0039G -05	17,5	7,5	101	51	39	25	20	8,5	2	LPET / LPNT 0502..
SCR1806R02-004 1G-06	18,0	6,0	102	52	41	25	20	7,0	2	LPET / LPNT 0602..
SCR1907R02-0043G -06	19,0	7,0	104	54	43	25	20	8,0	2	LPET / LPNT 0602..
SCR2006R02-0045G -07	20,0	6,0	114	58	45	32	25	7,0	2	LPET / LPNT 0 703..
SCR2107R02-004 7G-07	21,0	7,0	116	60	47	32	25	8,0	2	LPET / LPNT 0 703..
SCR2208R02-0050G -07	22,0	8,0	118	62	50	32	25	9,0	2	LPET / LPNT 0 703..
SCR2309R02-0052G -07	23,0	9,0	120	64	52	32	25	10,0	2	LPET / LPNT 0 703..
SCR2408R02-0054G -08	24,0	8,0	122	66	54	32	25	9,0	2	LPET / LPNT 0803..
SCR2509R02-0056G -08	25,0	9,0	130	70	56	40	32	10,0	2	LPET / LPNT 0803..
SCR2608R02-0059G -09	26,0	8,0	134	74	59	40	32	9,0	2	LPET / LPNT 09T3..
SCR2709R02-006 1G-09	27,0	9,0	137	77	61	40	32	10,0	2	LPET / LPNT 09T3..
SCR2810R02-0063G -09	28,0	10,0	140	80	63	40	32	11,0	2	LPET / LPNT 09T3..
SCR2909R02-0065G -10	29,0	9,0	144	84	65	40	32	10,0	2	LPET / LPNT 10T3..
SCR3010R02-0068G -10	30,0	10,0	146	86	68	40	32	11,0	2	LPET / LPNT 10T3..
SCR3111R02-00 70G-10	31,0	11,0	149	89	70	40	32	12,0	2	LPET / LPNT 10T3..
SCR3212R02-00 72G-10	32,0	12,0	151	91	72	40	32	13,0	2	LPET / LPNT 10T3..
SCR3313R02-00 74G-10	33,0	13,0	154	94	75	40	32	13,0	2	LPET / LPNT 10T3..
SCR3414R02-00 77G-10	34,0	14,0	156	96	77	40	32	15,0	2	LPET / LPNT 1304..
SCR3510R02-00 79G-13	35,0	10,0	166	96	79	50	40	10,0	2	LPET / LPNT 1304..
SCR3611R02-008 1G-13	36,0	11,0	168	98	81	50	40	11,0	2	LPET / LPNT 1304..
SCR3712R02-0083G -13	37,0	12,0	170	100	83	50	40	12,0	2	LPET / LPNT 1304..
SCR3813R02-0086G -13	38,0	13,0	173	103	86	50	40	13,0	2	LPET / LPNT 1304..
SCR3914R02-0088G -13	39,0	14,0	175	105	88	50	40	14,0	2	LPET / LPNT 1304..
SCR4015R02-0090G -13	40,0	15,0	177	107	90	50	40	15,0	2	LPET / LPNT 1304..
SCR4116R02-0092G -13	41,0	16,0	179	109	92	50	40	16,0	2	LPET / LPNT 1304..
SCR4217R02-0095G -13	42,0	17,0	182	112	95	50	40	17,0	2	LPET / LPNT 1304..
SCR4318R02-009 7G-13	43,0	18,0	185	115	97	50	40	18,0	2	LPET / LPNT 1304..
SCR4419R02-0099G -13	44,0	19,0	187	117	99	50	40	19,0	2	LPET / LPNT 1304..
SCR4513R02-0 101G-17	45,0	13,0	192	122	101	55	40	13,0	2	LPET / LPNT 1705..
SCR4614R02-0 104G-17	46,0	14,0	194	124	104	55	40	14,0	2	LPET / LPNT 1705..
SCR4715R02-0 106G-17	47,0	15,0	196	126	106	55	40	15,0	2	LPET / LPNT 1705..
SCR4816R02-0 108G-17	48,0	16,0	198	128	108	55	40	16,0	2	LPET / LPNT 1705..
SCR4917R02-0 110G-17	49,0	17,0	200	130	110	55	40	17,0	2	LPET / LPNT 1705..
SCR5018R02-0 113G-17	50,0	18,0	203	133	113	55	40	18,0	2	LPET / LPNT 1705..

\* Right-hand holder → Right-hand indexable insert

Dimensions in mm

Drilling depth up to  $2.25 \times D$  – 3 flute

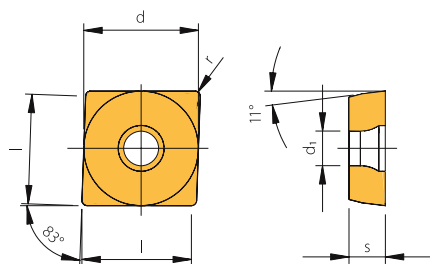
## Holder

규격	D	$d_{min}$	l	$l_1$	$l_2$	$d_1$	$d_A$	f	z	Insert
SCR2412R03-0054G -06	24	12	122	66	54	32	25	13	3	LPET / LPNT 0602..
SCR2513R03-0056G -06	25	13	130	70	56	40	32	14	3	LPET / LPNT 0602..
SCR2612R03-0059G -07	26	12	134	74	59	40	32	13	3	LPET / LPNT 0703..
SCR2713R03-006 1G-07	27	13	137	77	61	40	32	14	3	LPET / LPNT 0703..
SCR2814R03-0063G -07	28	14	140	80	63	40	32	15	3	LPET / LPNT 0703..
SCR2913R03-0065G -08	29	13	144	84	65	40	32	14	3	LPET / LPNT 0803..
SCR3014R03-0068G -08	30	14	146	86	68	40	32	15	3	LPET / LPNT 0803..
SCR3115R03-00 70G-08	31	15	149	89	70	40	32	16	3	LPET / LPNT 0803..
SCR3216R03-00 72G-08	32	16	151	91	72	40	32	17	3	LPET / LPNT 0803..
SCR3317R03-00 74G-08	33	17	154	94	74	40	32	18	3	LPET / LPNT 0803..
SCR3418R03-00 77G-08	34	18	156	96	77	40	32	19	3	LPET / LPNT 0803..
SCR3517R03-00 79G-09	35	17	166	96	79	50	40	18	3	LPET / LPNT 09T3..
SCR3618R03-008 1G-09	36	18	168	98	81	50	40	19	3	LPET / LPNT 09T3..
SCR3719R03-0083G -09	37	19	170	100	83	50	40	20	3	LPET / LPNT 09T3..
SCR3820R03-0086G -09	38	20	173	103	86	50	40	21	3	LPET / LPNT 09T3..
SCR3921R03-0088G -09	39	21	175	105	88	50	40	22	3	LPET / LPNT 09T3..
SCR4022R03-0090G -09	40	22	177	107	90	50	40	23	3	LPET / LPNT 09T3..
SCR4121R03-0092G -10	41	21	179	109	92	50	40	22	3	LPET / LPNT 10T3..
SCR4222R03-0095G -10	42	22	182	112	95	50	40	23	3	LPET / LPNT 10T3..
SCR4323R03-009 7G-10	43	23	185	115	97	50	40	24	3	LPET / LPNT 10T3..
SCR4424R03-0099G -10	44	24	187	117	99	50	40	25	3	LPET / LPNT 10T3..
SCR4525R03-0 101G-10	45	25	190	120	101	50	40	26	3	LPET / LPNT 10T3..
SCR4626R03-0 104G-10	46	26	192	122	104	50	40	27	3	LPET / LPNT 10T3..
SCR4727R03-0 106G-10	47	27	195	125	106	50	40	28	3	LPET / LPNT 10T3..
SCR4823R03-0 108G-13	48	23	198	128	108	55	40	23	3	LPET / LPNT 1304..
SCR4924R03-0 110G-13	49	24	200	130	110	55	40	24	3	LPET / LPNT 1304..
SCR5025R03-0 113G-13	50	25	203	133	113	55	40	25	3	LPET / LPNT 1304..

Dimensions in mm



## Inserts



## LPET



구 격	l	d <sup>①</sup>	s	r	d <sub>1</sub>	coated			uncoated
						AL10	AM35C	AR26C	AK10
LPET 050204FN-AL U	5.0	5.8	2.10	0.4	2.25	●			●
LPET 060204FN-AL U	6.0	6.5	2.38	0.4	2.50	●			●
LPET 070304FN-AL U	7.0	7.6	3.18	0.4	2.80	●			●
LPET 080304FN-AL U	8.0	8.5	3.18	0.4	3.40	●			●
LPET 09T304FN-AL U	9.0	9.6	3.00	0.4	3.40	●			●
LPET 10T304FN-AL U	10.0	10.6	3.97	0.4	4.40	●			●
LPET 130404FN-AL U	12.5	13.5	4.76	0.4	5.30	●			●
LPET 170508FN-AL U	16.0	17.5	5.56	0.8	5.30	●			●
LPET 040 102FL-AWI*	4.0	4.5	1.80	0.2	2.10	●			●
LPET 040 102FR-AWI*	4.0	4.5	1.80	0.2	2.10	●			●
LPET 040 104FL-AWI*	4.0	4.5	1.80	0.4	2.10	●			●
LPET 040 104FR-AWI*	4.0	4.5	1.80	0.4	2.10	●			●
LPET 050202FN-A WI	5.0	5.8	2.10	0.2	2.25	●			●
LPET 050204FN-A WI	5.0	5.8	2.10	0.4	2.25	●			●
LPET 060202FN-A WI	6.0	6.5	2.38	0.2	2.50	●			●
LPET 060204FN-A WI	6.0	6.5	2.38	0.4	2.50	●			●
LPET 070304FN-A WI	7.0	7.6	3.18	0.4	2.80	●			●
LPET 080304FN-A WI	8.0	8.5	3.18	0.4	3.40	●			●
LPET 09T304FN-A WI	9.0	9.6	3.97	0.4	3.40	●			●
LPET 10T304FN-A WI	10.0	10.6	3.97	0.4	4.40	●			●
LPET 10T308FN-A WI	10.0	10.6	3.97	0.8	4.40	●			●
LPET 130404FN-A WI	12.5	13.5	4.76	0.4	5.30	●			●
LPET 130408FN-A WI	12.5	13.5	4.76	0.8	5.30	●			●
LPET 170508FN-A WI	16.0	17.5	5.56	0.8	5.30	●			●
LPET 060204EN- WI	6.0	6.5	2.38	0.4	2.5		●	●	
LPET 070304EN- WI	7.0	7.6	3.18	0.4	2.8		●	●	
LPET 080304EN- WI	8.0	8.5	3.18	0.4	3.4		●	●	
LPET 09T304EN- WI	9.0	9.6	3.97	0.4	3.4		●	●	
LPET 10T304EN- WI	10.0	10.6	3.97	0.4	4.4		●	●	
LPET 130404EN- WI	12.5	13.5	4.76	0.4	5.3		●	●	
LPET 170508EN- WI	16.0	17.5	5.56	0.8	5.3		●	●	

\* Right-hand holder → Right-hand indexable insert

① Dimension "d" measured to height "s"

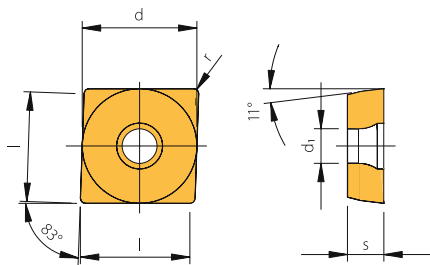
Dimensions in mm

● 강력추천

○ 추천

P	●	●	●	
M	●	○	●	
K	○		●	○
N				●
S	○	○		
H	○			

Inserts



LPNT



규격	l	d <sup>①</sup>	s	r	d <sub>1</sub>	coated					uncoated
						AM5035	AK2015	AL350	AM35C	AR26C	AP40
LPNT 040 102ER*	4,0	4,5	1,80	0,2	2,10			●	●	●	●
LPNT 040 104ER*	4,0	4,5	1,80	0,4	2,10	●	●	●	●	●	●
LPNT 040 102EL	4,0	4,5	1,80	0,2	2,10			●	●	●	●
LPNT 040 104EL	4,0	4,5	1,80	0,4	2,10	●	●	●	●	●	●
LPNT 050202EN	5,0	5,8	2,10	0,2	2,25			●	●	●	●
LPNT 050204EN	5,0	5,8	2,10	0,4	2,25	●	●	●	●	●	●
LPNT 060202EN	6,0	6,5	2,38	0,2	2,50			●	●	●	●
LPNT 060204EN	6,0	6,5	2,38	0,4	2,50	●	●	●	●	●	●
LPNT 070304EN	7,0	7,6	3,18	0,4	2,80	●	●	●	●	●	●
LPNT 080304EN	8,0	8,5	3,18	0,4	3,40	●	●	●	●	●	●
LPNT 09T304EN	9,0	9,6	3,97	0,4	3,40	●	●	●	●	●	●
LPNT 10T304EN	10,0	10,6	3,97	0,4	4,40	●	●	●	●	●	●
LPNT 10T308EN	10,0	10,6	3,97	0,8	4,40			●	●	●	●
LPNT 130404EN	12,5	13,5	4,76	0,4	5,30	●	●	●	●	●	●
LPNT 130408EN	12,5	13,5	4,76	0,8	5,30			●	●	●	●
LPNT 170508EN	16,0	17,5	5,56	0,8	5,30	●	●	●	●	●	●

\* Right-hand holder → Right-hand indexable insert

① Dimension “d” measured to heigth “s”

● 강력추천

○ 추천

P	○	○	○	●	●	●
M	●		●	○	●	
K		●			●	
N						
S	○		○	○		
H						

Dimensions in mm

ISO	Material		Tensile strength [N/mm <sup>2</sup> ]	Cutting speed V <sub>c</sub> (m/min)								
				AM5035	AK2015	AL10	AL350	AM35C	AR26C	AK10	AP40	
P	Unalloyed steel and cast steel	ca. 0.15 % C, annealed	340	120 – 230	120 – 220	200 – 300	120 – 230	140 – 250	150 – 280	–	80 – 140	
		ca. 0.45 % C, annealed	640	80 – 160	100 – 160	170 – 280	80 – 160	100 – 180	120 – 200	–	70 – 100	
		ca. 0.45 % C, hardened and tempered	830	80 – 160	100 – 160	160 – 250	80 – 160	100 – 180	120 – 200	–	70 – 100	
		ca. 0.75 % C, annealed	900	60 – 130	80 – 140	150 – 250	60 – 130	80 – 150	100 – 180	–	60 – 100	
		ca. 0.75 % C, hardened and tempered	1000	50 – 130	80 – 130	150 – 250	50 – 130	70 – 150	100 – 170	–	50 – 100	
	Low alloyed steel and cast steel	annealed	600	80 – 160	100 – 160	170 – 270	80 – 160	100 – 180	120 – 200	–	60 – 100	
		hardened and tempered	920	60 – 130	70 – 130	160 – 250	60 – 130	80 – 150	90 – 160	–	50 – 90	
		hardened and tempered	1000	60 – 120	60 – 130	150 – 250	60 – 120	80 – 150	80 – 160	–	50 – 80	
		hardened and tempered	1170	60 – 100	60 – 110	150 – 220	60 – 100	70 – 120	80 – 140	–	50 – 80	
	High alloyed steel, high alloyed toolsteel and cast steel	annealed	670	80 – 140	90 – 140	–	80 – 140	100 – 160	110 – 180	–	60 – 80	
		hardened and tempered	1100	50 – 100	60 – 110	–	50 – 100	60 – 120	80 – 140	–	–	
	Stainless steel and cast steel	ferritic / martensitic, annealed	670	50 – 200	–	160 – 280	50 – 200	100 – 180	–	–	–	
		martensitic, hardened and tempered	1000	50 – 150	–	140 – 280	50 – 150	80 – 150	–	–	–	
	M	Stainless steel and cast steel	austenitic and	450 – 600	50 – 190	–	140 – 280	50 – 190	100 – 190	–	–	50 – 150
			austenitic/ferritic, chilled	600 – 900	50 – 100	–	–	50 – 100	–	–	–	40 – 90
K	Cast iron	pearlitic, ferritic	500 – 700	–	140 – 240	170 – 300	–	–	120 – 200	100 – 150	–	
		pearlitic, martensitic	700 – 850	–	140 – 240	150 – 270	–	–	120 – 200	100 – 150	–	
			800 – 1100	–	120 – 190	120 – 240	–	–	100 – 160	80 – 120	–	
	Cast iron with nodular graphite	ferritic	550	–	130 – 240	140 – 230	–	–	110 – 200	100 – 140	–	
		pearlitic	800	–	130 – 240	120 – 170	–	–	110 – 200	100 – 140	–	
	Malleable cast iron	ferritic	450	–	120 – 240	150 – 200	–	–	100 – 200	100 – 160	–	
		pearlitic	750	–	120 – 240	140 – 200	–	–	100 – 200	100 – 160	–	
N	Aluminium alloys, long chipping	not heat treatable	200	–	–	800 – 1300	–	–	–	100 – 500	–	
		heat treatable, heat – treated	350	–	–	400 – 900	–	–	–	100 – 300	–	
	Casted aluminium alloys	≤ 12% Si, hardened	250	–	–	250 – 800	–	–	–	100 – 500	–	
		≤ 12% Si, heat treatable	300	–	–	200 – 550	–	–	–	100 – 300	–	
		≤ 12% Si, not heat treatable	450	–	–	200 – 550	–	–	–	100 – 300	–	
	Copper and copper alloys (brass/bronze)	Lead alloys, Pb > 1 %	400	–	–	–	–	–	–	100 – 500	–	
		Brass, bronze	300	–	–	–	–	–	–	100 – 500	–	
		Aluminium bronze	500	–	–	–	–	–	–	100 – 300	–	
		Copper and electrolyte copper	200	–	–	–	–	–	–	100 – 300	–	
	Non ferrous materials	Duroplastics		–	–	–	–	–	–	80 – 180	–	
		Re- inforced plastics		–	–	–	–	–	–	60 – 150	–	
		Hard rubber		–	–	–	–	–	–	100 – 250	–	
S	High temperature resistant alloys	Fe-alloyed, annealed	700	20 – 50	–	20 – 50	20 – 50	–	–	–	–	
		Fe-alloyed, heat-treated	950	20 – 40	–	20 – 50	20 – 40	–	–	–	–	
		Ni- or annealed	800	15 – 25	–	15 – 40	15 – 25	–	–	–	–	
		Co – based, casting	1100	10 – 20	–	15 – 30	–	–	–	–	–	
		Co – based, heat-treated	1200	10 – 20	–	15 – 30	–	–	–	–	–	
	Titanium alloys, high strength	Pure titan	500 – 700	50 – 120	–	–	50 – 120	–	–	50 – 120	–	
	Alpha-and Beut-alloys, hardened		700 – 1000	30 – 50	–	–	30 – 50	–	–	30 – 50	–	
H	Hardened steel	hardened and tempered	1000 – 1350	–	–	–	–	–	–	–	–	
		hardened and tempered	1350 – 1700	–	–	–	–	–	–	–	–	
	Hard cast iron	casting	1350	–	–	–	–	–	–	–	–	
	Hardened cast iron	hardened and tempered	1900	–	–	–	–	–	–	–	–	

The datas given are only approximate values. It can be necessary to adjust these datas to the individual machining operation.

Dimensions in mm

# INTERNAL MACHINING SYSTEM



1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

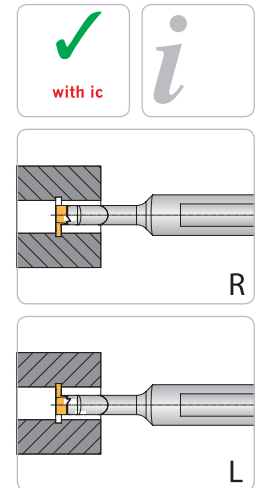
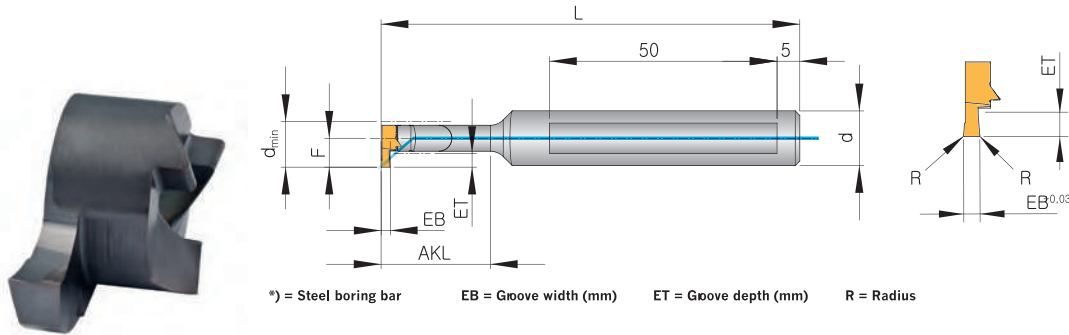
6. Whiz Cut

7. SPHINX

# Boring bars and inserts

SIM

## Grooving (홈터닝)



Insert									Boring bar					
d <sub>min</sub>	ET	EB	R	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation		
6,7	1,0	0,5	0,05	SIM067Z-0510005W R/L	●	●	3,85	Z	12	10	79,5	HSIMZ-1012S R/L*		
		1,0	0,05	SIM067Z-1010005W R/L	●	●				18	87,5	HSIMZ-1812 R/L		
		1,5	0,05	SIM067Z-1510005W R/L	●	●				20	89,5	HSIMZ-2012S R/L*		
		2,0	0,1	SIM067Z-201001W R/L	●	●				26	95,5	HSIMZ-2612 R/L		
7,7	2,0	0,5	0,05	SIM077Z-0520005W R/L	●	●	4,85					26	95,5	HSIMZ-2612S R/L*
		1,0	0,05	SIM077Z-1020005W R/L	●	●				36	105,5	HSIMZ-3612 R/L		
		1,5	0,05	SIM077Z-1520005W R/L	●	●								
		2,0	0,1	SIM077Z-202001W R/L	●	●								
7,8	1,2	2,0	0,10	SIM078A-201201W R		●		A	12	12	80	HSIMA-1212S R/L*		
9,7	3,0	1,0	0,05	SIM097A-1030005W R/L	●	●	6,35			15	83	HSIMA-1512 R/L		
		1,5	0,05	SIM097A-1530005W R/L	●	●				24	92	HSIMA-2412 R/L		
		2,0	0,10	SIM097A-203001W R/L	●	●				24	92	HSIMA-2412S R/L*		
		2,5	0,10	SIM097A-253001W R/L	●	●				32	100	HSIMA-3212 R/L		
		3,0	0,20	SIM097A-303002W R/L	●	●				48	115	HSIMA-4812 R/L		
11,7	3,5	1,0	0,05	SIM117B-1035005W R/L	●	●	7,6	B	12	14	80	HSIMB-1412S R/L*		
		1,5	0,05	SIM117B-1535005W R/L	●	●				29	95	HSIMB-2912S R/L*		
		2,0	0,10	SIM117B-203501W R/L	●	●				42	110	HSIMB-4212 R/L		
		2,5	0,10	SIM 117B-253501W R/L	●	●				56	120	HSIMB-5612 R/L		
		3,0	0,20	SIM117B-303502W R/L	●	●								
13,7	4,0	1,0	0,05	SIM137C-1040005W R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*		
		1,5	0,05	SIM137C-1540005W R/L	●	●				34	100	HSIMC-3416S R/L*		
		2,0	0,10	SIM137C-204001W R/L	●	●				45	110	HSIMC-4516 R/L		
		2,5	0,10	SIM137C-254001W R/L	●	●				64	130	HSIMC-6416 R/L		
		3,0	0,20	SIM137C-304002W R/L	●	●								
15,7	4,5	2,0	0,10	SIM157D-204501W R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*		
		2,5	0,10	SIM157D-254501W R/L	●	●				40	130	HSIMD-4016S R/L*		
		3,0	0,20	SIM157D-304502W R/L	●	●				40	130	HSIMD-4016 R/L		
		3,5	0,20	SIM157D-354502W R/L	●	●				56	130	HSIMD-5616 R/L		
		4,0	0,20	SIM157D-404502W R/L	●	●				80	150	HSIMD-8016 R/L		

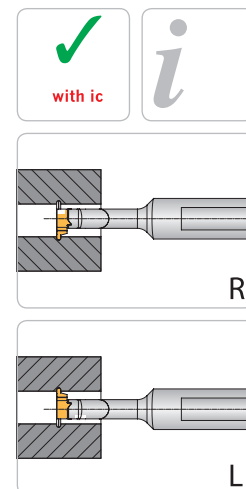
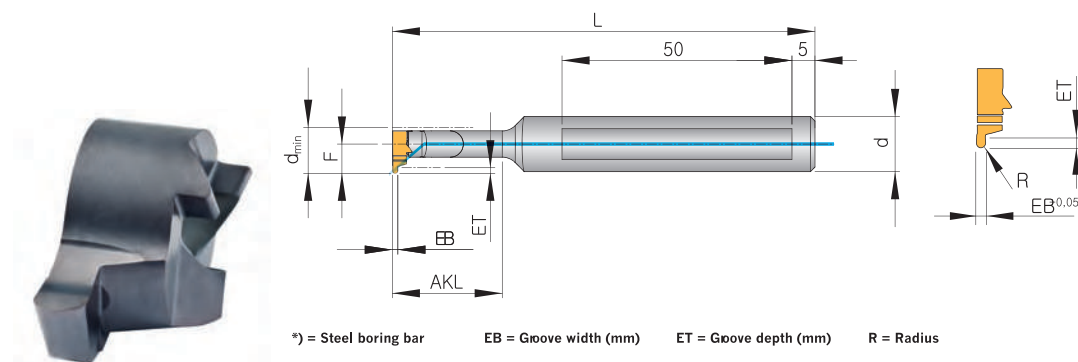
## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
Z	AS0030	T5107-IP	0,6	M 2,0
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

# Boring bars and inserts

SIM

## Radius grooving (R모양 터닝)



Insert								Boring bar				
d <sub>min</sub>	ET	EB	R	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
9,7	1,0	0,8	0,40	SIM097A-V-081004 R/L	●	●	6,35	A	12	12	80	HSIMA-1212S R/L*
		1,2	0,60	SIM097A-V-121006 R/L	●	●				15	83	HSIMA-1512 R/L
		0,8	0,90	SIM097A-V-181009 R/L	●	●				24	92	HSIMA-2412 R/L
										24	92	HSIMA-2412S R/L*
										32	100	HSIMA-3212 R/L
										48	115	HSIMA-4812 R/L
11,7	2,5	0,8	0,40	SIM117B-V-082504 R/L	●	●	7,6	B	12	14	80	HSIMB-1412S R/L*
		1,2	0,60	SIM117B-V-122506 R/L	●	●				29	95	HSIMB-2912S R/L*
		1,8	0,90	SIM117B-V-182509 R/L	●	●				42	110	HSIMB-4212 R/L
		2,0	1,00	SIM117B-V-202510 R/L	●	●				56	120	HSIMB-5612 R/L
		3,0	1,50	SIM117B-V-302515 R/L	●	●						
13,7	4,0	1,2	0,60	SIM137C-V-124006 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*
		1,8	0,90	SIM137C-V-184009 R/L	●	●				34	100	HSIMC-3416S R/L*
		2,0	1,00	SIM137C-V-204010 R/L	●	●				45	110	HSIMC-4516 R/L
		2,2	1,10	SIM137C-V-224011 R/L	●	●				64	130	HSIMC-6416 R/L
		3,0	1,50	SIM137C-V-304015 R/L	●	●						
15,7	4,5	1,8	0,90	SIM157D-V-184509 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
		2,2	1,10	SIM157D-V-224511 R/L	●	●				40	130	HSIMD-4016S R/L*
		3,0	1,50	SIM157D-V-304515 R/L	●	●				40	130	HSIMD-4016 R/L
		4,0	2,00	SIM157D-V-404520 R/L	●	●				56	130	HSIMD-5616 R/L
										80	150	HSIMD-8016 R/L

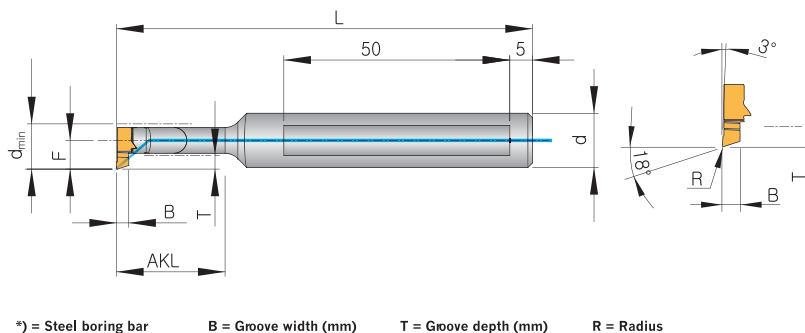
## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

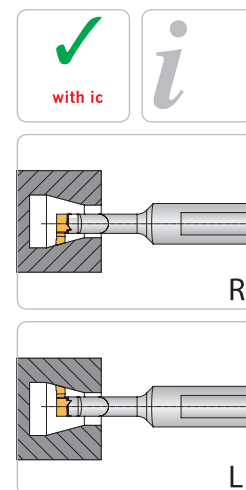
# Boring bars and inserts

SIM

## Copying 15°



\*) = Steel boring bar      B = Groove width (mm)      T = Groove depth (mm)      R = Radius



Insert									Boring bar					
d <sub>min</sub>	T	B	R	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation		
6,7	1,0	2,2					3,85	Z	12	10	79,5	HSIMZ-1012S R/L*		
												18	87,5	HSIMZ-1812 R/L
			0,2	SIM067Z-K18-02 R/L	●	●						20	89,5	HSIMZ-2012S R/L*
			0,4	SIM067Z-K18-04 R/L	●	●						26	95,5	HSIMZ-2612 R/L
												26	95,5	HSIMZ-2612S R/L*
												36	105,5	HSIMZ-3612 R/L
9,7	3,0	2,70	0,2	SIM097A-K18-02 R/L	●	●	6,35	A	12	12	80	HSIMA-1212S R/L*		
										15	83	HSIMA-1512 R/L		
										24	92	HSIMA-2412 R/L		
										24	92	HSIMA-2412S R/L*		
										32	100	HSIMA-3212 R/L		
										48	115	HSIMA-4812 R/L		
11,7	3,5	3,70	0,2	SIM117B-K18-02 R/L	●	●	7,6	B	12	14	80	HSIMB-1412S R/L*		
										29	95	HSIMB-2912S R/L*		
										42	110	HSIMB-4212 R/L		
										56	120	HSIMB-5612 R/L		
13,7	4,0	3,70	0,2	SIM137C-K18-02 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*		
										34	100	HSIMC-3416S R/L*		
										45	110	HSIMC-4516 R/L		
										64	130	HSIMC-6416 R/L		
15,7	4,5	4,70	0,2	SIM157D-K18-02 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*		
										40	130	HSIMD-4016S R/L*		
										40	130	HSIMD-4016 R/L		
										56	130	HSIMD-5616 R/L		
										80	150	HSIMD-8016 R/L		

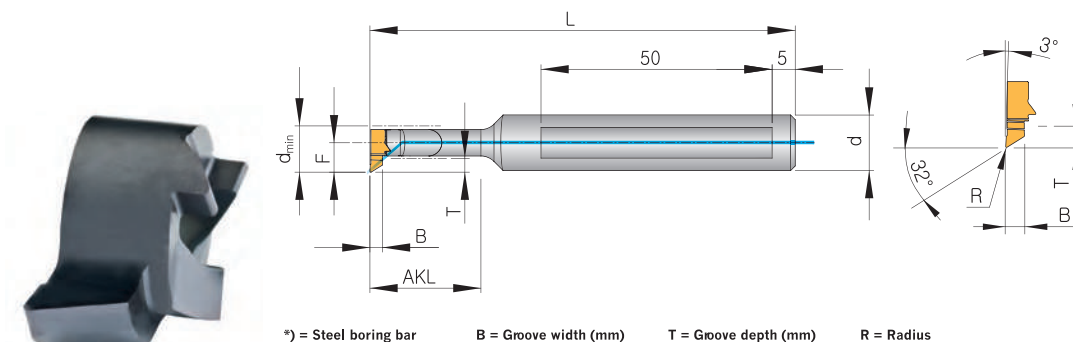
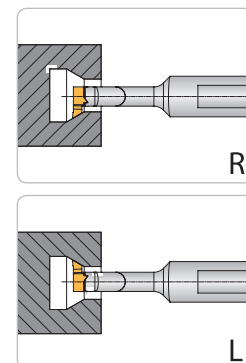
## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
Z	AS0030	T5107-IP	0,6	M 2,0
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

# Boring bars and inserts

SIM

## Copying 30°



\*) = Steel boring bar      B = Groove width (mm)      T = Groove depth (mm)      R = Radius

Insert									Boring bar			
d <sub>min</sub>	T	B	R	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
9,7	3,0	2,70	0,2	SIM097A-K32-02 R/L	●	●	6,35	A	12	12	80	HSIMA-1212S R/L*
										15	83	HSIMA-1512 R/L
										24	92	HSIMA-2412 R/L
										24	92	HSIMA-2412S R/L*
										32	100	HSIMA-3212 R/L
										48	115	HSIMA-4812 R/L
11,7	3,5	3,70	0,2	SIM117B-K32-02 R/L	●	●	7,6	B	12	14	80	HSIMB-1412S R/L*
										29	95	HSIMB-2912S R/L*
										42	110	HSIMB-4212 R/L
										56	120	HSIMB-5612 R/L
13,7	4,0	3,70	0,2	SIM137C-K32-02 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*
										34	100	HSIMC-3416S R/L*
										45	110	HSIMC-4516 R/L
										64	130	HSIMC-6416 R/L
15,7	4,5	4,70	0,2	SIM157D-K32-02 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
										40	130	HSIMD-4016S R/L*
										40	130	HSIMD-4016 R/L
										56	130	HSIMD-5616 R/L
										80	150	HSIMD-8016 R/L

## Spare parts

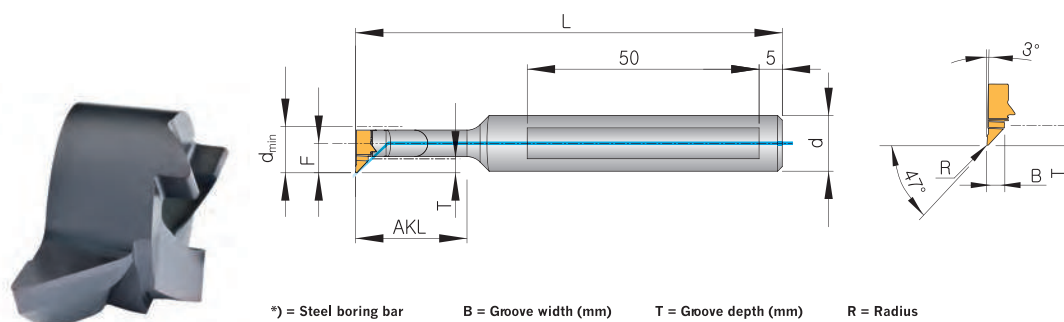
Boring Bars – Size	Screw	Key	Nm	Thread size
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0



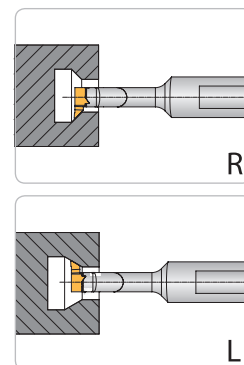
# Boring bars and inserts

SIM

## Copying 45°



\*) = Steel boring bar    B = Groove width (mm)    T = Groove depth (mm)    R = Radius

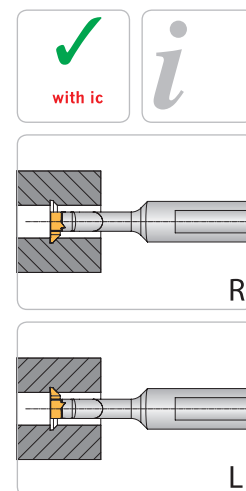
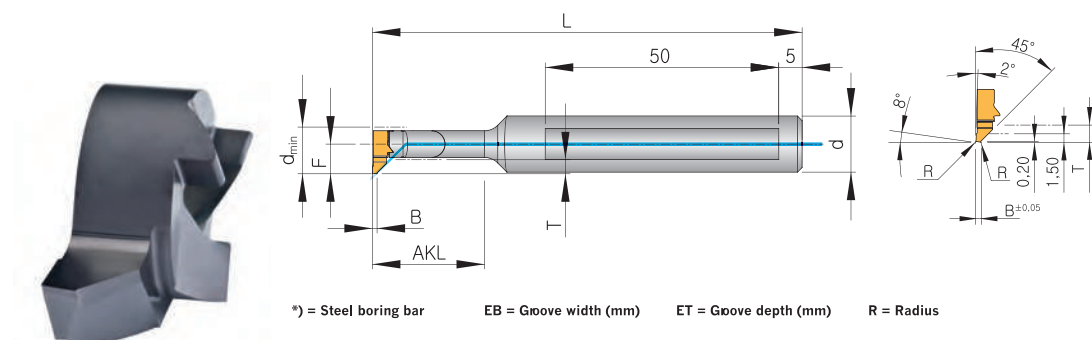


Insert									Boring bar			
d <sub>min</sub>	T	B	R	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
9,7	3,0	2,7	0,2	SIM097A-K47-02 R/L	●		6,35	A	12	12	80	HSIMA-1212S R/L*
										15	83	HSIMA-1512 R/L
										24	92	HSIMA-2412 R/L
										24	92	HSIMA-2412S R/L*
										32	100	HSIMA-3212 R/L
										48	115	HSIMA-4812 R/L
11,7	3,5	3,7	0,2	SIM117B-K47-02 R/L	●		7,6	B	12	14	80	HSIMB-1412S R/L*
										29	95	HSIMB-2912S R/L*
										42	110	HSIMB-4212 R/L
										56	120	HSIMB-5612 R/L
13,7	4,0	3,7	0,2	SIM137C-K47-02 R/L	●		8,85	C	16	16	82	HSIMC-1616S R/L*
										34	100	HSIMC-3416S R/L*
										45	110	HSIMC-4516 R/L
										64	130	HSIMC-6416 R/L
15,7	4,5	4,7	0,2	SIM157D-K47-02 R/L	●		10,1	D	16	18	108	HSIMD-1816S R/L*
										40	130	HSIMD-4016S R/L*
										40	130	HSIMD-4016 R/L
										56	130	HSIMD-5616 R/L
										80	150	HSIMD-8016 R/L

## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

## Pre-grooving and chamfering



Insert									Boring bar			
d <sub>min</sub>	T	B	R	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
9,7	3,0	1,0	0,1	SIM097A-VF-0810-45 R/L	●	●	6,35	A	12	12	80	HSIMA-1212S R/L*
										15	83	HSIMA-1512 R/L
										24	92	HSIMA-2412 R/L
										24	92	HSIMA-2412S R/L*
										32	100	HSIMA-3212 R/L
										48	115	HSIMA-4812 R/L
11,7	3,5	1,0	0,1	SIM117B-VF-0810-45 R/L	●	●	7,6	B	12	14	80	HSIMB-1412S R/L*
										29	95	HSIMB-2912S R/L*
										42	110	HSIMB-4212 R/L
										56	120	HSIMB-5612 R/L
13,7	4,0	1,5	0,1	SIM137C-VF-0815-45 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*
										34	100	HSIMC-3416S R/L*
										45	110	HSIMC-4516 R/L
										64	130	HSIMC-6416 R/L
15,7	4,5	1,5	0,1	SIM157D-VF-0815-45 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
										40	130	HSIMD-4016S R/L*
										40	130	HSIMD-4016 R/L
										56	130	HSIMD-5616 R/L
										80	150	HSIMD-8016 R/L

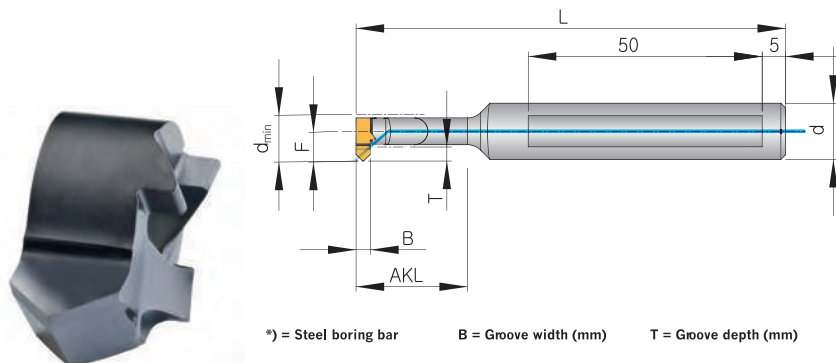
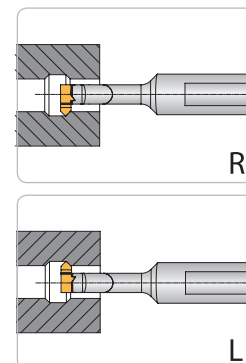
## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

# Boring bars and inserts

SIM

## Chamfering 45°



\*) = Steel boring bar      B = Groove width (mm)      T = Groove depth (mm)      R = Radius

Insert										Boring bar			
d <sub>min</sub>	T	B	R	S <sub>1</sub>	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
6,7	1,0	2,2	0,2	1,1	SIM067Z-F45-02 R/L	●	●	3,85	Z	12	10	79,5	HSIMZ-1012S R/L*
											18	87,5	HSIMZ-1812 R/L
											20	89,5	HSIMZ-2012S R/L*
											26	95,5	HSIMZ-2612 R/L
											26	95,5	HSIMZ-2612S R/L*
											36	105,5	HSIMZ-3612 R/L
9,7	3,0	3,0	0,2	1,5	SIM097A-F45-02 R/L	●	●	6,35	A	12	12	80	HSIMA-1212S R/L*
											15	83	HSIMA-1512 R/L
											24	92	HSIMA-2412 R/L
											24	92	HSIMA-2412S R/L*
											32	100	HSIMA-3212 R/L
											48	115	HSIMA-4812 R/L
11,7	3,5	4,0	0,2	2,0	SIM117B-F45-02 R/L	●	●	7,6	B	12	14	80	HSIMB-1412S R/L*
											29	95	HSIMB-2912S R/L*
											42	110	HSIMB-4212 R/L
											56	120	HSIMB-5612 R/L
13,7	4,0	4,0	0,2	2,0	SIM137C-F45-02 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*
											34	100	HSIMC-3416S R/L*
											45	110	HSIMC-4516 R/L
											64	130	HSIMC-6416 R/L
15,7	4,5	5,0	0,2	2,5	SIM157D-F45-02 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
											40	130	HSIMD-4016S R/L*
											40	130	HSIMD-4016 R/L
											56	130	HSIMD-5616 R/L
											80	150	HSIMD-8016 R/L

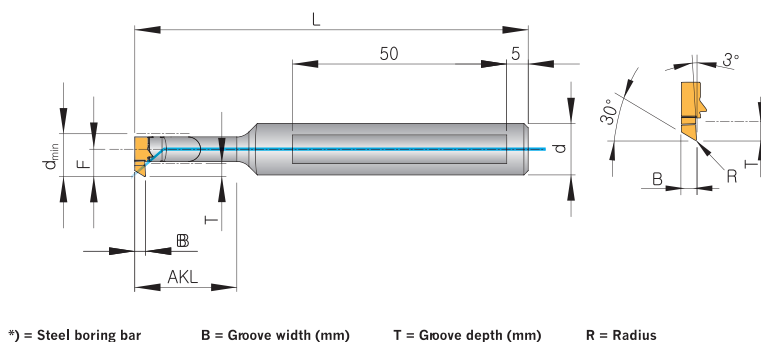
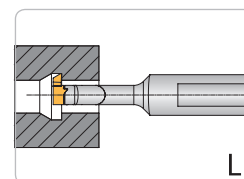
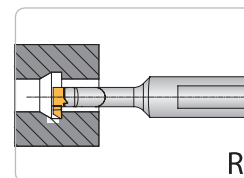
## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
Z	AS0030	T5107-IP	0,6	M 2,0
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

# Boring bars and inserts

SIM

## Back turning



\*) = Steel boring bar      B = Groove width (mm)      T = Groove depth (mm)      R = Radius

Insert									Boring bar			
d <sub>min</sub>	T	B	R	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
9,7	3,0	2,5	0,2	SIM097A-R30-02 R/L	●	●	6,35	A	12	12	80	HSIMA-1212S R/L*
										15	83	HSIMA-1512 R/L
										24	92	HSIMA-2412 R/L
										24	92	HSIMA-2412S R/L*
										32	100	HSIMA-3212 R/L
										48	115	HSIMA-4812 R/L
11,7	3,5	3,5	0,2	SIM117B-R30-02 R/L	●	●	7,6	B	12	14	80	HSIMB-1412S R/L*
										29	95	HSIMB-2912S R/L*
										42	110	HSIMB-4212 R/L
										56	120	HSIMB-5612 R/L
13,7	4,0	3,5	0,2	SIM137C-R30-02 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*
										34	100	HSIMC-3416S R/L*
										45	110	HSIMC-4516 R/L
										64	130	HSIMC-6416 R/L
15,7	4,5	4,5	0,2	SIM157D-R30-02 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
										40	130	HSIMD-4016S R/L*
										40	130	HSIMD-4016 R/L
										56	130	HSIMD-5616 R/L
										80	150	HSIMD-8016 R/L

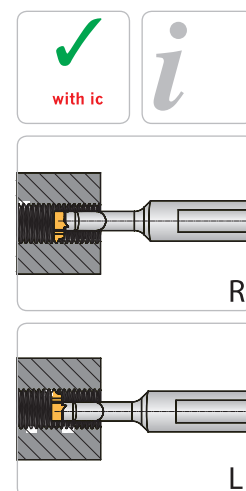
## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

# Boring bars and inserts

SIM

## Threading 60° Metric partial profile



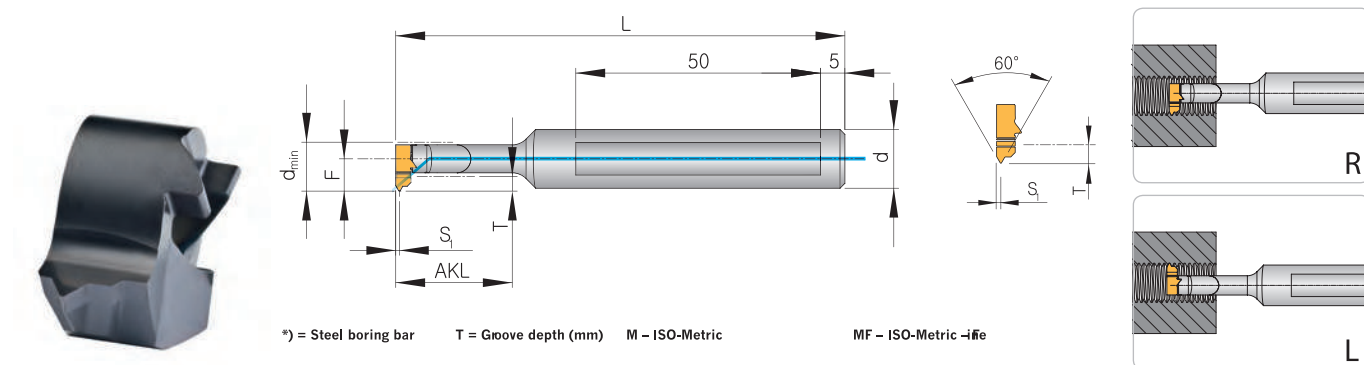
\*) = Steel boring bar T = Groove depth (mm) M – ISO-Metric MF – ISO-Metric –if

Insert										Boring bar			
d <sub>min</sub>	Typ	P Pitch	S <sub>1</sub>	T	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
6,7				1,0				3,85	Z	12	10	79,5	HSIMZ-1012S R/L*
											18	87,5	HSIMZ-1812 R/L
	M	1,25	0,8		SIM067Z-G-M125 R/L	●	●				20	89,5	HSIMZ-2012S R/L*
	MF	0,5–1,00	0,8		SIM067Z-G-MF050100 R/L	●	●				26	95,5	HSIMZ-2612 R/L
											26	95,5	HSIMZ-2612S R/L*
											36	105,5	HSIMZ-3612 R/L
8				1,8				4,85	A	12	12	80	HSIMA-1212S R/L*
	MF	0,5–0,75	0,8		SIM080A-G-MF050075 R/L	●	●				15	83	HSIMA-1512 R/L
	MF	1,0–1,25	0,8		SIM080A-G-MF100125 R/L	●	●				24	92	HSIMA-2412 R/L
	M	1,5–1,75	1,0		SIM080A-G-M150175 R/L	●	●				24	92	HSIMA-2412S R/L*
											32	100	HSIMA-3212 R/L
											48	115	HSIMA-4812 R/L
10,7	MF	0,5–0,75	0,8	3,0	SIM107B-G-MF050075 R/L	●	●	6,8	B	12	14	80	HSIMB-1412S R/L*
	MF	1,0–1,25	0,8		SIM107B-G-MF100125 R/L	●	●				29	95	HSIMB-2912S R/L*
	MF	1,5–1,75	1,0		SIM107B-G-MF150175 R/L	●	●				42	110	HSIMB-4212 R/L
	M	2,0	1,3		SIM107B-G-M200 R/L	●	●				56	120	HSIMB-5612 R/L
	M	2,5	1,4		SIM107B-G-M250 R/L	●	●						
13,7	MF	0,5–0,75	0,8	4,2	SIM137C-G-MF050075 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*
	MF	1,0–1,25	0,8		SIM137C-G-MF100125 R/L	●	●				34	100	HSIMC-3416S R/L*
	MF	1,5–1,75	1,0		SIM137C-G-MF150175 R/L	●	●				45	110	HSIMC-4516 R/L
	M	2,0	1,3		SIM137C-G-M200 R/L	●	●				64	130	HSIMC6416 R/L
	M	2,5	1,4		SIM137C-G-M250 R/L	●	●						
15,7	MF	1,0–1,25	0,8	4,7	SIM157D-G-MF100125 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
	MF	1,5–1,75	1,0		SIM157D-G-MF150175 R/L	●	●				40	130	HSIMD-4016S R/L*
	MF	2,00	1,3		SIM157D-G-MF200 R/L	●	●				40	130	HSIMD-4016 R/L
	M	2,50	1,4		SIM157D-G-M250 R/L	●	●				56	130	HSIMD-5616 R/L
											80	150	HSIMD-8016 R/L

## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
Z	AS0030	T5107-IP	0,6	M 2,0
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

## Threading 60° Metric full profile

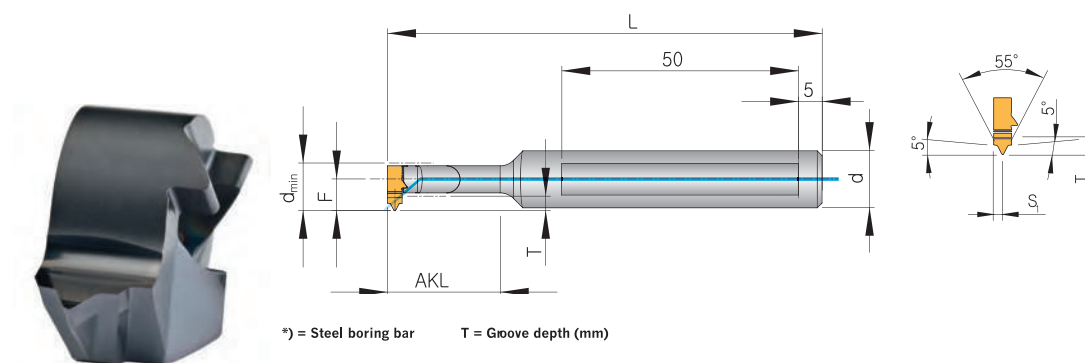
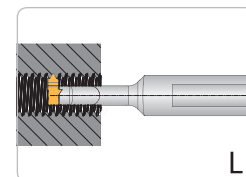
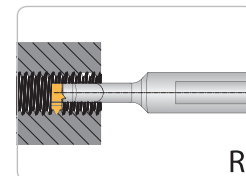


Insert										Boring bar			
d <sub>min</sub>	Typ	P Pitch	S <sub>1</sub>	T	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
8,0	M	1,5	1,0	1,8	SIM080A-GV-M150 R/L	●	●	4,85	A	12	12	80	HSIMA-1212S R/L*
											15	83	HSIMA-1512 R/L
											24	92	HSIMA-2412 R/L
											24	92	HSIMA-2412S R/L*
											32	100	HSIMA-3212 R/L
											48	115	HSIMA-4812 R/L
10,7	MF	1,0	0,8	3,0	SIM107B-GV-MF100 R/L	●	●	6,8	B	12	14	80	HSIMB-1412S R/L*
	MF	1,5	1,0		SIM107B-GV-MF150 R/L	●	●				29	95	HSIMB-2912S R/L*
	M	2,0	1,3		SIM107B-GV-M200 R/L	●	●				42	110	HSIMB-4212 R/L
	M	2,5	1,4		SIM107B-GV-M250 R/L	●	●				56	120	HSIMB-5612 R/L
	M	3,0	1,6		SIM107B-GV-M300 R/L	●	●						
13,7	MF	1,0	0,8	4,2	SIM137C-GV-MF100 R/L	●	●	8,85	C	16	16	82	HSIMC-1616S R/L*
	MF	1,5	1,0		SIM137C-GV-MF150 R/L	●	●				34	100	HSIMC-3416S R/L*
	M	2,0	1,3		SIM137C-GV-M200 R/L	●	●				45	110	HSIMC-4516 R/L
	M	2,5	1,4		SIM137C-GV-M250 R/L	●	●				64	130	HSIMC-6416 R/L
15,7	MF	1,0	0,8	4,7	SIM157D-GV-MF100 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
	MF	1,5	1,0		SIM157D-GV-MF150 R/L	●	●				40	130	HSIMD-4016S R/L*
	MF	2,0	1,3		SIM157D-GV-MF200 R/L	●	●				40	130	HSIMD-4016 R/L
	M	2,5	1,4		SIM157D-GV-M250 R/L	●	●				56	130	HSIMD-5616 R/L
	M	3,0	1,6		SIM157D-GV-M300 R/L	●	●				80	150	HSIMD-8016 R/L
	M	3,5	1,8		SIM157D-GV-M350 R/L	●	●						
	M	4,0	2,0		SIM157D-GV-M400 R/L	●	●						

## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
A	AS0031	T5108-IP	1,3	M 2,5
B	AS0032	T5109-IP	2,2	M 3,0
C	AS0033	T5110-IP	3,4	M 3,5
D	AS0034	T5115-IP	5,0	M 4,0

## Whitworth pipe thread 55° DIN ISO 228-Full profile



Insert										Boring bar			
d <sub>min</sub>	Typ	P Pitch (G/Inch)	S <sub>1</sub>	T	Designation	AK1020	AP5020	F	Size	d	AKL	L	Designation
10,7	W228	1,337	19	1,3	SIM107B-GV-W228/19 R/L	●	●	6,8	B	12	14	80	HSIMB-1412S R/L*
		1,814	14	1,6	SIM107B-GV-W228/14 R/L	●	●				29	95	HSIMB-2912S R/L*
											42	110	HSIMB-4212 R/L
											56	120	HSIMB-5612 R/L
15,7	W228	1,814	14	1,6	SIM157D-GV-W228/14 R/L	●	●	10,1	D	16	18	108	HSIMD-1816S R/L*
		2,309	11	2,0	SIM157D-GV-W228/11 R/L	●	●				40	130	HSIMD-4016S R/L*
											40	130	HSIMD-4016 R/L
											56	130	HSIMD-5616 R/L
											80	150	HSIMD-8016 R/L

## Spare parts

Boring Bars – Size	Screw	Key	Nm	Thread size
B	AS0032	T5109-IP	2,2	M 3,0
D	AS0034	T5115-IP	5,0	M 4,0

## Recommended cutting data – Threading – Number of passes

추천 가공 데이터 (나사가공)

Pitch		Number of passes					
(mm)	Pitch/Inch	Steel strength (N/mm <sup>2</sup> )			Stainless	Cast	Aluminium
		400–700	700–1.000	> 1.000			
0,8	32	8	9	10	10	9	8
1	24	10	11	12	12	12	10
1,25	20–19	12	14	15	15	14	12
1,5	16	15	17	18	18	17	15
1,75	14	17	19	21	21	18	17
2	12	19	22	25	25	20	18
2,5	10	22	26	31	31	22	20
3,0–3,5	8	28	32	38	38	24	22

The above mentioned data are general recommendations for machining steel and non-ferrous materials.

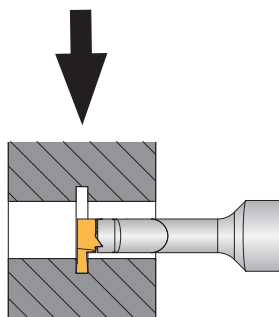
With hard materials we recommend to reduce cutting speed and increase number of passes.

By cutting edge breakage we suggest to increase number of passes, by edge wear reduce the number of passes.

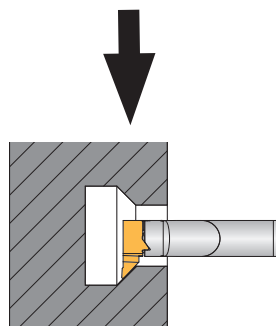
REMARK: The chip thickness should be constant at every pass, so with more cutting depth reduce the in-feed in order to obtain constant cutting forces.

## SIM – Boring bars – Feed rate

f (mm/U) 0,01–0,05



f (mm/U) 0,03–0,10





## Threading



### Radial infeed

Radial infeed is the simplest and quickest method. The feed is perpendicular to the turning axis and both flanks of the insert perform the cutting operation. Radial infeed is recommended when the pitch is smaller than 2 mm, for material with short chips, for workhardened materials and stainless steel.



### Flank infeed

Infeed at an angle of 3°- 5° to the flank of the thread. Mainly used on NC- machines. Excellent chip control, therefore very suitable for internal threads and long chipping materials. Pitches greater than 2 mm.



### Alternating flank infeed

Use of alternate flank infeed is recommended especially in large pitches and for long chipping materials. This method divides the work equally on both flanks, resulting in equal wear on both edges. Alternate flank infeed requires more complicated programming and is not available on all lathes.

## Calculation of helix angle $\beta$

$$\beta = \frac{P \text{ (mm)}}{D \text{ (mm)}} \times 18,23$$

Example internal thread M10. Pitch 1.5 mm:

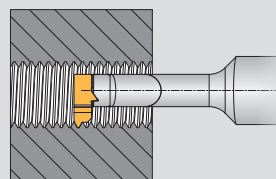
$$\beta = \frac{1,5 \text{ mm}}{9,03 \text{ mm}} \times 18,23 = 3,03^\circ \text{ helix angle}$$

$\beta$  = Helix angle (°)

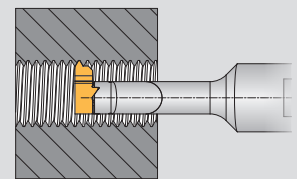
P = Pitch (mm)

D = Edge diameter (mm)

## ISO – Internal thread



Holder and inserts in  
Right-hand version



Holder and inserts in  
Left-hand version

## Grooving

## (터닝) Grooving, turning and copying

ISO	Material	Tensile strength (N/mm <sup>2</sup> )	Cutting speed V <sub>c</sub> (m/min)	
			coated AP5020	uncoated AK1020
P	Unalloyed steel and cast steel	< 0.15% C/hardened and tempered	350	20 – 130
		0.15 – 0.45% C/hardened and tempered	650	20 – 130
		> 0.45% C/hardened and tempered	1000	20 – 130
	Low alloyed steel and cast steel	annealed	600	15 – 110
		hardened and tempered	900	15 – 110
			1200	15 – 110
	High alloyed steel	annealed	700	20 – 85
	High alloyed tool steel and cast steel	hardened	1100	20 – 85
M	Stainless steel	ferritic, annealed	700	20 – 60
		austenitic and austenitic / ferritic, chilled	450–600	15 – 70
			600–900	20 – 110
K	Cast iron	pearlitic / ferritic	500–700	20 – 110
		pearlitic / martensitic	700–850	20 – 110
			800–1100	20 – 110
	Cast iron with nodular graphite	ferritic	550	20 – 110
		pearlitic	800	20 – 110
	Malleable cast iron	ferritic	450	20 – 120
		pearlitic	750	20 – 120
N	Aluminium alloys long chipping	not heat treatable	200	20 – 600
		heat treatable, heat treated	350	20 – 600
	Casted aluminium alloys	≤ 12 % Si, heat treated	250	20 – 600
		≤ 12 % Si, heat treatable, heat treated	300	20 – 600
		≤ 12 % Si, not heat treatable	450	20 – 600
	Copper and copper alloys (Brass/Bronze)	Lead alloys, Pb > 1 %	400	15 – 50
		Brass, Bronze	300	15 – 50
		Aluminium bronze	500	15 – 50
		Copper and elektrolyte copper	200	15 – 50
	Non-ferrous materials	Duroplastic	–	–
		Re-inforced plastics	–	–
		Hard rubber	–	–
S	High temperature resistant alloys	Fe-alloyed, annealed	700	15 – 30
		Fe-alloyed, heat treated	950	15 – 30
		Ni- or Co-alloyed, annealed	800	15 – 40
		Ni- or Co-alloyed, casting	1100	15 – 40
		Ni- or Co-alloyed, heat treated	1200	15 – 40
	Titanium alloys	Pure titan	500–700	–
H	Alpha- and Beta-alloys	heat treated	700–1000	–
	Hardened steel	hardened	55 HRC	–
			60 HRC	–
	Hard cast iron	casting	41 HRC	–
H	Hardened cast iron	hardened	55 HRC	–

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

## Grooving

## (나사) Threading

ISO	Material	Tensile strength (N/mm <sup>2</sup> )	Cutting speed $V_c$ (m/min)	
			coated AP5020	uncoated AK1020
P	Unalloyed steel and cast steel	< 0.15% C / hardened and tempered	350	80 – 110
		0.15 - 0.45% C / hardened and tempered	650	80 – 110
		> 0.45% C / hardened and tempered	1000	60 – 90
	Low alloyed steel and cast steel	annealed	600	70 – 100
		hardened and tempered	900	70 – 90
			1200	70 – 85
	High alloyed steel	annealed	700	60 – 80
	High alloyed tool steel and cast steel	hardened	1100	50 – 70
	Stainless steel	ferritic, annealed	700	50 – 70
	Cast steel	martensitic, hardened and tempered	1000	50 – 70
M	Stainless steel	austenitic and austenitic /	450–600	70 – 90
		ferritic, chilled	600–900	40 – 65
K	Cast iron	pearlitic / ferritic	500–700	–
		pearlitic / martensitic	700–850	80 – 100
			800–1100	–
	Cast iron with nodular graphite	ferritic	550	80 – 100
		pearlitic	800	80 – 90
	Malleable cast iron	ferritic	450	70 – 150
		pearlitic	750	–
N	Aluminium alloys long chipping	not heat treatable	200	100– 240
		heat treatable, heat treated	350	80 – 170
	Casted aluminium alloys	≤ 12 % Si, heat treated	250	–
		≤ 12 % Si, heat treatable, heat treated	300	–
		≤ 12 % Si, not heat treatable	450	–
	Copper and copper alloys (Brass/ Bronze)	Lead alloys, Pb > 1 %	400	100– 250
		Brass, Bronze	300	80 – 200
		Aluminium bronze	500	–
		Copper and elektrolyte copper	200	100– 250
	Non-ferrous materials	Duroplastic	–	–
		Re-inforced plastics	–	–
		Hard rubber	–	–
S	High temperature resistant alloys	Fe-alloyed, annealed	700	–
		Fe-alloyed, heat treated	950	–
		Ni- or Co-alloyed, annealed	800	–
		Ni- or Co-alloyed, casting	1100	–
		Ni- or Co-alloyed, heat treated	1200	–
	Titanium alloys	Pure titan	500–700	–
H	Alpha- and Beta-alloys	heat treated	700–1000	–
	Hardened steel	hardened	55 HRC	–
			60 HRC	–
	Hard cast iron	casting	41 HRC	–
H	Hardened cast iron	hardened	55 HRC	–

The recommended cutting data are only approximate values.  
It may be necessary to adjust them to each individual machining application.

# FORM GROOVING SYSTEM



1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

## Introduction

1. DIAMETAL

### Grooving system for one plunge groove cutting

2. BIMU

By utilizing the Profil-Cut you could benefit from vast cost savings in tooling costs and machine time. We are ready to produce your specific profile form inserts; we grind them in-house, accurately and quickly.

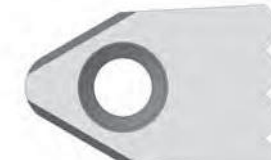
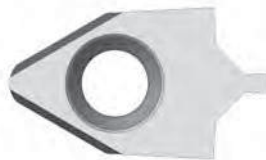
Alternatively we can supply our blanks which you can grind yourselves.

3. IFANGER



4. ZEUS

#### Examples



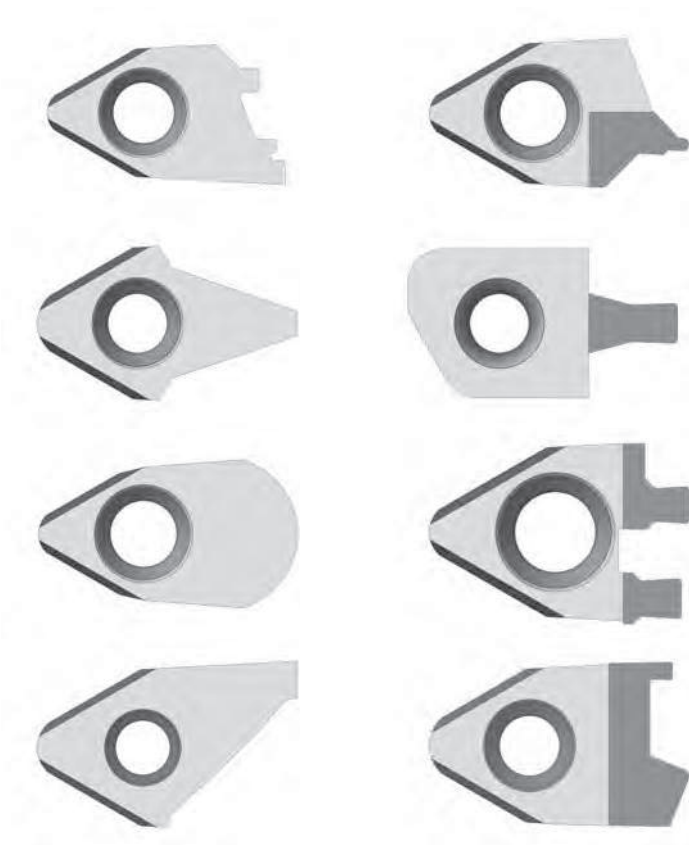
5. ARNO

6. Whiz Cut

7. SPHINX

## Introduction

- Different blanks for special profile grooves
- Easiest assembly for simple handling and quick insert changes
- Secure insert seat for absolute process reliability
- Special profiles up to a width of 25 mm possible
- Customer specific shapes on request

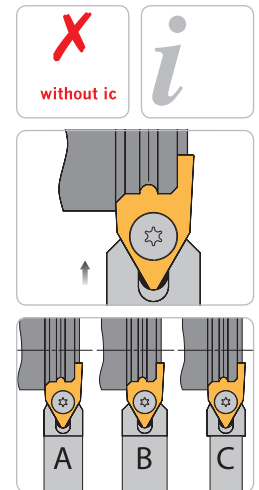
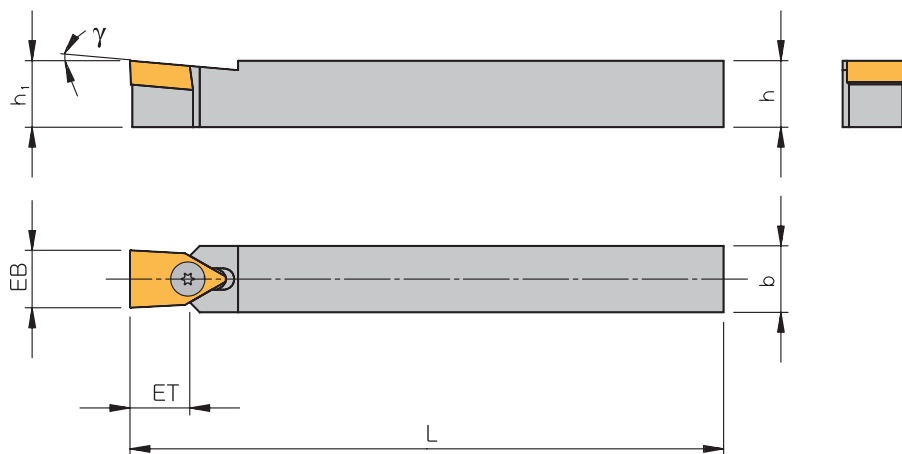


On request we also supply  
PKD or CBN tipped inserts.

## Monoblock holders

## Profil-Cut

### Form groove system



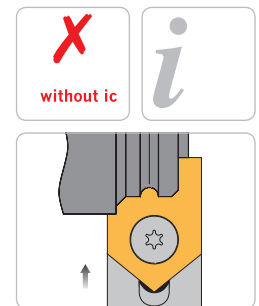
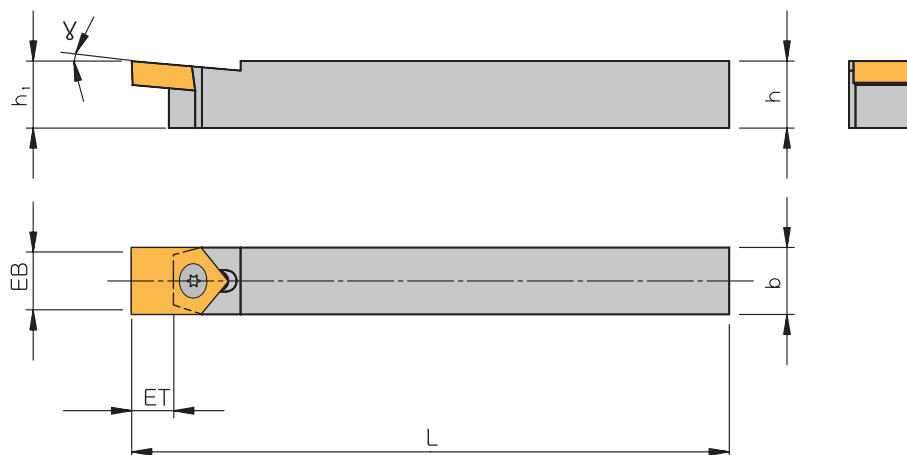
Designation	EB	ET	h	h <sub>1</sub>	b	L	$\gamma$	Insert
SXCCN 1212 K12-A	12	–	12	12	12	125	5°	122002...
SXCCN 1414 K12-B	12	12,5	14	14	14	125	5°	122002...
SXCCN 1414 K16-C	16	22,0	14	14	14	125	5°	162502...
SXCCN 1612 K12-A	12	–	16	16	12	125	5°	122002...
SXCCN 1616 K12-B	12	12,5	16	16	16	125	5°	122002...
SXCCN 1616 K16-A	16	–	16	16	16	125	5°	162502...
SXCCN 1616 K21-C	21	30,0	16	16	16	125	5°	213202...
SXCCN 2020 M12-B	12	12,6	20	20	20	150	5°	162502...
SXCCN 2020 M16-B	16	14,5	20	20	20	150	5°	162502...
SXCCN 2020 M21-A	21	–	20	20	20	150	5°	213202...
SXCCN 2025 M25-A	25	14,0	20	20	25	150	8°	253202...
SXCCN 2525 M12-B	12	12,6	25	25	25	150	5°	122002...
SXCCN 2525 M16-B	16	14,5	25	25	25	150	5°	162502...
SXCCN 2525 M21-B	21	18,2	25	25	25	150	5°	213202...
SXCCN 2525 M25-A	25	14,0	25	25	25	150	8°	253202...

### Spare parts

Holder	Screw	Key
SXCCN...12..	SS1221	KS1111
SXCCN...16..	SS9950	KS2520
SXCCN...21..	SS9980	KS2525
SXCCN...25..	SS9980	KS2525

## Form groove system

Holder only for grinding special profiles



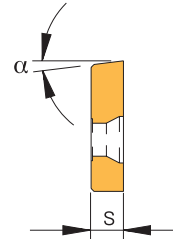
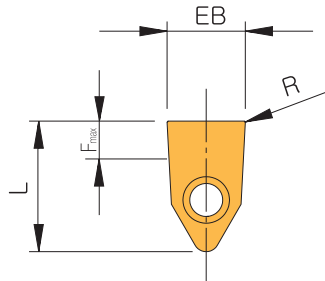
Designation	EB	ET	h	h <sub>1</sub>	b	L	$\gamma$	Insert
GXCCN 1212 K12	12	5,0	12	12	12	125	5°	122002...
GXCCN 1616 K16	16	6,5	16	16	16	125	5°	162502...
GXCCN 2020 M21	21	9,5	20	20	20	150	5°	213202...
GXCCN 2025 M25	25	9,5	20	25	25	150	8°	253202...

## Spare parts

Holder	Screw	Key
GXCCN 1212 K12	SS1221	KS1111
GXCCN 1616 K16	SS9950	KS2520
GXCCN 2020 M21	SS9980	KS2525
GXCCN 2025 M25	SS9980	KS2525



## Form groove system



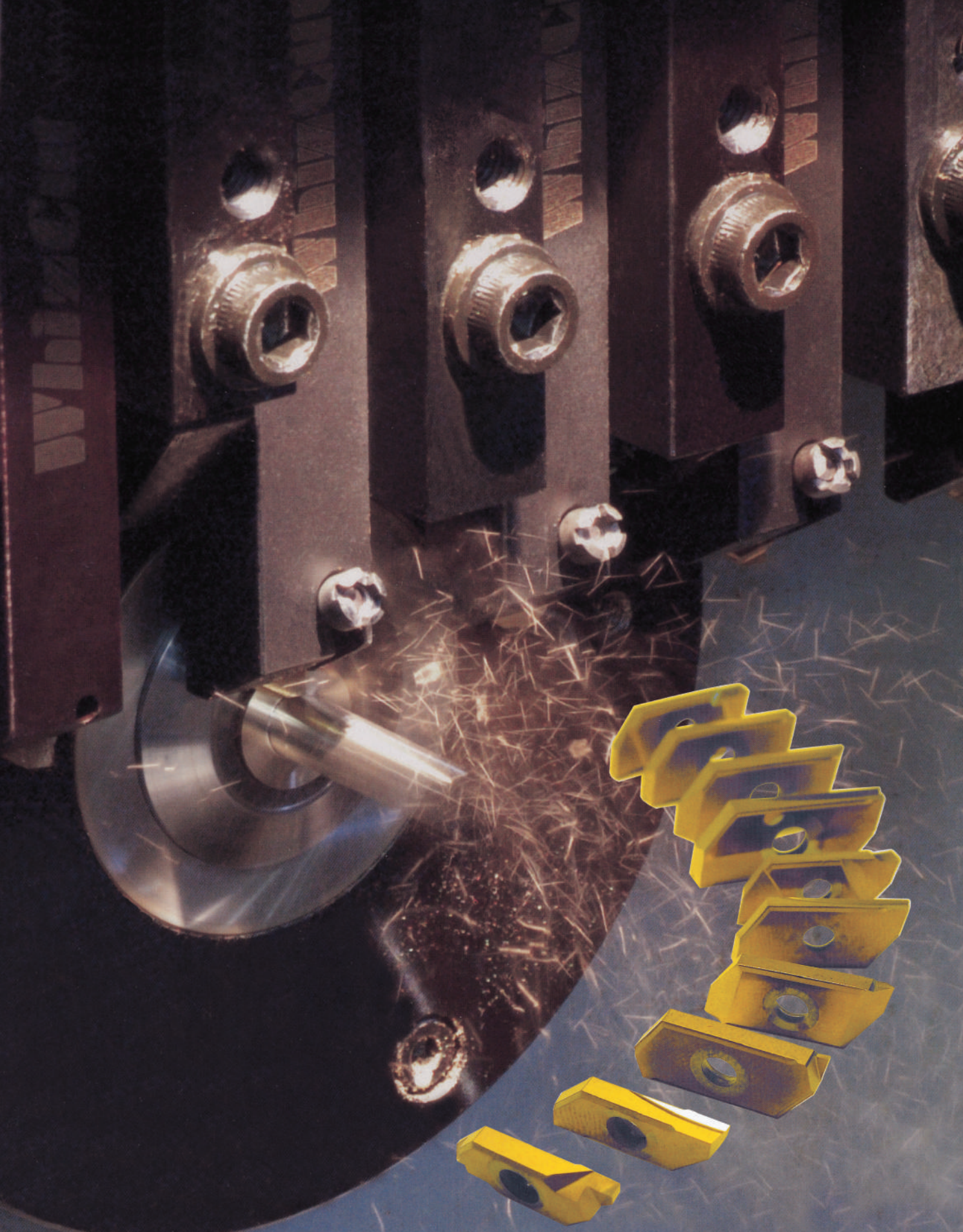
Designation	EB	s	L	F <sub>max</sub>	α	R	Grades uncoated		
							AK20	AP40	CERMET
122002	12	5,0	20	7,5	7°	0,2	●	●	●
162502	16	6,5	25	10,0	7°	0,2	●	●	●
213202	21	7,5	32	12,0	7°	0,2	●	●	●
253202	25	5,0	32	12,0	7°	0,2	●	●	●

Remark: Special form inserts (to customer's drawing) and coatings on request!

● Main application

○ Secondary application

P		●	●
M			○
K	●		○
N	●		
S	○		
H			



1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

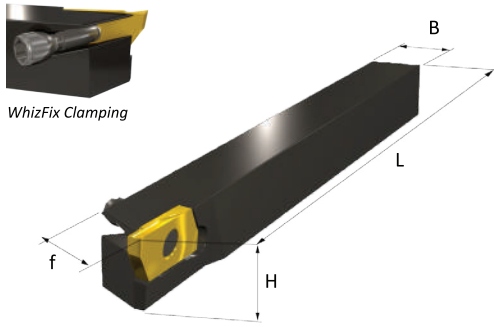
# WhizCut®

The smart tooling for greater productivity.



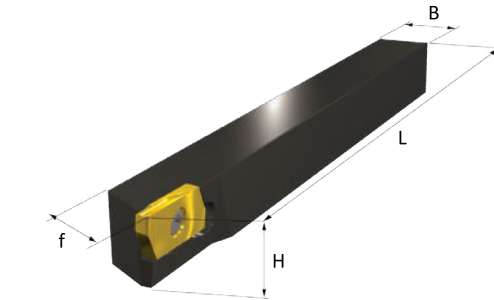
# J-TYPE TOOLHOLDERS Front Turning

## WPJ | Toolholders with WhizFix Pin Type Clamping

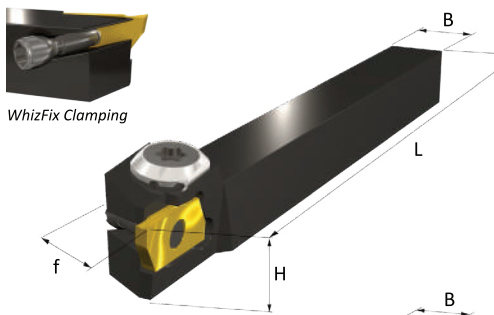
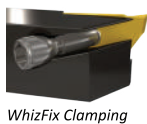


Toolholder	B	H	L	f	Insert	Pin + Nut	Bit	Stock group	Price
WPJ11ER/L 88K-8T	8	8	125	8	J11ER/L	Pin 8	K3	a	A62
WPJ11ER/L 1010K-8T	10	10	125	10	J11ER/L	Pin 8	K3	a	A62
WPJ15ER/L 1010K-8T	10	10	125	10	J15ER/L	Pin 12	J5	a	A62
WPJ15ER 1212F-8T	12	12	85	12	J15ER	Pin 12	J5	r	A61
WPJ15ER/L 1212K-8T	12	12	125	12	J15ER/L	Pin 12	J5	a	A62
WPJ15ER 1205K-8T	12	1/2"	125	12	J15ER	Pin 12	J5	r	A62
WPJ15ER/L 1616K-8T	16	16	125	16	J15ER/L	Pin 12	J5	a	A63
WPJ20ER 1212K-8T	12	12	125	12	J20ER	Pin 16	K3	r	A62
WPJ20ER 1205K-8T	12	1/2"	125	12	J20ER	Pin 16	K3	r	A62
WPJ20ER 1616K-8T	16	16	125	16	J20ER	Pin 16	K3	r	A63
WPJ20ER 2020K-8T	20	20	125	20	J20ER	Pin 16	K3	r	A64

## WSJ | Toolholders with Conventional Clamping



Toolholder	B	H	L	f	Insert	Screw	Key	Stock group	Price
WSJ11ER/L 88K-8T	8	8	125	8	J11ER/L	M2,5x6	J2	a	A52
WSJ15ER/L 1010K-8T	10	10	125	10	J15ER/L	M3x7	J3IP	a	A52
WSJ15ER/L 1212K-8T	12	12	125	12	J15ER/L	M3x7	J3IP	a	A52
WSJ15ER 1205K-8T	12	1/2"	125	12	J15ER	M3x7	J3IP	r	A52
WSJ15ER/L 1616K-8T	16	16	125	16	J15ER/L	M3x7	J3IP	a	A53
WSJ20ER 1212K-8T	12	12	125	12	J20ER	M4x9	J4	r	A52
WSJ20ER 1205K-8T	12	1/2"	125	12	J20ER	M4x9	J4	r	A52
WSJ20ER 1616K-8T	16	16	125	16	J20ER	M4x9	J4	r	A53
WSJ20ER 2020K-8T	20	20	125	20	J20ER	M4x9	J4	r	A54
WSJ20ER 2525M-8T	25	25	150	25	J20ER	M4x9	J4	r	A55
WSJ20ER 1000M-8T	1"	1"	150	1"	J20ER	M4x9	J4	r	A55

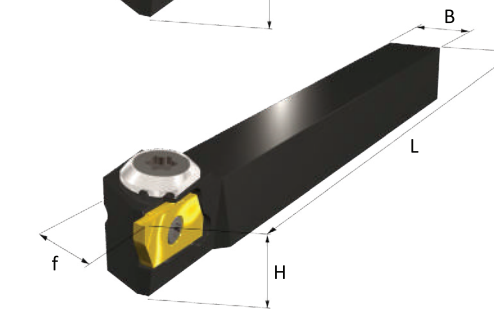


## WPJ | WhizFix Toolholders with High Pressure Coolant

Toolholder	B	H	L	f	Insert	Plug	Pin + Nut	Bit	Stock group	Price
WPJ15ER 1010K-8C	10	10	125	10	J15ER	M8x1	Pin 12	J5	r	A82
WPJ15ER 1212K-8C	12	12	125	12	J15ER	1/8 NPT	Pin 12	J5	r	A82
WPJ15ER 0500K-8C	1/2"	1/2"	125	1/2"	J15ER	1/8 NPT	Pin 12	J5	r	A82
WPJ15ER 1616K-8C	16	16	125	16	J15ER	1/8 NPT	Pin 12	J5	r	A83

For more info on WhizHip see page 11

## WSJ | Toolholders with High Pressure Coolant



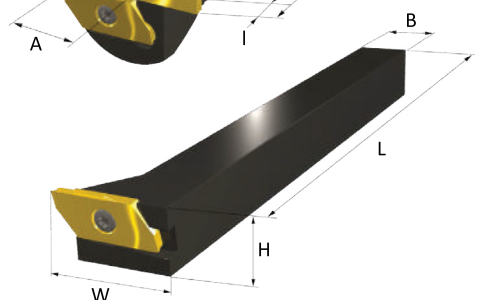
Toolholder	B	H	L	f	Insert	Plug	Screw	Key	Stock group	Price
WSJ15ER 1010K-8C	10	10	125	10	J15ER	M8x1	M3x7	J3IP	r	A72
WSJ15ER 1212K-8C	12	12	125	12	J15ER	1/8 NPT	M3x7	J3IP	r	A72
WSJ15ER 0500K-8C	1/2"	1/2"	125	1/2"	J15ER	1/8 NPT	M3x7	J3IP	r	A72
WSJ15ER 1616K-8C	16	16	125	16	J15ER	1/8 NPT	M3x7	J3IP	r	A73

## DSJ | Double Inserts Toolholders with Round Shank



Toolholder	D	A	L	I	Insert	Screw	Key	Stock group	Price
DSJ15ER 0016M-8T	16	14	150	8	J15ER	M3x7	J3IP	r	A76
DSJ15ER 0020M-8T	20	14	150	5	J15ER	M3x7	J3IP	r	A77

## ZSJ | Square Shank Toolholders

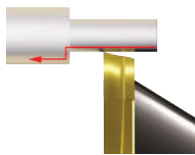


Toolholder	B	H	L	W	Insert	Screw	Key	Stock group	Price
ZSJ15ER 1212K-8T	12	12	125	20	J15ER	M3x7	J3IP	r	A72
ZSJ15ER 1616K-8T	16	16	125	24	J15ER	M3x7	J3IP	r	A73

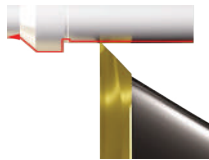
### Turning - Selecting the Best Insert

#### 1. Axial Relief vs Component Possibilities

- 3° Gives the strongest tool and smoother finish
- 12° Gives a strong tool and good finish
- 33° Medium strong tool, wiper good for smooth finish
- 48-53°: Less strong tool, wiper needed for smooth finish



Small axial relief  
Stronger tool



Large axial relief  
Weaker tool

#### 3. Cutting Rake vs Material

- 0-2° for short-chipping materials
- 3-8° for harder long-chipping materials
- 8-16° for long-chipping materials
- 16-20° for sticky long-chipping materials
- P - Line style inserts for sticky and exotic materials



0-2°



3-8°



8-16°



16-20°

#### 2. Chip Control

- Style H = Long chips and/or high feed rate
- Style J = Long chips and/or highest feed rate
- Style D, N & V = Short chips and/or low to moderate feed rate
- Style M = Short chips and/or low to moderate feed rate
- P - Line = Long chips and/or low to moderate feed rate

#### 4. Corner Alternatives

- Sharp corner = Minimum cutting force, good when component is weak.
- Wiper = For higher feed rates resulting in better surface finish.
- Radius = Stronger tool, also used upon request of component.
- Wiper and radius = For higher feed-rate with better surface.



Sharp Corner



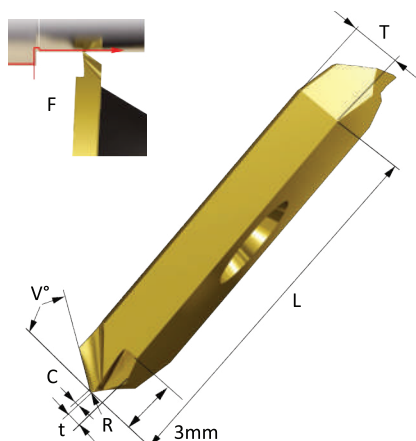
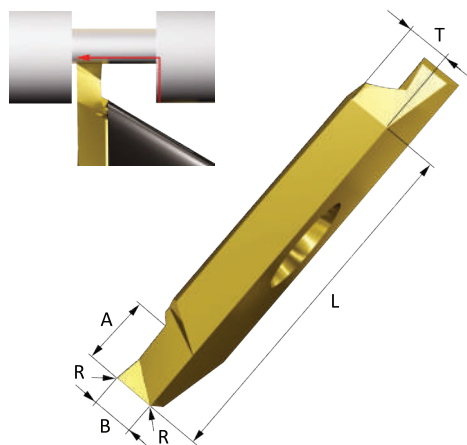
Wiper



Full Radius



Radius+Wiper



#### Style A | Inserts for Groove Turning

Inserts	L	B	A	R*2	Cutting rake°	8M	Stock C8	F8	B8	Price group
J11ER A0-0	11	1,3	2	0	0	r	r	r	r	A5
J11ER A12-0	11	1,3	2	0	12	r	r	r	r	A6
J15ER A0-08-0	15	0,5	0,8	0	0	r	r	r	r	A5
J15ER A0-12-0	15	0,75	1,2	0	0	r	r	r	r	A5
J15ER A0-16-0	15	1	1,6	0	0	r	r	r	r	A5
J15ER A0-0	15	1,5	2,3	0	0	r	r	r	r	A5
J15ER A12-16-0	15	1	1,6	0	12	r	r	r	r	A6
J15ER/L A12-0	15	1,5	2,3	0	12	b	b	b	r	A6
J15ER A12-1	15	1,5	2,3	0,1	12	r	r	r	r	A7
J20ER A0-3-0	20	2	3	0	0	r	r	r	k	A22
J20ER A0-5-0	20	3	5	0	0	r	r	r	k	A22
J20ER A12-3-0	20	2	3	0	12	r	r	r	k	A24
J20ER A12-5-0	20	3	5	0	12	r	r	r	k	A24

#### Stock status:

- a ER Stock standard, EL Stock standard
- b ER Stock standard, EL Against inquiry
- c EL Stock standard, ER Against inquiry
- r ER Stock standard only
- l EL Stock standard only
- k ER Against inquiry, EL Against inquiry

L	T
11	2,5
15	2,1
20	3,5

#### Style F | Inserts for an Extra Finishing Cut; Turning

Inserts	L	C	t	R	V°	Cutting rake°	8M	Stock C8	F8	B8	Price group
J15ER F16-0-05	15	0,15	0,6	0,05	30	16	r	r	r	k	A7

# J-TYPE INSERTS

Straight turning, Copy/Profile/Finish turning | Use with J-type Toolholders

## Style H, J | Inserts for Turning

Style	Inserts	L	V°	R	C	Cutting rake°	8M	Stock C8	F8	B8	Price group
<b>H</b> V = 3°	J15ER H6-0	15	3	0	0	6	r	r	r	k	A3
	J15ER H6-2	15	3	0,2	0	6	r	r	r	k	A4
	J15ER H16-0	15	3	0	0	16	r	r	r	r	A3
	J15ER H16-1	15	3	0,1	0	16	r	r	r	r	A4
	J15ER H16-2	15	3	0,2	0	16	r	r	r	r	A4
<b>J</b> V = 12°	J11ER/L J8-0	11	12	0	0	8	b	a	k	k	A3
	J11ER/L J8-2	11	12	0,2	0	8	b	a	k	k	A4
	J11ER/L J20-0	11	12	0	0	20	b	b	k	k	A3
	J11ER/L J20-2	11	12	0,2	0	20	b	b	k	k	A4
	J15ER/L J8-0	15	12	0	0	8	b	b	b	k	A3
	J15ER/L J8-1	15	12	0,1	0	8	b	b	b	k	A4
	J15ER/L J8-2	15	12	0,2	0	8	b	b	b	k	A4
	J15ER/L J20-0	15	12	0	0	20	b	b	b	k	A3
	J15ER/L J20-1	15	12	0,1	0	20	b	b	b	k	A4
	J15ER/L J20-2	15	12	0,2	0	20	b	b	b	k	A4
	J20ER J8-2	20	12	0,2	0	8	r	r	r	k	A21
	J20ER J8-4	20	12	0,4	0	8	r	r	r	k	A21
	J20ER J20-2	20	12	0,2	0	20	r	r	r	k	A23
	J20ER J20-4	20	12	0,4	0	20	r	r	r	k	A23

## Style D, N, V | Inserts for Finish and Copy Turning

	Inserts	L	V°	R <sup>1</sup>	C	Cutting rake°	8M	Stock C8	F8	B8	Price group
<b>D</b> V = 33°	J11ER/L D2-0	11	33	0,02	0	2	b	b	b	k	A5
	J11ER/L D2-0-1	11	33	0	0,12	2	b	b	b	k	A5
	J11ER/L D12-0	11	33	0,02	0	12	b	b	b	k	A5
	J11ER/L D12-0-1	11	33	0	0,12	12	b	b	b	k	A5
	J15ER/L D2-0	15	33	0,02	0	2	b	b	b	k	A5
	J15ER/L D2-0-2	15	33	0	0,2	2	b	b	b	k	A5
	J15ER/L D12-0	15	33	0,02	0	12	b	b	b	k	A5
	J15ER D16-1	15	33	0,1	0	16	r	r	r	r	A5
	J15ER/L D12-0-2	15	33	0	0,2	12	b	b	b	k	A5
	J15ER/L D12-1-3	15	33	0,15	0,3	12	b	b	b	k	A6
<b>N</b> V = 48°	J20ER D2-2-5	20	33	0,2	0,5	2	r	r	r	k	A23
	J20ER D12-2-5	20	33	0,2	0,5	12	r	r	r	k	A24
	J15ER/L N2-0-2	15	48	0	0,2	2	b	b	b	k	A6
	J15ER N2-1-3	15	48	0,1	0,3	2	r	r	r	k	A7
	J15ER/L N12-0-2	15	48	0	0,2	12	b	b	b	k	A6
	J15ER N12-1-3	15	48	0,1	0,3	12	r	r	r	k	A7
<b>V</b> V = 53°	J20ER N2-2-5	20	48	0,2	0,5	2	r	r	r	k	A24
	J20ER N12-2-5	20	48	0,2	0,5	12	r	r	r	k	A25
	J11ER/L V2-1	11	53	0,1	0	2	b	b	b	k	A6
	J11ER/L V12-2	11	53	0,2	0	12	b	b	b	k	A7
	J15ER/L V2-1	15	53	0,1	0	2	b	b	b	k	A6
	J15ER/L V2-0-2	15	53	0	0,2	2	a	a	a	k	A6
	J15ER/L V12-2	15	53	0,2	0	12	b	b	b	b	A7

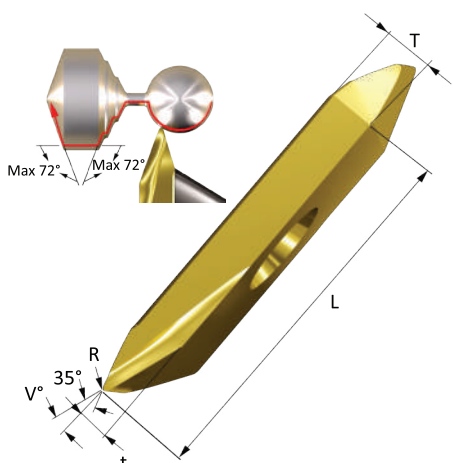
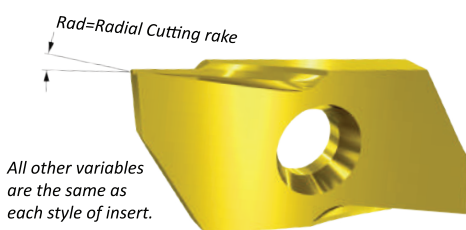
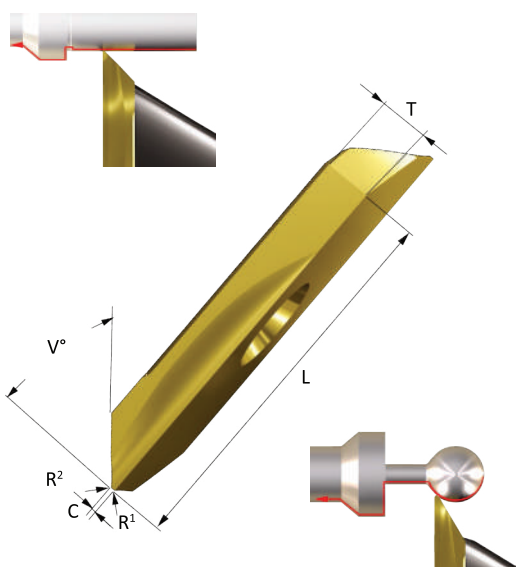
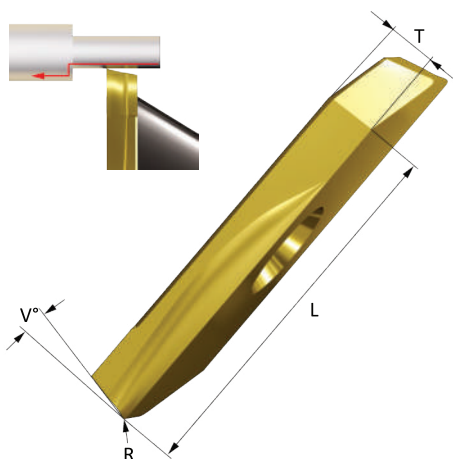
## P - Line Inserts for Turning Sticky and Exotic Materials

Style	Inserts	L	V°	R <sup>1</sup>	R <sup>2</sup>	C	Ax	Rad	8M	Stock F8	B8	Price group
<b>HP = 3°</b>	J15ER HP16-0	15	3	0	-	0	16	12	r	r	r	A4
	J15ER HP16-05	15	3	0,05	-	0	16	12	r	r	r	A5
	J15ER HP16-2	15	3	0,2	-	0	16	12	r	r	r	A5
<b>JP = 12°</b>	J15ER JP12-0	15	12	0	-	0	12	12	r	r	r	A4
	J15ER JP20-1	15	12	0,1	-	0	20	12	r	r	r	A5
	J20ER JP20-4	20	12	0,4	-	0	20	12	r	r	r	A24
<b>DP = 33°</b>	J15ER DP12-0	15	33	0,02	-	0	12	12	r	r	r	A6
	J15ER DP12-1	15	33	0,1	-	0	12	12	r	r	r	A6
	J15ER DP12-2	15	33	0,2	-	0	12	12	r	r	r	A6
<b>NP = 48°</b>	J15ER NP12-0-2	15	48	0	-	0,2	12	12	r	r	r	A7
	J15ER NP12-05-2	15	48	0,05	-	0,2	12	12	r	r	r	A8
	J15ER NP12-052	15	48	0,05	0,2	0	12	12	r	r	r	A8
	J15ER NP12-1-3	15	48	0,1	-	0,3	12	12	r	r	r	A8
<b>VP = 53°</b>	J15ER VP12-08	15	53	0,08	-	0	12	12	r	r	r	A8
	J15ER VP12-2	15	53	0,2	-	0	12	12	r	r	r	A8
<b>MP = 72°</b>	J15ER MP12-2	15	72,5	0,2	-	0	12	12	r	r	r	A8

## Style M | Inserts for Profile and Copy Turning

Inserts	L	t	V°	R	Cutting rake°	8M	Stock C8	F8	B8	Price group
J15ER M12-08	15	1,3	17,5	0,08	12	r	r	r	k	A7
J15ER M12-2	15	1,3	17,5	0,2	12	r	r	r	k	A7

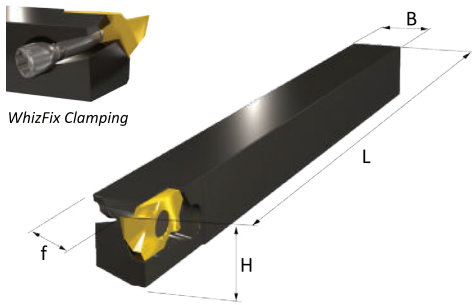
All angles are shown when mounted in toolholder



# K-TYPE TOOLHOLDERS

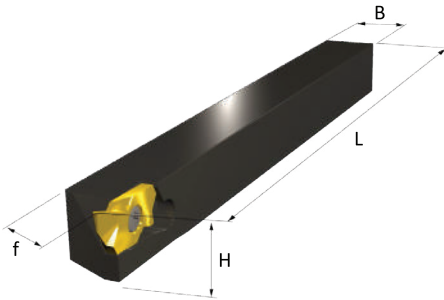
## Backturning, Grooving, Threading and Parting off

### WPK | Toolholders with WhizFix Pin Type Clamping



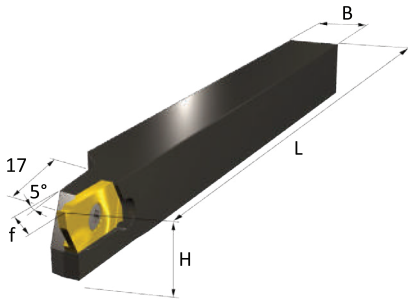
Toolholder	B	H	L	f	Insert	Pin + Nut	Bit	Stock	Price group
WPK11ER/L 88K-2P	8	8	125	8	K11ER/L	Pin 8	K3	a	A62
WPK11ER/L 1010K-2P	10	10	125	10	K11ER/L	Pin 8	K3	a	A62
WPK15ER/L 1010K-2P	10	10	125	10	K15ER/L	Pin 12	J5	a	A62
WPK15ER 1212F-2P	12	12	85	12	K15ER	Pin 12	J5	r	A61
WPK15ER/L 1212K-2P	12	12	125	12	K15ER/L	Pin 12	J5	a	A62
WPK15ER/L 1205K-2P	12	1/2"	125	12	K15ER/L	Pin 12	J5	k	A62
WPK15ER/L 1616K-2P	16	16	125	16	K15ER/L	Pin 12	J5	a	A63
WPK20ER 1212K-2P	12	12	125	12	K20ER	Pin 16	K3	r	A62
WPK20ER 1205K-2P	12	1/2"	125	12	K20ER	Pin 16	K3	r	A62
WPK20ER 1616K-2P	16	16	125	16	K20ER	Pin 16	K3	r	A63
WPK20ER 2020K-2P	20	20	125	20	K20ER	Pin 16	K3	r	A64

### WSK | Toolholders with Conventional Clamping



Toolholder	B	H	L	f	Insert	Screw	Key	Stock	Price group
WSK11ER/L 88K-2P	8	8	125	8	K11ER/L	M2,5x6	J2	a	A52
WSK15ER/L 1010K-2P	10	10	125	10	K15ER/L	M3x7	J3IP	a	A52
WSK15ER/L 1212K-2P	12	12	125	12	K15ER/L	M3x7	J3IP	a	A52
WSK15ER/L 1205K-2P	12	1/2"	125	12	K15ER/L	M3x7	J3IP	a	A52
WSK15ER/L 1616K-2P	16	16	125	16	K15ER/L	M3x7	J3IP	a	A53
WSK15ER 2020K-2P	20	20	125	20	K15ER	M3x7	J3IP	a	A54
WSK15ER 2525M-2P	25	25	150	25	K15ER	M3x7	J3IP	a	A55
WSK15ER 1000M-2P	1"	1"	150	1"	K15ER	M3x7	J3IP	a	A55
WSK20ER 1212K-2P	12	12	125	12	K20ER	M4x9	J4	r	A52
WSK20ER 1205K-2P	12	1/2"	125	12	K20ER	M4x9	J4	r	A52
WSK20ER 1616K-2P	16	16	125	16	K20ER	M4x9	J4	r	A53
WSK20ER 2020K-2P	20	20	125	20	K20ER	M4x9	J4	r	A54
WSK20ER 2525M-2P	25	25	150	25	K20ER	M4x9	J4	r	A55
WSK20ER 1000M-2P	1"	1"	150	1"	K20ER	M4x9	J4	r	A55

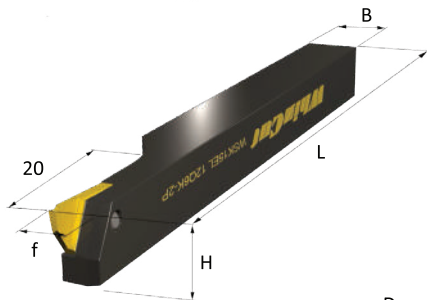
### WSK | Toolholders for Small Parts



Toolholder	B	H	L	f	Insert	Screw	Key	Stock	Price group
WSK15ER 1010K-2B	10	10	125	5	K15ER	M3x5	J3IP	r	A52
WSK15ER 1212K-2B	12	12	125	6	K15ER	M3x5	J3IP	r	A52



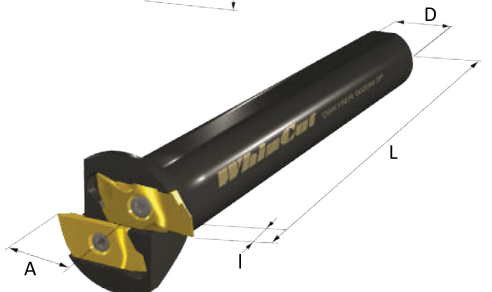
### WSK | Left hand Toolholder with Insert in Center



Toolholder	B	H	L	f	Insert	Screw	Key	Stock	Price group
WSK15EL 12Q6K-2P	12	12	125	6	K15EL	M3x5	J3IP	l	A52

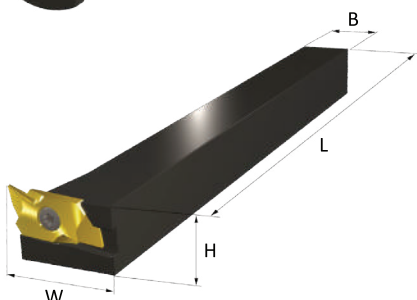


### DSK | Double Inserts Toolholders Round Shank



Toolholder	D	A	L	I	Insert	Screw	Key	Stock	Price Group
DSK15ER 0016M-2P	16	14	150	8	K15ER	M3x7	J3IP	r	A76
DSK15ER 0020M-2P	20	14	150	5	K15ER	M3x7	J3IP	r	A77

### ZSK | Square Shank Toolholders

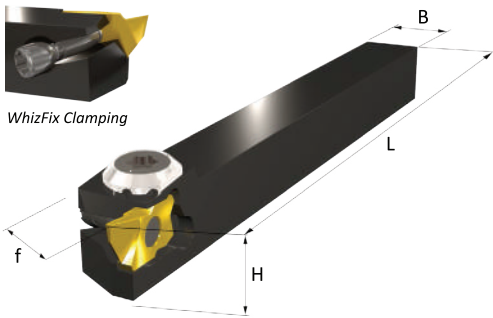


Toolholder	B	H	L	W	Insert	Screw	Key	Stock	Price Group
ZSK15ER 1212K-2P	12	12	125	20	K15ER	M3x7	J3IP	r	A72
ZSK15ER 1616K-2P	16	16	125	24	K15ER	M3x7	J3IP	r	A73



# K-TYPE WHIZHIP TOOLHOLDERS

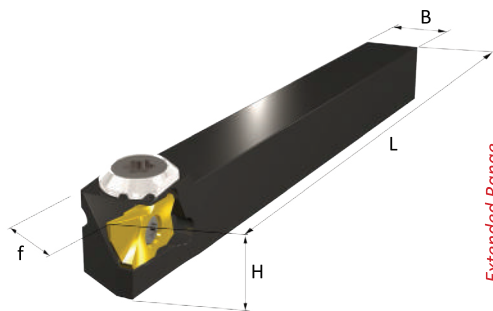
## Backturning, Grooving, Threading and Parting off



### WPK | WhizHip Pin type Toolholders for High Pressure Coolant

Toolholder	B	H	L	f	Insert	Plug	Pin + Nut	Bit	Stock	Price Group
WPK15ER 1010K-2C	10	10	125	10	K15ER	M8x1	Pin12	J5	r	A82
WPK15ER 1212K-2C	12	12	125	12	K15ER	1/8 NPT	Pin12	J5	r	A82
WPK15ER 0500K-2C	1/2"	1/2"	125	1/2"	K15ER	1/8 NPT	Pin12	J5	r	A82
WPK15ER 1616K-2C	16	16	125	16	K15ER	1/8 NPT	Pin12	J5	r	A83

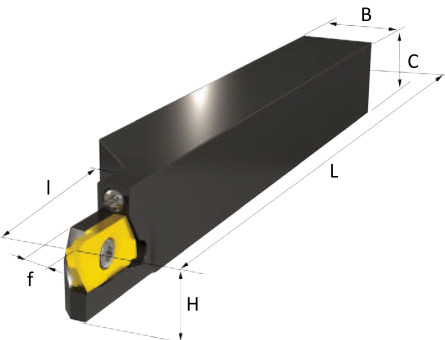
For more info on WhizHip See page 11



### WSK | WhizHip Toolholders for High Pressure Coolant

Toolholder	B	H	L	f	Insert	Plug	Screw	Key	Stock	Price Group
WSK15ER/L 1010K-2C	10	10	125	10	K15ER	M8x1	M3x7	J3IP	b	A72
WSK15ER/L 1212K-2C	12	12	125	12	K15ER	1/8 NPT	M3x7	J3IP	b	A72
WSK15ER/L 0500K-2C	1/2"	1/2"	125	1/2"	K15ER	1/8 NPT	M3x7	J3IP	b	A72
WSK15ER/L 1616K-2C	16	16	125	16	K15ER	1/8 NPT	M3x7	J3IP	b	A73

Extended Range



### WSK | WhizHip Toolholders for Parting off Small Parts

Toolholder	B	H	C	L	I	f	Insert	Plug	Screw	Key	Stock	Price Group
WSK15ER 1010K-2CA	10	10	10	125	18	5	K15ER	M8	M3x5	J3IP	r	A72
WSK15ER 1212K-2CA	12	12	12	125	18	5	K15ER	1/8 NPT	M3x5	J3IP	r	A72
WSK15ER 0500K-2CA	1/2"	1/2"	1/2"	125	18	5	K15ER	1/8 NPT	M3x5	J3IP	r	A72
WSK15ER 1616K-2CA	16	12	16	125	25,4	5	K15ER	1/8 NPT	M3x5	J3IP	r	A73

New Product



### AHK | Coolant Through Height Adjustable Toolholders for Back Working

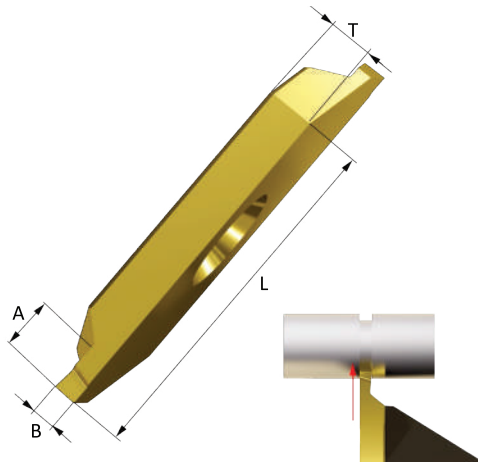
WhizAdjust is a new patented toolholder system from WhizCut that allows for very quick and easy height adjustment without losing any stability. This makes it perfect for turning against the sub spindle. The new back working tooling program can be downloaded from the WhizCut website. Visit [www.whizcut.com](http://www.whizcut.com) for more information or contact a WhizCut distributor.



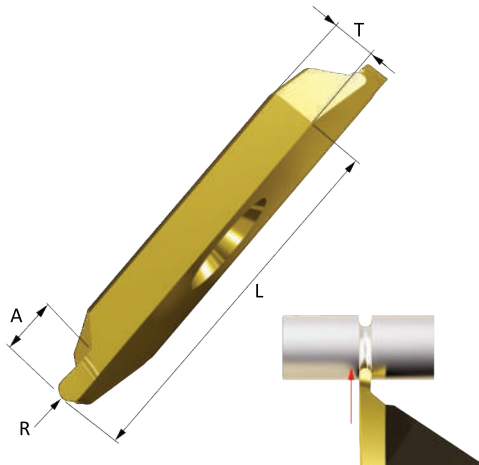
# K-TYPE INSERTS

## Grooving and Threading

### Style G | Inserts for Grooving



Inserts	B	Max A	Circlip Size	8M	Stock C8	F8	B8	Price group
K11ER G0,5	0,5	1	0,4	r	r	r	k	A4
K11ER G0,8	0,8	1,6	0,7	r	r	r	k	A4
K11ER G1,0	1	2	0,9	r	r	r	k	A4
K15ER G0,1	0,1	0,2		r	r	r	k	A6
K15ER G0,2	0,2	0,4		r	r	r	k	A5
K15ER G0,25	0,25	0,5		r	r	r	k	A5
K15ER G0,3	0,3	0,6		r	r	r	k	A4
K15ER G0,4	0,4	0,8		r	r	r	k	A4
K15ER/L G0,5	0,5	1	0,4	b	b	r	r	A4
K15ER G0,6	0,6	1,2	0,5	r	r	r	k	A4
K15ER G0,7	0,7	1,4	0,6	r	r	r	k	A4
K15ER/L G0,8	0,8	1,6	0,7	b	b	r	r	A4
K15ER G0,9	0,9	2		r	r	r	r	A4
K15ER/L G1,0	1	2	0,9	b	b	r	r	A4
K15ER/L G1,15	1,15	2,3	1	b	b	r	r	A4
K15ER G1,35	1,35	2,7	1,2	r	r	r	r	A4
K15ER/L G1,5	1,5	3		b	b	r	r	A4
K15ER G1,65	1,65	3,3	1,5	r	r	r	r	A4
K15ER G1,90	1,9	3,8	1,75	r	r	r	r	A4
K15ER G2,05	2,05	4,1		r	r	r	r	A4
K20ER G2,0	2	4		r	r	r	k	A24
K20ER G2,5	2,5	5		r	r	r	k	A24
K20ER G3,0	3	6		r	r	r	k	A24



### Style GR | Inserts for Radius Grooving

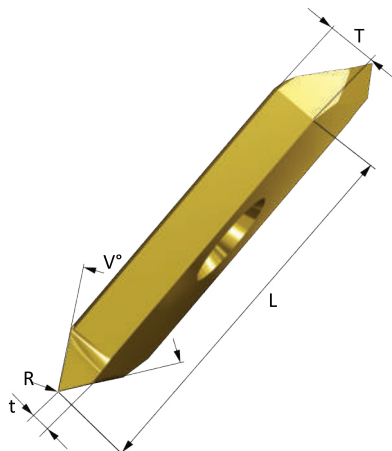
Inserts	R	A	L	T	8M	Stock C8	F8	B8	Price group
K15ER GR0,25	0,25	1	15	2,1	r	r	r	k	A7
K15ER GR0,5	0,5	2	15	2,1	r	r	r	k	A7
K15ER GR0,75	0,75	3	15	2,1	r	r	r	k	A7
K15ER GR1,0	1	4	15	2,1	r	r	r	k	A7
K20ER GR1,25	1,25	5	20	3,5	r	r	r	k	A27
K20ER GR1,5	1,5	6	20	3,5	r	r	r	k	A27
K20ER GR1,75	1,75	7	20	3,5	r	r	r	k	A27

#### Stock status:

- a ER Stock standard, EL Stock standard
- b ER Stock standard, EL Against inquiry
- c EL Stock standard, ER Against inquiry
- r ER Stock standard only
- l EL Stock standard only
- k ER Against inquiry, EL Against inquiry

L	T
11	2,5
15	2,1
20	3,5

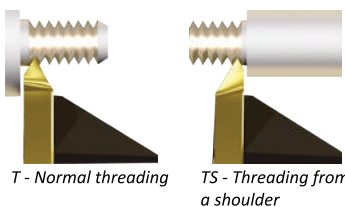
All angles are shown when mounted in toolholder



### Style T | Inserts for Partial Profile Threading

Inserts	L	V°	t	R	8M	Stock C8	F8	B8	Price group
K11ER/L T60-5	11	60	0,5	0,03	a	a	b	k	A4
K15ER/L T55-5	15	55	0,5	0,03	b	b	b	k	A5
K15ER/L T60-5	15	60	0,5	0,02	a	a	b	k	A4
K15ER/L T60-8	15	60	0,8	0,05	a	a	b	k	A4
K15ER TS60-16	15	60	1,6	0,03	b	b	b	k	A5
K20ER T60-10	20	60	1	0,1	r	r	r	k	A25
K20ER T60-15	20	60	1,5	0,2	r	r	r	k	A25
K20ER TS60-25	20	60	2,5	0,1	r	r	r	k	A25

Right hand insert shown. See page 30 for the WhizThread full line of threading inserts.





# Back Turning - Exceptional Results in All Materials

WhizCut Backturning inserts have during the past years helped our customers to achieve results that is not possible with any other tools in the market.

## WhizCut B Style Back Turning Insert

- Gives better roundness on the component
- Keeps the size longer without adjustment
- Controls chips by moving them away from the work piece
- Curls the chip before it hits the finished face
- Small distance from the side to end of wiper which makes final diameter
- Very suitable for small diameters
- Available in a wide range of unique geometries
- A narrow parting off insert can be used when clearing up unwanted end material



## Selecting the Best Back Turning Insert

### Style C

Style C is used when there is an undercut required.

### Style B

Style B is for general use in back turning applications in stainless steel and other hard and long-chipping materials where good chip control is needed.

### Style BP

Style BP is used for sticky materials when there is a chance of an edge build up that can spoil the surface finish or reduce tool-life.

### Style BT

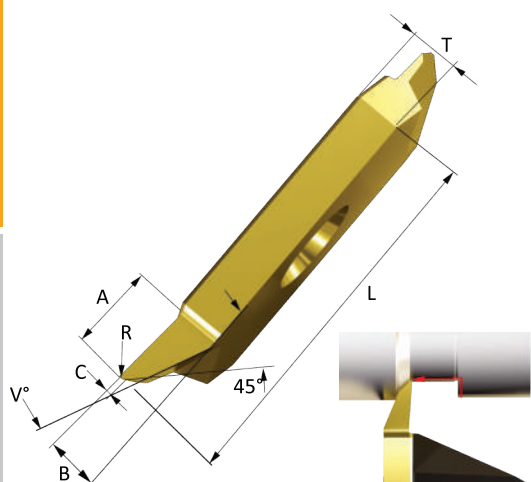
Style BT inserts has a chamfer on the leading corner that improves the tool-life in harder materials. This insert is suitable when the wear on the style B insert is found in an early stage.

### Style VLR

Style VLR is used for back turning when a smooth surface is needed when profiling. It is for example excellent to go in behind the head of a bone screw with.

### Style E

Style E is used for fine turning, using high cutting speed and low feed rate. This insert will give the best possible surface finish. By protecting the small radius with the larger radius the tool life is extended compared with conventional full radius inserts.



## Style C | Inserts for Back Turning when there is a Undercut Required

Inserts	A	B	C	R	V°	Cutting rake°	8M	C8	F8	B8	Price group
K11ER C0-1-0	1,3	1	0,2	0	30	0	r	r	r	k	A6
K15ER/L C0-3-0	3	1,9	0,2	0	20	0	a	a	b	k	A7

### Stock status:

- a ER Stock standard, EL Stock standard
- b ER Stock standard, EL Against inquiry
- c EL Stock standard, ER Against inquiry
- r ER Stock standard only
- l EL Stock standard only
- k ER Against inquiry, EL Against inquiry

L	T
11	2,5
15	2,1
20	3,5

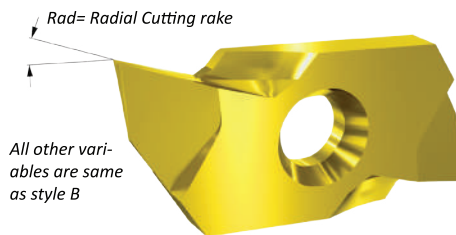
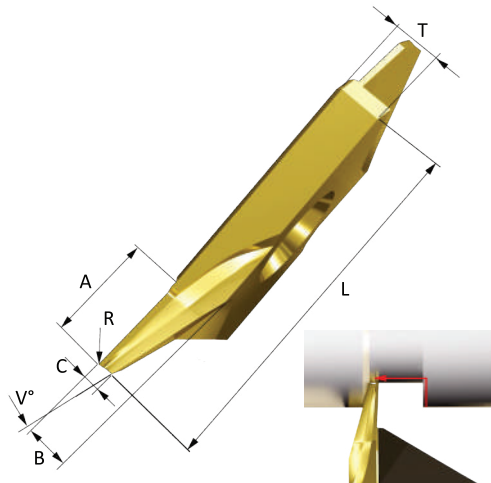
# K-TYPE INSERTS

## Back turning

### Style B | Inserts for Back Turning in Steel and Other Hard and Long-Chipping Materials

Inserts	A	B	C	R	V°	Cutting rake°	8M	C8	F8	B8	Price group
K11ER/L B12-2-0	2	1	0,4	0	15	12	a	a	b	b	A8
K11ER/L B12-3-0	3,5	1,5	0,6	0	15	12	a	a	b	b	A8
K15ER/L B12-2-0	2,5	1,3	0,5	0	15	12	a	a	b	b	A8
K15ER/L B12-4-0	4	1,9	0,7	0	15	12	a	a	b	b	A8
K15ER/L B12-4-05	4	1,9	0,7	0,05	15	12	a	a	b	b	A9
K15ER/L B12-4-1	4	1,9	0,7	0,1	15	12	a	a	b	b	A9
K15ER/L B12-4-2	4	1,9	0,7	0,2	15	12	a	a	b	b	A9
K20ER B12-7-0	7	3,2	1,3	0	15	12	r	r	r	k	A28
K20ER B12-7-2	7	3,2	1,3	0,2	15	12	r	r	r	k	A29

Right hand insert shown.



All other variables are same as style B

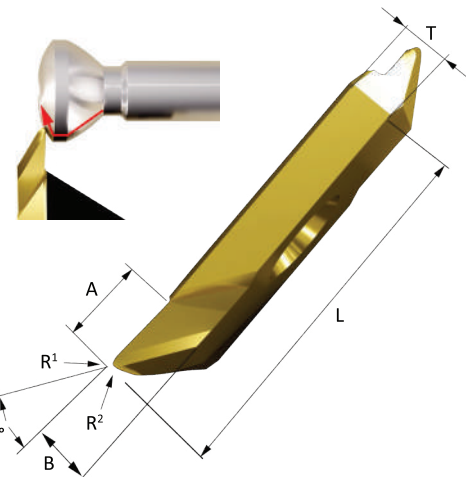
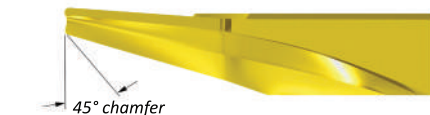
### Style BP | Inserts for Back Turning in Sticky Materials

Inserts	A	B	C	R	V°	Ax	Rad	8M	C8	F8	B8	Price group
K15ER BP12-2-0	2,5	1,3	0,5	0	20	12	14	r	k	r	r	A8
K15ER BP12-2-05	2,5	1,3	0,5	0,05	20	12	14	r	k	r	r	A9
K15ER BP12-4-0	4	1,9	0,7	0	20	12	14	r	k	r	r	A8
K15ER BP12-4-1	4	1,9	0,7	0,1	20	12	14	r	k	r	r	A9

Please note: K15ER BP has a small chamfer on the left corner

### Style BT | Inserts for Back Turning in Tough Materials for Longer Tool Life

Inserts	A	B	C	R	V°	Cutting rake°	8M	C8	F8	B8	Price group
K15ER BT12-4-2	4	1,9	0,7	0,2	15	12	r	r	r	r	A9
K20ER BT12-7-2	7	3,2	1,3	0,2	15	12	r	r	r	r	A29



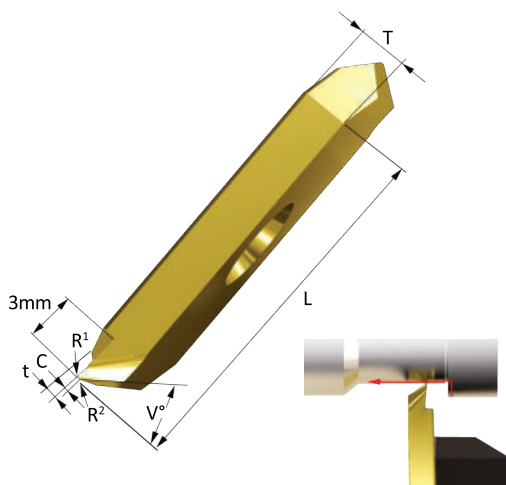
### Style VLR | Inserts for Back Turning Profiles

Inserts	A	B	R <sup>1</sup>	R <sup>2</sup>	V°	Cutting rake°	Stock 8M C8 F8 B8	Price group
K15ER VLR12-12	3	1,9	0,1	0,2	35	20	r r r r	A7
K15ER VLR12-2	3	1,9	0,2	0,2	35	20	r r r r	A7

Extended Range

### Style E | Inserts for an Extra Finishing Cut; Back turning

Inserts	Max cut	C	t	R <sup>1</sup>	R <sup>2</sup>	V°	Cutting rake°	8M	F8	B8	Price group
K15ER E16-0-0	0,8	0	0,6	0,05	0,15	30	16	r	r	r	A8
K15ER E16-12	0,8	0	0,6	0,1	0,2	30	16	r	r	r	A8



# K-TYPE INSERTS

## Parting Off

### Style Z | Inserts for Parting Off

Inserts	B	Max D	V	Cutting rake°	8M	Stock C8	F8	B8	Price group
K11ER/L Z0,5-12	0,5	4	15°	12	r	k	r	r	A6
K11ER/L Z1,0-0	1	9	15°	0	a	a	b	k	A6
K11ER/L Z1,0-12	1	9	15°	12	a	a	b	k	A6
K11ER/L Z1,5-0	1,5	11	15°	0	a	a	b	k	A5
K11ER/L Z1,5-12	1,5	11	15°	12	a	a	b	k	A5
K15ER/L Z0,5-12	0,5	5	15°	12	b	b	b	r	A6
K15ER/L Z0,7-0	0,7	5	15°	0	b	b	b	k	A6
K15ER/L Z0,7-12	0,7	5	15°	12	b	b	b	k	A6
K15ER/L Z1,0-0	1	10	15°	0	a	a	b	r	A6
K15ER/L Z1,0-12	1	10	15°	12	a	a	b	r	A6
K15ER/L Z1,5-0	1,5	12	15°	0	a	a	b	k	A5
K15ER/L Z1,5-12	1,5	12	15°	12	a	a	b	r	A5
K15ER/L Z1,5-12D	1,5	12,6	15°	12	a	a	b	k	A5
K15ER/L Z2,0-0	2	12	15°	0	a	a	b	k	A5
K15ER/L Z2,0-12	2	12	15°	12	a	a	b	k	A5
K20ER Z2,0-0	2	20	15°	0	r	r	r	k	A26
K20ER Z2,0-12	2	20	15°	12	r	r	r	k	A26
K20ER Z2,5-0	2,5	20	15°	0	r	r	r	k	A26
K20ER Z2,5-12	2,5	20	15°	12	r	r	r	k	A26

Extended Range

### Style S | Inserts for Parting Off

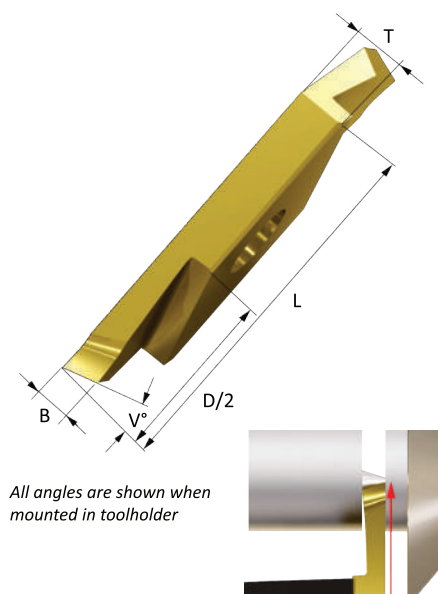
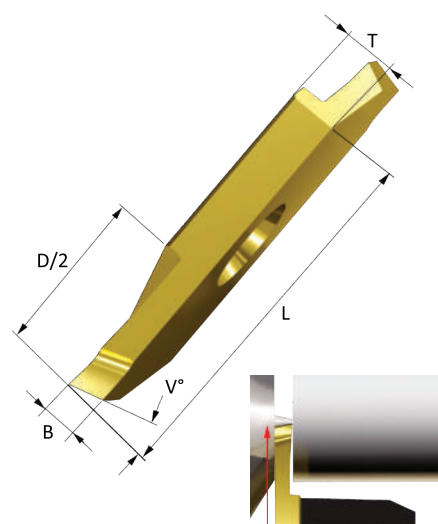
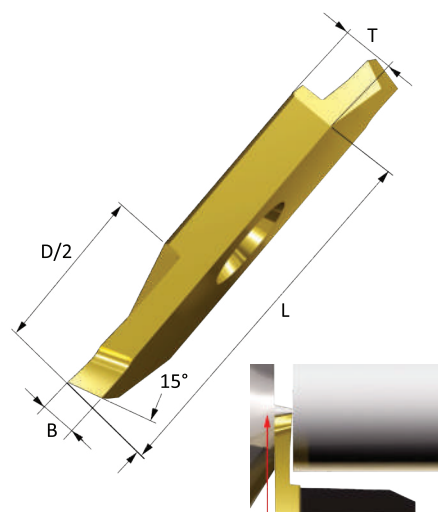
Inserts	B	Max D	V	Cutting rake°	8M	Stock C8	F8	B8	Price group
K15ER S1,0-0	1	6	20°	0	b	b	b	r	A5
K15ER S1,0-12	1	6	20°	12	b	b	b	r	A6
K15ER S1,5-0	1,5	9	20°	0	b	b	b	k	A5
K15ER S1,5-12	1,5	9	20°	12	b	b	b	k	A6

### Style U | Inserts for Parting Off

Inserts	B	Max D	V	Cutting rake°	8M	Stock C8	F8	B8	Price group
K11ER/L U1,0-0	1	8	30°	0	b	b	b	k	A6
K15ER/L U1,0-0	1	9	30°	0	b	b	b	k	A6
K15ER/L U1,5-0	1,5	12	30°	0	b	b	b	k	A6
K20ER U2,0-0	2	16	30°	0	r	r	r	k	A26
K20ER U2,5-0	2,5	20	30°	0	r	r	r	k	A26

### Style YR, ZR, SR | Inserts for Parting Off against the Sub Spindle etc.

Style	Inserts	B	Max D	V	Cutting rake°	8M	Stock C8	F8	B8	Price group
YR V = 6°	K15EL YR1,5-12	1,5	12	6°	12	l	l	l	k	A6
	K15EL YR2,0-12	2	12	6°	12	l	l	l	k	A6
ZR V = 15°	K11EL ZR0,5-12	0,5	4	15°	12	l	k	l	k	A6
	K11EL ZR1,0-0	1	9	15°	0	l	l	l	k	A6
	K11EL ZR1,0-12	1	9	15°	12	l	l	l	k	A6
	K11EL ZR1,5-0	1,5	11	15°	0	l	l	l	k	A6
	K11EL ZR1,5-12	1,5	11	15°	12	l	l	l	k	A6
	K15EL ZR1,0-0	1	10	15°	0	l	l	l	k	A6
	K15EL ZR1,0-12	1	10	15°	12	l	l	l	k	A6
	K15EL ZR1,5-0	1,5	12	15°	0	l	l	l	k	A6
	K15EL ZR1,5-12	1,5	12	15°	12	l	l	l	k	A6
	K15EL ZR2,0-0	2	12	15°	0	l	l	l	k	A6
	K15EL ZR2,0-12	2	12	15°	12	l	l	l	k	A6
	K15EL SR1,0-0	1	5,5	20°	0	l	k	l	l	A6
SR Short V = 20°	K15EL SR1,0-12	1	5,5	20°	12	l	k	l	l	A6
	K15EL SR1,5-0	1,5	8	20°	0	l	k	l	k	A6
	K15EL SR1,5-12	1,5	8	20°	12	l	k	l	k	A6



All angles are shown when mounted in toolholder

# Parting Off - Selecting the Best Insert

## 1. Axial Relief vs Component Possibilities

- Style P: 0° gives the strongest tool. Suitable with use of sub spindle. Style PS can be used for extra stability.
- Style Y: 6° gives a strong tool but can leave a small chamfer if a sub spindle is not used.
- Style Z: 15° is an all-round parting off insert. It can be used without a sub spindle.
- Style S, U: 20-30° is a less strong tool suitable for small parts where a fine surface finish is needed.

## 2. Cutting Rake vs Material

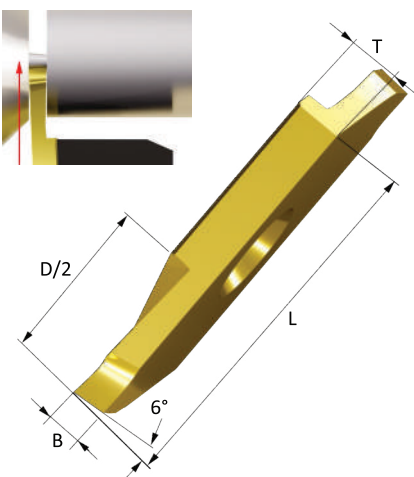
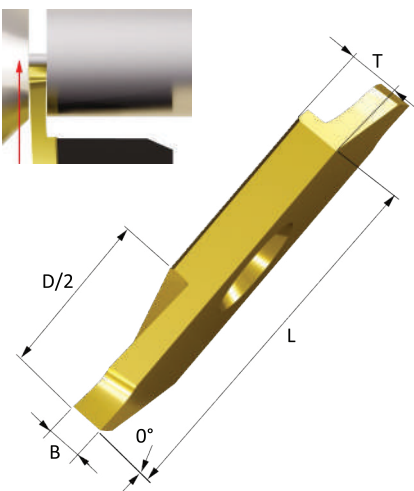
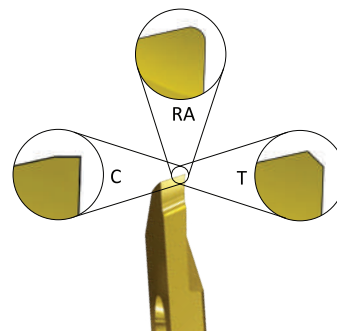
- 0° for short-chipping materials
- 12° for long-chipping materials
- 20° for sticky long-chipping materials

## 3. Machining Against the Sub Spindle

Recommended inserts are YR, ZR and SR. For maximum stability of the part use the special toolholder WSK15EL 12Q6K-2P.

## 4. Special Corner Alternatives for Parting Off Inserts

Parting off applications sometimes demand a different kind of corner execution on the parting off insert. WhizCut can arrange any type of corner execution. Contact your local distributor who will assist you in finding the type that best suits your needs.



## Style P, PS | Inserts for Parting Off

Inserts	B	Max D	V	Cutting rake°	8M	Stock C8	F8	B8	Price group
K11ER P0,5-12	0,5	4	0°	12	b	b	b	k	A5
K11ER/L P0,8-12	0,8	7	0°	12	b	b	b	k	A5
K11ER/L P1,0-12	1	9	0°	12	b	b	b	k	A5
K11ER/L P1,5-12	1,5	11	0°	12	b	b	b	k	A4
K15ER PS0,5-12	0,5	3	0°	12	r	k	r	k	A5
K15ER/L P0,7-12	0,7	5	0°	12	b	a	b	k	A5
K15ER/L P1,0-12	1	10	0°	12	a	a	b	k	A5
K15ER PS1,0-12	1	6	0°	12	r	k	r	k	A5
K15ER P1,0-20	1	10	0°	20	b	k	b	k	A5
K15ER/L P1,2-12	1,2	12	0°	12	a	a	b	k	A5
K15ER/L P1,5-12	1,5	12	0°	12	a	a	b	k	A4
K15ER PS1,5-12	1,5	9	0°	12	r	b	a	k	A4
K15ER/L P1,5-20	1,5	12	0°	20	b	k	r	k	A4
K15ER/L P2,0-12	2	12	0°	12	a	a	b	k	A4
K20ER P1,5-12	1,5	16	0°	12	r	r	r	k	A25
K20ER P2,0-12	2	20	0°	12	r	r	r	k	A25
K20ER P2,5-12	2,5	20	0°	12	r	r	r	k	A25
K20ER P3,0-12	3	20	0°	12	r	r	r	k	A25

## Style Y | Inserts for Parting Off

Inserts	B	Max D	V	Cutting rake°	8M	Stock C8	F8	B8	Price group
K11ER/L Y1,0-12	1	9	6°	12	b	b	b	k	A6
K11ER/L Y1,5-12	1,5	11	6°	12	b	b	b	k	A5
K15ER/L Y1,0-12	1	10	6°	12	a	a	b	k	A6
K15ER/L Y1,2-12	1,2	12	6°	12	b	b	b	k	A5
K15ER/L Y1,5-12	1,5	12	6°	12	a	a	b	k	A5
K15ER/L Y2,0-12	2	12	6°	12	a	a	b	k	A5
K20ER Y2,0-12	2	20	6°	12	r	r	r	k	A26
K20ER Y2,5-12	2,5	20	6°	12	r	r	r	k	A26

### Stock status:

- a ER Stock standard, EL Stock standard
- b ER Stock standard, EL Against inquiry
- c EL Stock standard, ER Against inquiry
- r ER Stock standard only
- l EL Stock standard only
- k ER Against inquiry, EL Against inquiry

L	T
11	2,5
15	2,1
20	3,5

# T-TYPE TOOLHOLDERS

## WhizThread

1. DIAMETAL

2. BIMU

3. IFANGER

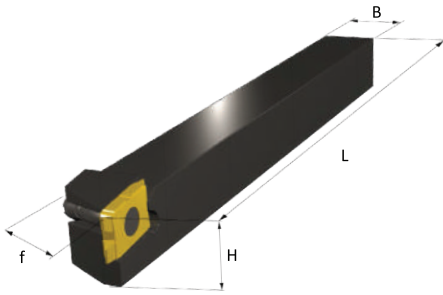
4. ZEUS

5. ARNO

6. Whiz Cut

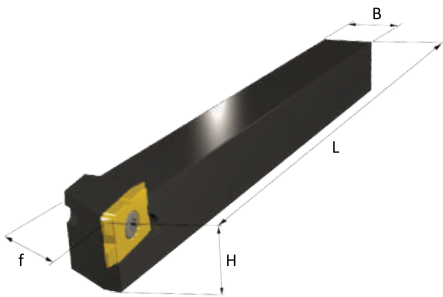
7. SPHINX

### TPT | Toolholders with WhizFix Pin type Clamping



Toolholder	B	H	L	f	α	Insert	Pin + Nut	Bit	Stock	Price group
TPT13ER 1010K-2	10	10	125	10	2°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 1010K-4	10	10	125	10	4°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 0375K-2	3/8"	3/8"	125	3/8"	2°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 0375K-4	3/8"	3/8"	125	3/8"	4°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 1212K-2	12	12	125	12	2°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 1212K-4	12	12	125	12	4°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 0500K-2	1/2"	1/2"	125	1/2"	2°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 0500K-4	1/2"	1/2"	125	1/2"	4°	T13ER/EN	Pin 12	J5	r	A62
TPT13ER 1616K-2	16	16	125	16	2°	T13ER/EN	Pin 12	J5	r	A63
TPT13ER 1616K-4	16	16	125	16	4°	T13ER/EN	Pin 12	J5	r	A63

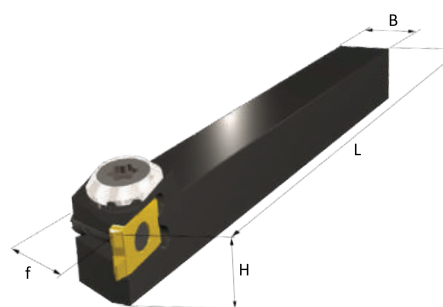
### TST | Toolholders with Conventional Clamping



Toolholder	B	H	L	f	α	Insert	Screw	Key	Stock	Price group
TST13ER 88K-2	8	8	125	8	2°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 88K-4	8	8	125	8	4°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 1010K-2	10	10	125	10	2°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 1010K-4	10	10	125	10	4°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 1010K-6	10	10	125	10	6°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 0375K-2	3/8"	3/8"	125	3/8"	2°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 0375K-4	3/8"	3/8"	125	3/8"	4°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 1212K-2	12	12	125	12	2°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 1212K-4	12	12	125	12	4°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 0500K-2	1/2"	1/2"	125	1/2"	2°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 0500K-4	1/2"	1/2"	125	1/2"	4°	T13ER/EN	M3x7	J3IP	r	A52
TST13ER 1616K-2	16	16	125	16	2°	T13ER/EN	M3x7	J3IP	r	A53
TST13ER 1616K-4	16	16	125	16	4°	T13ER/EN	M3x7	J3IP	r	A53
TST13ER 0750K-2	3/4"	3/4"	125	3/4"	2°	T13ER/EN	M3x7	J3IP	r	A54
TST13ER 0750K-4	3/4"	3/4"	125	3/4"	4°	T13ER/EN	M3x7	J3IP	r	A54
TST13ER 2020K-2	20	20	125	20	2°	T13ER/EN	M3x7	J3IP	r	A54
TST13ER 2525M-2	25	25	150	25	2°	T13ER/EN	M3x7	J3IP	r	A55
TST13ER 1000M-2	1"	1"	150	1"	2°	T13ER/EN	M3x7	J3IP	r	A55

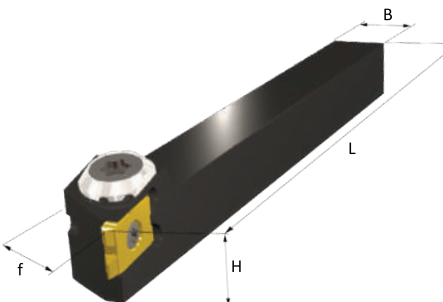


### TPT | WhizHip Pin type Toolholders for High Pressure Coolant



Toolholder	B	H	L	f	α	Insert	Pin + Nut	Plug	Bit	Stock	Price group
TPT13ER 1010K-2C	10	10	125	10	2°	T13ER/EN	Pin12	M8x1	J5	r	A82
TPT13ER 1010K-4C	10	10	125	10	4°	T13ER/EN	Pin12	M8x1	J5	r	A82
TPT13ER 0375K-2C	3/8"	3/8"	125	3/8"	2°	T13ER/EN	Pin12	1/8 NPT	J5	r	A82
TPT13ER 0375K-4C	3/8"	3/8"	125	3/8"	4°	T13ER/EN	Pin12	1/8 NPT	J5	r	A82
TPT13ER 1212K-2C	12	12	125	12	2°	T13ER/EN	Pin12	1/8 NPT	J5	r	A82
TPT13ER 1212K-4C	12	12	125	12	4°	T13ER/EN	Pin12	1/8 NPT	J5	r	A82
TPT13ER 0500K-2C	1/2"	1/2"	125	1/2"	2°	T13ER/EN	Pin12	1/8 NPT	J5	r	A82
TPT13ER 0500K-4C	1/2"	1/2"	125	1/2"	4°	T13ER/EN	Pin12	1/8 NPT	J5	r	A82
TPT13ER 1616K-2C	16	16	125	16	2°	T13ER/EN	Pin12	1/8 NPT	J5	r	A83

### TST | WhizHip Toolholders for High Pressure Coolant

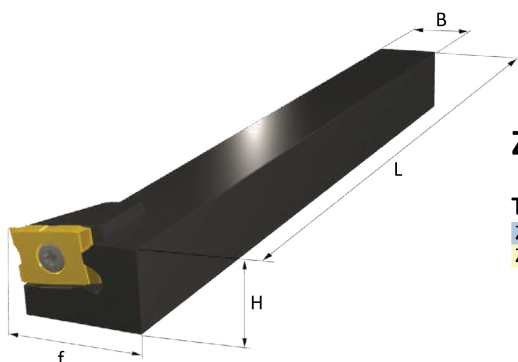


Toolholder	B	H	L	f	α	Insert	Screw	Plug	Key	Stock	Price group
TST13ER 1010K-2C	10	10	125	10	2°	T13ER/EN	M3x7	M8x1	J3IP	r	A72
TST13ER 1010K-4C	10	10	125	10	4°	T13ER/EN	M3x7	M8x1	J3P	r	A72
TST13ER 0375K-2C	3/8"	3/8"	125	3/8"	2°	T13ER/EN	M3x7	1/8 NPT	J3IP	r	A72
TST13ER 0375K-4C	3/8"	3/8"	125	3/8"	4°	T13ER/EN	M3x7	1/8 NPT	J3IP	r	A72
TST13ER 1212K-2C	12	12	125	12	2°	T13ER/EN	M3x7	1/8 NPT	J3IP	r	A72
TST13ER 1212K-4C	12	12	125	12	4°	T13ER/EN	M3x7	1/8 NPT	J3IP	r	A72
TST13ER 0500K-2C	1/2"	1/2"	125	1/2"	2°	T13ER/EN	M3x7	1/8 NPT	J3IP	r	A72
TST13ER 1616K-2C	16	16	125	16	2°	T13ER/EN	M3x7	1/8 NPT	J3IP	r	A73



# T-TYPE TOOLHOLDERS, INSERTS

## Partial profile



### ZST | Square shank Toolholders

Toolholder	B	H	L	f	$\alpha$	Insert	Screw	Key	Stock group	Price
ZST13ER 1212K-2	12	12	125	20	2°	T13ER/EN	M3x7	J3IP	r	A72
ZST13ER 1616K-2	16	16	125	24	2°	T13ER/EN	M3x7	J3P	r	A73



### AST | Height Adjustable Toolholders for Back Working Sub Spindle Threading

Do you need to thread against the sub spindle? WhizCut has designed a Patent toolholder system that allows very quick and easy height adjustment with increased stability. Go to [www.whizcut.com](http://www.whizcut.com) for more info or contact your local distributor.

1. DIAMETAL

2. BIMU

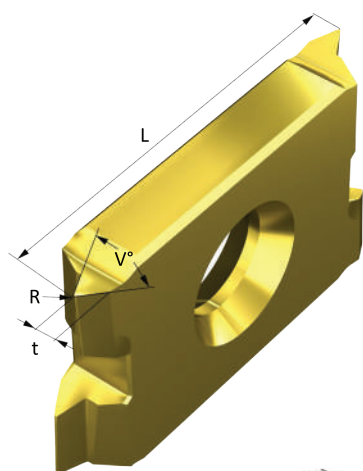
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



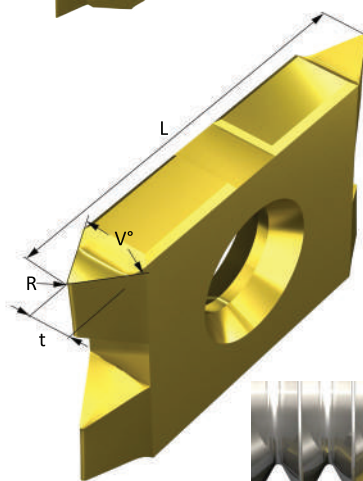
### Style V | Inserts for Partial Profile Micro Threading

Inserts	L	V°	t	R	8M	Stock C8	F8	B8	Price group
T13ER V60-02-02	13	60	0,2	0,02	r	r	r	r	E3
T13ER V60-05-02	13	60	0,5	0,02	r	r	r	r	E2
T13ER V60-05-05	13	60	0,5	0,05	r	r	r	r	E2

#### Stock status:

- a ER Stock standard, EL Stock standard
- b ER Stock standard, EL Against inquiry
- c EL Stock standard, ER Against inquiry
- r ER Stock standard only
- l EL Stock standard only
- k ER Against inquiry, EL Against inquiry

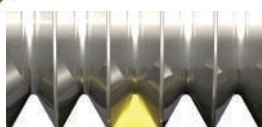
L	T
13	2,2



### Style V | Inserts for Partial Profile Threading

Inserts	L	V°	t	R	8M	Stock C8	F8	B8	Price group
T13EN V55-11-10	13	55	1,1	0,1	r	r	r	r	E3
T13EN V60-11-05	13	60	1,1	0,05	r	r	r	r	E2
T13EN V60-11-10	13	60	1,1	0,1	r	r	r	r	E2
T13EN V80-11-14	13	80	1,1	0,14	r	r	r	r	E3
T13EN V90-11	13	90	1,1	C 0,10	r	r	r	r	E2

T13EN V90-11 has a 0,1mm flat instead of a radius



Partial Profile Threading

# T-TYPE INSERTS ISO, UN, UNJ

1.DIAMETAL

2.BIMU

3.IFANGER

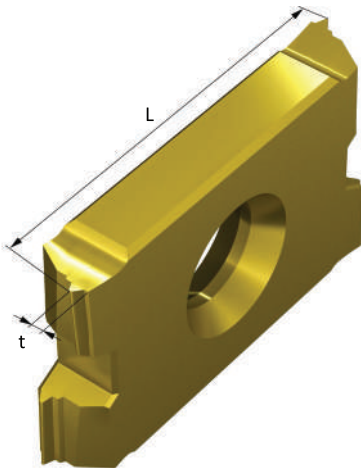
4.ZEUS

5.ARNO

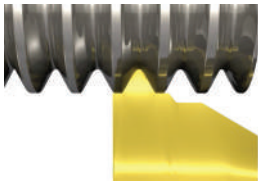
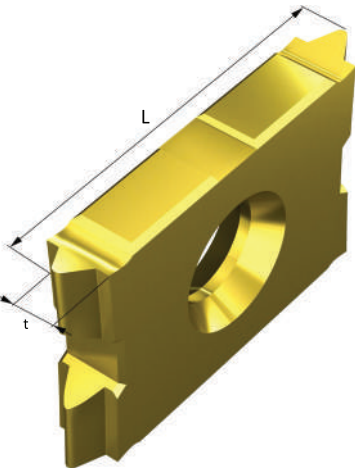
6.Whiz Cut

7.SPHINX

## Small Thread Profiles (ER) 0,25-1,0 ISO and 80-24 UN



## Larger Thread Profiles (EN) ≥1,25 ISO and ≥20 UN



Full Profile Threading

### T-ISO | Inserts for Full Profile Threading

Pitch mm	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
0,25	T13ER 0,25ISO	13	0,2	r	k	r	r	E5
0,3	T13ER 0,3ISO	13	0,2	r	k	r	r	E5
0,35	T13ER 0,35ISO	13	0,25	r	k	r	r	E5
0,4	T13ER 0,4ISO	13	0,25	r	k	r	r	E4
0,45	T13ER 0,45ISO	13	0,3	r	k	r	r	E4
0,5	T13ER 0,5ISO	13	0,3	r	r	r	r	E3
0,6	T13ER 0,6ISO	13	0,35	r	k	k	r	E3
0,7	T13ER 0,7ISO	13	0,4	r	r	r	k	E3
0,75	T13ER 0,75ISO	13	0,4	r	r	r	k	E3
0,8	T13ER 0,8ISO	13	0,45	r	r	r	k	E3
1	T13ER 1,0ISO	13	0,55	r	r	r	k	E3
1,25	T13EN 1,25ISO	13	1,1	r	r	r	k	E2
1,5	T13EN 1,5ISO	13	1,1	r	r	r	k	E2
1,75	T13EN 1,75ISO	13	1,1	r	r	r	k	E2
2	T13EN 2,0ISO	13	1,1	r	r	r	k	E2

### T-UN | Inserts for Full Profile Threading (UNC, UNF, UNEF, UNS)

TPI	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
80	T13ER 80UN	13	0,2	r	k	r	r	E5
72	T13ER 72UN	13	0,25	r	k	r	r	E5
64	T13ER 64UN	13	0,25	r	k	r	r	E4
56	T13ER 56UN	13	0,3	r	k	r	r	E4
48	T13ER 48UN	13	0,35	r	k	r	r	E3
44	T13ER 44UN	13	0,35	r	r	r	k	E3
40	T13ER 40UN	13	0,4	r	r	r	k	E3
36	T13ER 36UN	13	0,4	r	r	r	k	E3
32	T13ER 32UN	13	0,45	r	r	r	k	E3
28	T13ER 28UN	13	0,5	r	r	r	k	E3
24	T13ER 24UN	13	0,55	r	r	r	k	E3
20	T13EN 20UN	13	1,1	r	r	r	k	E2
18	T13EN 18UN	13	1,1	r	r	r	k	E2
16	T13EN 16UN	13	1,1	r	r	r	k	E2
14	T13EN 14UN	13	1,1	r	r	r	k	E2
13	T13EN 13UN	13	1,1	r	r	r	k	E2
12	T13EN 12UN	13	1,1	r	r	r	k	E2

Threading Inserts down to 120 TPI available as Specials

### T-UNJ | Inserts for Full Profile Threading (UNJC, UNJF, UNJEF, UNJS)

TPI	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
48	T13ER 48UNJ	13	0,35	r	r	r	k	E3
40	T13ER 40UNJ	13	0,4	r	r	r	k	E3
36	T13ER 36UNJ	13	0,4	r	r	r	k	E3
32	T13ER 32UNJ	13	0,45	r	r	r	k	E3
28	T13ER 28UNJ	13	0,5	r	r	r	k	E3
24	T13ER 24UNJ	13	0,55	r	r	r	k	E3
20	T13EN 20UNJ	13	1,1	r	r	r	k	E2
18	T13EN 18UNJ	13	1,1	r	r	r	k	E2
16	T13EN 16UNJ	13	1,1	r	r	r	k	E2
14	T13EN 14UNJ	13	1,1	r	r	r	k	E2
13	T13EN 13UNJ	13	1,1	r	r	r	k	E2
12	T13EN 12UNJ	13	1,1	r	r	r	k	E2

# T-TYPE INSERTS

## NPT, NPTF, Whitworth, DIN, ACME, STUB ACME

### T-NPT | Inserts for Full Profile Threading NPT

TPI	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
27	T13ER 27NPT	13	0,55	r	r	r	k	E5
18	T13EN 18NPT	13	1,1	r	r	r	k	E4
14	T13EN 14NPT	13	1,1	r	r	r	k	E4

### T-NPTF | Inserts for Full Profile Threading NPTF

TPI	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
27	T13ER 27NPTF	13	0,55	r	r	r	k	E5
18	T13EN 18NPTF	13	1,1	r	r	r	k	E4
14	T13EN 14NPTF	13	1,1	r	r	r	k	E4

### T-W | Inserts for Full Profile Threading Whitworth (BSW, BSP, BSF, BSB)

TPI	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
28	T13ER 28W	13	0,55	r	r	r	k	E5
19	T13EN 19W	13	1,1	r	r	r	k	E4
14	T13EN 14W	13	1,1	r	r	r	k	E4

#### Stock status:

- a ER Stock standard, EL Stock standard
- b ER Stock standard, EL Against inquiry
- c EL Stock standard, ER Against inquiry
- r ER Stock standard only
- l EL Stock standard only
- k ER Against inquiry, EL Against inquiry

L T  
13 2,2

### T-Tr | Inserts for Full Profile Threading Trapezoidal DIN 103

Pitch mm	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
1,5	T13EN 1,5TR	13	1,1	k	k	k	k	E5
2,0	T13EN 2,0TR	13	1,1	k	k	k	k	E4
2,5	T13EN 2,5TR	13	1,1	k	k	k	k	E4

### T-ACME | Inserts for Full Profile Threading ACME

TPI	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
16	T13EN 16ACME	13	1,1	k	k	k	k	E5
14	T13EN 14ACME	13	1,1	k	k	k	k	E4
12	T13EN 12ACME	13	1,1	k	k	k	k	E4
10	T13EN 10ACME	13	1,1	k	k	k	k	E4

### T-STACME | Inserts for Full Profile Threading STUB ACME

TPI	Inserts	L	t	8M	Stock			Price group
					C8	F8	B8	
16	T13EN 16STACME	13	1,1	k	k	k	k	E5
14	T13EN 14STACME	13	1,1	k	k	k	k	E4
12	T13EN 12STACME	13	1,1	k	k	k	k	E4
10	T13EN 10STACME	13	1,1	k	k	k	k	E4



# Recommended Cutting Data

## T-style inserts

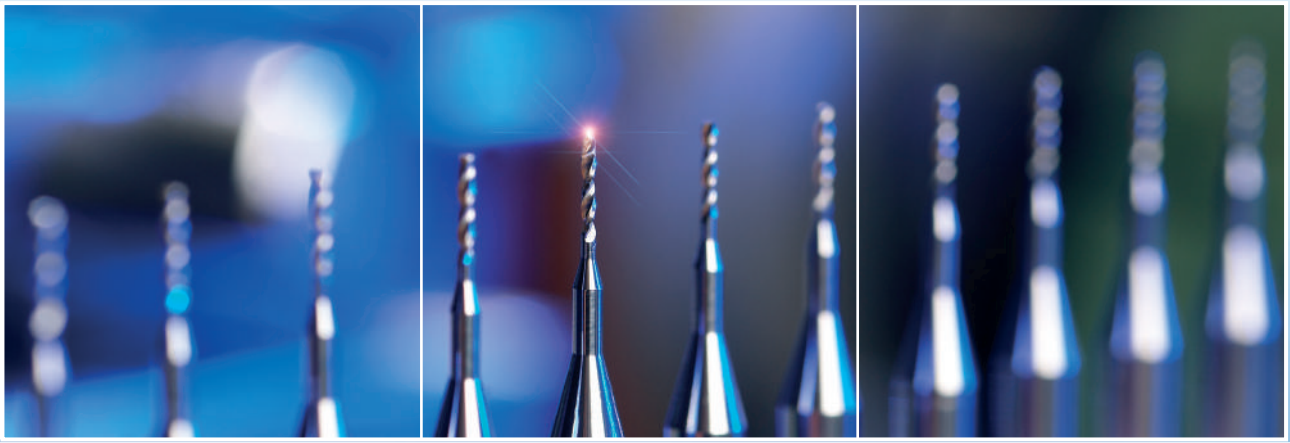
## K-Style inserts

## J-Style inserts

Matreial	Hard- ness	Feedrate mm/rev	Turning, copyturning etc m/min*	Feedrate mm/rev	Grooving, threading etc m/min*	Material HB	Hardness mm/rev	Feed rate m/min	Uncoated m/min	Coated m/min
Carbon steel	150	0. 10-0. 22	160-270	200-350	0. 07-0. 15	150	0,07-0,15	130-230	160-270	160-270
	250	0. 08-0. 17	120-220	150-275	0. 05-0. 12	250	0,05-0,12	100-190	120-220	120-220
	350	0. 07-0. 14	70-140	100-200	0. 04-0. 10	350	0,04-0,10	60-120	70-140	70-140
Alloy steel	200	0. 08-0. 20	110-190	150-275	0. 05-0. 12	200	0,05-0,12	90-160	110-190	110-190
	300	0. 07-0. 16	70-140	100-200	0. 04-0. 10	300	0,04-0,10	60-120	70-140	70-140
	400	0. 06-0. 15	50-100	70-140	0. 03-0. 08	400	0,03-0,08	40-80	50-100	50-100
Stainless steel	150	0. 08-0. 20	110-190	150-275	0. 05-0. 12	150	0,05-0,12	90-160	110-190	110-190
	250	0. 07-0. 16	70-140	100-200	0. 04-0. 10	250	0,04-0,10	60-120	70-140	70-140
	350	0. 06-0. 15	50-100	70-140	0. 03-0. 08	350	0,03-0,08	40-80	50-100	50-100
High temp. all.	200	0. 05-0. 12	40-110	50-130	0. 03-0. 09	200	0,03-0,09	30-90	40-110	40-110
	300	0. 05-0. 12	25-90	30-110	0. 03-0. 09	300	0,03-0,09	20-75	25-90	25-90
	400	0. 05-0. 12	20-65	25-80	0. 03-0. 09	400	0,03-0,09	15-50	20-65	20-65
Brass	<110	0. 10-0. 35	300-700	400-1000	0. 07-0. 25	<110	0,07-0,25	250-500	300-700	300-700
	>110	0. 08-0. 28	250-500	300-700	0. 05-0. 20	>110	0,05-0,20	175-350	250-500	250-500
Copper	<100	0. 10-0. 35	250-500	300-700	0. 07-0. 25	<100	0,07-0,25	200-400	250-500	250-500
	>100	0. 08-0. 28	175-350	250-500	0. 05-0. 20	>100	0,05-0,20	140-280	175-350	175-350
Aluminium	<100	0. 10-0. 20	300-700	400-1000	0. 07-0. 15	<100	0,07-0,15	250-600	300-700	300-700
	>100	0. 08-0. 20	250-500	300-700	0. 06-0. 15	>100	0,06-0,15	175-400	250-500	250-500

\* HB Scale is Hultgren BALL Scale and is roughly equivalent to ten time Rockwell C Scale. Ex: A 350 HB Would be approximately 35RC

\* Meters per min convert to RPM with formula  $RPM = \frac{\text{Ø of Work(mm)}}{3.14} \cdot 1000$



1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

**Where precision sets standards.**

**SPHINX**  
 **Swissmade tools**  
**Your partner** 

# Micro drilling ≤ Ø3.00 mm

Ø3 이하 마이크로 드릴

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS















































5. ARNO

6. Whiz Cut

7. SPHINX

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
Micro NC spotting drill, pilot drill with reinforced shank without internal coolant							
	50806	0.50–3.00	0.10		60°+/- 1°	20°	
	50809	0.50–1.90	0.10		90°+/- 1°	20°	
	56005	0.10–1.50	0.05	2–4×Ø	130°	20°	
	56030	0.10–1.00	0.01	2×Ø	130°	30°	
	56033	0.03–2.00	0.01	2×Ø	130°	30°	
	56036	0.40–3.00	0.05	2×Ø	140°/90°	30°	
	16004	0.10–1.50	0.05	2–3×Ø	130°	20°	
Micro drill with reinforced shank without internal coolant							
	50695	0.20–1.50	0.01	6×Ø	118°	30°	
	50699	0.05–2.00	0.01	6×Ø	118°	30°	
	51200	0.03–3.00	0.01	6×Ø	130°	35°	
	51201	0.20–3.00	0.01	6×Ø	130°	35°	
	50620	0.50–1.60	0.50	10–15×Ø	118°	25°	
	50621	0.20–3.00	0.01	12×Ø	130°	25°	
	50622	0.20–3.00	0.01	12×Ø	130°	25°	
	50941	0.50–2.40	0.05	6×Ø	140°	30°	
	55652	0.20–2.99	0.01	5×Ø	140°	35°	
	12604	0.05–3.175	0.01	5–8×Ø	118°	25°	
	11654	0.50–2.30	0.05	6×Ø	120°	30°	

- ✓ outstanding
- able

Material	Workpiece material*							Application*	
	P	M	K	S	N	H	O		
VHM/MD/SC	✓	✓	✓	•	✓		✓	 	
VHM/MD/SC	✓	✓	✓	•	✓		✓	 	
VHM/MD/SC	✓	•	✓	•	✓		✓	  	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	  	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	  	
VHM/MD/SC; AlCrN	✓	✓	✓	✓	✓	•	•	 	
HSS-E	✓	•	✓		•		•	  	
VHM/MD/SC	✓	•	✓		✓		•	 	
VHM/MD/SC	✓	•	✓		✓		•	 	
VHM/MD/SC	✓	✓	✓	✓	✓		•	 	
VHM/MD/SC; TiAlN	✓	✓	✓	✓	✓	•	•	  	
VHM/MD/SC	✓	•	✓		✓		•	 	
VHM/MD/SC	✓	•	✓		✓		•	 	
VHM/MD/SC; TiAlN	✓	•	✓	•	✓	•	•	  	
VHM/MD/SC; TiAlN	✓	✓	✓	✓	✓	•	✓	  	
VHM/MD/SC	✓	•	✓	•	✓		•	    	
HSS-E	✓	•	✓		•		•	 	
HSS-E	✓	•	✓		•			 	

1.DIAMETAL

2. BIMU






3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
<b>Micro high performance drill Phoenix-TC2 with reinforced shank with internal coolant</b>							
	52903	1.00–3.00	0.05	3× $\emptyset$	140°	30°	
	52906	1.00–3.00	0.05	6× $\emptyset$	140°	30°	
	52909	1.00–3.00	0.10	9× $\emptyset$	140°	30°	
	52912	1.00–3.00	0.10	12× $\emptyset$	137°	30°	
	52916	1.00–3.00	0.10	16× $\emptyset$	137°	30°	

- ✓ outstanding
- able

	Material	Workpiece material*							Application*			
		P	M	K	S	N	H	O				
	VHM/MD/SC; AlTiCrN+S	✓	✓	✓	✓	✓	•	•				
	VHM/MD/SC; AlTiCrN+S	✓	✓	✓	✓	✓	•	•				
	VHM/MD/SC; AlTiCrN+S	✓	✓	✓	✓	✓	•	•				
	VHM/MD/SC; AlCrTin	✓	✓	✓	✓	✓	•	•				
	VHM/MD/SC; AlCrTin	✓	✓	✓	✓	✓	•	•				

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

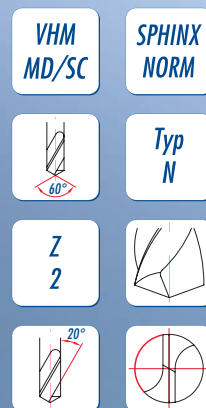
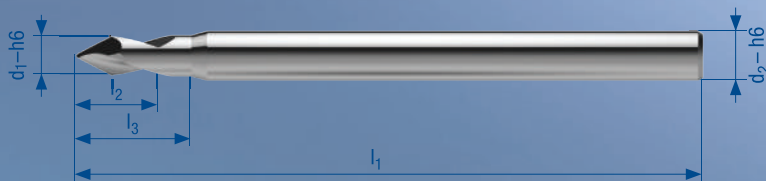
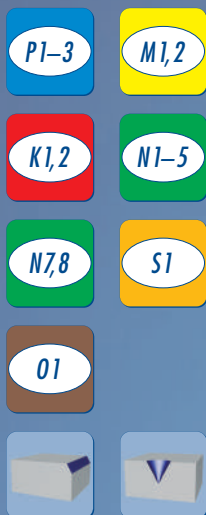
6. Whiz Cut

7. SPHINX



# Micro NC spotting drill and chamfering 60° Art. 50806

60도 센터 드릴

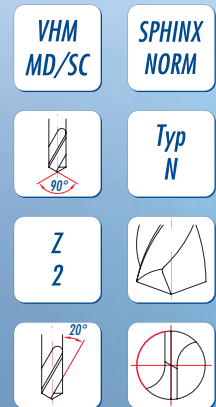
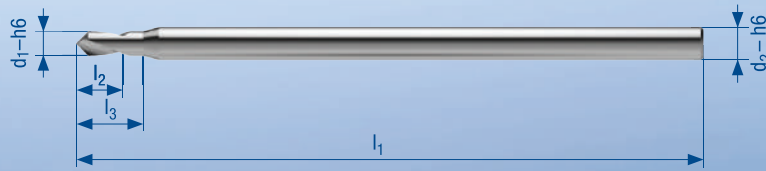
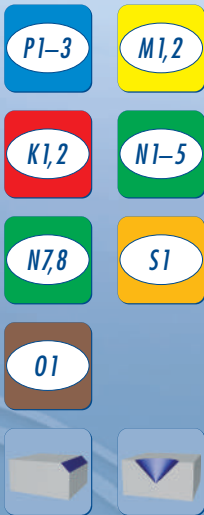


d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
0.50	1.50	2.00	38	3.00
0.60	1.50	2.00	38	3.00
0.70	1.50	2.00	38	3.00
0.80	2.00	2.50	38	3.00
0.90	2.00	2.50	38	3.00
1.00	2.00	2.50	38	3.00
1.10	2.50	3.50	38	3.00
1.20	2.50	3.50	38	3.00
1.30	2.50	3.50	38	3.00
1.40	3.00	4.00	38	3.00
1.50	3.00	4.00	38	3.00
1.60	3.00	4.00	38	3.00
1.70	4.00	5.00	38	3.00
1.80	4.00	5.00	38	3.00
1.90	4.00	5.00	38	3.00
2.00	5.00	6.00	38	3.00
2.10	5.00	6.00	38	3.00
2.20	5.00	6.00	38	3.00
2.30	6.00	7.00	38	3.00
2.40	6.00	7.00	38	3.00
2.50	6.00	7.00	38	3.00
2.60	7.00	8.00	38	3.00
2.70	7.00	8.00	38	3.00
2.80	7.00	8.00	38	3.00
2.90	7.00	8.00	38	3.00
3.00	9.50	9.50	38	3.00

# Micro NC spotting drill 90°

Art. 50809

마이크로 90도 센터 드릴



d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
0.50	1.00	1.60	38	2.00
0.60	1.20	1.80	38	2.00
0.70	1.40	2.00	38	2.00
0.80	1.60	2.20	38	2.00
0.90	1.80	2.40	38	2.00
1.00	2.00	2.60	38	2.00
1.10	2.20	2.80	38	2.00
1.20	2.40	3.00	38	2.00
1.30	2.60	3.20	38	2.00
1.40	2.80	3.40	38	2.00
1.50	3.00	3.80	38	2.00
1.60	3.20	4.20	38	2.00
1.70	3.40	4.40	38	2.00
1.80	3.60	4.60	38	2.00
1.90	3.80	4.80	38	2.00
2.00	5.00	6.00	38	3.00
2.50	6.50	8.00	38	3.00
3.00	7.50	7.50	38	3.00

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



## Micro NC spotting drill 130°

마이크로 130도 센터 드릴

Art. 56005

P1-3

M1

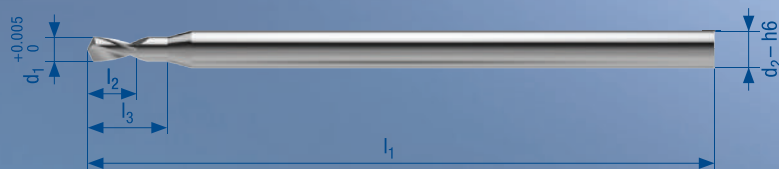
K1,2

N1-5

N7,8

S1

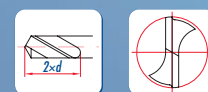
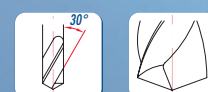
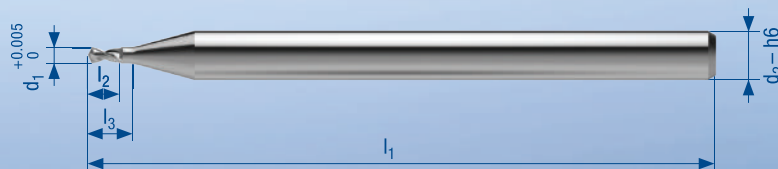
01

VHM  
MD/SCSPHINX  
NORMd<sub>1</sub>  
+0.005  
0Z  
2

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
0.10	0.40	0.60	25	1.50
0.15	0.40	0.60	25	1.50
0.20	0.60	0.90	25	1.50
0.25	0.60	0.90	25	1.50
0.30	0.90	1.20	25	1.50
0.35	0.90	1.20	25	1.50
0.40	0.90	1.60	25	1.50
0.45	0.90	1.60	25	1.50
0.50	1.00	1.80	25	1.50
0.55	1.00	1.80	25	1.50
0.60	1.20	2.00	25	1.50
0.65	1.20	2.00	25	1.50
0.70	1.50	2.50	25	1.50
0.75	1.50	2.50	25	1.50
0.80	1.50	2.50	25	1.50
0.85	1.50	2.50	25	1.50
0.90	1.60	2.60	25	1.50
0.95	1.60	2.60	25	1.50
1.00	2.00	3.20	25	1.50
1.05	2.00	3.20	25	1.50
1.10	2.30	3.50	25	1.50
1.15	2.30	3.50	25	1.50
1.20	2.30	3.50	25	1.50
1.25	2.30	3.50	25	1.50
1.30	2.70	4.20	25	1.50
1.35	2.70	4.20	25	1.50
1.40	2.70	4.20	25	1.50
1.45	2.70	4.20	25	1.50
1.50	3.00	4.20	25	1.50

# Micro pilot drill Plus 2 × d

Art. 56033



d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
0.03	0.15	0.30	38	3.00
0.04	0.15	0.30	38	3.00
0.05	0.20	0.40	38	3.00
0.06	0.20	0.40	38	3.00
0.07	0.25	0.45	38	3.00
0.08	0.25	0.45	38	3.00
0.09	0.30	0.50	38	3.00
0.10	0.35	0.55	38	3.00
0.11	0.35	0.55	38	3.00
0.12	0.35	0.55	38	3.00
0.13	0.40	0.60	38	3.00
0.14	0.40	0.60	38	3.00
0.15	0.40	0.60	38	3.00
0.16	0.40	0.60	38	3.00
0.17	0.50	0.70	38	3.00
0.18	0.50	0.70	38	3.00
0.19	0.50	0.70	38	3.00
0.20	0.55	0.75	38	3.00
0.21	0.55	0.75	38	3.00
0.22	0.60	0.80	38	3.00
0.23	0.60	0.80	38	3.00
0.24	0.60	0.80	38	3.00
0.25	0.70	0.90	38	3.00
0.26	0.70	0.90	38	3.00
0.27	0.70	0.90	38	3.00
0.28	0.80	1.00	38	3.00
0.29	0.80	1.00	38	3.00
0.30	0.90	1.20	38	3.00
0.31	0.90	1.20	38	3.00
0.32	0.90	1.20	38	3.00
0.33	0.90	1.20	38	3.00
0.34	0.90	1.35	38	3.00
0.35	0.90	1.35	38	3.00
0.36	0.95	1.35	38	3.00
0.37	0.95	1.35	38	3.00
0.38	0.95	1.50	38	3.00
0.39	0.95	1.50	38	3.00
0.40	0.80	1.60	38	3.00

d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
0.41	0.82	1.60	38	3.00
0.42	0.84	1.60	38	3.00
0.43	0.86	1.60	38	3.00
0.44	0.88	1.60	38	3.00
0.45	0.90	1.60	38	3.00
0.46	0.92	1.70	38	3.00
0.47	0.94	1.70	38	3.00
0.48	0.96	1.70	38	3.00
0.49	0.98	1.70	38	3.00
0.50	1.00	1.70	38	3.00
0.51	1.02	1.80	38	3.00
0.52	1.04	1.80	38	3.00
0.53	1.06	1.80	38	3.00
0.54	1.08	1.80	38	3.00
0.55	1.10	1.80	38	3.00
0.56	1.12	1.90	38	3.00
0.57	1.14	1.90	38	3.00
0.58	1.16	1.90	38	3.00
0.59	1.18	1.90	38	3.00
0.60	1.20	1.90	38	3.00
0.61	1.22	2.00	38	3.00
0.62	1.24	2.00	38	3.00
0.63	1.26	2.00	38	3.00
0.64	1.28	2.00	38	3.00
0.65	1.30	2.00	38	3.00
0.66	1.32	2.10	38	3.00
0.67	1.34	2.10	38	3.00
0.68	1.36	2.10	38	3.00
0.69	1.38	2.10	38	3.00
0.70	1.40	2.10	38	3.00
0.71	1.42	2.20	38	3.00
0.72	1.44	2.20	38	3.00
0.73	1.46	2.20	38	3.00
0.74	1.48	2.20	38	3.00
0.75	1.50	2.20	38	3.00
0.76	1.52	2.30	38	3.00
0.77	1.54	2.30	38	3.00
0.78	1.56	2.30	38	3.00

d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
0.79	1.58	2.30	38	3.00
0.80	1.60	2.30	38	3.00
0.81	1.62	2.40	38	3.00
0.82	1.64	2.40	38	3.00
0.83	1.66	2.40	38	3.00
0.84	1.68	2.40	38	3.00
0.85	1.70	2.40	38	3.00
0.86	1.72	2.50	38	3.00
0.87	1.74	2.50	38	3.00
0.88	1.76	2.50	38	3.00
0.89	1.78	2.50	38	3.00
0.90	1.80	2.50	38	3.00
0.91	1.82	2.60	38	3.00
0.92	1.84	2.60	38	3.00
0.93	1.86	2.60	38	3.00
0.94	1.88	2.60	38	3.00
0.95	1.90	2.60	38	3.00
0.96	1.92	2.70	38	3.00
0.97	1.94	2.70	38	3.00
0.98	1.96	2.70	38	3.00
0.99	1.98	2.70	38	3.00
1.00	2.00	2.70	38	3.00
1.01	2.02	3.50	38	3.00
1.02	2.04	3.50	38	3.00
1.03	2.06	3.50	38	3.00
1.04	2.08	3.50	38	3.00
1.05	2.10	3.50	38	3.00
1.06	2.12	3.60	38	3.00
1.07	2.14	3.60	38	3.00
1.08	2.16	3.60	38	3.00
1.09	2.18	3.60	38	3.00
1.10	2.20	3.60	38	3.00
1.11	2.22	3.70	38	3.00
1.12	2.24	3.70	38	3.00
1.13	2.26	3.70	38	3.00
1.14	2.28	3.70	38	3.00
1.15	2.30	3.70	38	3.00
1.16	2.32	3.80	38	3.00

d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
1.17	2.34	3.80	38	3.00
1.18	2.36	3.80	38	3.00
1.19	2.38	3.80	38	3.00
1.20	2.40	3.80	38	3.00
1.21	2.42	4.20	38	3.00
1.22	2.44	4.20	38	3.00
1.23	2.46	4.20	38	3.00
1.24	2.48	4.20	38	3.00
1.25	2.50	4.20	38	3.00
1.26	2.52	4.30	38	3.00
1.27	2.54	4.30	38	3.00
1.28	2.56	4.30	38	3.00
1.29	2.58	4.30	38	3.00
1.30	2.60	4.30	38	3.00
1.31	2.62	4.40	38	3.00
1.32	2.64	4.40	38	3.00
1.33	2.66	4.40	38	3.00
1.34	2.68	4.40	38	3.00
1.35	2.70	4.40	38	3.00
1.36	2.72	4.50	38	3.00
1.37	2.74	4.50	38	3.00
1.38	2.76	4.50	38	3.00
1.39	2.78	4.50	38	3.00
1.40	2.80	4.50	38	3.00
1.41	2.82	4.60	38	3.00
1.42	2.84	4.60	38	3.00
1.43	2.86	4.60	38	3.00
1.44	2.88	4.60	38	3.00
1.45	2.90	4.60	38	3.00
1.46	2.92	4.70	38	3.00
1.47	2.94	4.70	38	3.00
1.48	2.96	4.70	38	3.00
1.49	2.98	4.70	38	3.00
1.50	3.00	4.70	38	3.00
1.51	3.02	5.10	38	3.00
1.52	3.04	5.10	38	3.00
1.53	3.06	5.10	38	3.00
1.54	3.08	5.10	38	3.00

## 1. DIAMETAL

d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.55	3.10	5.10	38	3.00
1.56	3.12	5.20	38	3.00
1.57	3.14	5.20	38	3.00
1.58	3.16	5.20	38	3.00
1.59	3.18	5.20	38	3.00
1.60	3.20	5.20	38	3.00
1.61	3.22	5.30	38	3.00
1.62	3.24	5.30	38	3.00
1.63	3.26	5.30	38	3.00
1.64	3.28	5.30	38	3.00
1.65	3.30	5.30	38	3.00
1.66	3.32	5.40	38	3.00

## 2. BIMU

d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.67	3.34	5.40	38	3.00
1.68	3.36	5.40	38	3.00
1.69	3.38	5.40	38	3.00
1.70	3.40	5.40	38	3.00
1.71	3.42	5.50	38	3.00
1.72	3.44	5.50	38	3.00
1.73	3.46	5.50	38	3.00
1.74	3.48	5.50	38	3.00
1.75	3.50	5.50	38	3.00
1.76	3.52	5.60	38	3.00
1.77	3.54	5.60	38	3.00
1.78	3.56	5.60	38	3.00

d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.79	3.58	5.60	38	3.00
1.80	3.60	5.60	38	3.00
1.81	3.62	5.70	38	3.00
1.82	3.64	5.70	38	3.00
1.83	3.66	5.70	38	3.00
1.84	3.68	5.70	38	3.00
1.85	3.70	5.70	38	3.00
1.86	3.72	5.80	38	3.00
1.87	3.74	5.80	38	3.00
1.88	3.76	5.80	38	3.00
1.89	3.78	5.80	38	3.00
1.90	3.80	5.80	38	3.00

d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.91	3.82	5.90	38	3.00
1.92	3.84	5.90	38	3.00
1.93	3.86	5.90	38	3.00
1.94	3.88	5.90	38	3.00
1.95	3.90	5.90	38	3.00
1.96	3.92	6.00	38	3.00
1.97	3.94	6.00	38	3.00
1.98	3.96	6.00	38	3.00
1.99	3.98	6.00	38	3.00
2.00	4.00	6.00	38	3.00

## 3. IFANGER

## 4. ZEUS

## 5. ARNO

## 6. Whiz Cut

## 7. SPHINX





# Micro pilot step drill Plus

Art. 56036

PI-3

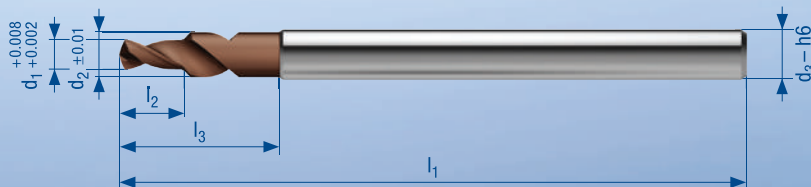
M1,2

K1,2

N1-5

S1

H1



VHM  
MD/SC

SPHINX  
NORM



Typ  
N

Z  
2



AlCrN



d1	d2	l2	l3	l1	d3
mm	mm	mm	mm	mm	mm
0.40	1.00	0.80	3.00	50	4.00
0.50	1.20	1.00	3.50	50	4.00
0.55	1.30	1.10	3.50	50	4.00
0.60	1.40	1.20	4.30	50	4.00
0.65	1.50	1.30	4.30	50	4.00
0.70	1.80	1.40	5.30	50	4.00
0.75	1.80	1.50	5.30	50	4.00
0.80	2.00	1.60	6.00	50	4.00
0.85	2.00	1.70	6.00	50	4.00
0.90	2.00	1.80	6.00	50	4.00
0.95	2.00	1.90	6.00	50	4.00
1.00	2.20	2.00	7.00	50	4.00
1.05	2.20	2.10	7.00	50	4.00
1.10	2.20	2.20	7.00	50	4.00
1.15	2.20	2.30	7.00	50	4.00
1.20	2.20	2.40	7.00	50	4.00
1.25	2.50	2.50	8.00	50	4.00
1.30	2.50	2.60	8.00	50	4.00
1.35	2.50	2.70	8.00	50	4.00
1.40	2.50	2.80	8.00	50	4.00
1.45	2.70	2.90	9.00	50	4.00
1.50	2.70	3.00	9.00	50	4.00
1.55	2.70	3.10	9.00	50	4.00
1.60	2.70	3.20	9.00	50	4.00
1.65	2.80	3.30	9.50	50	4.00
1.70	2.80	3.40	9.50	50	4.00
1.75	2.80	3.50	9.50	50	4.00
1.80	2.80	3.60	9.50	50	4.00
1.85	3.00	3.70	10.20	50	4.00
1.90	3.00	3.80	10.20	50	4.00
1.95	3.00	3.90	10.20	50	4.00
2.00	3.00	4.00	10.20	50	4.00
2.05	3.20	4.10	11.00	50	4.00
2.10	3.20	4.20	11.00	50	4.00
2.15	3.20	4.30	11.00	50	4.00
2.20	3.20	4.40	11.00	50	4.00

d1	d2	l2	l3	l1	d3
mm	mm	mm	mm	mm	mm
2.25	3.40	4.50	12.00	50	4.00
2.30	3.40	4.60	12.00	50	4.00
2.35	3.40	4.70	12.00	50	4.00
2.40	3.40	4.80	12.00	50	4.00
2.45	3.60	4.90	12.70	50	4.00
2.50	3.60	5.00	12.70	50	4.00
2.55	3.60	5.10	12.70	50	4.00
2.60	3.60	5.20	12.70	50	4.00
2.65	3.80	5.30	13.50	50	4.00
2.70	3.80	5.40	13.50	50	4.00
2.75	3.80	5.50	13.50	50	4.00
2.80	3.80	5.60	13.50	50	4.00
2.85	4.00	5.70	14.10	50	4.00
2.90	4.00	5.80	14.10	50	4.00
2.95	4.00	5.90	14.10	50	4.00
3.00	4.00	6.00	14.10	50	4.00

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

# Micro drill Spirec 6 × d

Art. 50699

Ø2.0 이하 0.01단위 마이크로 드릴

1. DIAMETAL

2. BIMU

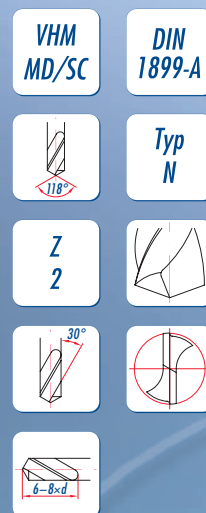
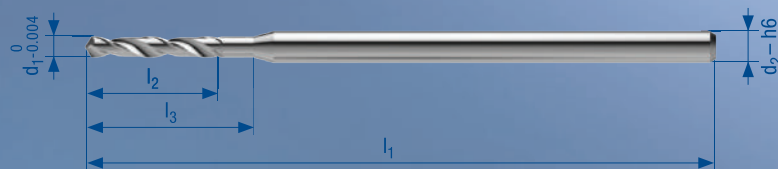
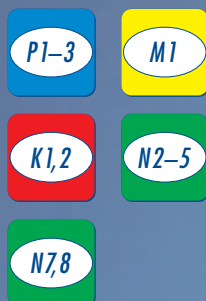
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
0.05	0.40	0.60	25	1.00
0.06	0.40	0.60	25	1.00
0.07	0.50	0.70	25	1.00
0.08	0.50	0.70	25	1.00
0.09	0.50	0.70	25	1.00
0.10	0.50	0.70	25	1.00
0.11	0.50	0.70	25	1.00
0.12	0.50	0.70	25	1.00
0.13	0.80	1.00	25	1.00
0.14	0.80	1.00	25	1.00
0.15	0.80	1.00	25	1.00
0.16	1.10	1.40	25	1.00
0.17	1.10	1.40	25	1.00
0.18	1.10	1.40	25	1.00
0.19	1.10	1.40	25	1.00
0.20	1.50	1.80	25	1.00
0.21	1.50	1.80	25	1.00
0.22	1.50	1.80	25	1.00
0.23	1.50	1.80	25	1.00
0.24	1.50	1.80	25	1.00
0.25	1.90	2.20	25	1.00
0.26	1.90	2.20	25	1.00
0.27	1.90	2.20	25	1.00
0.28	1.90	2.20	25	1.00
0.29	1.90	2.20	25	1.00
0.30	1.90	2.20	25	1.00
0.31	2.40	2.80	25	1.00
0.32	2.40	2.80	25	1.00
0.33	2.40	2.80	25	1.00
0.34	2.40	2.80	25	1.00
0.35	2.40	2.80	25	1.00
0.36	2.40	2.80	25	1.00
0.37	2.40	2.80	25	1.00
0.38	2.40	2.80	25	1.00
0.39	2.70	3.60	25	1.00
0.40	2.70	3.60	25	1.00
0.41	2.70	3.60	25	1.00
0.42	2.70	3.60	25	1.00

d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
0.43	2.70	3.60	25	1.00
0.44	2.70	3.60	25	1.00
0.45	2.70	3.60	25	1.00
0.46	2.70	3.60	25	1.00
0.47	2.70	3.60	25	1.00
0.48	2.70	3.60	25	1.00
0.49	3.20	4.00	25	1.00
0.50	3.20	4.00	25	1.00
0.51	3.20	4.00	25	1.00
0.52	3.20	4.00	25	1.00
0.53	3.20	4.00	25	1.00
0.54	3.60	4.50	25	1.00
0.55	3.60	4.50	25	1.00
0.56	3.60	4.50	25	1.00
0.57	3.60	4.50	25	1.00
0.58	3.60	4.50	25	1.00
0.59	3.60	4.50	25	1.00
0.60	3.60	4.50	25	1.00
0.61	3.90	5.00	25	1.00
0.62	3.90	5.00	25	1.00
0.63	3.90	5.00	25	1.00
0.64	3.90	5.00	25	1.00
0.65	3.90	5.00	25	1.00
0.66	3.90	5.00	25	1.00
0.67	3.90	5.00	25	1.00
0.68	4.50	5.60	25	1.00
0.69	4.50	5.60	25	1.00
0.70	4.50	5.60	25	1.00
0.71	4.50	5.60	25	1.00
0.72	4.50	5.60	25	1.00
0.73	4.50	5.60	25	1.00
0.74	4.50	5.60	25	1.00
0.75	4.50	5.60	25	1.00
0.76	5.00	6.30	25	1.00
0.77	5.00	6.30	25	1.00
0.78	5.00	6.30	25	1.00
0.79	5.00	6.30	25	1.00
0.80	5.00	6.30	25	1.00

d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
0.81	5.00	6.30	25	1.50
0.82	5.00	6.30	25	1.50
0.83	5.00	6.30	25	1.50
0.84	5.00	6.30	25	1.50
0.85	5.00	6.30	25	1.50
0.86	5.70	7.10	25	1.50
0.87	5.70	7.10	25	1.50
0.88	5.70	7.10	25	1.50
0.89	5.70	7.10	25	1.50
0.90	5.70	7.10	25	1.50
0.91	5.70	7.10	25	1.50
0.92	5.70	7.10	25	1.50
0.93	5.70	7.10	25	1.50
0.94	5.70	7.10	25	1.50
0.95	5.70	7.10	25	1.50
0.96	6.50	8.00	25	1.50
0.97	6.50	8.00	25	1.50
0.98	6.50	8.00	25	1.50
0.99	6.50	8.00	25	1.50
1.00	6.50	8.00	25	1.50
1.01	6.50	8.00	25	1.50
1.02	6.50	8.00	25	1.50
1.03	6.50	8.00	25	1.50
1.04	6.50	8.00	25	1.50
1.05	6.50	8.00	25	1.50
1.06	7.30	9.00	25	1.50
1.07	7.30	9.00	25	1.50
1.08	7.30	9.00	25	1.50
1.09	7.30	9.00	25	1.50
1.10	7.30	9.00	25	1.50
1.11	7.30	9.00	25	1.50
1.12	7.30	9.00	25	1.50
1.13	7.30	9.00	25	1.50
1.14	7.30	9.00	25	1.50
1.15	7.30	9.00	25	1.50
1.16	8.20	10.00	25	1.50
1.17	8.20	10.00	25	1.50
1.18	8.20	10.00	25	1.50

d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
1.19	8.20	10.00	25	1.50
1.20	8.20	10.00	25	1.50
1.21	8.20	10.00	25	1.50
1.22	8.20	10.00	25	1.50
1.23	8.20	10.00	25	1.50
1.24	8.20	10.00	25	1.50
1.25	8.20	10.00	25	1.50
1.26	8.20	10.00	25	1.50
1.27	8.20	10.00	25	1.50
1.28	8.20	10.00	25	1.50
1.29	8.20	10.00	25	1.50
1.30	8.20	10.00	25	1.50
1.31	9.20	11.20	25	1.50
1.32	9.20	11.20	25	1.50
1.33	9.20	11.20	25	1.50
1.34	9.20	11.20	25	1.50
1.35	9.20	11.20	25	1.50
1.36	9.20	11.20	25	1.50
1.37	9.20	11.20	25	1.50
1.38	9.20	11.20	25	1.50
1.39	9.20	11.20	25	1.50
1.40	9.20	11.20	25	1.50
1.41	9.20	11.20	25	1.50
1.42	9.20	11.20	25	1.50
1.43	9.20	11.20	25	1.50
1.44	9.20	11.20	25	1.50
1.45	9.20	11.20	25	1.50
1.46	9.20	11.20	25	1.50
1.47	9.20	11.20	25	1.50
1.48	9.20	11.20	25	1.50
1.49	9.20	11.20	25	1.50
1.50	9.20	11.20	25	1.50
1.51	11.20	13.40	38	2.00
1.52	11.20	13.40	38	2.00
1.53	11.20	13.40	38	2.00
1.54	11.20	13.40	38	2.00
1.55	11.20	13.40	38	2.00
1.56	11.20	13.40	38	2.00



d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.57	11.20	13.40	38	2.00
1.58	11.20	13.40	38	2.00
1.59	11.20	13.40	38	2.00
1.60	11.20	13.40	38	2.00
1.61	11.20	13.40	38	2.00
1.62	11.20	13.40	38	2.00
1.63	11.20	13.40	38	2.00
1.64	11.20	13.40	38	2.00
1.65	11.20	13.40	38	2.00
1.66	11.20	13.40	38	2.00
1.67	11.20	13.40	38	2.00
1.68	11.20	13.40	38	2.00

d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.69	11.20	13.40	38	2.00
1.70	11.20	13.40	38	2.00
1.71	11.20	13.40	38	2.00
1.72	11.20	13.40	38	2.00
1.73	11.20	13.40	38	2.00
1.74	11.20	13.40	38	2.00
1.75	11.20	13.40	38	2.00
1.76	11.20	13.40	38	2.00
1.77	11.20	13.40	38	2.00
1.78	11.20	13.40	38	2.00
1.79	11.20	13.40	38	2.00
1.80	11.20	13.40	38	2.00

d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.81	11.20	13.40	38	2.00
1.82	11.20	13.40	38	2.00
1.83	11.20	13.40	38	2.00
1.84	11.20	13.40	38	2.00
1.85	11.20	13.40	38	2.00
1.86	11.20	13.40	38	2.00
1.87	11.20	13.40	38	2.00
1.88	11.20	13.40	38	2.00
1.89	11.20	13.40	38	2.00
1.90	11.20	13.40	38	2.00
1.91	11.20	13.40	38	2.00
1.92	11.20	13.40	38	2.00

d <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	d <sub>2</sub>
mm	mm	mm	mm	mm
1.93	11.20	13.40	38	2.00
1.94	11.20	13.40	38	2.00
1.95	11.20	13.40	38	2.00
1.96	11.20	13.40	38	2.00
1.97	11.20	13.40	38	2.00
1.98	11.20	13.40	38	2.00
1.99	11.20	13.40	38	2.00
2.00	11.20	13.40	38	2.00





# Micro drill 6 × d

Art. 51200

Ø2.0 이하 0.01단위 마이크로 드릴(상크 Ø3.0)

1. DIAMETAL

2. BIMU

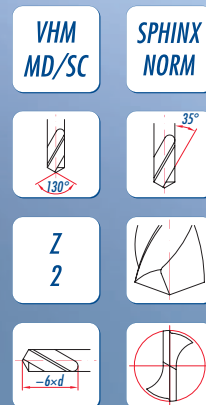
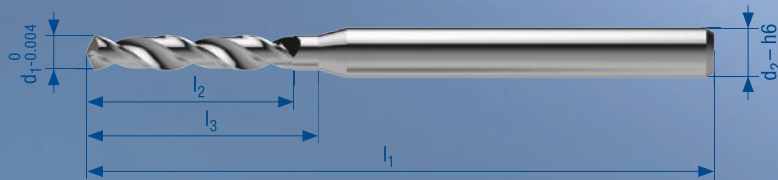
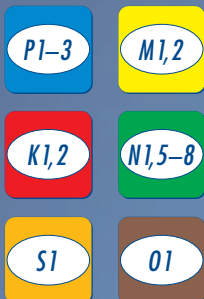
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
0.03	0.25	0.35	38	3.00
0.04	0.30	0.40	38	3.00
0.05	0.35	0.45	38	3.00
0.06	0.40	0.50	38	3.00
0.07	0.45	0.60	38	3.00
0.08	0.50	0.70	38	3.00
0.09	0.50	0.70	38	3.00
0.10	0.50	0.70	38	3.00
0.11	0.50	0.70	38	3.00
0.12	0.50	0.70	38	3.00
0.13	0.80	1.00	38	3.00
0.14	0.80	1.00	38	3.00
0.15	0.80	1.00	38	3.00
0.16	1.10	1.40	38	3.00
0.17	1.10	1.40	38	3.00
0.18	1.10	1.40	38	3.00
0.19	1.10	1.40	38	3.00
0.20	1.50	1.80	38	3.00
0.21	1.50	1.80	38	3.00
0.22	1.50	1.80	38	3.00
0.23	1.50	1.80	38	3.00
0.24	1.50	1.80	38	3.00
0.25	1.90	2.20	38	3.00
0.26	1.90	2.20	38	3.00
0.27	1.90	2.20	38	3.00
0.28	1.90	2.20	38	3.00
0.29	1.90	2.20	38	3.00
0.30	1.80	2.40	38	3.00
0.31	1.80	2.40	38	3.00
0.32	1.80	2.40	38	3.00
0.33	1.80	2.40	38	3.00
0.34	1.80	2.40	38	3.00
0.35	2.20	2.80	38	3.00
0.36	2.20	2.80	38	3.00
0.37	2.20	2.80	38	3.00
0.38	2.20	2.80	38	3.00
0.39	2.70	3.60	38	3.00
0.40	2.70	3.60	38	3.00

d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
0.41	2.70	3.60	38	3.00
0.42	2.70	3.60	38	3.00
0.43	2.70	3.60	38	3.00
0.44	2.70	3.60	38	3.00
0.45	2.70	3.60	38	3.00
0.46	2.70	3.60	38	3.00
0.47	2.70	3.60	38	3.00
0.48	2.70	3.60	38	3.00
0.49	3.20	4.00	38	3.00
0.50	3.20	4.00	38	3.00
0.51	3.20	4.00	38	3.00
0.52	3.20	4.00	38	3.00
0.53	3.20	4.00	38	3.00
0.54	3.60	4.50	38	3.00
0.55	3.60	4.50	38	3.00
0.56	3.60	4.50	38	3.00
0.57	3.60	4.50	38	3.00
0.58	3.60	4.50	38	3.00
0.59	3.60	4.50	38	3.00
0.60	3.60	4.50	38	3.00
0.61	3.90	5.00	38	3.00
0.62	3.90	5.00	38	3.00
0.63	3.90	5.00	38	3.00
0.64	3.90	5.00	38	3.00
0.65	3.90	5.00	38	3.00
0.66	3.90	5.00	38	3.00
0.67	3.90	5.00	38	3.00
0.68	4.50	5.60	38	3.00
0.69	4.50	5.60	38	3.00
0.70	4.50	5.60	38	3.00
0.71	4.50	5.60	38	3.00
0.72	4.50	5.60	38	3.00
0.73	4.50	5.60	38	3.00
0.74	4.50	5.60	38	3.00
0.75	4.50	5.60	38	3.00
0.76	5.00	6.30	38	3.00
0.77	5.00	6.30	38	3.00
0.78	5.00	6.30	38	3.00

d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
0.79	5.00	6.30	38	3.00
0.80	5.00	6.30	38	3.00
0.81	5.00	6.30	38	3.00
0.82	5.00	6.30	38	3.00
0.83	5.00	6.30	38	3.00
0.84	5.00	6.30	38	3.00
0.85	5.00	6.30	38	3.00
0.86	5.70	7.10	38	3.00
0.87	5.70	7.10	38	3.00
0.88	5.70	7.10	38	3.00
0.89	5.70	7.10	38	3.00
0.90	5.70	7.10	38	3.00
0.91	5.70	7.10	38	3.00
0.92	5.70	7.10	38	3.00
0.93	5.70	7.10	38	3.00
0.94	5.70	7.10	38	3.00
0.95	5.70	7.10	38	3.00
0.96	6.50	8.00	38	3.00
0.97	6.50	8.00	38	3.00
0.98	6.50	8.00	38	3.00
0.99	6.50	8.00	38	3.00
1.00	6.50	8.00	38	3.00
1.01	6.50	8.00	38	3.00
1.02	6.50	8.00	38	3.00
1.03	6.50	8.00	38	3.00
1.04	6.50	8.00	38	3.00
1.05	6.50	8.00	38	3.00
1.06	7.30	9.00	38	3.00
1.07	7.30	9.00	38	3.00
1.08	7.30	9.00	38	3.00
1.09	7.30	9.00	38	3.00
1.10	7.30	9.00	38	3.00
1.11	7.30	9.00	38	3.00
1.12	7.30	9.00	38	3.00
1.13	7.30	9.00	38	3.00
1.14	7.30	9.00	38	3.00
1.15	7.30	9.00	38	3.00
1.16	8.20	10.00	38	3.00

d1	l2	l3	l1	d2
mm	mm	mm	mm	mm
1.17	8.20	10.00	38	3.00
1.18	8.20	10.00	38	3.00
1.19	8.20	10.00	38	3.00
1.20	8.20	10.00	38	3.00
1.21	8.20	10.00	38	3.00
1.22	8.20	10.00	38	3.00
1.23	8.20	10.00	38	3.00
1.24	8.20	10.00	38	3.00
1.25	8.20	10.00	38	3.00
1.26	8.20	10.00	38	3.00
1.27	8.20	10.00	38	3.00
1.28	8.20	10.00	38	3.00
1.29	8.20	10.00	38	3.00
1.30	8.20	10.00	38	3.00
1.31	9.20	11.20	38	3.00
1.32	9.20	11.20	38	3.00
1.33	9.20	11.20	38	3.00
1.34	9.20	11.20	38	3.00
1.35	9.20	11.20	38	3.00
1.36	9.20	11.20	38	3.00
1.37	9.20	11.20	38	3.00
1.38	9.20	11.20	38	3.00
1.39	9.20	11.20	38	3.00
1.40	9.20	11.20	38	3.00
1.41	9.20	11.20	38	3.00
1.42	9.20	11.20	38	3.00
1.43	9.20	11.20	38	3.00
1.44	9.20	11.20	38	3.00
1.45	9.20	11.20	38	3.00
1.46	9.20	11.20	38	3.00
1.47	9.20	11.20	38	3.00
1.48	9.20	11.20	38	3.00
1.49	9.20	11.20	38	3.00
1.50	9.20	11.20	38	3.00
1.51	11.20	13.40	38	3.00
1.52	11.20	13.40	38	3.00
1.53	11.20	13.40	38	3.00
1.54	11.20	13.40	38	3.00



d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
1.55	11.20	13.40	38	3.00
1.56	11.20	13.40	38	3.00
1.57	11.20	13.40	38	3.00
1.58	11.20	13.40	38	3.00
1.59	11.20	13.40	38	3.00
1.60	11.20	13.40	38	3.00
1.61	11.20	13.40	38	3.00
1.62	11.20	13.40	38	3.00
1.63	11.20	13.40	38	3.00
1.64	11.20	13.40	38	3.00
1.65	11.20	13.40	38	3.00
1.66	11.20	13.40	38	3.00
1.67	11.20	13.40	38	3.00
1.68	11.20	13.40	38	3.00
1.69	11.20	13.40	38	3.00
1.70	11.20	13.40	38	3.00
1.71	11.20	13.40	38	3.00
1.72	11.20	13.40	38	3.00
1.73	11.20	13.40	38	3.00
1.74	11.20	13.40	38	3.00
1.75	11.20	13.40	38	3.00
1.76	11.20	13.40	38	3.00
1.77	11.20	13.40	38	3.00
1.78	11.20	13.40	38	3.00
1.79	11.20	13.40	38	3.00
1.80	11.20	13.40	38	3.00
1.81	11.20	13.40	38	3.00
1.82	11.20	13.40	38	3.00
1.83	11.20	13.40	38	3.00
1.84	11.20	13.40	38	3.00
1.85	11.20	13.40	38	3.00
1.86	11.20	13.40	38	3.00
1.87	11.20	13.40	38	3.00
1.88	11.20	13.40	38	3.00
1.89	11.20	13.40	38	3.00
1.90	11.20	13.40	38	3.00
1.91	11.20	13.40	38	3.00
1.92	11.20	13.40	38	3.00

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
1.93	11.20	13.40	38	3.00
1.94	11.20	13.40	38	3.00
1.95	11.20	13.40	38	3.00
1.96	11.20	13.40	38	3.00
1.97	11.20	13.40	38	3.00
1.98	11.20	13.40	38	3.00
1.99	11.20	13.40	38	3.00
2.00	11.20	13.40	38	3.00
2.01	12.50	14.00	38	3.00
2.02	12.50	14.00	38	3.00
2.03	12.50	14.00	38	3.00
2.04	12.50	14.00	38	3.00
2.05	12.50	14.00	38	3.00
2.06	12.50	14.00	38	3.00
2.07	12.50	14.00	38	3.00
2.08	12.50	14.00	38	3.00
2.09	12.50	14.00	38	3.00
2.10	12.50	14.00	38	3.00
2.11	12.50	14.00	38	3.00
2.12	12.50	14.00	38	3.00
2.13	12.50	14.00	38	3.00
2.14	12.50	14.00	38	3.00
2.15	12.50	14.00	38	3.00
2.16	12.50	14.00	38	3.00
2.17	12.50	14.00	38	3.00
2.18	12.50	14.00	38	3.00
2.19	12.50	14.00	38	3.00
2.20	12.50	14.00	38	3.00
2.21	12.50	14.00	38	3.00
2.22	12.50	14.00	38	3.00
2.23	12.50	14.00	38	3.00
2.24	12.50	14.00	38	3.00
2.25	12.50	14.00	38	3.00
2.26	12.50	14.00	38	3.00
2.27	12.50	14.00	38	3.00
2.28	12.50	14.00	38	3.00
2.29	12.50	14.00	38	3.00
2.30	12.50	14.00	38	3.00

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
2.31	12.50	14.00	38	3.00
2.32	12.50	14.00	38	3.00
2.33	12.50	14.00	38	3.00
2.34	12.50	14.00	38	3.00
2.35	12.50	14.00	38	3.00
2.36	12.50	14.00	38	3.00
2.37	12.50	14.00	38	3.00
2.38	12.50	14.00	38	3.00
2.39	12.50	14.00	38	3.00
2.40	12.50	14.00	38	3.00
2.41	12.50	14.00	38	3.00
2.42	12.50	14.00	38	3.00
2.43	12.50	14.00	38	3.00
2.44	12.50	14.00	38	3.00
2.45	12.50	14.00	38	3.00
2.46	12.50	14.00	38	3.00
2.47	12.50	14.00	38	3.00
2.48	12.50	14.00	38	3.00
2.49	12.50	14.00	38	3.00
2.50	14.00	17.00	38	3.00
2.51	14.00	17.00	38	3.00
2.52	14.00	17.00	38	3.00
2.53	14.00	17.00	38	3.00
2.54	14.00	17.00	38	3.00
2.55	14.00	17.00	38	3.00
2.56	14.00	17.00	38	3.00
2.57	14.00	17.00	38	3.00
2.58	14.00	17.00	38	3.00
2.59	14.00	17.00	38	3.00
2.60	14.00	17.00	38	3.00
2.61	14.00	17.00	38	3.00
2.62	14.00	17.00	38	3.00
2.63	14.00	17.00	38	3.00
2.64	14.00	17.00	38	3.00
2.65	14.00	17.00	38	3.00
2.66	14.00	17.00	38	3.00
2.67	14.00	17.00	38	3.00
2.68	14.00	17.00	38	3.00

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
2.69	14.00	17.00	38	3.00
2.70	14.00	17.00	38	3.00
2.71	14.00	17.00	38	3.00
2.72	14.00	17.00	38	3.00
2.73	14.00	17.00	38	3.00
2.74	14.00	17.00	38	3.00
2.75	14.00	17.00	38	3.00
2.76	14.00	17.00	38	3.00
2.77	14.00	17.00	38	3.00
2.78	14.00	17.00	38	3.00
2.79	14.00	17.00	38	3.00
2.80	14.00	17.00	38	3.00
2.81	14.00	17.00	38	3.00
2.82	14.00	17.00	38	3.00
2.83	14.00	17.00	38	3.00
2.84	14.00	17.00	38	3.00
2.85	14.00	17.00	38	3.00
2.86	14.00	17.00	38	3.00
2.87	14.00	17.00	38	3.00
2.88	14.00	17.00	38	3.00
2.89	14.00	17.00	38	3.00
2.90	14.00	17.00	38	3.00
2.91	14.00	17.00	38	3.00
2.92	14.00	17.00	38	3.00
2.93	14.00	17.00	38	3.00
2.94	14.00	17.00	38	3.00
2.95	14.00	17.00	38	3.00
2.96	14.00	17.00	38	3.00
2.97	14.00	17.00	38	3.00
2.98	14.00	17.00	38	3.00
2.99	14.00	17.00	38	3.00
3.00	14.00	17.00	38	3.00

1.DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

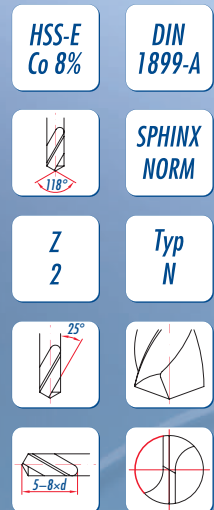
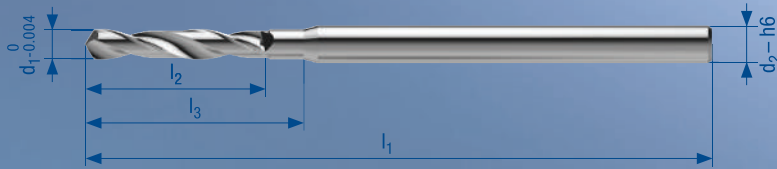
6. Whiz Cut

7. SPHINX

# Micro drill Spirec 6 × d in HSS-E

Art. 12604

0.01단위 마이크로 드릴 (HSS-E)



d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
0.05	0.40	0.60	25	1.00
0.06	0.40	0.60	25	1.00
0.07	0.50	0.70	25	1.00
0.08	0.50	0.70	25	1.00
0.09	0.50	0.70	25	1.00
0.10	0.50	0.70	25	1.00
0.11	0.50	0.70	25	1.00
0.12	0.50	0.70	25	1.00
0.13	0.80	1.00	25	1.00
0.14	0.80	1.00	25	1.00
0.15	0.80	1.00	25	1.00
0.16	1.10	1.40	25	1.00
0.17	1.10	1.40	25	1.00
0.18	1.10	1.40	25	1.00
0.19	1.10	1.40	25	1.00
0.20	1.50	1.80	25	1.00
0.21	1.50	1.80	25	1.00
0.22	1.50	1.80	25	1.00
0.23	1.50	1.80	25	1.00
0.24	1.50	1.80	25	1.00
0.25	1.90	2.20	25	1.00
0.26	1.90	2.20	25	1.00
0.27	1.90	2.20	25	1.00
0.28	1.90	2.20	25	1.00
0.29	1.90	2.20	25	1.00
0.30	1.90	2.20	25	1.00
0.31	2.40	2.80	25	1.00
0.32	2.40	2.80	25	1.00
0.33	2.40	2.80	25	1.00
0.34	2.40	2.80	25	1.00
0.35	2.40	2.80	25	1.00
0.36	2.40	2.80	25	1.00
0.37	2.40	2.80	25	1.00
0.38	2.40	2.80	25	1.00
0.39	2.70	3.60	25	1.00
0.40	2.70	3.60	25	1.00
0.41	2.70	3.60	25	1.00
0.42	2.70	3.60	25	1.00

d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
0.43	2.70	3.60	25	1.00
0.44	2.70	3.60	25	1.00
0.45	2.70	3.60	25	1.00
0.46	2.70	3.60	25	1.00
0.47	2.70	3.60	25	1.00
0.48	2.70	3.60	25	1.00
0.49	3.20	4.00	25	1.00
0.50	3.20	4.00	25	1.00
0.51	3.20	4.00	25	1.00
0.52	3.20	4.00	25	1.00
0.53	3.20	4.00	25	1.00
0.54	3.60	4.50	25	1.00
0.55	3.60	4.50	25	1.00
0.56	3.60	4.50	25	1.00
0.57	3.60	4.50	25	1.00
0.58	3.60	4.50	25	1.00
0.59	3.60	4.50	25	1.00
0.60	3.60	4.50	25	1.00
0.61	3.90	5.00	25	1.00
0.62	3.90	5.00	25	1.00
0.63	3.90	5.00	25	1.00
0.64	3.90	5.00	25	1.00
0.65	3.90	5.00	25	1.00
0.66	3.90	5.00	25	1.00
0.67	3.90	5.00	25	1.00
0.68	4.50	5.60	25	1.00
0.69	4.50	5.60	25	1.00
0.70	4.50	5.60	25	1.00
0.71	4.50	5.60	25	1.00
0.72	4.50	5.60	25	1.00
0.73	4.50	5.60	25	1.00
0.74	4.50	5.60	25	1.00
0.75	4.50	5.60	25	1.00
0.76	5.00	6.30	25	1.00
0.77	5.00	6.30	25	1.00
0.78	5.00	6.30	25	1.00
0.79	5.00	6.30	25	1.00
0.80	5.00	6.30	25	1.50

d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
0.81	5.00	6.30	25	1.50
0.82	5.00	6.30	25	1.50
0.83	5.00	6.30	25	1.50
0.84	5.00	6.30	25	1.50
0.85	5.00	6.30	25	1.50
0.86	5.70	7.10	25	1.50
0.87	5.70	7.10	25	1.50
0.88	5.70	7.10	25	1.50
0.89	5.70	7.10	25	1.50
0.90	5.70	7.10	25	1.50
0.91	5.70	7.10	25	1.50
0.92	5.70	7.10	25	1.50
0.93	5.70	7.10	25	1.50
0.94	5.70	7.10	25	1.50
0.95	5.70	7.10	25	1.50
0.96	6.50	8.00	25	1.50
0.97	6.50	8.00	25	1.50
0.98	6.50	8.00	25	1.50
0.99	6.50	8.00	25	1.50
1.00	6.50	8.00	25	1.50
1.05	6.50	8.00	25	1.50
1.10	7.30	9.00	25	1.50
1.15	7.30	9.00	25	1.50
1.20	8.20	10.00	25	1.50
1.25	8.20	10.00	25	1.50
1.30	8.20	10.00	25	1.50
1.35	9.20	11.20	25	1.50
1.40	9.20	11.20	25	1.50
1.45	9.20	11.20	25	1.50
1.50	10.90	12.90	38	2.00
1.55	11.20	13.40	38	2.00
1.587	11.20	13.40	38	2.00
1.60	11.20	13.40	38	2.00
1.65	11.20	13.40	38	2.00
1.70	11.20	13.40	38	2.00
1.75	11.20	13.40	38	2.00
1.80	11.20	13.40	38	2.00
1.85	11.20	13.40	38	2.00

d1 mm	l2 mm	l3 mm	l1 mm	d2 mm
1.90	11.70	14.00	38	2.00
1.95	11.70	14.00	38	2.00
1.984	11.70	14.00	38	2.00
2.00	12.70	15.00	43	2.50
2.05	12.70	15.00	43	2.50
2.10	12.70	15.00	43	2.50
2.15	12.70	15.00	43	2.50
2.20	13.70	17.00	43	2.50
2.25	13.70	17.00	43	2.50
2.30	13.70	17.00	43	2.50
2.35	13.70	17.00	43	2.50
2.381	13.70	17.00	43	2.50
2.40	14.70	18.00	43	2.50
2.45	14.70	18.00	43	2.50
2.50	14.70	18.00	46	3.00
2.55	15.70	19.00	46	3.00
2.60	15.70	19.00	46	3.00
2.65	16.70	20.00	46	3.00
2.70	16.70	20.00	46	3.00
2.75	17.70	21.00	46	3.00
2.778	17.70	21.00	46	3.00
2.80	17.70	21.00	46	3.00
2.85	18.70	22.00	46	3.00
2.90	18.70	22.00	46	3.00
2.95	19.70	23.00	46	3.00
3.00	19.70	23.00	46	3.00
3.175	19.70	23.00	46	3.175

# Applications

	Blind hole
	Blind hole with countersink
	Step hole
	Graver for groove, flat bottom
	Graver for groove, full bottom radius
	Plunge radius
	Straight radius milling
	Through hole
	Through hole with countersink
	Multi-composite material
	Cross hole
	Round surface
	Inclined surface
	Chamfer 60°
	Chamfer 90°

	Chamfer 120°
	Countersink 60°
	Countersink 90°
	Countersink 120°
	Countersink 130°
	Countersink 140°
	Double angle countersink 90° – 140°
	Plunge
	Straight groove milling
	Angular groove milling
	Front side finishing
	Side finishing
	Front side roughing
	Angular milling
	Circular milling

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

# Micro milling ≤ Ø3.00 mm

Ø3.0 이하 마이크로 앤드밀

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
Engraving mill with reinforced shank							
	70030	0.02–0.15	0.01		30°	0°	
	70040	0.02–0.15	0.01		40°	0°	
	70050	0.02–0.15	0.01		50°	0°	
	70060	0.02–0.15	0.01		60°	0°	
	70090	0.02–0.15	0.01		90°	0°	
	70130	0.04–0.10	0.01		30°	0°	
	70140	0.04–0.10	0.01		40°	0°	
	70150	0.04–0.10	0.01		50°	0°	
	70160	0.04–0.10	0.01		60°	0°	
	70190	0.04–0.10	0.01		90°	0°	
Micro end mill with reinforced shank							
	72075	0.20–2.00	0.10	0.75×Ø		30°	
	72150	0.10–2.00	0.10	1.5×Ø		30°	
	42000	0.10–3.00	0.10	3×Ø		30°	
	72500	0.30–2.50	0.10	5×Ø		30°	
	72800	0.40–2.50	0.10	8×Ø		30°	
	73130	0.30–2.90	0.10	1.3×Ø		30°	
	73200	0.30–2.90	0.10	2×Ø		30°	
	73300	0.30–2.90	0.10	3×Ø		30°	



- ✓ outstanding
- able

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS









5. ARNO

6. Whiz Cut

7. SPHINX



Material	Workpiece material *							Application *
	P	M	K	S	N	H	O	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	✓	✓	✓	✓		✓	
VHM/MD/SC	✓	•	✓	•	✓		•	
VHM/MD/SC	✓	•	✓	•	✓		•	
VHM/MD/SC	✓	•	✓	•	✓		•	
VHM/MD/SC	✓	•	✓	•	✓		•	
VHM/MD/SC	✓	•	✓	•	•			
VHM/MD/SC	✓	•	✓	•	•			

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
	43105	0.30–3.00	0.10	1× $\varnothing$		35°	
	43305	0.30–3.00	0.10	3× $\varnothing$		35°	
Ball nose end mill with reinforced shank							
	74075	0.20–1.00	0.10	0.75× $\varnothing$		30°	
	74150	0.20–2.00	0.10	1.5× $\varnothing$		30°	
	74300	0.20–2.80	0.10	3× $\varnothing$		30°	
Chamfering tool and end mill 1 tooth with reinforced shank							
	73000	0.50–3.00	0.50		90°	0°	
	47330	0.30–3.00	0.10			0°	
	47344	0.50–8.00	0.10			0°	

- ✓ outstanding
- able

	Material	Workpiece material *							Application *	
		P	M	K	S	N	H	O		
	VHM / MD / SC; Cro-Nova	✓	✓	•	✓	✓	•	•		
	VHM / MD / SC; Cro-Nova	✓	✓	•	✓	✓	•	•		
	VHM / MD / SC	✓	•	✓	•	✓		•		
	VHM / MD / SC	✓	•	✓	•	✓		•		
	VHM / MD / SC	✓	•	✓	•	✓		•		
	VHM / MD / SC	✓	•	✓	•	✓				
	VHM / MD / SC	•	•	•		✓				
	VHM / MD / SC	•	•	•		✓				

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



# Drilling – Reaming

드릴- 리머

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS








































5. ARNO

6. Whiz Cut

7. SPHINX

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
<b>NC spotting drill and chamfering drill</b>							
	50806	0.50–6.00	0.10		60°+/- 1°	20°	
	50810	2.00–20.00	1.00		90°+/- 1°	20°	
	50812	2.00–20.00	1.00		120°	20°	
	50814	2.00–20.00	1.00		142°	20°	
	50818	1.60–12.00	0.40		142°/90°	20°	
<b>Twist drill without internal coolant</b>							
	50950	3.00–20.00	0.10	3×Ø	140°	30°	
	50830	0.30–20.00	0.10	5×Ø	118°	35°	
	50838	0.30–6.00	0.05	6×Ø	118°	30°–35°	
	50820	0.70–14.00	0.10	10×Ø	130°	35°–15°	
<b>High performance drill with reinforced shank with internal coolant</b>							
	50938	1.00–12.70	0.10	3×Ø	140°	30°	
	50940	1.00–12.70	0.05	6×Ø	140°	30°	
	50942	1.00–12.70	0.10	12×Ø	140°	30°	
	52100	3.00–20.00	0.50	6×Ø	140°	0°	
	52200	3.00–20.00	0.50	12×Ø	140°	0°	
	52150	4.00–20.00	0.50	6×Ø	140°	15°	

- ✓ outstanding
- able

	Material	Workpiece material*							Application*				
		P	M	K	S	N	H	O					
	VHM/MD/SC	✓	✓	✓	•	✓		✓					
	VHM/MD/SC	✓	✓	✓	•	✓		✓					
	VHM/MD/SC	✓	✓	✓	•	✓		✓					
	VHM/MD/SC	✓	✓	✓	•	✓		✓					
	VHM/MD/SC	✓	✓	✓	•	✓		✓					
	VHM/MD/SC; TiAlN	✓	•	✓	•	•	•	•					
	VHM/MD/SC	✓	✓	•	•	✓		✓					
	VHM/MD/SC	✓	✓	•	•	✓		✓					
	VHM/MD/SC	✓		✓		•							
	VHM/MD/SC; AlCrN	✓	✓	✓	•	•							
	VHM/MD/SC; TiAlN	✓	✓	✓	•	•							
	VHM/MD/SC; AlCrN	✓	•	✓	•	•							
	VHM/MD/SC			✓		✓		•					
	VHM/MD/SC			✓		✓		•					
	VHM/MD/SC; TiAlN	✓		✓		•	•						

1. DIAMETAL

2. BIMU

















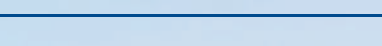
3. IFANGER

4. ZEUS































































5. ARNO

6. Whiz Cut

7. SPHINX

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
<b>High performance drill Power-Phoenix with reinforced shank with internal coolant</b>							
	50909	1.00–12.70	0.10	9× $\emptyset$	140°	30°	
	50912	1.00–12.70	0.10	12× $\emptyset$	137°	30°	
	50916	1.00–12.70	0.10	16× $\emptyset$	137°	30°	
	50920	3.00–10.00	1.00	20× $\emptyset$	137°	30°	
	50925	3.00–10.00	1.00	25× $\emptyset$	137°	30°	
	50930	3.00–10.00	1.00	30× $\emptyset$	137°	30°	
<b>High performance drill Phoenix-TC2 with reinforced shank with internal coolant</b>							
	52903	1.00–10.00	0.05	3× $\emptyset$	140°	30°	
	52906	1.00–10.00	0.05	6× $\emptyset$	140°	30°	
	52909	1.00–10.00	0.10	9× $\emptyset$	140°	30°	
	52912	1.00–10.00	0.10	12× $\emptyset$	137°	30°	
	52916	1.00–10.00	0.10	16× $\emptyset$	137°	30°	
	52920	3.00–10.00	1.00	20× $\emptyset$	137°	30°	
	52930	3.00–10.00	1.00	30× $\emptyset$	137°	30°	
<b>High performance drill Phoenix-TC4 with reinforced shank with internal coolant</b>							
	54906	3.00–10.00	0.10	6× $\emptyset$	140°	30°	
	54909	3.00–10.00	0.10	9× $\emptyset$	140°	30°	
	54912	3.00–10.00	0.10	12× $\emptyset$	137°	30°	
	54916	3.00–10.00	0.10	16× $\emptyset$	137°	30°	

- ✓ hervorragend / outstanding
- geeignet / able

Material	Workpiece material*							Application*	
	P	M	K	S	N	H	O		
VHM / MD / SC; AlCrN	✓	✓	✓	•	✓		•	  	
VHM / MD / SC; AlCrN	✓		✓		•			  	
VHM / MD / SC; AlCrN	✓		✓		•			  	
VHM / MD / SC; AlCrN	✓		✓		•			  	
VHM / MD / SC; AlCrN	✓		✓		•			  	
VHM / MD / SC; AlCrN	✓		✓		•			  	
VHM / MD / SC; AlTiCrN+S	✓	✓	✓	✓	✓	•	•	    	
VHM / MD / SC; AlTiCrN+S	✓	✓	✓	✓	✓	•	•	    	
VHM / MD / SC; AlTiCrN+S	✓	✓	✓	✓	✓	•	•	   	
VHM / MD / SC; AlCrN; AlCrTiN	✓	✓	✓	✓	✓	•	•	   	
VHM / MD / SC; AlCrN; AlCrTiN	✓	✓	✓	✓	✓	•	•	  	
VHM / MD / SC; AlCrTiN	•	✓	•	✓	✓	•	•	  	
VHM / MD / SC; AlCrTiN	•	✓	•	✓	✓	•	•	  	
VHM / MD / SC; AlTiCrN+S	✓		✓		•			    	
VHM / MD / SC; AlTiCrN+S	✓		✓		•			   	
VHM / MD / SC; AlCrTiN	✓		✓		•			   	
VHM / MD / SC; AlCrTiN	✓		✓		•			   	

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS


5. ARNO

6. Whiz Cut

7. SPHINX

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
	54920	3.00–10.00	1.00 und M	20× $\varnothing$	137°	30°	
	54930	3.00–10.00	1.00 und M	30× $\varnothing$	137°	30°	
<b>Punta alesatore e alesatore      드릴 리머 및 리머</b> <b>Drill reamer and reamer</b>							
	50840	2.00–14.00	0.10	–5× $\varnothing$	118°	35°	
	55654	1.00–14.00	0.10	–5× $\varnothing$	118°	35°	
	55338	1.00–14.00	0.10	–10× $\varnothing$	118°	35°	
	58000	0.99–6.00	0.01	–8× $\varnothing$		10°	
	58500	0.99–6.00	0.01	–8× $\varnothing$		10°	

- ✓ outstanding
- able

	Material	Workpiece material*							Application*	
		P	M	K	S	N	H	O		
	VHM/MD/SC; AlCrTiN	✓		✓		•			   	
	VHM/MD/SC; AlCrTiN	✓		✓		•			   	
	VHM/MD/SC	•	•	•	•	✓			 	
	VHM/MD/SC	✓	•	✓	•	•			    	
	VHM/MD/SC	✓	•	✓	•	•			    	
	VHM/MD/SC	✓	✓	✓	•	✓			 	
	VHM/MD/SC	✓	✓	✓	•	✓				

1.DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



# NC spotting drill and chamfering 60°

Art. 50806

60도 센터 드릴

1. DIAMETAL

2. BIMU

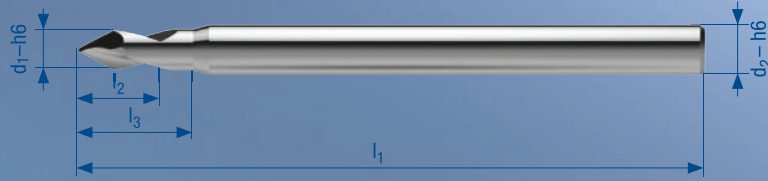
3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



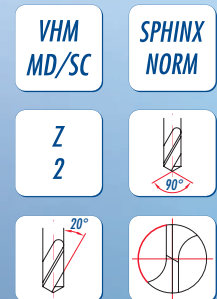
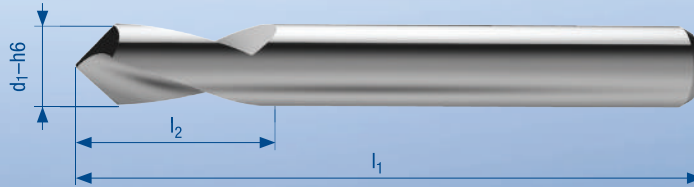
d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
0.50	1.50	2.00	38	3.00
0.60	1.50	2.00	38	3.00
0.70	1.50	2.00	38	3.00
0.80	2.00	2.50	38	3.00
0.90	2.00	2.50	38	3.00
1.00	2.00	2.50	38	3.00
1.10	2.50	3.50	38	3.00
1.20	2.50	3.50	38	3.00
1.30	2.50	3.50	38	3.00
1.40	3.00	4.00	38	3.00
1.50	3.00	4.00	38	3.00
1.60	3.00	4.00	38	3.00
1.70	4.00	5.00	38	3.00
1.80	4.00	5.00	38	3.00
1.90	4.00	5.00	38	3.00
2.00	5.00	6.00	38	3.00
2.10	5.00	6.00	38	3.00
2.20	5.00	6.00	38	3.00
2.30	6.00	7.00	38	3.00
2.40	6.00	7.00	38	3.00
2.50	6.00	7.00	38	3.00
2.60	7.00	8.00	38	3.00
2.70	7.00	8.00	38	3.00
2.80	7.00	8.00	38	3.00
2.90	7.00	8.00	38	3.00
3.00	9.50	9.50	38	3.00
4.00	10.50	10.50	40	4.00
5.00	16.00	16.00	50	5.00
6.00	16.00	16.00	50	6.00



# NC spotting drill 90°

90도 센터 드릴

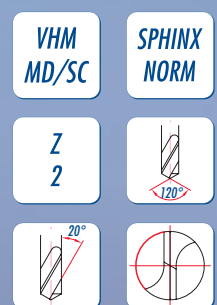
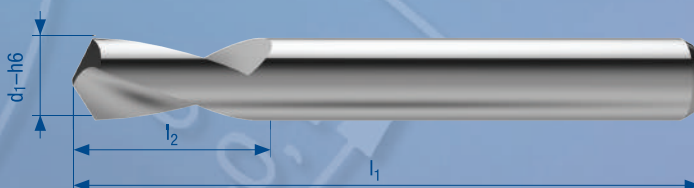
Art. 50810



d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
2.00	8.50	25
3.00	9.50	32
4.00	10.50	40
5.00	16.00	50
6.00	16.00	50
8.00	20.00	60
10.00	22.00	70
12.00	22.00	70
14.00	25.00	75
16.00	25.00	75
20.00	35.00	75

# NC spotting drill 120° 120도 센터 드릴

Art. 50812



Vc → S./p. 172

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
2.00	8.50	25
3.00	9.50	32
4.00	10.50	40
5.00	16.00	50
6.00	16.00	50
8.00	20.00	60
10.00	22.00	70
12.00	22.00	70
14.00	25.00	75
16.00	25.00	75
20.00	35.00	75

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

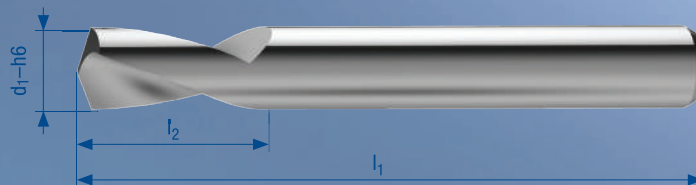
6. Whiz Cut

7. SPHINX

# NC spotting drill 142°

142도 센터 드릴

Art. 50814

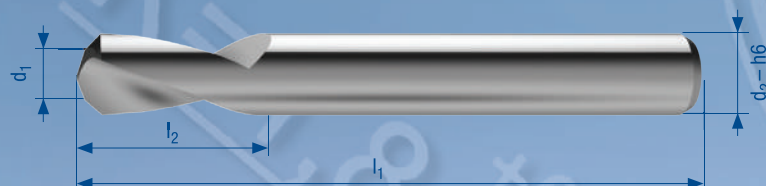


d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
2.00	8.50	25
3.00	9.50	32
4.00	10.50	40
5.00	16.00	50
6.00	16.00	50
8.00	20.00	60
10.00	22.00	70
12.00	22.00	70
14.00	25.00	75
16.00	25.00	75
20.00	35.00	75

# Spotting and chamfering drill 142°/90°

142/90도 센터 드릴

Art. 50818



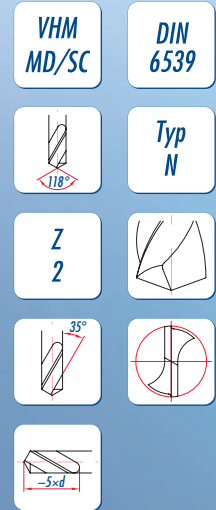
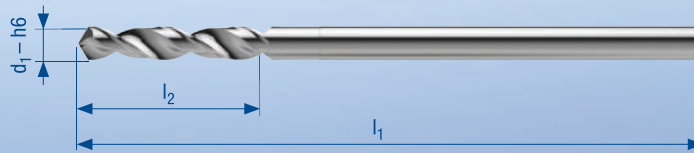
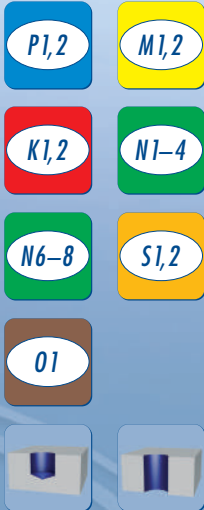
d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
1.60	9.50	32	3.00
2.00	9.50	32	3.00
2.50	10.50	40	4.00
3.00	10.50	40	4.00
3.30	16.00	50	5.00
4.00	16.00	50	5.00

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
4.20	16.00	50	6.00
5.00	20.00	60	8.00
6.00	20.00	60	8.00
6.80	22.00	70	10.00
7.00	22.00	70	10.00
8.00	22.00	70	10.00

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> mm
8.50	22.00	70	12.00
9.00	22.00	70	12.00
10.00	22.00	70	12.00
10.20	25.00	75	14.00
11.00	25.00	75	14.00
12.00	25.00	75	16.00

# Twist drill Posicut 5 × d

Art. 50830



d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
0.30	1.50	19
0.40	2.30	19
0.50	2.80	20
0.60	3.30	21
0.70	4.30	23
0.80	4.80	24
0.90	5.30	25
1.00	5.70	26
1.10	6.70	28
1.20	7.70	30
1.30	7.70	30
1.40	8.70	32
1.50	8.70	32
1.60	9.70	34
1.70	9.70	34
1.80	10.70	36
1.90	10.70	36
2.00	11.50	38
2.10	11.50	38
2.20	12.50	40
2.30	12.50	40
2.40	13.50	43
2.50	13.50	43
2.60	13.50	43
2.70	15.50	46
2.80	15.50	46
2.90	15.50	46
3.00	15.50	46
3.10	17.50	49
3.20	17.50	49
3.30	17.50	49
3.40	19.50	52
3.50	19.50	52
3.60	19.50	52
3.70	19.50	52
3.80	21.50	55
3.90	21.50	55
4.00	21.50	55

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
4.10	21.50	55
4.20	21.50	55
4.30	23.00	58
4.40	23.00	58
4.50	23.00	58
4.60	23.00	58
4.70	23.00	58
4.80	25.00	62
4.90	25.00	62
5.00	25.00	62
5.10	25.00	62
5.20	25.00	62
5.30	25.00	62
5.40	27.00	66
5.50	27.00	66
5.60	27.00	66
5.70	27.00	66
5.80	27.00	66
5.90	27.00	66
6.00	27.00	66
6.10	30.00	70
6.20	30.00	70
6.30	30.00	70
6.40	30.00	70
6.50	30.00	70
6.60	30.00	70
6.70	30.00	70
6.80	33.00	74
6.90	33.00	74
7.00	33.00	74
7.10	33.00	74
7.20	33.00	74
7.30	33.00	74
7.40	33.00	74
7.50	33.00	74
7.60	36.00	79
7.70	36.00	79
7.80	36.00	79

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
7.90	36.00	79
8.00	36.00	79
8.10	36.00	79
8.20	36.00	79
8.30	36.00	79
8.40	36.00	79
8.50	36.00	79
8.60	39.00	84
8.70	39.00	84
8.80	39.00	84
8.90	39.00	84
9.00	39.00	84
9.10	39.00	84
9.20	39.00	84
9.30	39.00	84
9.40	39.00	84
9.50	39.00	84
9.60	41.00	89
9.70	41.00	89
9.80	41.00	89
9.90	41.00	89
10.00	41.00	89
10.20	41.00	89
10.50	41.00	89
11.00	45.00	95
11.50	45.00	95
12.00	49.00	102
12.50	49.00	102
13.00	49.00	102
13.50	52.00	107
14.00	52.00	107
15.00	54.00	111
16.00	56.00	115
17.00	58.00	119
18.00	60.00	123
19.00	62.00	127
20.00	64.00	131

# Twist drill Spirec 5 × d

Art. 50838

1. DIAMETAL



2. BIMU



3. IFANGER



4. ZEUS

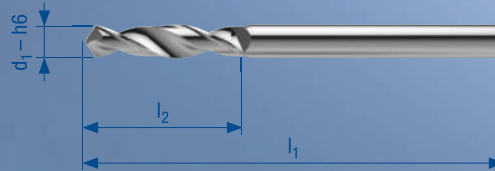
d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
0.30	3.70	38
0.35	3.70	38
0.40	4.70	38
0.45	4.70	38
0.50	5.70	38
0.55	5.70	38
0.60	7.70	38
0.65	7.70	38
0.70	9.70	38
0.75	9.70	38
0.80	11.70	38
0.85	11.70	38
0.90	14.70	38
0.95	14.70	38
1.00	14.70	38
1.05	14.70	38
1.10	14.70	38
1.15	14.70	38
1.20	14.70	38
1.25	14.70	38
1.30	14.70	38
1.35	14.70	38
1.40	14.70	38
1.45	14.70	38
1.50	14.70	38
1.55	14.70	38
1.60	14.70	38
1.65	14.70	38
1.70	14.70	38
1.75	14.70	38
1.80	14.70	38
1.85	14.70	38
1.90	14.70	38
1.95	14.70	38
2.00	14.70	38
2.05	14.70	38
2.10	14.70	38
2.15	14.70	38

5. ARNO

d <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm
2.20	14.70	38
2.25	14.70	38
2.30	14.70	38
2.35	14.70	38
2.40	14.70	38
2.45	14.70	38
2.50	14.70	38
2.55	14.70	38
2.60	14.70	38
2.65	14.70	38
2.70	14.70	38
2.75	14.70	38
2.80	14.70	38
2.85	14.70	38
2.90	14.70	38
2.95	14.70	38
3.00	14.70	38
3.05	14.70	38
3.10	14.70	38
3.15	14.70	38
3.175	14.70	38
3.20	19.70	50
3.30	19.70	50
3.40	19.70	50
3.50	19.70	50
3.60	19.70	50
3.70	19.70	50
3.80	19.70	50
3.90	19.70	50
4.00	19.70	50
4.10	24.70	50
4.20	24.70	50
4.30	24.70	50
4.40	24.70	50
4.50	24.70	50
4.60	24.70	50
4.70	24.70	50
4.80	24.70	50

6. Whiz Cut

7. SPHINX



VHM  
MD/SC

SPHINX  
NORM



Typ  
N

Z  
2



# Workpiece materials

		Material	Festigkeit (N/mm <sup>2</sup> ) Härte hardness	example
P	P1	unalloyed steels, steel casting	bis up to 700 N/mm <sup>2</sup>	St37, St42, C22, GS38, St50, St60, C35, GS52
	P2	alloyed steels	bis up to 700 – 1000 N/mm <sup>2</sup>	St70, C45, GS62, 16MnCr5, 42CrMo4, 90MnCrV8, 100Cr6
	P3	High alloyed / high-grade steels	bis / up to 1400 N/mm <sup>2</sup>	S210Cr12, 34CrAlNi7
M	M1	Ferritic / martensitic stainless steels		
	M2	Austenitic stainless steels		
K	K1	grey cast iron		
	K2	Spheroidal / ductile cast iron		
N	N1	malleable alu alloy	bis up to 350 N/mm <sup>2</sup>	Al99.5, AlMg1, AlCuSiPb, G-AlCu5Ni1.5, AlZnMgCu0.5
	N2	cast alu alloy <10% Si	bis up to 300 N/mm <sup>2</sup>	G-AlCu4TiMg, G-AlSi7Mg, G-AlSi9Mg, G-AlSi10Mg, G-AlSi12
	N3	cast alu alloy >10% Si	bis up to 450 N/mm <sup>2</sup>	G-AlSi17Cu4, G-AlSi21CuNiMg
	N4	Magnesium, magnesium alloys		
	N5	Copper nickel alloys, brass		
	N6	Copper, forging copper alloys		
	N7	Silver		
	N8	Gold		
S	S1	Titanium, titanium alloys	over 700 N/mm <sup>2</sup>	Ti6Al4V, Ti-4Al-4Mo-2Sn
	S2	Ni / Co based super alloys		
H	H1	Hardened steels 50 – 55 HRC		
	H2	Hardened steels 55 – 60 HRC		
	H3	Hardened steels > 60 HRC		
O	O1	Thermoplast, thermosetting plastics		
	O2	Fiber-reinforced plastics		
	O3	Graphite		EDM36

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



# Milling

앤드밀

1. DIAMETAL

2. BIMU





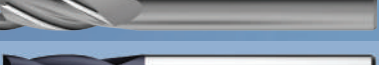






3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

	Article	Diameter range	Incre- ments	Cutting length	Point angle	Helix angle	
End mill							
	40000	2.00-20.00	0.50	DIN 6528		30°	
	40600	2.00-20.00	0.50	DIN 6529		30°	
	40002	2.00-20.00	0.50	DIN 6530		30°	
	40602	2.00-20.00	0.50	DIN 6531		30°	
	40004	2.00-20.00	0.50	DIN 6532		30°	
	40604	2.00-20.00	0.50	DIN 6533		30°	
	40006	4.00-20.00	0.50	DIN 6534		45°	
	40008	4.00-20.00	0.50	DIN 6535		55°	
	47000	3.00-20.00	1.00	1.5-4×φ		55°	
	47500	6.00-20.00	2.00	4.5-8×φ		55°	
	47344	0.50-8.00	0.10	1-3×φ		0°	

- ✓ outstanding
- able

1. DIAMETAL

2. BIMU












3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

Material	Workpiece material *							Application *
	P	M	K	S	N	H	O	
VHM / MD / SC	•		•		✓		•	
VHM / MD / SC; TiAlN+AlCrN	✓	•	✓		✓	✓		
VHM / MD / SC	✓	•	✓		✓			
VHM / MD / SC; TiAlN+AlCrN	✓	•	✓		✓	✓		
VHM / MD / SC	✓	•	✓					
VHM / MD / SC; TiAlN+AlCrN	✓	•	✓	•		✓		
VHM / MD / SC	✓	✓	✓	•				
VHM / MD / SC	✓	✓	✓	•				
VHM / MD / SC					✓		•	
VHM / MD / SC					✓		•	
VHM / MD / SC	•	•	•		✓			



# Explication cutting data

1. DIAMETAL

Formula cutting speed v:

$$v = \frac{d \times \pi \times n}{1000}$$

2. BIMU

Formula spindle speed n:

$$n = \frac{v \times 1000}{d \times \pi}$$

3. IFANGER

Drill, reamer

Vc = Cutting speed in m/min

Vf = Cutting feed in mm/rev

4. ZEUS

End mill

Vc = Cutting speed in m/min

fz = Cutting speed in mm/tooth

Vf = Cutting speed in mm/rev = fz × t × n

ap = Cutting depth

ae = Cutting width

5. ARNO

6. Whiz Cut

7. SPHINX

# Cutting data 추천 절삭 조건

## Art. 50806 / 50809

Mat.		ø 0.50-1.00	ø 1.10-2.90	ø 3.00-6.00
P1	Vc	15-25	25-40	25-40
P1	fz	0.020-0.080	0.060-0.140	0.120-0.250
P2	Vc	12-20	20-35	20-35
P2	fz	0.010-0.060	0.040-0.120	0.100-0.220
P3	Vc	8-18	12-30	12-30
P3	fz	0.010-0.040	0.030-0.090	0.080-0.200
M1	Vc	6-12	10-20	10-20
M1	fz	0.020-0.050	0.030-0.070	0.050-0.150
M2	Vc	5-10	8-16	8-16
M2	fz	0.010-0.040	0.030-0.060	0.040-0.080
K1	Vc	15-25	25-40	25-40
K1	fz	0.010-0.050	0.030-0.080	0.070-0.150
K2	Vc	12-20	20-35	20-35
K2	fz	0.010-0.040	0.030-0.060	0.050-0.100
N1	Vc	30-45	45-60	45-60
N1	fz	0.030-0.080	0.060-0.120	0.100-0.250
N2	Vc	20-35	30-45	30-45
N2	fz	0.040-0.080	0.070-0.150	0.130-0.300
N3	Vc	15-30	25-40	25-40
N3	fz	0.020-0.070	0.060-0.120	0.100-0.250
N4	Vc	15-25	25-40	25-40
N4	fz	0.010-0.050	0.030-0.08	0.060-0.150
N5	Vc	30-45	45-60	45-60
N5	fz	0.040-0.080	0.070-0.130	0.100-0.250
N6	Vc	15-30	25-40	25-40
N6	fz	0.010-0.040	0.038-0.065	0.060-0.090
N7	Vc	15-25	25-40	25-40
N7	fz	0.010-0.040	0.030-0.080	0.050-0.130
N8	Vc	8-18	12-30	12-30
N8	fz	0.010-0.040	0.020-0.050	0.030-0.100
S1	Vc	20-35	30-45	30-45
S1	fz	0.010-0.040	0.020-0.0560	0.040-0.100
S2	Vc			
S2	fz			
H1	Vc			
H1	fz			
H2	Vc			
H2	fz			
H3	Vc			
H3	fz			
O1	Vc	20-35	30-45	30-45
O1	fz	0.020-0.060	0.050-0.120	0.100-0.250
O2	Vc			
O2	fz			
O3	Vc			
O3	fz			

## Art. 56005

Mat.		ø 0.10-0.30	ø 0.35-0.80	ø 0.85-1.50
P1	Vc	8-18	15-30	30-60
P1	fz	0.001-0.003	0.002-0.010	0.010-0.020
P2	Vc	6-16	12-25	20-40
P2	fz	0.001-0.002	0.002-0.008	0.006-0.015
P3	Vc	6-13	10-20	18-35
P3	fz	0.001-0.002	0.002-0.005	0.004-0.012
M1	Vc	5-12	10-18	15-30
M1	fz	0.001-0.002	0.002-0.005	0.004-0.010
M2	Vc	5-10	8-15	13-25
M2	fz	0.001-0.002	0.002-0.004	0.003-0.009
K1	Vc	8-18	15-30	30-60
K1	fz	0.003-0.008	0.006-0.010	0.008-0.025
K2	Vc	6-16	12-25	20-40
K2	fz	0.002-0.004	0.005-0.008	0.007-0.020
N1	Vc	12-20	18-35	35-65
N1	fz	0.001-0.004	0.003-0.008	0.006-0.015
N2	Vc	10-18	15-30	25-50
N2	fz	0.002-0.005	0.004-0.010	0.008-0.025
N3	Vc	8-18	15-30	30-60
N3	fz	0.002-0.005	0.004-0.008	0.006-0.020
N4	Vc	8-18	15-30	30-60
N4	fz	0.001-0.004	0.003-0.006	0.005-0.015
N5	Vc	12-20	18-35	35-65
N5	fz	0.002-0.005	0.004-0.010	0.009-0.025
N6	Vc	8-18	15-30	30-60
N6	fz	0.002-0.005	0.004-0.008	0.007-0.020
N7	Vc	8-18	15-30	30-60
N7	fz	0.002-0.005	0.004-0.008	0.007-0.020
N8	Vc	6-13	10-20	18-35
N8	fz	0.001-0.004	0.002-0.007	0.005-0.015
S1	Vc	15-30	28-45	30-45
S1	fz	0.002-0.006	0.005-0.010	0.008-0.020
S2	Vc			
S2	fz			
H1	Vc			
H1	fz			
H2	Vc			
H2	fz			
H3	Vc			
H3	fz			
O1	Vc	8-18	15-30	30-60
O1	fz	0.005-0.010	0.008-0.015	0.013-0.035
O2	Vc			
O2	fz			
O3	Vc			
O3	fz			

These are recommended values that depend on the condition of the machine, fixture, coolant etc., and they may have to be adapted yet.

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX

# Cutting data 추천 절삭 조건

1. DIAMETAL

2. BIMU

3. IFANGER

















4. ZEUS

5. ARNO
























6. Whiz Cut

7. SPHINX

## Art. 50695 / 50699

Mat.		ø 0.05-0.30	ø 0.31-0.50	ø 0.51-0.80	ø 0.81 + 1.20	ø 1.21-2.00
	Vc	1.0-6.0	6.0-15	10-23	23-60	23-60
	fz	0.001-0.004	0.003-0.008	0.007-0.013	0.012-0.018	0.016-0.025
	Vc	1.0-6.0	2.0-10	3.5-16	7.0-30	7.0-30
	fz	0.001-0.003	0.002-0.007	0.006-0.012	0.010-0.016	0.014-0.022
	Vc	0.5-5.0	1.0-8.0	2.5-13	5.0-25	5.0-25
	fz	0.001-0.002	0.002-0.006	0.005-0.010	0.008-0.014	0.012-0.020
	Vc	0.5-3.0	1.0-6.0	4.0-10	8.0-18	8.0-18
	fz	0.001-0.002	0.002-0.005	0.004-0.008	0.007-0.012	0.010-0.016
	Vc					
	fz					
	Vc	2.0-8.0	6.0-15	10-23	23-60	23-60
	fz	0.001-0.004	0.003-0.008	0.007-0.013	0.012-0.018	0.016-0.025
	Vc	1.0-6.0	2.0-10	3.5-16	7.0-30	7.0-30
	fz	0.001-0.003	0.002-0.007	0.006-0.012	0.010-0.016	0.014-0.022
	Vc					
	fz					
	Vc	3.0-16	8.0-26	13-55	30-100	30-100
	fz	0.001-0.004	0.004-0.007	0.007-0.011	0.010-0.016	0.015-0.022
	Vc	2.5-13	6.0-22	10-40	20-80	20-80
	fz	0.001-0.004	0.004-0.006	0.005-0.010	0.009-0.015	0.014-0.020
	Vc	2.0-8.0	6.0-15	10-23	23-60	23-60
	fz	0.001-0.002	0.002-0.005	0.004-0.008	0.007-0.017	0.010-0.016
	Vc	3.0-16	8.0-26	13-55	30-100	30-100
	fz	0.001-0.004	0.004-0.006	0.005-0.010	0.009-0.015	0.014-0.020
	Vc					
	fz					
	Vc	2.0-8.0	6.0-15	10-23	23-60	23-60
	fz	0.001-0.004	0.004-0.006	0.005-0.010	0.009-0.015	0.014-0.020
	Vc	1.0-6.0	2.0-10	3.5-16	7.0-30	7.0-30
	fz	0.001-0.002	0.002-0.005	0.004-0.008	0.007-0.010	0.008-0.013
	Vc					
	fz					
	Vc					
	fz					
	Vc					
	fz					
	Vc					
	fz					
	Vc					
	fz					
	Vc					
	fz					
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	Vc					
	fz					
























## Art. 51200

Mat.		ø 0.03-0.30	ø 0.31-0.50	ø 0.51-1.00	ø 1.01-2.00	ø 2.01-3.00
	Vc	1.5-5	4-10	10-30	30-60	30-60
	fz	0.001-0.004	0.003-0.008	0.007-0.015	0.014-0.025	0.023-0.035
	Vc	1.2-4	3.5-8	8-25	25-50	25-50
	fz	0.001-0.003	0.002-0.007	0.006-0.014	0.012-0.023	0.021-0.032
	Vc	1-3	3-6	6-20	20-45	20-45
	fz	0.001-0.002	0.002-0.006	0.005-0.013	0.011-0.020	0.018-0.030
	Vc	1.2-4	3.5-8	8-20	20-45	20-45
	fz	0.001-0.002	0.002-0.005	0.004-0.011	0.010-0.018	0.016-0.028
	Vc	1-3	3-6	5-15	15-30	15-30
	fz	0.001-0.002	0.002-0.004	0.003-0.009	0.008-0.016	0.016-0.028
	Vc	1.5-5	4-10	10-30	30-60	30-60
	fz	0.001-0.004	0.003-0.008	0.007-0.015	0.014-0.025	0.023-0.035
	Vc	1.2-4	3.5-8	8-25	25-50	25-50
	fz	0.001-0.003	0.002-0.007	0.006-0.014	0.012-0.022	0.020-0.032
	Vc	2-6	5-15	15-40	40-70	40-70
	fz	0.001-0.003	0.002-0.006	0.005-0.013	0.012-0.020	0.018-0.030
	Vc	1.8-5.5	5.0-15	15-40	40-65	40-65
	fz	0.001-0.004	0.003-0.007	0.006-0.015	0.014-0.022	0.020-0.035
	Vc	1.5-5	4-12	12-30	30-60	30-60
	fz	0.001-0.004	0.003-0.006	0.006-0.013	0.012-0.020	0.018-0.032
	Vc	1.5-5	4-12	12-30	30-60	30-60
	fz	0.001-0.002	0.002-0.005	0.004-0.010	0.009-0.016	0.015-0.025
	Vc	2-6	5-15	15-35	35-65	35-65
	fz	0.001-0.004	0.003-0.006	0.005-0.013	0.012-0.020	0.018-0.032
	Vc	1.5-5	4-12	12-30	30-60	30-60
	fz	0.001-0.002	0.002-0.005	0.004-0.010	0.009-0.016	0.015-0.020
	Vc	1.5-5	4-12	12-30	30-60	30-60
	fz	0.001-0.004	0.003-0.006	0.005-0.012	0.011-0.018	0.016-0.025
	Vc	1-3	2.5-6	6-20	20-45	20-45
	fz	0.001-0.002	0.002-0.005	0.004-0.009	0.008-0.013	0.012-0.018
	Vc	0.8-5	4-7	7-15	15-30	15-30
	fz	0.001-0.003	0.002-0.006	0.005-0.013	0.012-0.020	0.018-0.030
	Vc					
	fz					
	Vc					
	fz					
	Vc					
	fz					
	Vc					
	fz					
	Vc	1.5-5	4-10	10-25	20-35	30-60
	fz	0.001-0.004	0.003-0.010	0.009-0.018	0.016-0.028	0.026-0.040
	Vc					
	fz					
	Vc					
	fz					
























These are recommended values that depend on the condition of the machine, fixture, coolant etc., and they may have to be adapted yet.

# Cutting data 추천 절삭 조건

## Art. 50810/50812/50814/50818

Mat.		ø 3.00-6.00	ø 6.00-12.00	ø 12.00-20.00
	Vc	25-40	25-40	25-40
	fz	0.120-0.250	0.200-0.300	0.280-0.400
	Vc	20-35	20-35	20-35
	fz	0.100-0.200	0.150-0.250	0.200-0.350
	Vc	12-30	12-30	12-30
	fz	0.080-0.150	0.140-0.220	0.180-0.300
	Vc	10-20	10-20	10-20
	fz	0.050-0.150	0.110-0.200	0.150-0.250
	Vc	8-16	8-16	8-16
	fz	0.040-0.080	0.060-0.140	0.100-0.150
	Vc	25-40	25-40	25-40
	fz	0.070-0.150	0.130-0.200	0.180-0.350
	Vc	20-35	20-35	20-35
	fz	0.050-0.100	0.080-0.150	0.120-0.250
	Vc	45-60	45-60	45-60
	fz	0.100-0.250	0.200-0.300	0.260-0.350
	Vc	30-45	30-45	30-45
	fz	0.130-0.300	0.260-0.350	0.330-0.500
	Vc	25-40	25-40	25-40
	fz	0.100-0.250	0.200-0.300	0.260-0.350
	Vc	25-40	25-40	25-40
	fz	0.006-0.150	0.120-0.180	0.160-0.220
	Vc	45-60	45-60	45-60
	fz	0.100-0.250	0.200-0.300	0.260-0.350
	Vc	25-40	25-40	25-40
	fz	0.060-0.090	0.080-0.110	0.100-0.130
	Vc	25-40	25-40	25-40
	fz	0.050-0.130	0.100-0.180	0.160-0.250
	Vc	12-30	12-30	12-30
	fz	0.030-0.100	0.080-0.130	0.100-0.150
	Vc	30-45	30-45	30-45
	fz	0.040-0.120	0.080-0.160	0.150-0.220
	Vc			
	fz			
	Vc			
	fz			
	Vc			
	fz			
	Vc			
	fz			
	Vc	30-45	30-45	30-45
	fz	0.100-0.250	0.220-0.400	0.350-0.700
	Vc			
	fz			
	Vc			
	fz			

## Art. 50838

Mat.		ø 0.30-1.00	ø 1.05-3.00	ø 3.105-6.00
	Vc	30-60	50-90	50-90
	fz	0.010-0.040	0.038-0.050	0.045-0.060
	Vc	20-35	30-60	30-60
	fz	0.010-0.030	0.028-0.045	0.040-0.055
	Vc	15-30	25-50	25-50
	fz	0.005-0.020	0.018-0.035	0.030-0.050
	Vc	15-30	25-50	25-50
	fz	0.005-0.020	0.018-0.035	0.030-0.050
	Vc	10-20	15-40	15-40
	fz	0.004-0.018	0.016-0.030	0.028-0.040
	Vc	40-80	70-120	70-120
	fz	0.010-0.060	0.055-0.070	0.065-0.100
	Vc	30-50	40-80	40-80
	fz	0.010-0.030	0.028-0.055	0.050-0.080
	Vc	30-60	50-90	50-90
	fz	0.012-0.045	0.042-0.060	0.055-0.090
	Vc	40-80	70-120	70-120
	fz	0.015-0.050	0.048-0.070	0.065-0.110
	Vc	30-70	60-110	60-110
	fz	0.010-0.045	0.040-0.065	0.060-0.100
	Vc	20-40	30-70	30-70
	fz	0.005-0.030	0.028-0.050	0.048-0.075
	Vc	30-60	50-90	50-90
	fz	0.015-0.050	0.048-0.070	0.065-0.110
	Vc	15-30	25-50	25-50
	fz	0.012-0.045	0.040-0.065	0.060-0.100
	Vc			
	fz			
	Vc			
	fz			
	Vc	20-35	30-60	30-60
	fz	0.010-0.030	0.028-0.045	0.040-0.055
	Vc			
	fz			
	Vc			
	fz			
	Vc			
	fz			
	Vc			
	fz			
	Vc	20-40	30-70	30-70
	fz	0.015-0.050	0.048-0.070	0.065-0.120
	Vc			
	fz			
	Vc			
	fz			

These are recommended values that depend on the condition of the machine, fixture, coolant etc., and they may have to be adapted yet.

1. DIAMETAL

2. BIMU

3. IFANGER

4. ZEUS

5. ARNO

6. Whiz Cut

7. SPHINX



# RE-AL

Swiss Made

DIN212  
Machine reamers

Hard surface coating

TiAlN-NANO

DIN8089  
Reamers for automatic  
lathe

DIN 8093-8094

Carbide reamers

Reamers with TS

DIN208  
Expandable reamers  
with TS

DIN 206  
Hand-reamers

DIN311  
Taper bridge reamers  
with TS

DIN 212-208  
High-helix machine  
reamers

DIN 2179-2180  
High-helix taper  
pin reamers

Floating holder  
Technical dates

Recommendations  
for reaming

## Power Reaming

8. REAL

9. LOUIS

10. PCM

11. WTO

12. REGOFIX

13. DIXI

14. Manigley

## Machine precision reamers

from stock **DIN 212** every 0.01mm  
**DIN 212 H7**

**HSS-E, TiAlN or NANO**  
**hard surface coating**  
straight shank h8  
left hand spiral 7-8 ° ,  
right hand cut

8. REAL

9. LOUIS

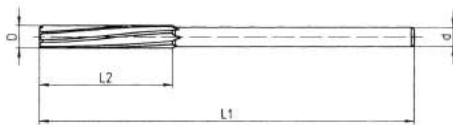
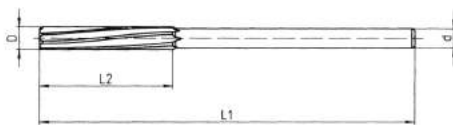
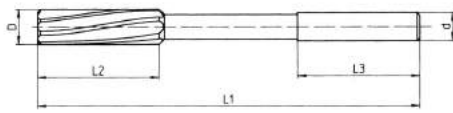
10. PCM

11. WTO

12. REGOFIX

13. DIXI

14. Manigley

	D $\varnothing$ mm	L1	L2	L3	d	Z
<b>tol. 0/+0.003</b> lead angle 60 ° 	0.60-1.32	40	15		1.2	4
	1.33-1.50	40	15		1.5	4
	1.51-2.12	50	20		2.0	4
	2.13-2.65	50	20		2.5	4
<b>tol. 0/+0.004</b> lead angle 45 ° female centres 	2.66-3.05	61	20		2.50	6
	3.06-3.35	65	25		3.00	6
	3.36-3.75	70	25		3.00	6
<b>tol. 0/+0.004</b> lead angle 45 ° female centres 	3.76-4.25	75	25	32	4.00	6
	4.26-4.75	80	28	32	4.50	6
	4.76-5.30	86	28	34	5.00	6
	5.31-6.05	93	32	36	5.50	6
	6.06-6.70	101	32	38	6.00	6
	6.71-7.55	109	32	40	7.00	6
	7.56-8.50	117	33	42	8.00	6
	8.51-9.50	125	36	42	9.00	6
	9.51-10.60	133	38	44	10.00	6
	10.61-11.80	142	41	44	10.00	6
	11.81-13.20	151	44	44	10.00	6
	13.21-14.05	160	47	50	12.50	8
	14.06-15.05	162	50	50	12.50	8
	15.06-16.05	170	52	50	12.50	8
	16.06-17.05	175	54	52	14.00	8
	17.06-18.05	182	56	52	14.00	8
	18.06-19.05	189	58	58	16.00	8
	19.06-20.05	195	60	58	16.00	8



HSS-E et TiAIN · DIN 212 stock RE-AL reamers HSS-E and TiAIN

	0.79	1.29	1.79	2.29	2.79	3.29	3.79	4.29	4.79	5.29	5.79	6.29	6.79
0.60	0.80	1.30	1.80	2.30	2.80	3.30	3.80	4.30	4.80	5.30	5.80	6.30	6.80
0.62	0.82	1.32	1.82	2.32	2.82	3.32	3.82	4.32	4.82	5.32	5.82	6.32	6.82
0.63	0.83	1.33	1.83	2.33	2.83	3.33	3.83	4.33	4.83	5.33	5.83	6.33	6.83
0.64	0.84	1.34	1.84	2.34	2.84	3.34	3.84	4.34	4.84	5.34	5.84	6.34	6.84
0.65	0.85	1.35	1.85	2.35	2.85	3.35	3.85	4.35	4.85	5.35	5.85	6.35	6.85
0.66	0.86	1.36	1.86	2.36	2.86	3.36	3.86	4.36	4.86	5.36	5.86	6.36	6.86
0.67	0.87	1.37	1.87	2.37	2.87	3.37	3.87	4.37	4.87	5.37	5.87	6.37	6.87
0.68	0.88	1.38	1.88	2.38	2.88	3.38	3.88	4.38	4.88	5.38	5.88	6.38	6.88
0.69	0.89	1.39	1.89	2.39	2.89	3.39	3.89	4.39	4.89	5.39	5.89	6.39	6.89
0.70	0.90	1.40	1.90	2.40	2.90	3.40	3.90	4.40	4.90	5.40	5.90	6.40	6.90
0.71	0.91	1.41	1.91	2.41	2.91	3.41	3.91	4.41	4.91	5.41	5.91	6.41	6.91
0.72	0.92	1.42	1.92	2.42	2.92	3.42	3.92	4.42	4.92	5.42	5.92	6.42	6.92
0.73	0.93	1.43	1.93	2.43	2.93	3.43	3.93	4.43	4.93	5.43	5.93	6.43	6.93
0.74	0.94	1.44	1.94	2.44	2.94	3.44	3.94	4.44	4.94	5.44	5.94	6.44	6.94
0.75	0.95	1.45	1.95	2.45	2.95	3.45	3.95	4.45	4.95	5.45	5.95	6.45	6.95
0.76	0.96	1.46	1.96	2.46	2.96	3.46	3.96	4.46	4.96	5.46	5.96	6.46	6.96
0.77	0.97	1.47	1.97	2.47	2.97	3.47	3.97	4.47	4.97	5.47	5.97	6.47	6.97
0.78	0.98	1.48	1.98	2.48	2.98	3.48	3.98	4.48	4.98	5.48	5.98	6.48	6.98
	0.985	1.485	1.985	2.485	2.985	3.485	3.985	4.485	4.985	5.485	5.985	6.485	6.985
	0.99	1.49	1.99	2.49	2.99	3.49	3.99	4.49	4.99	5.49	5.99	6.49	6.99
	0.995	1.495	1.995	2.495	2.995	3.495	3.995	4.495	4.995	5.495	5.995	6.495	6.995
	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00
	1.007	1.507	2.007	2.507	3.007	3.507	4.007	4.507	5.007	5.507	6.007	6.507	7.007
	1.005	1.505	2.005	2.505	3.005	3.505	4.005	4.505	5.005	5.505	6.005	6.505	7.005
	1.01	1.51	2.01	2.51	3.01	3.51	4.01	4.51	5.01	5.51	6.01	6.51	7.01
	1.015	1.515	2.015	2.515	3.015	3.515	4.015	4.515	5.015	5.515	6.015	6.515	7.015
	1.02	1.52	2.02	2.52	3.02	3.52	4.02	4.52	5.02	5.52	6.02	6.52	7.02
	1.025	1.525	2.025	2.525	3.025	3.525	4.025	4.525	5.025	5.525	6.025	6.525	7.025
	1.03	1.53	2.03	2.53	3.03	3.53	4.03	4.53	5.03	5.53	6.03	6.53	7.03
	1.04	1.54	2.04	2.54	3.04	3.54	4.04	4.54	5.04	5.54	6.04	6.54	7.04
	1.05	1.55	2.05	2.55	3.05	3.55	4.05	4.55	5.05	5.55	6.05	6.55	7.05
	1.06	1.56	2.06	2.56	3.06	3.56	4.06	4.56	5.06	5.56	6.06	6.56	7.06
	1.07	1.57	2.07	2.57	3.07	3.57	4.07	4.57	5.07	5.57	6.07	6.57	7.07
	1.08	1.58	2.08	2.58	3.08	3.58	4.08	4.58	5.08	5.58	6.08	6.58	7.08
	1.09	1.59	2.09	2.59	3.09	3.59	4.09	4.59	5.09	5.59	6.09	6.59	7.09
	1.10	1.60	2.10	2.60	3.10	3.60	4.10	4.60	5.10	5.60	6.10	6.60	7.10
	1.11	1.61	2.11	2.61	3.11	3.61	4.11	4.61	5.11	5.61	6.11	6.61	7.11
	1.12	1.62	2.12	2.62	3.12	3.62	4.12	4.62	5.12	5.62	6.12	6.62	7.12
	1.13	1.63	2.13	2.63	3.13	3.63	4.13	4.63	5.13	5.63	6.13	6.63	7.13
	1.14	1.64	2.14	2.64	3.14	3.64	4.14	4.64	5.14	5.64	6.14	6.64	7.14
	1.15	1.65	2.15	2.65	3.15	3.65	4.15	4.65	5.15	5.65	6.15	6.65	7.15
	1.16	1.66	2.16	2.66	3.16	3.66	4.16	4.66	5.16	5.66	6.16	6.66	7.16
	1.17	1.67	2.17	2.67	3.17	3.67	4.17	4.67	5.17	5.67	6.17	6.67	7.17
	1.18	1.68	2.18	2.68	3.18	3.68	4.18	4.68	5.18	5.68	6.18	6.68	7.18
	1.19	1.69	2.19	2.69	3.19	3.69	4.19	4.69	5.19	5.69	6.19	6.69	7.19
	1.20	1.70	2.20	2.70	3.20	3.70	4.20	4.70	5.20	5.70	6.20	6.70	7.20
	1.21	1.71	2.21	2.71	3.21	3.71	4.21	4.71	5.21	5.71	6.21	6.71	7.21
	1.22	1.72	2.22	2.72	3.22	3.72	4.22	4.72	5.22	5.72	6.22	6.72	7.22
	1.23	1.73	2.23	2.73	3.23	3.73	4.23	4.73	5.23	5.73	6.23	6.73	7.23
	1.24	1.74	2.24	2.74	3.24	3.74	4.24	4.74	5.24	5.74	6.24	6.74	7.24
	1.25	1.75	2.25	2.75	3.25	3.75	4.25	4.75	5.25	5.75	6.25	6.75	7.25
	1.26	1.76	2.26	2.76	3.26	3.76	4.26	4.76	5.26	5.76	6.26	6.76	7.26
	1.27	1.77	2.27	2.77	3.27	3.77	4.27	4.77	5.27	5.77	6.27	6.77	7.27
	1.28	1.78	2.28	2.78	3.28	3.78	4.28	4.78	5.28	5.78	6.28	6.78	7.28

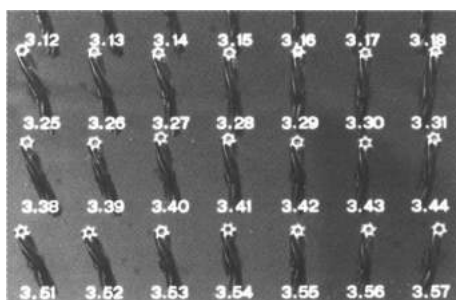
NANO hard surface coating, delivery 7days



## Machine reamers in sets

from stock **DIN 212** every 0.01mm  
**DIN 212 H7**

**HSS-E, TiAlN or NANO**  
**hard surface coating**  
 special sets on request



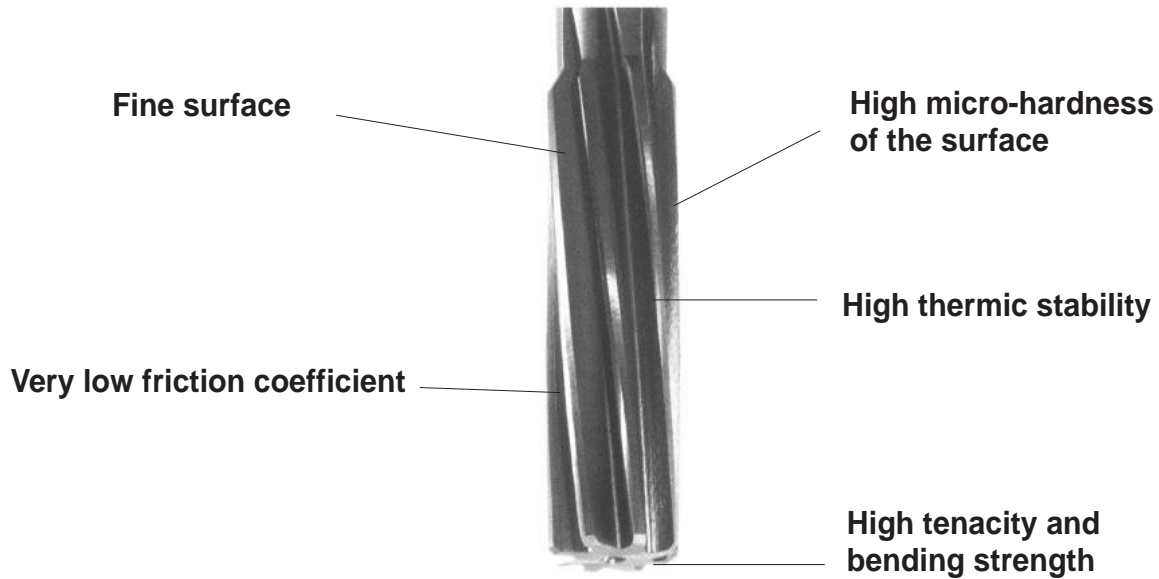
Code	ø mm	in steps	pieces
1040	0.60-1.01	0.01	42
1041	0.98-2.01	0.01	104
1042	1.98-3.01	0.01	104
1043	2.98-4.01	0.01	104
1044	3.98-5.01	0.01	104
1045	4.98-6.01	0.01	104
5001	6.01-6.50	0.01	50
5002	6.51-7.00	0.01	50
5003	7.01-7.50	0.01	50
5004	7.51-8.00	0.01	50
5005	8.01-8.50	0.01	50
5006	8.51-9.00	0.01	50
5007	9.01-9.50	0.01	50
5008	9.51-10.00	0.01	50
5009	10.01-10.50	0.01	50
5010	10.51-11.00	0.01	50
5011	11.01-11.50	0.01	50
5012	11.51-12.00	0.01	50
5013	12.01-12.50	0.01	50
5014	12.51-13.00	0.01	50
3001	0.97-1.02		
	1.47-1.52		
	1.97-2.02		
	2.47-2.52		
	2.97-3.02	0.01	30
3002	3.47-3.52		
	3.97-2.02		
	4.47-4.52		
	4.97-5.02		
	5.47-5.52	0.01	30
3003	5.97-6.02		
	6.97-7.02		
	7.97-8.02		
	8.97-9.02		
	9.97-10.02	0.01	30
3004	1-13H7	1.00	13
3601	1.97-2.02		
	2.97-3.02		
	3.97-4.02		
	4.97-5.02		
	5.97-6.02		
	7.97-8.02	0.01	36
3602	3/32-5/15	INCH	40
6301	0.90-6.00	0.10	63
4002	6.10-10.00	0.10	40

**RE-AL**

## Hard surface coatings

### TiAlN - NANO

TiAlN and NANO the modern RE-AL reaming technique  
the evident alternative to carbide reamers

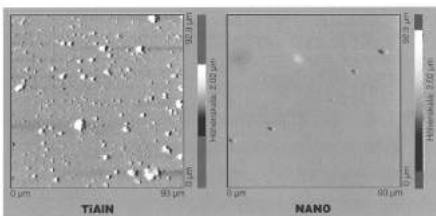


Recommended applications

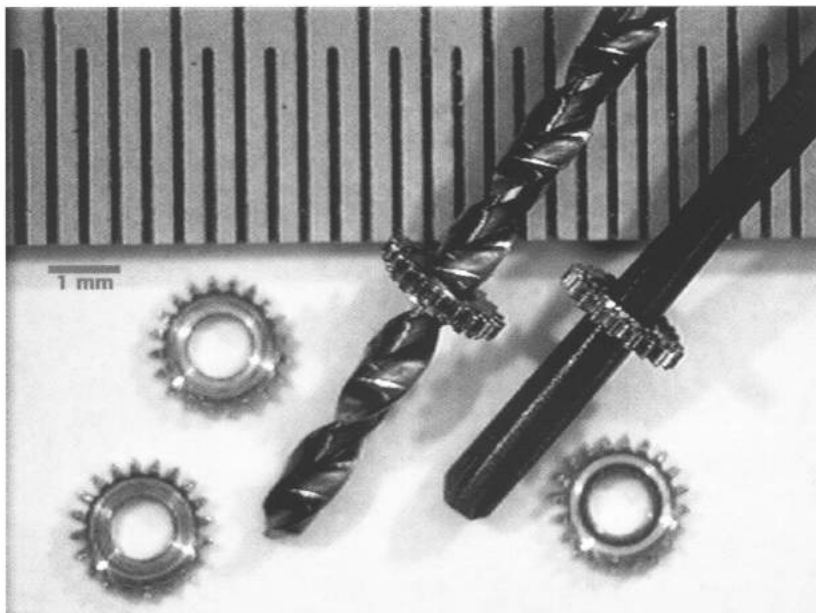
**DIN 212 & DIN 8089 Ø 0.60-20mm**

**HSS-E+**

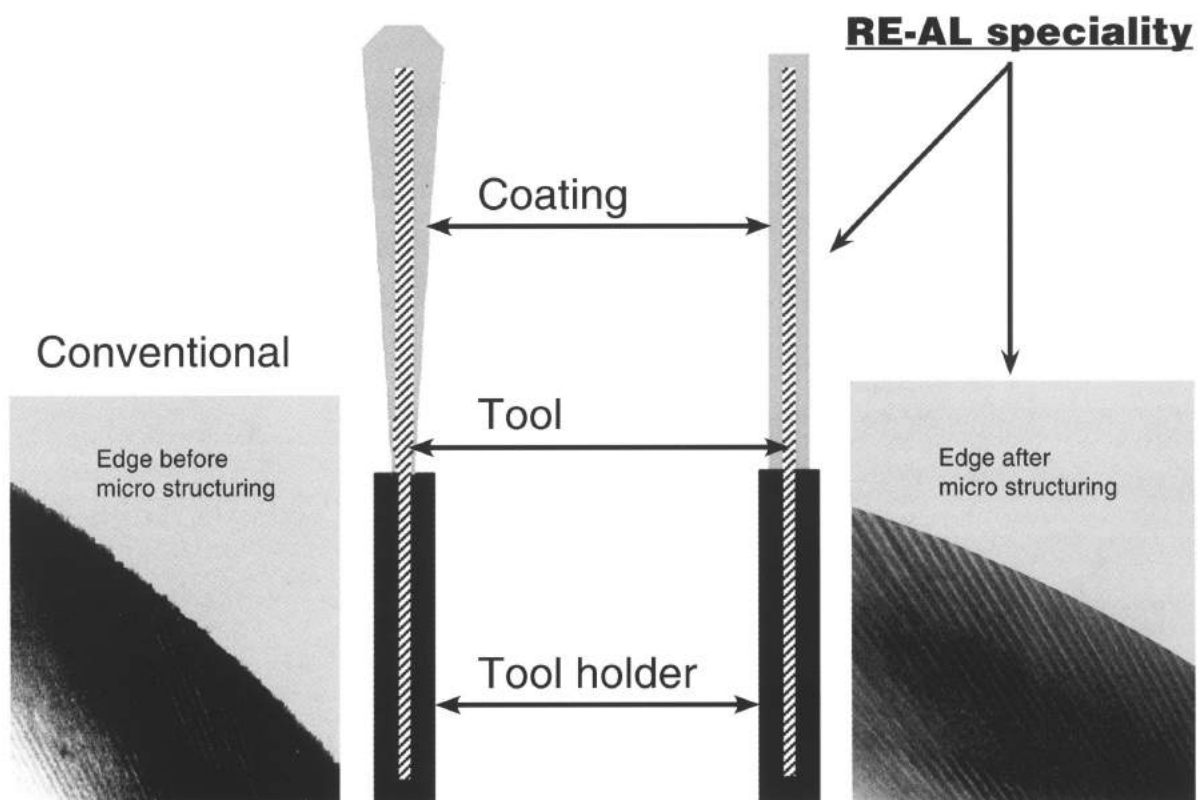
Recommendations for reaming	TiAlN	NANO
Hardness	3'000 HV	3'800 HV
Resistance to oxydation	800℃	800℃
Friction coefficient	0.4	0.3
Coating thickness	0.7µm	0.7µm
Surface speed	20-30 m/min	
Feed	0.-0.2 mm/U	
Depth of cut	0.1-0.2 mm/ Ø	
Material	Steel up to 1200N	Special material
	Stainless steel	Aluminium with high contaent of Si
	Free cutting steel	Non-magnetic material
	Non-Ferrous metal	Titan
	Plastics	Fibre strengthened material
	Cast steel and iron	Heat treated material
		Graphite



## Micro-cutting with HSS-E hard surface coated reamers



Very fine coating thickness



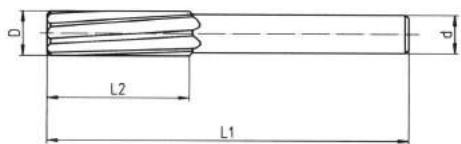
**RE-AL**

## NC Reamers for automatic lathe

DIN 8089 every 0.01mm  
DIN 8089 H7

for short tool feeding  
**HSS-E, also with and**  
**NANO hard surface coatings**  
straight shank h6 in full diameter

tol. 0/+0.004  
lead angle 45 °  
female centres



D $\varnothing$ mm	L1	L2	d	Z
3.76-				
4.25	56	20	3.0	6
4.26-				
5.30	63	22	4.0	6
5.31-				
6.70	63	22	5.0	6
6.71-				
8.50	71	25	6.0	6
8.51-				
10.60	71	25	8.0	6
10.61-				
13.20	80	28	10.0	6
13.21-				
17.00	90	32	12.0	8
17.01-				
20.05	100	36	16.0	8

$\varnothing$  3.76-20.05 mm Left hand spiral flutes 7-8 ° right hand cut  
 $\varnothing$  3.76-13.20 mm Right hand spiral flutes 7-8 °, right hand cut

NC-Reamers

\* for high precision shrink bushing  
for high precision concentricity and reaming result

8. REAL

9. LOUIS

10. PCM

11. WTO

12. REGOFIX

13. DIXI

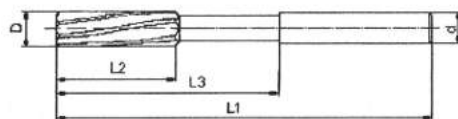
14. Manigley

## Carbide machine reamers K10 Micrograin

**DIN 8093** every 0.01mm  
**DIN 8093 H7**  
 similar

**58-62-60 °**  
 unequal flute division,  
 cyl. Shank h6 left hand spiral  
 flutes 12 °, right hand cut

tol. 0/+0.003  
 lead angle 45 °



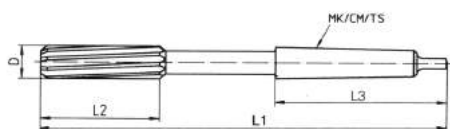
D Ø mm	L1	L2	L3	d	Z
0.40-0.49	50	3	3	2.00	3
0.50-0.69	50	4	4	2.00	3
0.70-0.79	50	6	6	2.00	3
0.80-1.46	50	8	8	2.00	3
1.47-1.96	50	10	10	2.00	3
1.97-2.46	50	10	25	2.50	3
2.47-2.96	60	15	30	3.00	4
2.97-3.46	60	15	30	3.50	4
3.47-3.96	60	18	33	4.00	4
3.97-4.46	60	20	35	4.50	4
4.47-4.96	75	20	45	5.00	6
4.97-5.46	75	23	45	5.50	6
5.47-5.96	75	23	45	6.00	6
5.97-6.46	75	23	45	6.50	6
6.47-6.96	75	23	45	7.00	6
6.97-7.46	100	30	55	7.50	6
7.47-7.96	100	30	55	8.00	6
7.97-8.46	100	30	55	8.50	6
8.47-8.96	100	30	55	9.00	6
8.97-9.46	100	30	55	9.50	6
9.47-9.96	100	30	55	10.00	6
9.97-10.46	100	30	55	10.50	6
10.47-10.96	100	30	55	11.00	6
10.97-11.46	100	30	55	11.50	6
11.47-11.96	100	30	55	12.00	6
11.97-12.46	100	30	55	12.50	6
12.47-12.96	100	30	55	13.00	6
12.97-13.03	100	30	55	13.50	6

## Carbide machine reamers with taper shank

**DIN 8094 H7**

**Brazed carbide inserts K10**  
 taper shank, tolerance H7  
 left hand spiral flutes,  
 right hand cut

lead angle 45 °  
 female centres

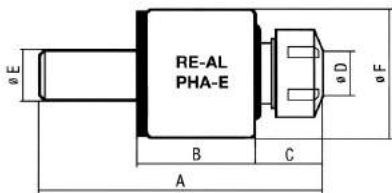
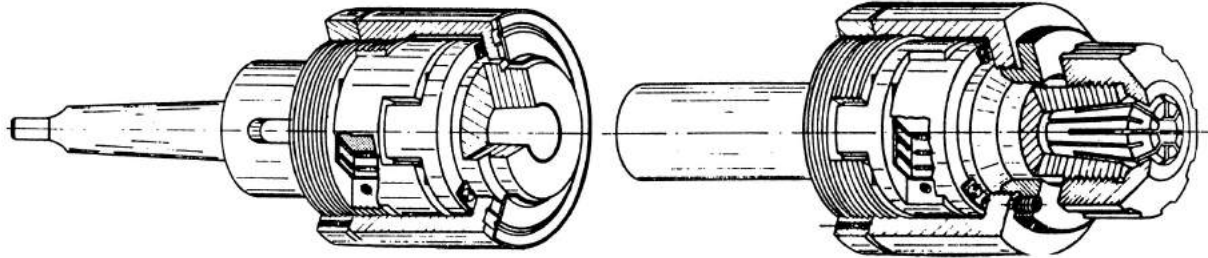


D Ø mm	L1	L2	L3	MK	Z
14	189	47	62	1	6
15	204	50	75	2	6
16	210	52	75	2	6
17	214	54	75	2	6
18	219	56	75	2	6
19	223	58	75	2	6
20	228	60	75	2	6

intermediary sizes on request

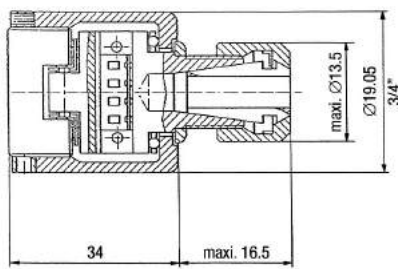
**RE-AL**

## Floating holder

**NEW**

Floating holder

Short execution

**PHA 9**

Mod.

A

B

C

D

E

F

18091000	PHA-E	9	90	34	16	13.5	10	19.5
18091000	PHA-E	9 MINI	50	34	16	13.5		19.05/3/4"
18121200	PHA-E	12	97	32	20	19	12	31
18121600	PHA-E	12	100	32	20	19	16	31
18122000	PHA-E	12	102	32	20	19	20	31
18161600	PHA-E	16	85	35	20	35	16	50
18162000	PHA-E	16	85	35	20	35	20	50
18162500	PHA-E	16	105	35	20	35	25	50
18201600	PHA-E	20	85	35	20	35	16	50
18202000	PHA-E	20	85	35	20	35	20	50
18202500	PHA-E	20	105	35	20	35	25	50
18202540	PHA-E	20	105	35	20	35	1"	50
18200001	PHA-E	20	122	35	20	35	MK1	50
18200002	PHA-E	20	137	35	20	35	MK2	50
18252000	PHA-E	25	128	48	30	42	20	62
18252500	PHA-E	25	128	48	30	42	25	62
18252540	PHA-E	25	128	48	30	42	1"	62
18250002	PHA-E	25	160	48	30	42	MK2	62
18250003	PHA-E	25	179	48	30	42	MK3	62
18322000	PHA-E	32	143	55	38	50	20	78
18324000	PHA-E	32	173	55	38	50	40	78
18323175	PHA-E	32	173	55	38	50	1 1/4	78
18322003	PHA-E	32	195	55	38	50	MK3	78

details	PHA-E9	PHA-E12	PHA-E16	PHA-E20	PHA-E25	PHA-E32
collets	EX8/9	EX 11/12	EX 16	EX 20	EX 25	EX 32
nuts						
Range	1-5mm	1-7mm	1-10mm	1-13mm	2-16mm	3-20mm
Oscillation	0.1-0.2mm	0.2mm	0.3mm	0.3mm	(*)	(*)
Weight	100g	300g	800g	800g	1400g	2600g

(\*) adjustment range up to 3 mm

## Recommendations for reaming

Surface speed m/min=v

Feed mm/U = f

Speed U/min = n

material	Reamer quality			
	HSS-E HSS-E/NANO	HSS-E/TiAlN	HM/Carb. +NANO	PHA +TiAlN +HM/Carb.
	v	v	v	n
Stahl/Acier/Steel				
< 500 N/mm <sup>2</sup>	10-12	25-30	20-25	
<700	8-10	20-25	15-20	mit Pendelhalter
<1000	6-8	15-20	10-15	avec mandrin
>1000	4-6	10-15	8-10	with floating holder
Stahlguss/Fonte/Cast steel				
< 500 N/mm <sup>2</sup>	6-10	20-30	15-20	n2000-
>500	4-6	15-25	10-15	3000 U/min
Grauguss/Fonte grise/Cast iron				
<200 Brin	8-10	20-30	15-20	
>200	4-6	15-25	10-15	
Kupfer/Cuivre/copper	8-12	20-30	15-20	
Messing/Laiton/Brass	10-12	25-40	20-25	
Leichtmetall/Aluminium	10-20	30-40	20-30	
Kunststoff/Matiere plastique/Plastics	4-10	20-30	10-20	
Feed per rev.	< ø 3mm < ø 8mm  < ø 10mm < ø 10mm	01-0.2mm 0.15-0.25mm  0.2-0.4mm 0.3-0.5mm	* the harder the material f = less	
Return feed rapid			* the harder the material f = more	
Depth of cut mm/ ●	< ø 3mm < ø 8mm < ø 10mm < ø 10mm	0.1-0.2 0.2-0.3 0.3-0.4 0.3-0.5		
Coolant	Cutting oil/soluble 1:10		also with through coolant	
			min 10 bar	





LOUIS BELET SA

8. REAL

9. LOUIS

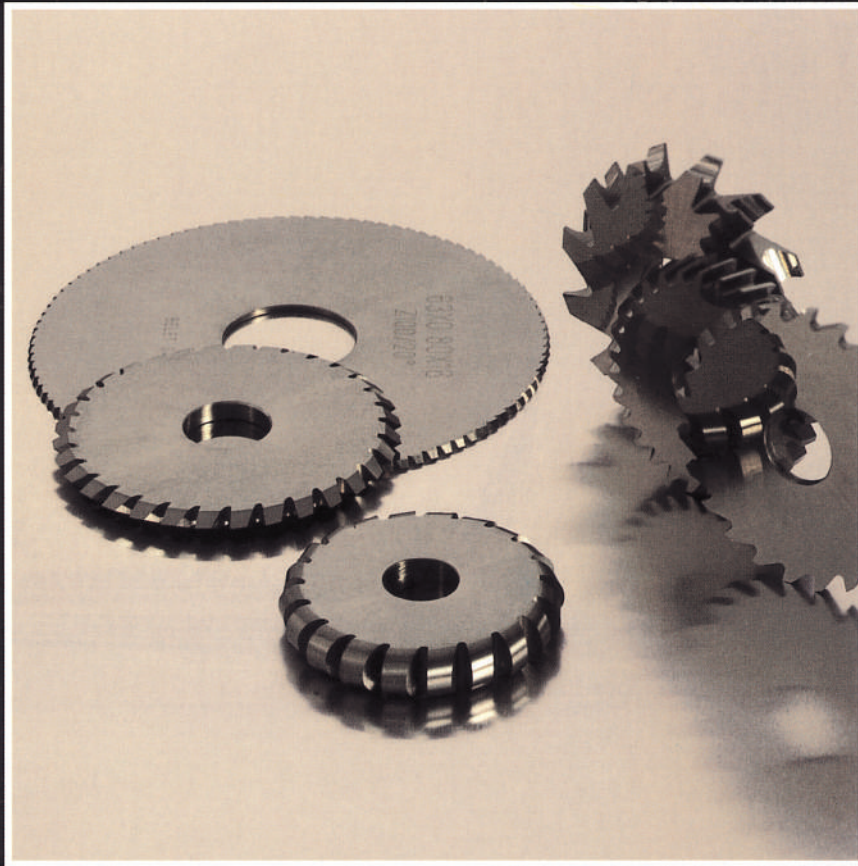
10. PCM

11. WTO

12. REGOFIX

13. DIXI

14. Manigley



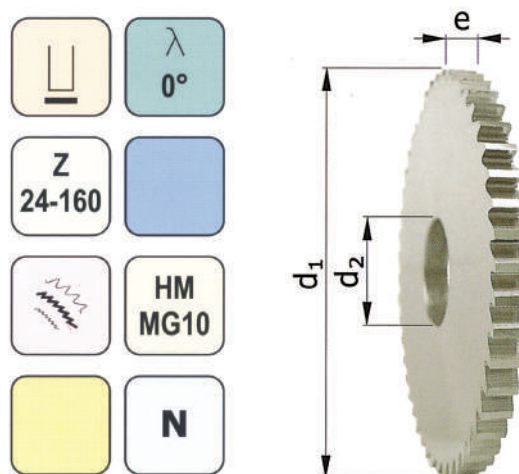
## FRAISES CIRCULAIRES MD



## Slitting saws DIN 1837 fine pitch

Usage recommendations:			
Material	Vc [m/min]	Uncoated	Coated
Inox/stainless steel	50 - 100	+	++
Steel < 700 N/mm <sup>2</sup>	80 - 160	+	++
Steel > 700 N/mm <sup>2</sup>	50 - 110	+	++
Titan	30 - 60	+	++
Aluminium	150 - 600	+	++
Copper	80 - 300	+	++
Brass	80 - 300	++	+++
Gold & Silver	80 - 300	+	-
Graphite	200 - 800	-	+++
Polymers	150 - 600	+++	-

$$V_i = 0.003 \rightarrow 0.030 \times d_1 \times n$$



Coated : uncoated. HARDLUBE

d <sub>1</sub>	e	d <sub>2</sub>	Z
15	0.10	5	64
15	0.15	5	64
15	0.20	5	64
15	0.25	5	64
15	0.30	5	64
15	0.35	5	64
15	0.40	5	64
15	0.45	5	48
15	0.50	5	48
15	0.60	5	48
15	0.70	5	48
15	0.80	5	40
15	0.90	5	40
15	1.00	5	40
15	1.10	5	40
15	1.20	5	40
15	1.30	5	40
15	1.40	5	40
15	1.50	5	40
15	1.60	5	40
15	1.70	5	40
15	1.80	5	40
15	1.90	5	40

d <sub>1</sub>	e	d <sub>2</sub>	Z
15	2.00	5	40
15	2.10	5	40
15	2.20	5	40
15	2.30	5	40
15	2.40	5	40
15	2.50	5	40
15	2.60	5	40
15	2.70	5	40
15	2.80	5	40
15	2.90	5	40
15	3.00	5	40
15	3.10	5	24
15	3.20	5	24
15	3.30	5	24
15	3.40	5	24
15	3.50	5	24
15	3.60	5	24
15	3.70	5	24
15	3.80	5	24
15	3.90	5	24
15	4.00	5	24
15	4.50	5	24
15	5.00	5	24

**8. REAL**

d <sub>1</sub>	e	d <sub>2</sub>	Z
15	5.50	5	24
15	6.00	5	24

**9. LOUIS**

20	0.10	5	80
20	0.15	5	80
20	0.20	5	80
20	0.25	5	64
20	0.30	5	64
20	0.35	5	64
20	0.40	5	64
20	0.45	5	48
20	0.50	5	48
20	0.60	5	48
20	0.70	5	48
20	0.80	5	40
20	0.90	5	40
20	1.00	5	40
20	1.10	5	40
20	1.20	5	40
20	1.30	5	40
20	1.40	5	40
20	1.50	5	40
20	1.60	5	40
20	1.70	5	32
20	1.80	5	32
20	1.90	5	32
20	2.00	5	32
20	2.10	5	32
20	2.20	5	32
20	2.30	5	32
20	2.40	5	32
20	2.50	5	32
20	2.60	5	32
20	2.70	5	32
20	2.80	5	32
20	2.90	5	32
20	3.00	5	32
20	3.10	5	24
20	3.20	5	24
20	3.30	5	24
20	3.40	5	24
20	3.50	5	24
20	3.60	5	24
20	3.70	5	24
20	3.80	5	24
20	3.90	5	24
20	4.00	5	24
20	4.50	5	24

**10. PCM**
**11. WTO**
**12. REGOFIX**
**13. DIXI**
**14. Manigley**

20	5.00	5	24
20	5.50	5	24
20	6.00	5	24
25	0.10	8	80
25	0.15	8	80
25	0.20	8	80
25	0.25	8	80
25	0.30	8	80
25	0.35	8	64
25	0.40	8	64
25	0.45	8	64
25	0.50	8	64
25	0.60	8	64
25	0.70	8	48
25	0.80	8	48
25	0.90	8	48
25	1.00	8	48
25	1.10	8	48
25	1.20	8	48
25	1.30	8	40
25	1.40	8	40
25	1.50	8	40
25	1.60	8	40
25	1.70	8	40
25	1.80	8	40
25	1.90	8	40
25	2.00	8	40
25	2.10	8	40
25	2.20	8	40
25	2.30	8	40
25	2.40	8	40
25	2.50	8	40
25	2.60	8	32
25	2.70	8	32
25	2.80	8	32
25	2.90	8	32
25	3.00	8	32
25	3.10	8	32
25	3.20	8	32
25	3.30	8	32
25	3.40	8	32
25	3.50	8	32
25	3.60	8	32
25	3.70	8	32
25	3.80	8	32
25	3.90	8	32
25	4.00	8	32

d <sub>1</sub>	e	d <sub>2</sub>	Z
25	4.50	8	32
25	5.00	8	32
25	5.50	8	24
25	6.00	8	24
30	0.10	8	100
30	0.15	8	100
30	0.20	8	100
30	0.25	8	100
30	0.30	8	80
30	0.35	8	80
30	0.40	8	80
300	0.45	8	80
30	0.50	8	80
30	0.60	8	64
30	0.70	8	64
30	0.80	8	64
30	0.90	8	64
30	1.00	8	64
30	1.10	8	48
30	1.20	8	48
30	1.30	8	48
30	1.40	8	48
30	1.50	8	48
30	1.60	8	48
30	1.70	8	48
30	1.80	8	48
30	1.90	8	48
30	2.00	8	48
30	2.10	8	40
30	2.20	8	40
30	2.30	8	40
30	2.40	8	40
30	2.50	8	40
30	2.60	8	40
30	2.70	8	40
30	2.80	8	40
30	2.90	8	40
30	3.00	8	40
30	3.10	8	40
30	3.20	8	40
30	3.30	8	40
30	3.40	8	40
30	3.50	8	40
30	3.60	8	40
30	3.70	8	40
30	3.80	8	40
30	3.90	8	40

d <sub>1</sub>	e	d <sub>2</sub>	Z
30	4.00	8	40
30	4.50	8	32
30	5.00	8	32
30	5.50	8	32
30	6.00	8	32
40	0.10	10	128
40	0.15	10	128
40	0.20	10	128
40	0.25	10	100
40	0.30	10	100
40	0.35	10	100
40	0.40	10	100
40	0.45	10	80
40	0.50	10	80
40	0.60	10	80
40	0.70	10	80
40	0.80	10	80
40	0.90	10	64
40	1.00	10	64
40	1.10	10	64
40	1.20	10	64
40	1.30	10	64
40	1.40	10	64
40	1.50	10	64
40	1.60	10	64
40	1.70	10	48
40	1.80	10	48
40	1.90	10	48
40	2.00	10	48
40	2.10	10	48
40	2.20	10	48
40	2.30	10	48
40	2.40	10	48
40	2.50	10	48
40	2.60	10	48
40	2.70	10	48
40	2.80	10	48
40	2.90	10	48
40	3.00	10	48
40	3.10	10	40
40	3.20	10	40
40	3.30	10	40
40	3.40	10	40
40	3.50	10	40
40	3.60	10	40
40	3.70	10	40
40	3.80	10	40

8. REAL

9. LOUIS

10. PCM

11. WTO

12. REGOFIX

13. DIXI

14. Manigley

8. REAL

9. LOUIS

10. PCM



**PCM**<sup>®</sup>

SWISS



PRECISION TOOLING

11. WTO

12. REGOFIX

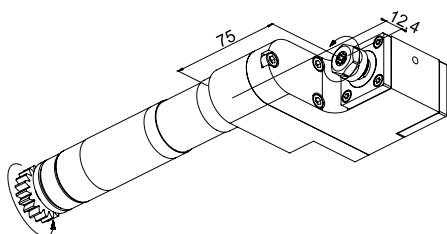
13. DIXI

14. Manigley



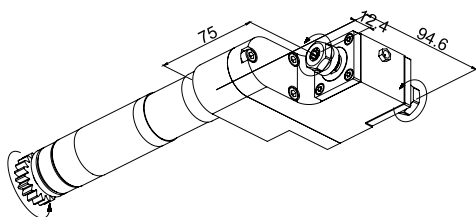
# CITIZEN L20

## GSE-306-SE312 Radial



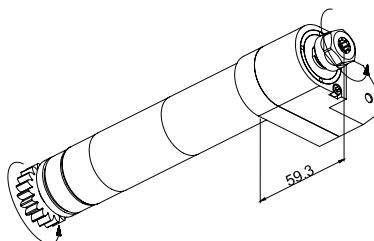
Collet	ER11
Ratio	1:3
RPM	15'000 max

## GSE-306-DE312 Radial



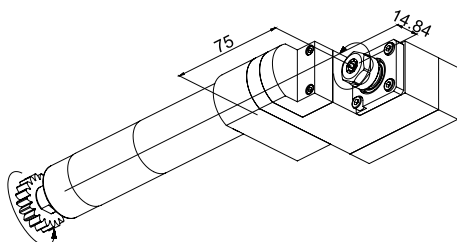
Collet	2x ER11
Ratio	1:3
RPM	15'000 max

## GSC-510-3X Axial



Collet	ER11
Ratio	1:3
RPM	15'000 max

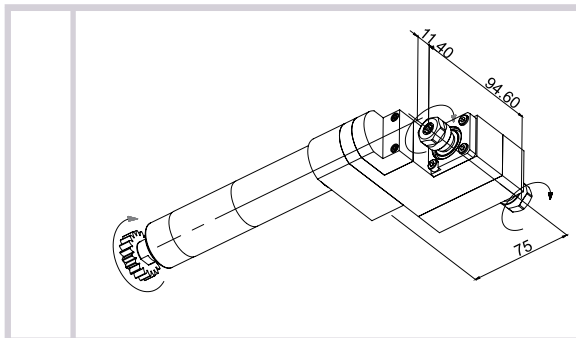
## GSE-306-L-520 Radial



Collet	ER11
Ratio	1:1
RPM	5'000 max

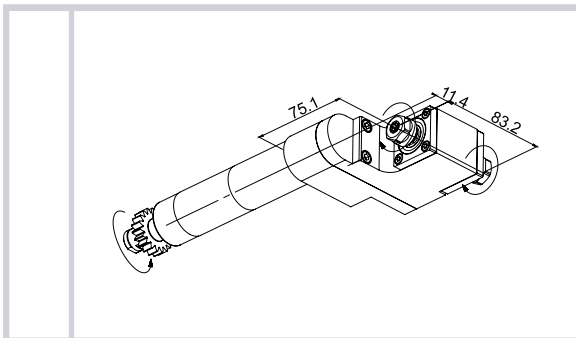
## CITIZEN L20

### GSE-306-DE011 Radial



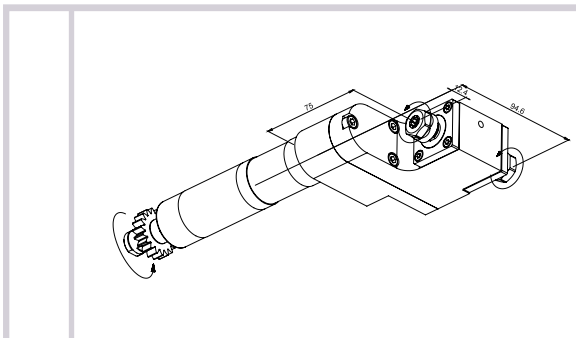
Collet	2x ER11
Ratio	1:1
RPM	5'000 max

### GSE-306-DE511 Radial



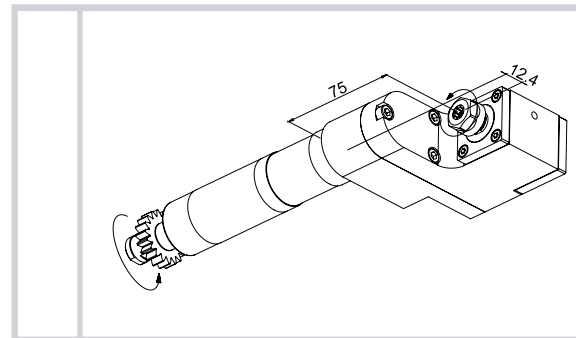
Collet	2x ER11
Ratio	1:1
RPM	5'000 max

### GSE-306-DE512 Radial



Collet	2x ER11
Ratio	1:3
RPM	15'000 max

### GSE-306-SE512 Radial



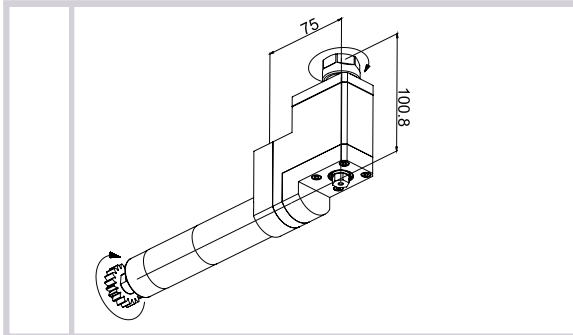
Collet	ER11
Ratio	1:3
RPM	15'000 max



## CITIZEN L20

### GSE-316-GS

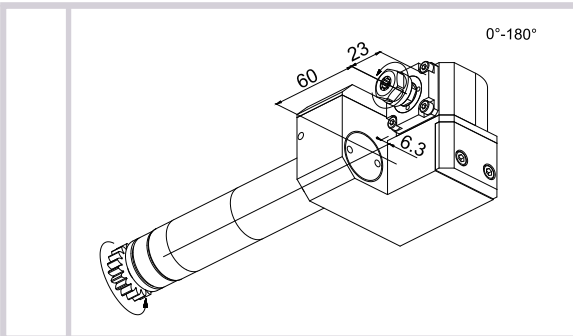
Radial



Collet	ER16
Ratio	1:1
RPM	5'000 max

### GSA107

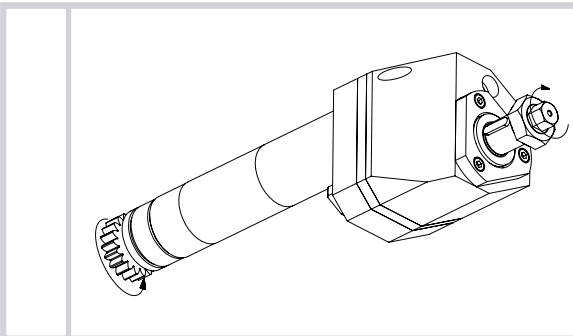
Adjustable



Collet	ER11
Ratio	1:1
RPM	5'000 max
Adjustable 0° - 180°	

### GSS-510

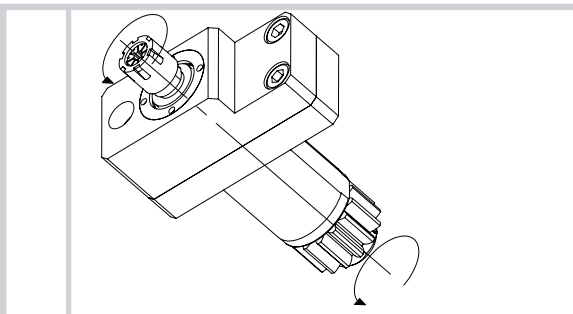
Milling Tool



Arbor	Ø 16
Ratio	2:1
RPM	2'500 max

### GSE-3307-3X

Axial high speed

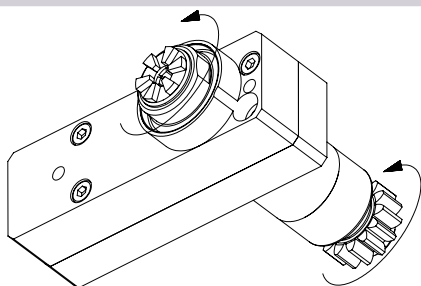


Collet	ER08
Ratio	1:3
RPM	15'000 max
For L20-E or newest	

## CITIZEN L20 - L20E/L20X

### GSE-3507-3X

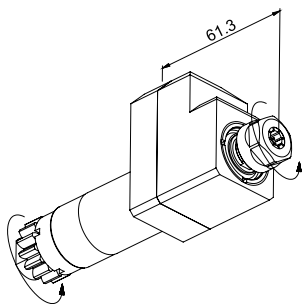
Axial high speed



Collet	ER11
Ratio	1:3
RPM	15'000 max
For L20-E or newest	

### GSC-204-3X

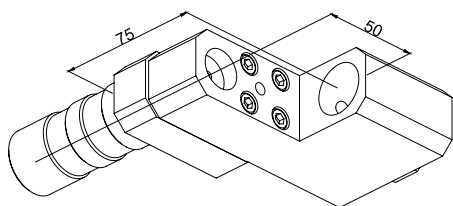
Adjustable



Collet	ER11
Ratio	1:3
RPM	15'000 max

### GDF903

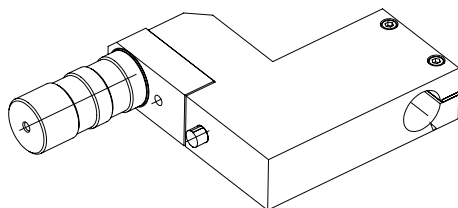
Toolholder



Boring	Ø 25.4
Height	75

### 852-354-OF-010

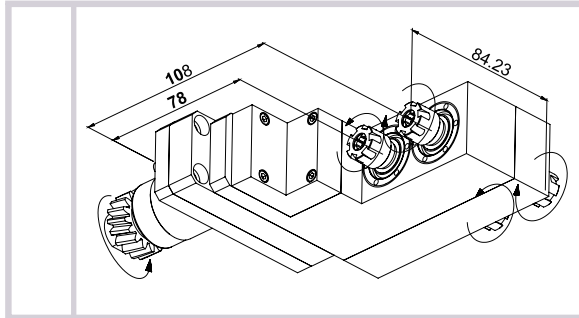
Toolholder



Boring	Ø 25
Height	105
For high frequency Spindle	

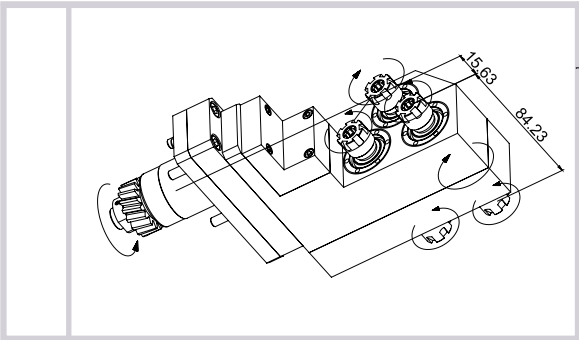
CITIZEN L20 - L20E/L20X

GSE-3107      Radial



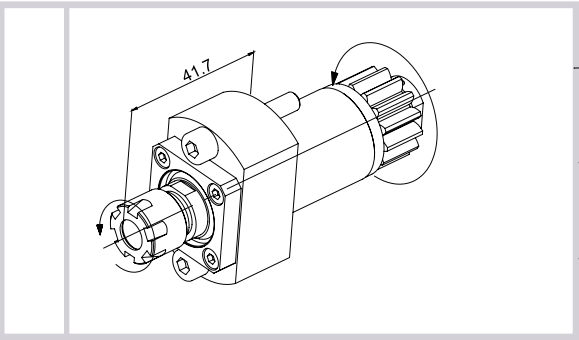
Collet	4x ER11
Ratio	1:1
RPM	5'000 max
For L20-E or newest	

GSE-3207      Radial



Collet	6x ER11
Ratio	1:1
RPM	5'000 max
For L20-E or newest	

GSE-3307      Radial



Collet	ER11
Ratio	1:1
RPM	5'000 max
For L20-E or newest	

8. REAL

9. LOUIS

10. PCM

11. WTO

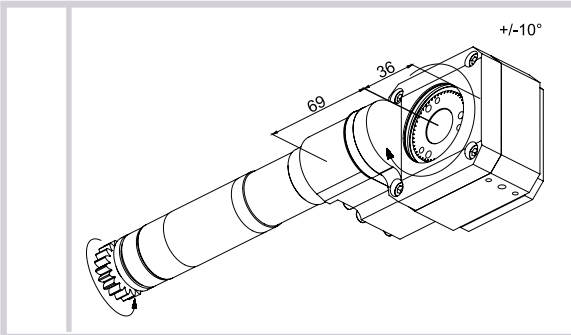
12. REGOFIX

13. DIXI

14. Manigley

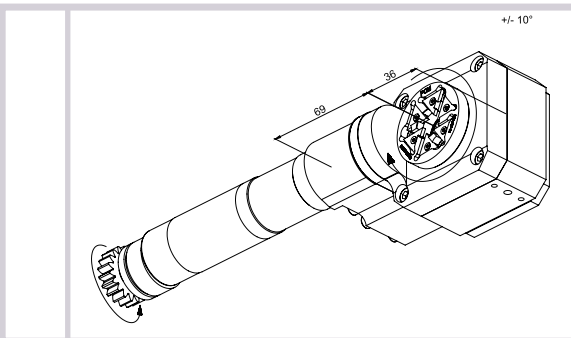
## CITIZEN L20

### LSW-101-L20-000 Thread whirling



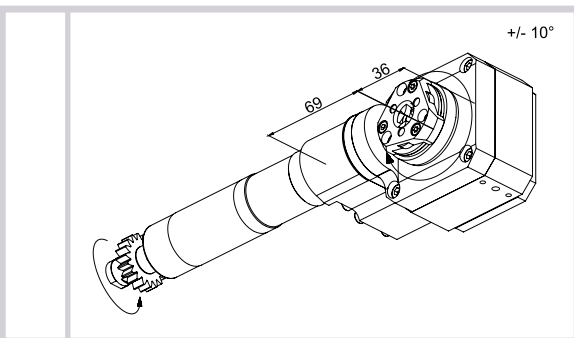
Attachment	Without
Ratio	2:1
RPM	2'500 max

### LSW-101-L20-S Thread whirling



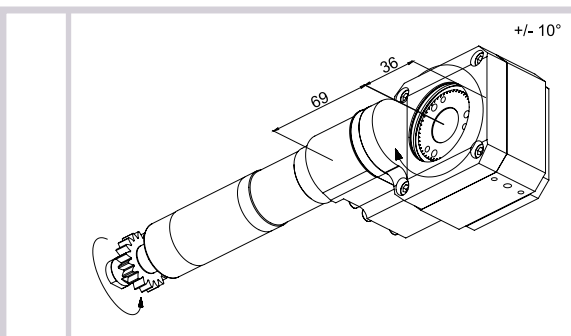
Attachment	Schwanog
Ratio	2:1
RPM	2'500 max

### LSW-101-L25 Thread whirling



Attachment	Without
Ratio	2:1
RPM	2'500 max

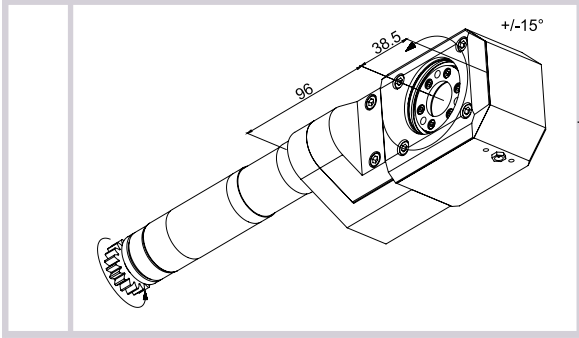
### LSW-101-L25-000 Thread whirling



Attachment	Without
Ratio	2:1
RPM	2'500 max

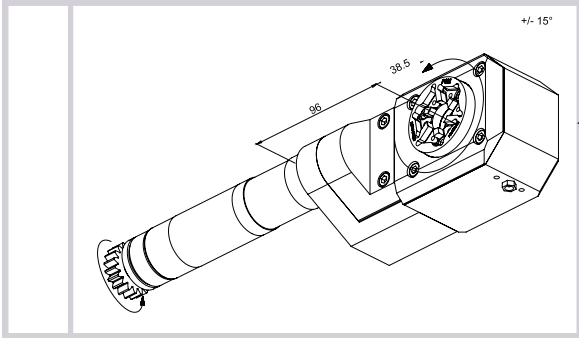
CITIZEN L20

LSW-215-000 Thread whirling



Attachment	
Ratio	1:1
RPM	5'000 max

LSW-215-SWG Thread whirling



Attachment	Schwanog
Ratio	1:1
RPM	5'000 max

8. REAL
9. LOUIS
10. PCM
11. WTO
12. REGOFIX
13. DIXI
14. Manigley

## 브로치(구멍 넓히는 기계, 송곳) 작업의 사용 권장 사항

### 브로치 회전

브로치 작업은 회전하고 있는 부품에 작업이 가능하므로, 구멍을 뚫어야 하는 회전 부품은 나사를 돌리는 기계나 CNC 회전 기계상에 최초 설치, 완성할 수 있다. 이절차는 2차적인 작업을 불필요하게 한다. 회전식 브로치 방식은 CNC 기계 가공 중심이나 트랜스퍼 머신(일반작업용 자동 공작 설비)에도 또한 적용될 수 있다. 브로치 받침대가 기계 축에서 회전한다는 점과 부품이 움직이지 않고 회전하는 기계에 고정되어 있다는 점이 그 반대 상황과 유일하게 다른 점이다. 성공적인 부품 생산을 위해서는 반드시 이행되어야 할 기본 규정이 몇 가지 있다.

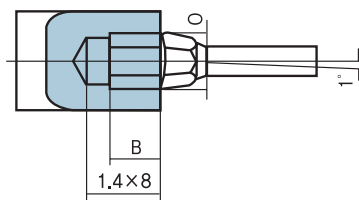
### 절삭 원칙

절삭 공구의 중심선은 작업 부분 중심선으로부터 1도 차이가 나게 한다. 이는 브로치가 마치 작업 재료 안으로 들어가는 것처럼 부채꼴 효과를 가지고 부품에 파고들게 하고, 전체 끝표면을 깎는 것이 아니라 앞쪽 가장자리만을 깎게 한다. 이는 절삭하고, 파고들게 하면서, 회전하며 깎는 동작에 미는 힘을 80%까지 줄여(작업이) 더 쉽게 이루어지게 한다.

### 브로치 중심잡기

절삭기가 작업 재료 중심상 가능한 가장 가깝게 중심을 잡도록 하는 것이 매우 중요하다. 부적합한 중심 잡기는 불규칙한 구멍 모양이나 큰 치수의 구멍 또는 나선형 현상을 만든다. 손쉬운 설정을 위해서는 자사의 6189나 6199와 같이 계량기를 사용할 것.

### 드릴로 구멍내기



안쪽 브로치 작업상 구멍은 평면상에서 켄 브로치의 큰 넓이 치수보다 대략 1% 정도 크게 뚫어야 한다. 이러한 비율은 세공이 쉬운 절삭 재료에서는 줄어들고, 내구성이 강한 재료에는 늘어날 수 있다. 구멍은 깎아낸 부스러기가 쌓일 수 있게 공간을 두고 가능한 깊게 팔 것. 우리는 측면 길이의 1.3에서 1.5배 깊이를 권장.

### 브로치 사전 안내

모서리를 깎은 면은 브로치의 가장 큰 넓이 치수보다 약간 더 큰데, 이는 브로치의 작업 시작을 쉽게 하는 가장 중요한 본질이다. 동일한 중심 잡기가 필요할 때, 브로치 치수와 같게 초벌 구멍을 우묵한 곳에 걸쳐서 뚫는다. 이와 같은 방법은 브로치 작업을 시작할 때, 브로치가 동일 중심축에 있도록 한다.

### 브로치 회전 속도

1도를 기울이는 기본 원칙은 1500에서 3000rpm까지의 빠른 속도 적용을 가능하게 한다. 회전하는 속도는 깎는 속도나 공구 수명에는 작은 영향을 미친다. 그러나 빠른 속도에선 브로치의 절삭 가장자리가 닳기 시작할 때 재료가 분쇄하는 경향이 있다. 따라서 브로치 작업을 브로치가 작업 재료와 같이 회전할 때 느린 회전 또는 점차 속도를 빠르게 하면서 시작한다. 나선형을 그리게 되는 현상은 축 회전을 반대로 하여 반쯤 부품으로 들어가게 하는 식으로 줄일 수 있다.

### 공급 비율

공급 선택은 주로 소재의 성질에 따라 달라진다. 어떤 경우든, 최대 1회전당 공급 비율은 측면 지름의 0.03배를 절대 넘어서는 안 된다.

### 냉각제

일반 냉각제 또는 절삭용 윤활유(油)

### 브로치 깎기

바깥쪽 또는 안쪽 브로치는 앞면만 다시 날카롭게 깎아낼 수 있으며, 깎는 각도는 4도부터 6도까지 가능하다.

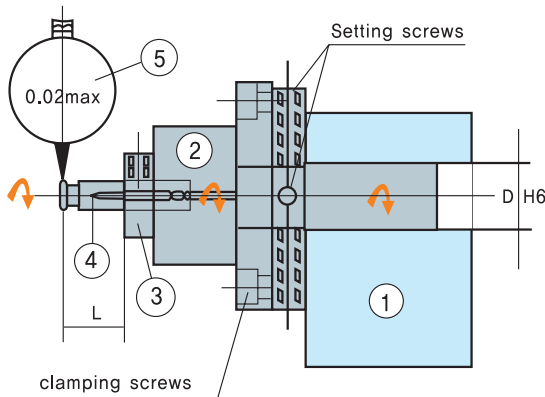
## Broaching Toolholders

### 정확한 중심 잡기를 위한 브로치의 조정

PCM 6180, 6190, 26200, 26300 시리즈와 같은 브로치 작업용 공구 고정장치는 표준 공구상 정확한 길이로 0.015내에는 조절할 수 있게 한다. 다른 길이의 공구가 사용될 때에 정확한 중심잡기를 재조정하는 것은 필수적이다.

몇 번의 작업을 거치다 보면 회전 탭(塔)이 기계 축과 완벽한 정열을 이루지 않는다는 것이 종종 증명된다. 0.05이상의 정열 차이가 생긴다면, 작은 치수상의 어려움을 없애기 위해서, 브로치 회전 부분 끝의 위치를 재조정하는 것은 정말 필수적이다.

기계가 기하학적으로 정확하다면, PCM 브로치 공구 고정 장치는 표준 공구 길이에 미리 맞춰져 있는 것이고, 설정 없이 직접 탑재될 수 있다. 다른 길이의 브로치들은 중심을 조절하여 다시 잡아주어야만 한다.



#### 정확한 중심잡기를 위한 예비 설정

H6 구경의 예비 설정 고정 장치(1)는, 계량기 우측 규격 편심(偏心)률이 0.02의 최대치를 확보하기 위하여, 규격을 브로치와 동일한 길이, "L"로 하여, 기계 축(3)과 함께 공구 고정장치(2)를 회전 시킨다.

4개의 방사형 나사를 이 작업을 지지한다. 4개의 앞 나사를 죄고 나서 다시 확인한다.

의견: 완성된 공구 고정장치의 느린 회전은 브로치의 작은 진동을 보인다.

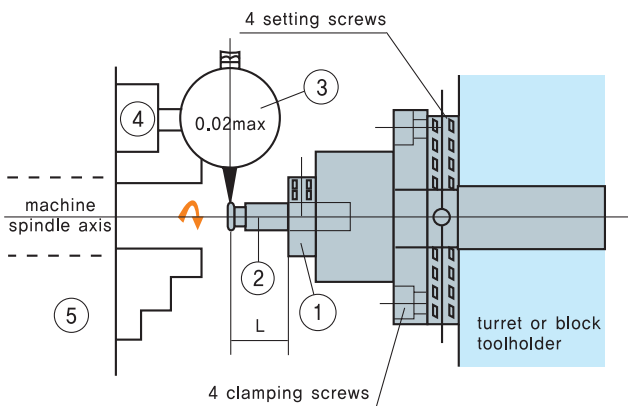
#### 기계상에 직접 중심을 조절하여 잡기

기계상에서의 조절은 기계의 축과 탑재 구멍의 잘못된 정열을 바로잡는 이점이 있다. 그러나 이 방법의 불편함은 기계상 탭(첨)부분에 있는 한 구멍에만 가능하다는 점이다.

지름 (1)은 브로치와 브로치대(臺)와 같이 동일한 "L" 길이의 치수로 제공된다. 시계가 달린 자석 받침을 척(Chuck) 면(面)에 고정시킨다. 측량기 오른쪽 구간에 지점을 잡는다. 기계 축을 돌린다.

4개의 방사형 날을 사용하여, 최대 0.02로 동일 중심을 조절한다. 그리고, 4개의 앞 나사를 죄다. 죄고 난 뒤, 다시 확인한다.

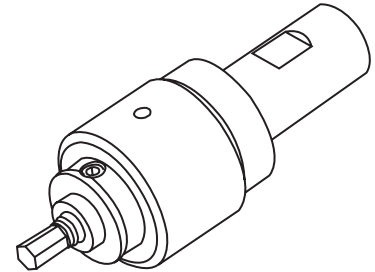
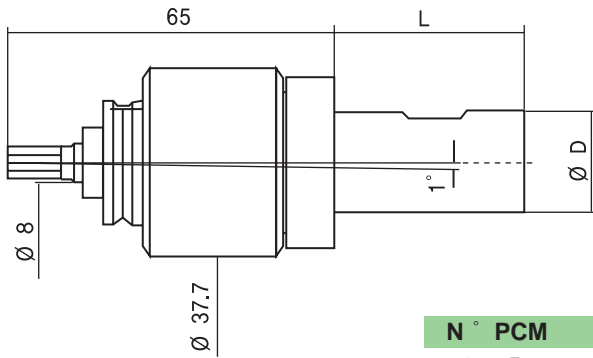
필요하다면, 지름을 다양한 위치로 옮기고 다시 확인한다. 측량기의 적합한 동일 중심과 회전하는 지름은 0.012를 넘어서는 안 된다.





# 2100 series

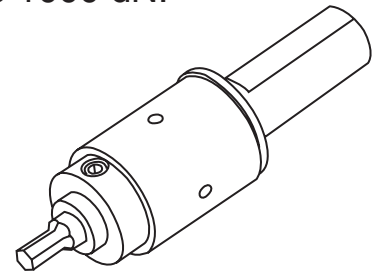
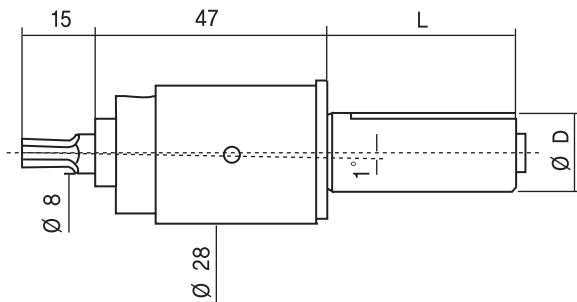
to hold 8 mm shank broaches  
max. pushing force 400 dN.



N ° PCM	D	L
2100-58	15.87	38
2100-16	16	38
2102	19.05	38
2101	20	38
2103	25	50
2104	25.4	50
2100-22-75	22	75

# 2160 series

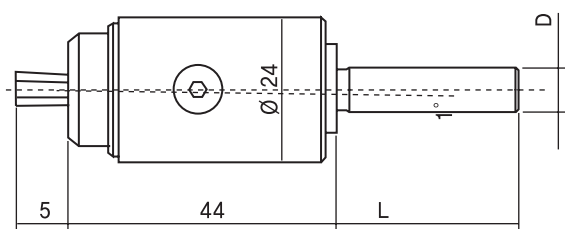
to hold 8 mm shank broaches  
max. pushing force 1000 dN.



PCM Nr.	D	L
2160-120-038	12	38
2160-140-038	14	38
2160-158-038	15.875	38
2160-160-038	16	38
2160-190-100	19.05	100
2160-200-100	20	100
2160-220-100	22	100
2160-250-120	25	120
2160-254-120	25.40	120

# 2150 series

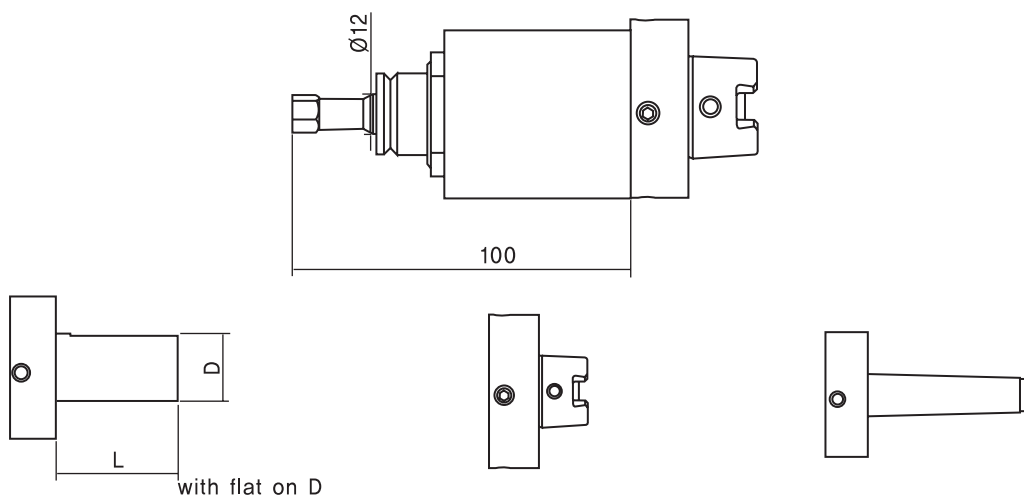
to hold 5 mm shank broaches  
max. pushing force 50 dN.



PCM Nr.	D	L
2150-070	7	30
2150-080	8	30
2150-100	10	38
2150-120	12	38
2150-130	13	38
2150-140	14	38
2150-150	15	38
2150-160	16	38
2150-190	19.05	38
2150-200	20	38
2150-220-75	22	75

# 6162 series

to hold 12 mm shank broaches  
max. pushing force 1200 dN.



without flat on D

PCM Nr.	D	L
6162-12-160	16	45
6162-12-190	19.05	45
6162-12-200	20	45
6162-12-250	25	45
6162-12-254	25.40	45
6162-12-320	32	45
6162-12-400	40	45

PCM Nr.	HSK-C
6162-12-HSK32	32
6162-12-HSK40	40

PCM Nr.	MK
6162-12-CM2	2
6162-12-CM3	3

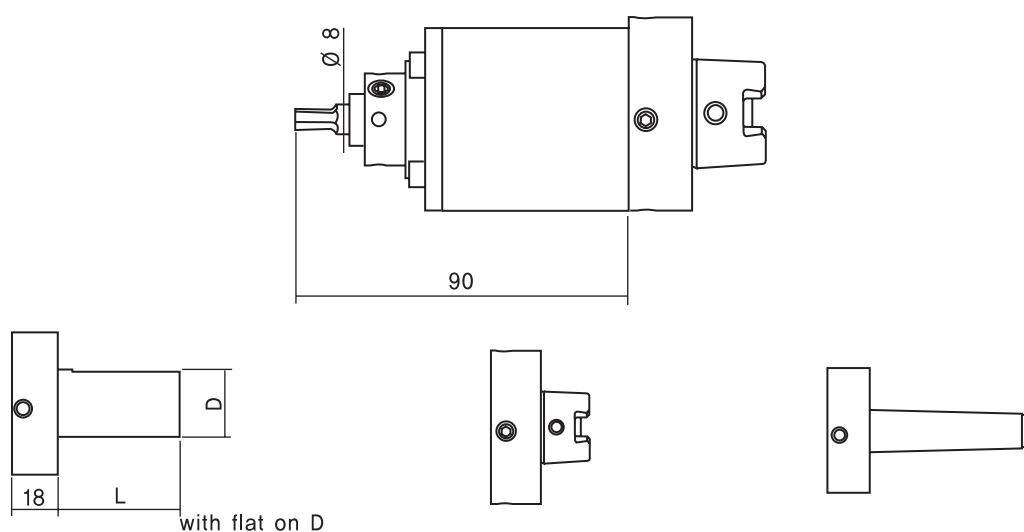
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# 6165 series

to hold 8 mm shank broaches  
max. pushing force 1200 dN.



without flat on D

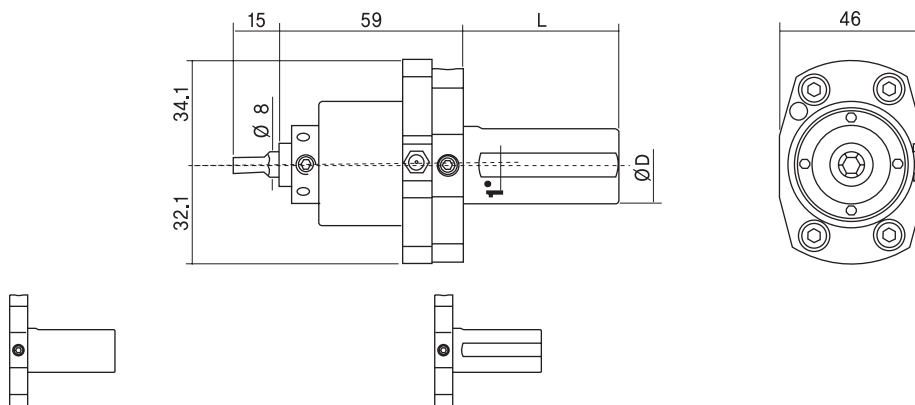
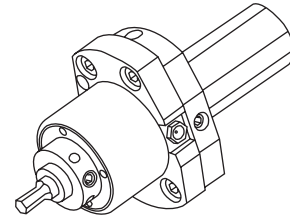
PCM Nr.	D	L
6165-08-160	16	45
6165-08-190	19.05	45
6165-08-200	20	45
6165-08-250	25	45
6165-08-254	25.40	45
6165-08-320	32	45
6165-08-400	40	45

PCM Nr.	HSK-C
6165-08-HSK32	32
6165-08-HSK40	40

PCM Nr.	MK
6165-08-CM2	2
6165-08-CM3	3

# 6180 / 6181 / 26200 series

to hold 8 mm shank broaches  
max. pushing force 1200 dN.



without flat on D

PCM Nr.	D	L
6180-158	15.87	40
6180-160	16	40
6180-190	19.05	40
6180-200	20	40
6180-250	25	50
6180-254	25.4	50
6180-300	30	60
6180-317	31.75	60
6180-320	32	60

with 2 flats on D

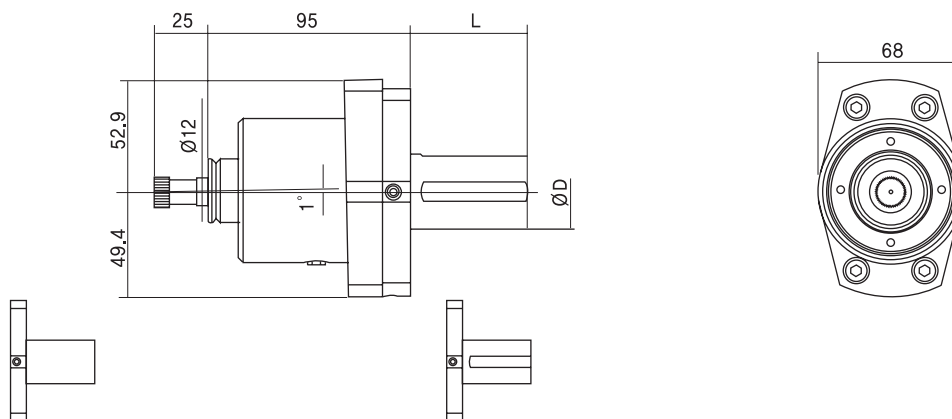
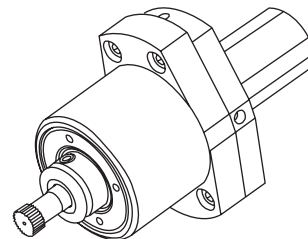
PCM Nr.	D	L
6181-158	15.87	40
6181-160	16	40
6181-190	19.05	40
6181-200	20	40
6181-250	25	50
6181-254	25.4	50
6181-300	30	60
6181-317	31.75	60
6181-320	32	60

VDI 3425-2 / DIN 69880

PCM Nr.	D=VDI
26200-16	16
26201	20

# 6190 / 6191 / 26300 series

to hold 12 mm shank broaches  
max. pushing force 4000 dN.



without flat on D

PCM Nr.	D	L
6190-250	25	55
6190-254	25.4	55
6190-300	30	55
6190-317	31.75	55
6190-320	32	55

with 2 flats on D

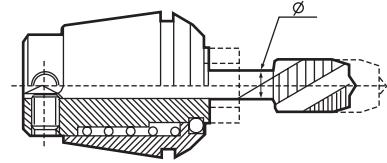
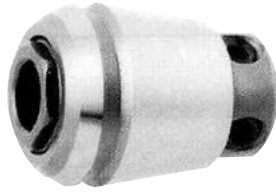
PCM Nr.	D	L
6191-250	25	55
6191-254	25.4	55
6191-300	30	55
6191-317	31.75	55
6191-320	32	55
6191-350	35	55
6191-381	38.10	55
6191-400	40	55
6191-444	44.45	68
6191-450	45	68
6191-500	50	68
6191-508	50.80	68

VDI 3425-2 / DIN 69880

PCM Nr.	D=VDI
26303	30
26304	40
26305	50

## PCM ET1 탭핑 콜렛

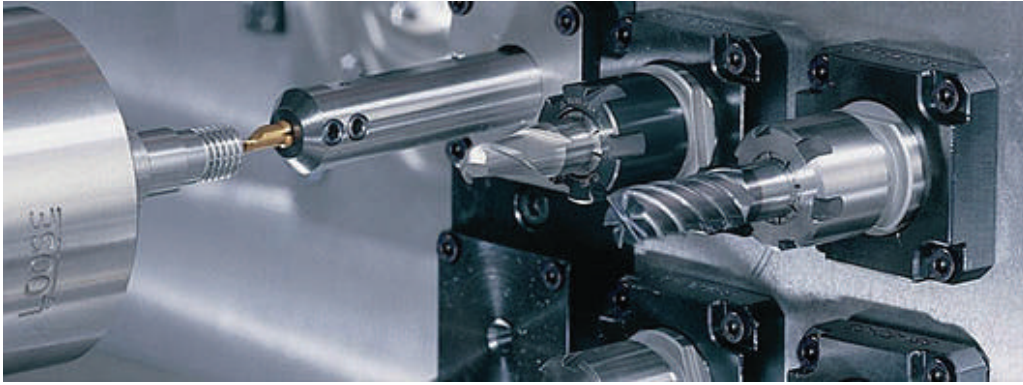
DIN 6499, ER/ESX 8



타입	범위	Bmm	Cmm	Dmm	Emm	Kmm	Lmm
ET1-12...	M0.5-M4	8.5 1	13.0	3.55	5.5	7	18
ET1-16...	M0.7-M6	0.5	18.0	6.30	7.0	11	22
ET1-20...	M1-MB(M10)	11.5	19.5	7.10	7.0	14	24
ET1-25...	M1-M10(M12)	13.5	20.5	10.00	8.0	19	26
ET1-32...	M4-M12(M16)	14.5	28.5	12.50	10.0	23	33
ET1-40	M6-M16(M20)	15.5	38.5	17.00	13.0	28	42

Ø 싱크	ET1-12	ET1-16	ET1-20	ET1-25	ET1-32	ET1-40	ISO DIN JIS
2.00	ET1-12200	ET1-16200					(I)
2.20	ET1-12221	ET1-16221	ET1-20221				D
2.24	ET1-12224	ET1-16224	ET1-20224				I
2.50	ET1-12250	ET1-16250	ET1-20250	ET1-25250			I/D
2.80	ET1-12280	ET1-16280	ET1-20280	ET1-25280			I/D
3.00	ET1-12300	ET1-16300	ET1-20300	ET1-25300			J
3.15	ET1-12315	ET1-16315	ET1-20315	ET1-25315			I
3.50	ET1-12350	ET1-16350	ET1-20350	ET1-25350			D
3.55	ET1-12355	ET1-16355	ET1-20355	ET1-25355			I
4.00		ET1-16400	ET1-20400	ET1-25400			I/D/J
4.50		ET1-16450	ET1-20450	ET1-25450	ET1-32450		I/D
5.00		ET1-16500	ET1-20500	ET1-25500	ET1-32500		I/J
5.50		ET1-16550	ET1-20550	ET1-25550	ET1-32550		(D)/J
5.60		ET1-16560	ET1-20560	ET1-25560	ET1-32560		I
6.00		ET1-16600	ET1-20600	ET1-25600	ET1-32600	ET1-40600	D/J
6.20		ET1-16620	ET1-20620	ET1-25620	ET1-32620	ET1-40620	J
6.30		ET1-16630	ET1-20630	ET1-25630	ET1-32630	ET1-40630	I
7.00			ET1-20700	ET1-25700	ET1-32700	ET1-40700	D/J
7.10				ET1-25710	ET1-32710	ET1-40710	I
8.00				ET1-25800	ET1-32800	ET1-40800	I/D(J)
8.50				ET1-25850	ET1-32850	ET1-40850	J
9.00				ET1-25900	ET1-32900	ET1-40900	I/D
10.00				ET1-25100	ET1-32100	ET1-40100	I/D
10.50					ET1-32105	ET1-40105	J
11.00					ET1-32110	ET1-40110	D
11.20					ET1-32112	ET1-40112	I
12.00					ET1-32120	ET1-40120	D
12.50					ET1-32125	ET1-40125	I/J
14.00						ET1-40140	I/D/J
15.00						ET1-40150	J
16.00						ET1-40160	I/D
17.00						ET1-40170	J





**WTO**  
*Higher Productivity*



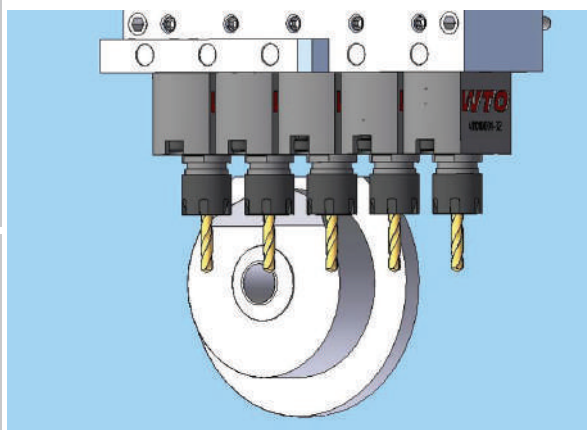
# Swiss Type Turning Centers

Driven  
Precision  
Toolholders

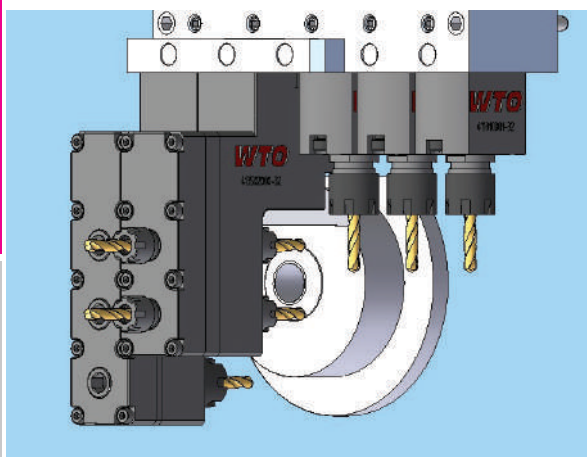
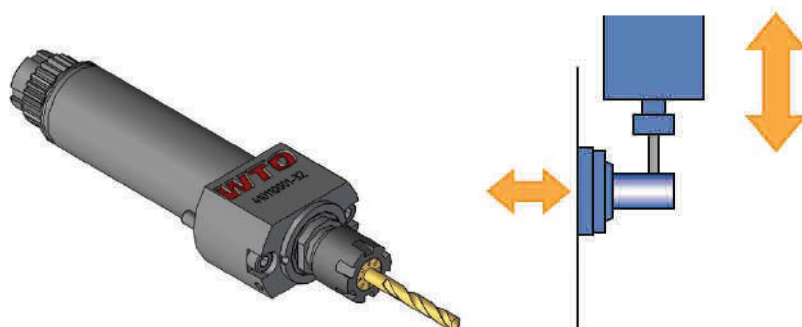


**WTO**  
Higher Productivity

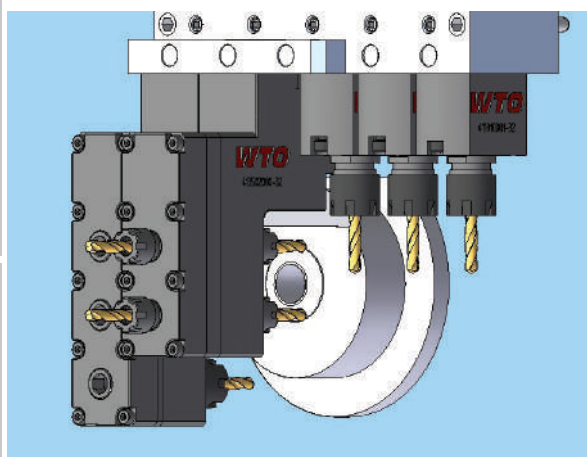
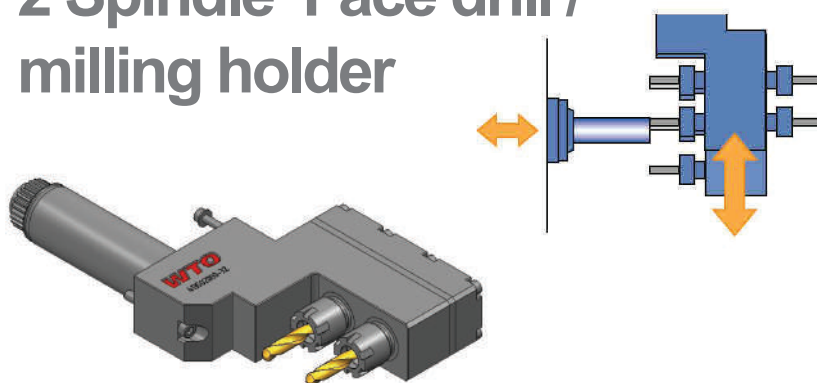
## Swiss Type Turning Centers for Cross Slide Unit



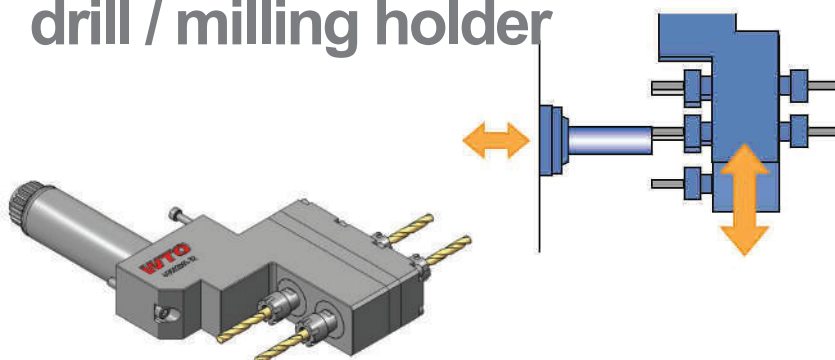
Cross drill / milling holder



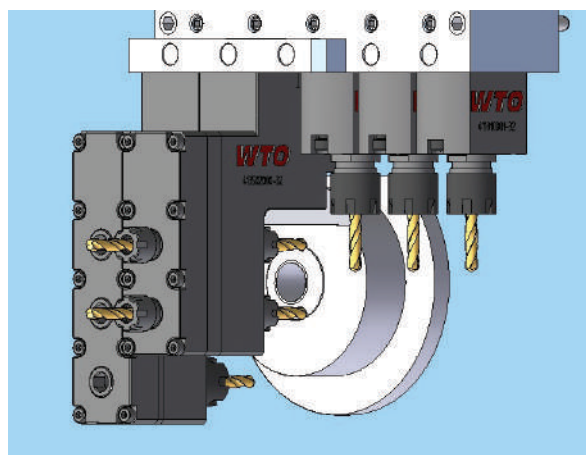
2 Spindle Face drill /  
milling holder



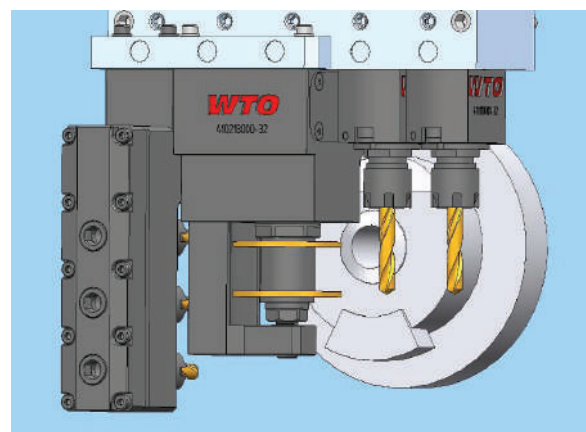
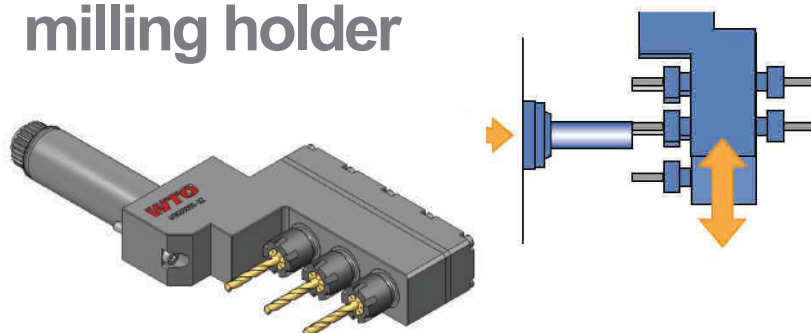
2 Spindle Counter Face  
drill / milling holder



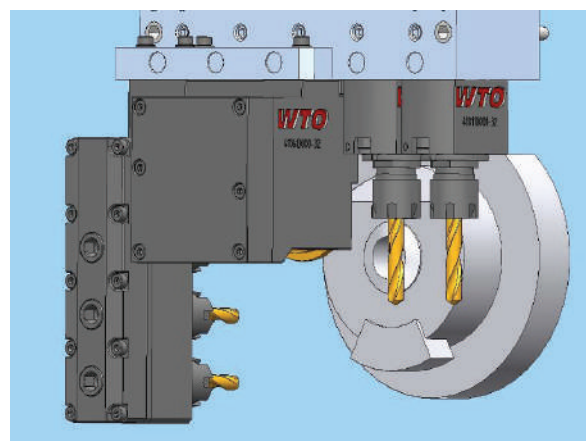
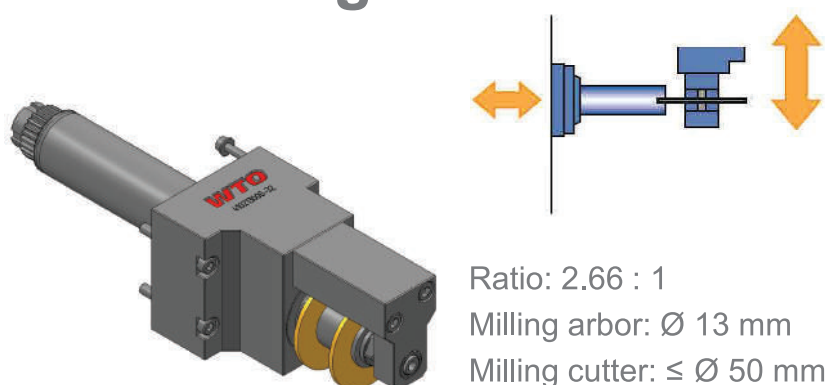
# Swiss Type Turning Centers for Cross Slide Unit



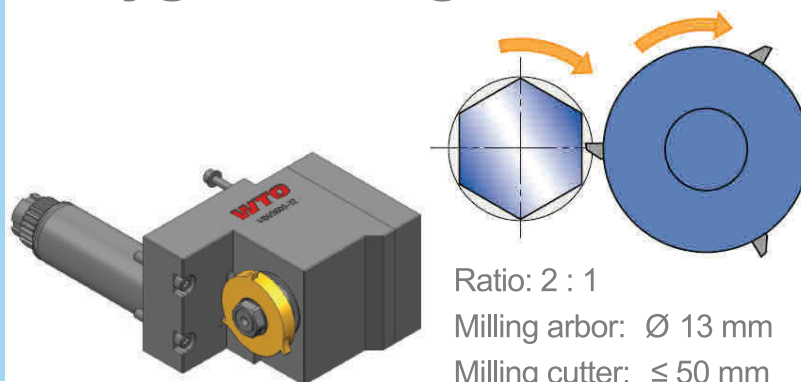
## 3 Spindle Face drill / milling holder



## Face slotting holder



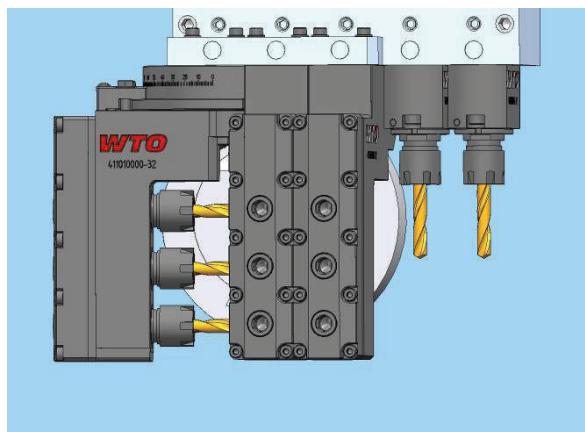
## Polygon milling holder



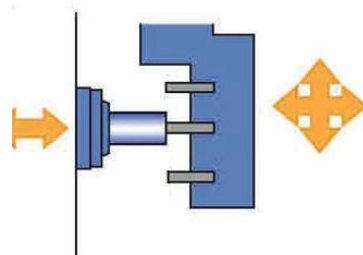


**WTO**  
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## Swiss Type Turning Centers for Cross Slide Unit

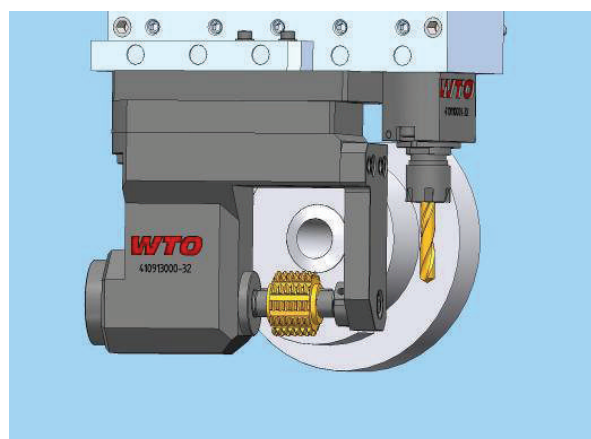
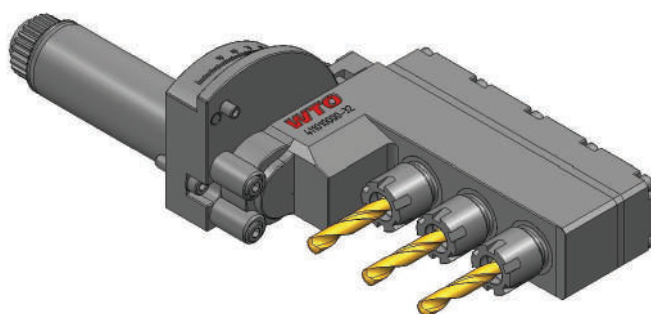
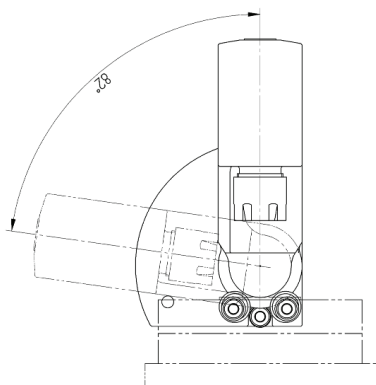


3 Spindle adjustable angle  
drill / milling holder

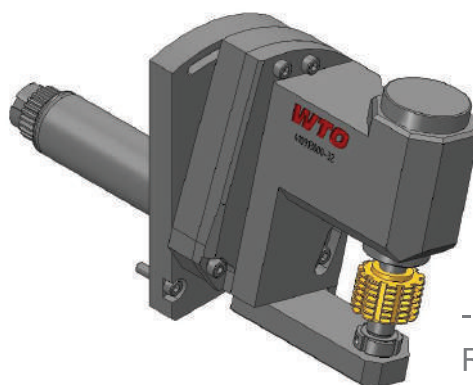
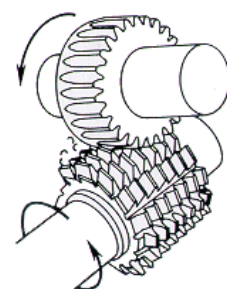


0-90°

Collet: ER16



## Gear Hobbing Unit

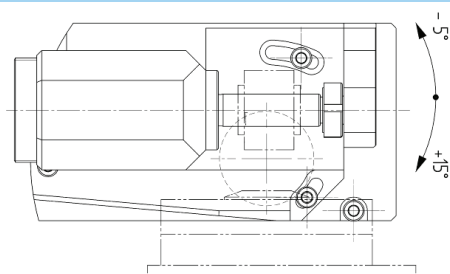


-5° - +15°

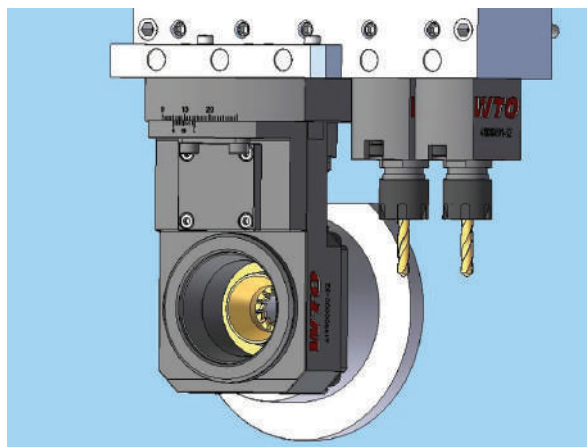
Ratio: 3,2 : 1

Milling arbor: Ø 13 mm

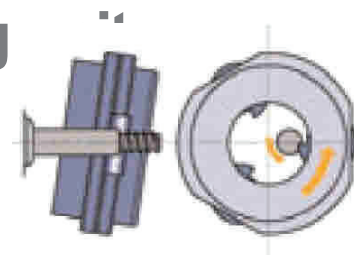
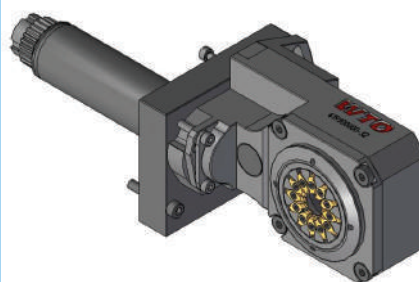
Milling cutter: ≤ Ø 32 mm



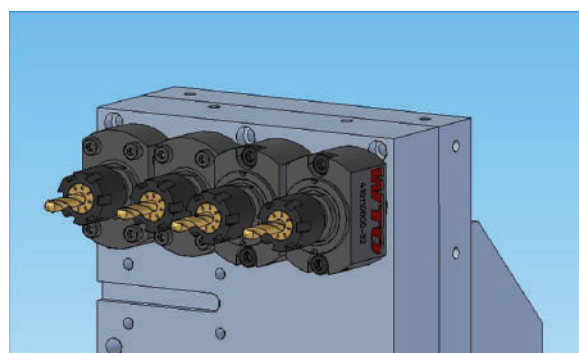
# Swiss Type Turning Centers for Cross Slide Unit



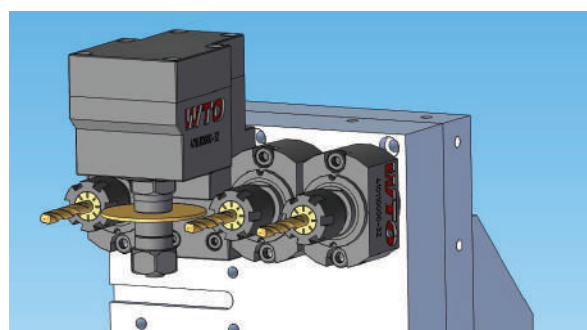
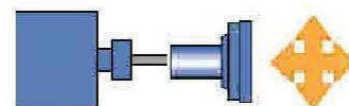
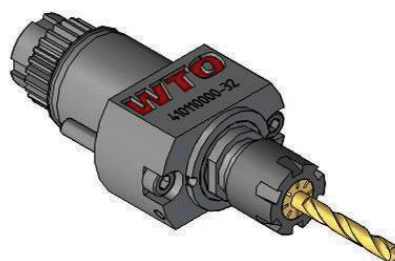
Thread whirling



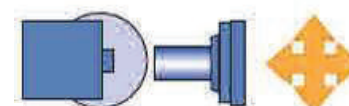
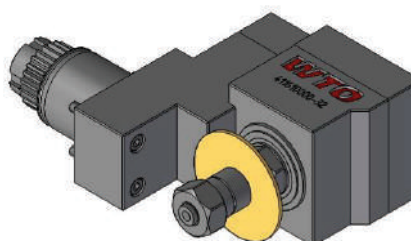
for Back Side Unit



Face drill / milling holder



Face slotting holder





Swiss  
Precision  
Tools

# ER Collets

## 특징 | 장점

### 스위스 품질

ISO 9001/ISO 14001에 의한 스위스 생산제품.

### 1 마킹

타입 및 크기 (콜렛 선별 실수 감소).

### 2 제품 추적성

모든 제품에 추적이 가능하도록 제품번호(Lot)를 제조공정에서 마킹.

### 3 오리지널 REGO-FIX®

REGO-FIX®는 세계표준인 ER 콜렛 시스템의 발명자이며 많은 경험의 결과인 뛰어난 공학 시스템으로 만든 제품으로 ER 콜렛을 구매할 때 콜렛 앞면의 레고픽스 품질표시인 △ 마크를 확인바람.

### 넓은 클램핑 범위

16홈의 설계는 일정한 흔들림 공차를 유지하면서 넓은 클램핑 범위를 갖는다.

### 다양한 제품 종류

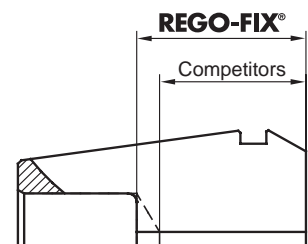
크기는 ER8 에서 ER50 까지  
직경은 0.2mm 에서 36mm 까지

### 세계적인 공급성

전 세계의 레고픽스 공급망.

### 20% 더 긴 클램핑 길이

작은 경에서 경쟁사보다 20%이상 더 긴 클램핑 길이는 더 좋은 런아웃을 가져온다.



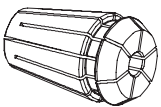
### 최적의 툴링 시스템

레고픽스의 콜렛, 툴 홀더, 클램핑 너트, 스패너 등 모든 제품은 한곳에서 생산하여 시스템 화합성의 결과가 최상의 정밀도, 밸런스 및 공구수명으로 나타난다.



ER 콜렛 구매시 콜렛 앞면의 레고픽스 품질보증 표시인 △ 를 확인 바람.

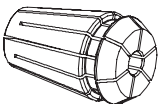
## REGO-FIX® ER Collets



### ER Standard Collets

REGO-FIX® 콜릿은 DIN 6499 Form B 를 기준으로 만들어지며 드릴, 밀링, 리밍, 탭핑 및 연마 공정에 사용된다.

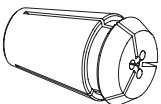
- 전 클램핑 범위에서 흔들림 10 미크론 이하
- 클램핑 범위 직경 0.2mm 에서 36mm 까지
- 클램핑 범위 DIN 6499/ISO 15488 Form B
- 고정밀에 최적의 설계



### ER-UP Ultra Precision Collets

REGO-FIX® 정밀 콜릿은 DIN 6499 /ISO 15488 A+B의 장점을 기준으로 만들어지며 최소의 흔들림 공차를 요구하는 고속 가공에 주로 사용된다.  
최소의 흔들림은 공구 수명을 연장 시킨다.

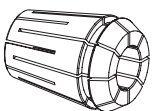
- 전 클램핑 범위에서 흔들림 5 미크론
- 클램핑 범위 직경 0.2mm 에서 36mm 까지
- 클램핑 범위 표준 콜릿과 동일함



### ER-MB Microbore Collets

REGO-FIX®가 개발한 마이크로 보아 콜릿은 작은 직경의 툴 상크를 위한 것이다.

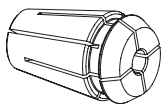
- 흔들림 6 미크론 이하
- 클램핑 범위 직경 0.2mm 에서 0.9mm 까지
- 툴 상크는 직경의 h7 공차시 가능



### ER-DM Metallic Sealed Collets (pat. pend.)

REGO-FIX®의 금속 실링 콜릿은 DIN 6499/ISO 15488을 기준으로 만들어지며 드릴, 밀링, 리밍, 탭핑 및 연마 공정에 사용된다.

- 전 클램핑 범위에서 흔들림 6 미크론 이하
- 클램핑 범위 직경 2.75mm 에서 26mm 까지
- 금속 실링은 냉각수 압력 300bar까지 가능
- 클램핑 범위는 표준 콜릿 보다 적음



### ER-ND High Precision Collets

REGO-FIX®에서 고속 가공용으로 개발한 콜릿으로 특히 마이크로 가공용 초정밀 툴 홀더에 적용한다.

- 흔들림 3 미크론 이하
- 클램핑 범위 직경 3mm 에서 6mm 까지
- 툴 상크는 직경의 h9 공차시 가능



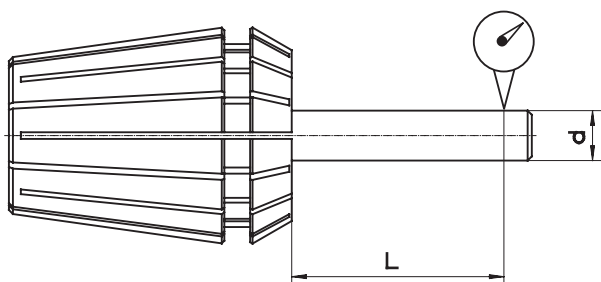


Swiss  
Precision  
Tools

**ER**  
Collets

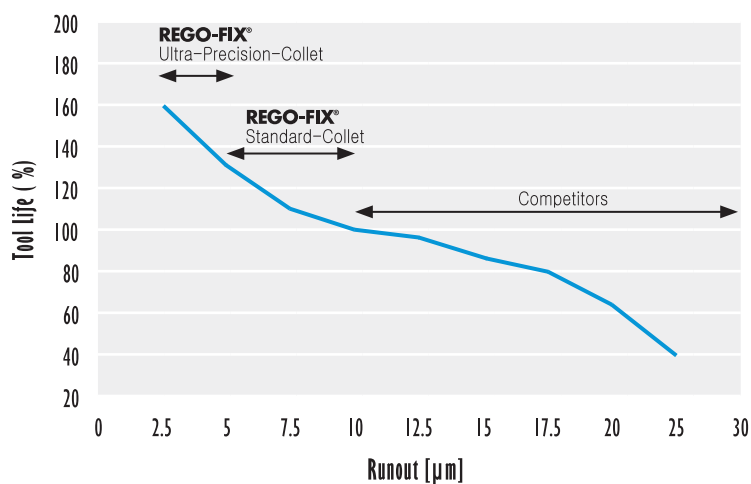
## Concentricity T.I.R. DIN 6499/ISO 15488

### ER (Standard) and ER-UP (Ultra-Precision)



Clamping diameter d [mm]			T.I.R. max. [mm]		
>	≤	L	DIN 6499/ ISO 15488 Form B	△ ER	△ ER-UP
1.0	1.6	6.0	0.015	0.010	0.005
1.6	3.0	10.0			
3.0	6.0	16.0			
6.0	10.0	25.0			
10.0	18.0	40.0	0.020	0.010	0.005
18.0	26.0	50.0			
26.0	36.0	60.0	0.025	0.010	0.005

### Influence of Tool Runout (T.I.R.) on Tool Life

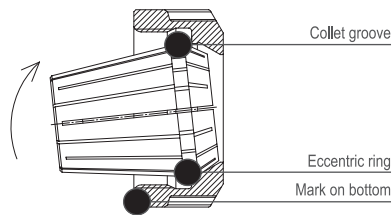


정밀도는 툴 홀더, 콜릿, 클램핑 너트 전체 시스템의 기능이다.  
최적의 결과를 위해 우리는 레고픽스 툴 홀더, 레고픽스 콜릿,  
레고픽스 클램핑 너트 사용을 추천한다.

### Collets Type ER and ER-UP

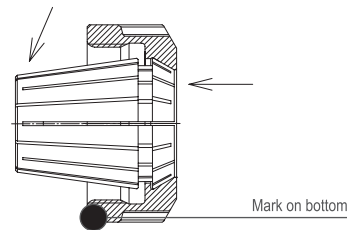
#### 조립 방법

콜렛의 홈을 클램핑 너트의 바닥에 표시가 있는 편심 링에 끼운다. 콜렛을 화살표 방향으로 소리가 날 때까지 밀어 넣는다. 콜렛과 함께 홀더 위에 놓고 너트를 조인다. 너트는 토크 렌치 사용을 권장한다.



#### 분해 방법

툴 홀더에서 너트를 풀고 콜렛의 뒤쪽을 표시 반대 쪽으로 누르는 것과 동시에 콜렛의 앞면을 클램핑 너트에서 떨어질 때까지 누른다.



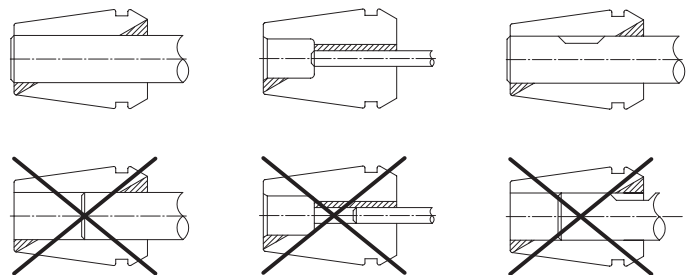
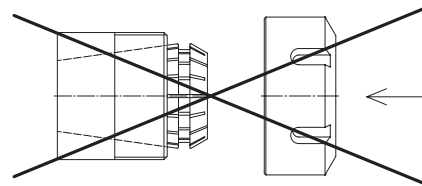
부적절한 조립은 콜렛의 동심에 영구적인 손상을 주거나 클램핑 너트를 파괴하는 결과가 될 수 있다.

콜렛에 맞는 클램핑 너트만 사용해야 한다.

툴 상크가 큰 것은 클램프 하지 말 것!

예: Ø 12-11 mm 콜렛에 Ø 12.2 mm 상크를 사용하지 말 것. 반대로 한 단계 큰 것을 사용 (Ø 12.5-11.5 mm 또는 13-12 mm 콜렛)

최상의 결과를 위해 가능하면 콜렛의 전체 길이만큼 공구를 넣을 것. 콜렛 내경 길이의 2/3 이하로 넣지 말 것. 부적절한 툴 삽입은 콜렛의 영구 변형을 줄 수 있고 그 결과 흔들림이 나빠진다.

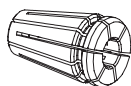


# ER

## Collets

# ER 8 | ER 8-UP | ER 8-MB

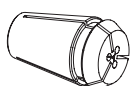
DIN 6499/ ISO 15488



## ER 8 Standard ER 8-UP Ultra Precision

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 8 Part No.	ER 8-UP Part No.
1.00 - 0.50*	0.0394 - 0.0197	1/32"	1108.01000	1108.01001
1.50 - 1.00*	0.0591 - 0.0394	-	1108.01500	1108.01501
2.00 - 1.50*	0.0787 - 0.0591	1/16"	1108.02000	1108.02001
2.50 - 2.00*	0.0984 - 0.0787	3/32"	1108.02500	1108.02501
3.00 - 2.50*	0.1181 - 0.0984	-	1108.03000	1108.03001
3.50 - 3.00*	0.1378 - 0.1181	1/8"	1108.03500	1108.03501
4.00 - 3.50*	0.1575 - 0.1378	5/32"	1108.04000	1108.04001
4.50 - 4.00*	0.1772 - 0.1575	-	1108.04500	1108.04501
5.00 - 4.50*	0.1969 - 0.1772	3/16"	1108.05000	1108.05001

\*Included in collet set.



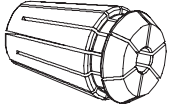
## ER 8-MB with Microbore (pat. pend.)

Clamping Capacity h7 [mm]	Clamping Capacity h7 [Inch]	ER 8-MB Part No.
0.2	0.0079	1308.00200
0.3	0.0118	1308.00300
0.4	0.0157	1308.00400
0.5	0.0197	1308.00500
0.6	0.0236	1308.00600
0.7	0.0276	1308.00700
0.8	0.0315	1308.00800
0.9	0.0354	1308.00900

마이크로보아 콜릿은 6μ m 이하의 흔들림을 갖는다. 이것은 작은 공구 상크를 위해 레고픽스에 의해 특별히 개발 되었다.



공구 상크는 직경의 h7 공차를 요구한다.



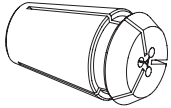
## ER 11 | ER 11-UP | ER 11-MB | ER 11-ND

### ER 11 Standard ER 11-UP Ultra Precision

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 11 Part No.	ER 11-UP Part No.
1.00 - 0.50*	0.0394 - 0.0197	1/32"	1111.01000	1111.01001
1.50 - 1.00*	0.0591 - 0.0394	-	1111.01500	1111.01501
2.00 - 1.50*	0.0787 - 0.0591	1/16"	1111.02000	1111.02001
2.50 - 2.00*	0.0984 - 0.0787	3/32"	1111.02500	1111.02501
3.00 - 2.50*	0.1181 - 0.0984	-	1111.03000	1111.03001
3.50 - 3.00*	0.1378 - 0.1181	1/8"	1111.03500	1111.03501
4.00 - 3.50*	0.1575 - 0.1378	5/32"	1111.04000	1111.04001

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 11 Part No.	ER 11-UP Part No.
4.50 - 4.00*	0.1772 - 0.1575	-	1111.04500	1111.04501
5.00 - 4.50*	0.1969 - 0.1772	3/16"	1111.05000	1111.05001
5.50 5.00*	0.2165 - 0.1969	-	1111.05500	1111.05501
6.00 5.50*	0.2362 - 0.2165	7/32"	1111.06000	1111.06001
6.50 - 6.00*	0.2559 - 0.2362	1/4"	1111.06500	1111.06501
7.00 - 6.50*	0.2756 - 0.2559	-	1111.07000	1111.07001

\*Included in collet set.



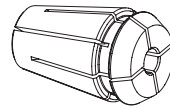
### ER 11-MB with Microbore

Clamping Capacity h7 [mm]	Clamping Capacity h7 [Inch]	ER 11-MB Part No.
0.2	0.0079	1311.00200
0.3	0.0118	1311.00300
0.4	0.0157	1311.00400
0.5	0.0197	1311.00500
0.6	0.0236	1311.00600
0.7	0.0276	1311.00700
0.8	0.0315	1311.00800
0.9	0.0354	1311.00900

마이크로보어 콜릿은 6μ m 이하의 흔들림을 갖는다. 이것은 작은 공구 상크를 위해 레고픽스에 의해 특별히 개발 되었다.



공구 상크는 직경의 h7 공차를 요구한다.



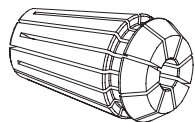
### ER 11-ND High Precision Collets

Clamping Diameter h9 [mm]	ER 11-ND Part No.
3.0	1111.03005
3.175	1111.03185
4.0	1111.04005
6.0	1111.06005

고속가공용 콜릿은 3μ m 이하의 흔들림이 있고 마이크로 가공을 위한 높은 정밀도의 톨 홀더를 위해 레고픽스에서 특별히 개발 하였다.



공구 상크는 직경의 h9 공차를 요구한다.



## ER 16 Standard ER 16-UP Ultra Precision

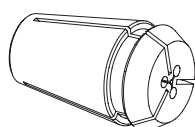
Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 16 Part No.	ER 16-UP Part No.
1.00 - 0.50*	0.0394 - 0.0197	1/32"	1116.01000	1116.01001
1.50 - 1.00	0.0591 - 0.0394	-	1116.01500	1116.01501
2.00 - 1.00*	0.0787 - 0.0394	1/16"	1116.02000	1116.02001
2.50 - 1.50	0.0984 - 0.0591	3/32"	1116.02500	1116.02501
3.00 - 2.00*	0.1181 - 0.0787	-	1116.03000	1116.03001
3.50 - 2.50	0.1378 - 0.0984	1/8"	1116.03500	1116.03501
4.00 - 3.00*	0.1575 - 0.1181	5/32"	1116.04000	1116.04001
4.50 - 3.50	0.1772 - 0.1378	-	1116.04500	1116.04501
5.00 - 4.00*	0.1969 - 0.1575	3/16"	1116.05000	1116.05001
5.50 - 4.50	0.2165 - 0.1772	-	1116.05500	1116.05501

## ER 16 | ER 16-UP | ER 16-MB

DIN 6499 / ISO 15488

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 16 Part No.	ER 16-UP Part No.
6.00 - 5.00*	0.2362 - 0.1969	7/32"	1116.06000	1116.06001
6.50 - 5.50	0.2559 - 0.2165	1/4"	1116.06500	1116.06501
7.00 - 6.00*	0.2756 - 0.2362	-	1116.07000	1116.07001
7.50 - 6.50	0.2953 - 0.2559	9/32"	1116.07500	1116.07501
8.00 - 7.00*	0.3150 - 0.2756	5/16"	1116.08000	1116.08001
8.50 - 7.50	0.3347 - 0.2953	-	1116.08500	1116.08501
9.00 - 8.00*	0.3543 - 0.3150	11/32"	1116.09000	1116.09001
9.50 - 8.50	0.3740 - 0.3347	-	1116.09500	1116.09501
10.00 - 9.00*	0.3937 - 0.3543	3/8"	1116.10000	1116.10001

\*Included in collet set.



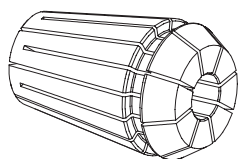
## ER 16-MB with Microbore

Clamping Capacity h7 [mm]	Clamping Capacity h7 [Inch]	ER 16-MB Part No.
0.2	0.0079	1316.00200
0.3	0.0118	1316.00300
0.4	0.0157	1316.00400
0.5	0.0197	1316.00500
0.6	0.0236	1316.00600
0.7	0.0276	1316.00700
0.8	0.0315	1316.00800
0.9	0.0354	1316.00900

마이크로보어 콜릿은 6  $\mu$ m 이하의 흔들림을 갖는다. 이것은 작은 공구 샹크를 위해 레고픽스에 의해 특별히 개발 되었다.



공구 샹크는 직경의 h7 공차를 요구한다.



## ER 20 | ER 20-UP

DIN 6499/ISO 15488

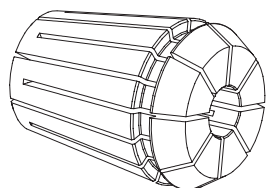
**ER 20      Standard**  
**ER 20-UP Ultra Precision**

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 20 Part No.	ER 20-UP Part No.
1.00 - 0.50	0.0394 - 0.0197	1/32"	1120.01000	1120.01001
1.50 - 1.00	0.0591 - 0.0394	-	1120.01500	1120.01501
2.00 - 1.00 *	0.0787 - 0.0394	1/16"	1120.02000	1120.02001
2.50 - 1.50	0.0984 - 0.0591	3/32"	1120.02500	1120.02501
3.00 - 2.00 *	0.1181 - 0.0787	-	1120.03000	1120.03001
3.50 - 2.50	0.1378 - 0.0984	1/8"	1120.03500	1120.03501
4.00 - 3.00 *	0.1575 - 0.1181	5/32"	1120.04000	1120.04001
4.50 - 3.50	0.1772 - 0.1378	-	1120.04500	1120.04501
5.00 - 4.00 *	0.1969 - 0.1575	3/16"	1120.05000	1120.05001
5.50 - 4.50	0.2165 - 0.1772	-	1120.05500	1120.05501
6.00 - 5.00 *	0.2362 - 0.1969	7/32"	1120.06000	1120.06001
6.50 - 5.50	0.2559 - 0.2165	1/4"	1120.06500	1120.06501
7.00 - 6.00 *	0.2756 - 0.2362	-	1120.07000	1120.07001
7.50 - 6.50	0.2953 - 0.2559	9/32"	1120.07500	1120.07501
8.00 - 7.00 *	0.3150 - 0.2756	5/16"	1120.08000	1120.08001
8.50 - 7.50	0.3347 - 0.2953	-	1120.08500	1120.08501
9.00 - 8.00 *	0.3543 - 0.3150	11/32"	1120.09000	1120.09001
9.50 - 8.50	0.3740 - 0.3347	-	1120.09500	1120.09501
10.00 - 9.00 *	0.3937 - 0.3543	3/8"	1120.10000	1120.10001
10.50 - 9.50	0.4134 - 0.3740	13/32"	1120.10500	1120.10501
11.00 - 10.00 *	0.4330 - 0.3937	-	1120.11000	1120.11001
11.50 - 10.50	0.4528 - 0.4134	7/16"	1120.11500	1120.11501
12.00 - 11.00 *	0.4724 - 0.4375	15/32"	1120.12000	1120.12001
12.50 - 11.50	0.4921 - 0.4528	-	1120.12500	1120.12501
13.00 - 12.00 *	0.5118 - 0.4724	1/2"	1120.13000	1120.13001

\*Included in collet set.

# ER

## Collets



**ER 25 | ER 25-UP**  
DIN 6499/ ISO 15488

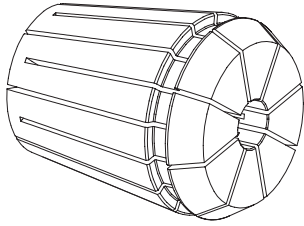
### ER 25 Standard ER 25-UP Ultra Precision

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 25 Part No.	ER 25-UP Part No.
1.00 - 0.50	0.0394 - 0.0197	1/32"	1125.01000	1125.01001
1.50 - 1.00	0.0591 - 0.0394	-	1125.01500	1125.01501
2.00 - 1.00 *	0.0787 - 0.0394	1/16"	1125.02000	1125.02001
2.50 - 1.50	0.0984 - 0.0591	3/32"	1125.02500	1125.02501
3.00 - 2.00 *	0.1181 - 0.0787	-	1125.03000	1125.03001
3.50 - 2.50	0.1378 - 0.0984	1/8"	1125.03500	1125.03501
4.00 - 3.00 *	0.1575 - 0.1181	5/32"	1125.04000	1125.04001
4.50 - 3.50	0.1772 - 0.1378	-	1125.04500	1125.04501
5.00 - 4.00 *	0.1969 - 0.1575	3/16"	1125.05000	1125.05001
5.50 - 4.50	0.2165 - 0.1772	-	1125.05500	1125.05501
6.00 - 5.00 *	0.2362 - 0.1969	7/32"	1125.06000	1125.06001
6.50 - 5.50	0.2559 - 0.2165	1/4"	1125.06500	1125.06501
7.00 - 6.00 *	0.2756 - 0.2362	-	1125.07000	1125.07001
7.50 - 6.50	0.2953 - 0.2559	9/32"	1125.07500	1125.07501
8.00 - 7.00 *	0.3150 - 0.2756	5/16"	1125.08000	1125.08001
8.50 - 7.50	0.3347 - 0.2953	-	1125.08500	1125.08501

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 25 Part No.	ER 25-UP Part No.
9.00 - 8.00 *	0.3543 - 0.3150	11/32"	1125.09000	1125.09001
9.50 - 8.50	0.3740 - 0.3347	-	1125.09500	1125.09501
10.00 - 9.00 *	0.3937 - 0.3543	3/8"	1125.10000	1125.10001
10.50 - 9.50	0.4134 - 0.3740	13/32"	1125.10500	1125.10501
11.00 - 10.00 *	0.4330 - 0.3937	-	1125.11000	1125.11001
11.50 - 10.50	0.4528 - 0.4134	7/16"	1125.11500	1125.11501
12.00 - 11.00 *	0.4724 - 0.4375	15/32"	1125.12000	1125.12001
12.50 - 11.50	0.4921 - 0.4528	-	1125.12500	1125.12501
13.00 - 12.00 *	0.5118 - 0.4724	1/2"	1125.13000	1125.13001
13.50 - 12.50	0.5315 - 0.4921	17/32"	1125.13500	1125.13501
14.00 - 13.00 *	0.5512 - 0.5118	-	1125.14000	1125.14001
14.50 - 13.50	0.5709 - 0.5315	9/16"	1125.14500	1125.14501
15.00 - 14.00 *	0.5905 - 0.5512	-	1125.15000	1125.15001
15.50 - 14.50	0.6102 - 0.5315	19/32"	1125.15500	1125.15501
16.00 - 15.00 *	0.6300 - 0.5905	5/8"	1125.16000	1125.16001
17.00 - 16.00	0.6692 - 0.6300	21/32"	1125.17000	1125.17001

\*Included in collet set.





# ER 32 | ER 32-UP

DIN 6499/ ISO 15488

## ER 32 Standard ER 32-UP Ultra Precision

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 32 Part No.	ER 32-UP Part No.
2.00 - 1.00	0.0787 - 0.0394	1/16"	I132.02000	I132.02001
2.50 - 1.50	0.0984 - 0.0591	3/32"	I132.02500	I132.02501
3.00 - 2.00 *	0.1181 - 0.0787	-	I132.03000	I132.03001
3.50 - 2.50	0.1378 - 0.0984	1/8"	I132.03500	I132.03501
4.00 - 3.00 *	0.1575 - 0.1181	5/32"	I132.04000	I132.04001
4.50 - 3.50	0.1772 - 0.1378	-	I132.04500	I132.04501
5.00 - 4.00 *	0.1969 - 0.1575	3/16"	I132.05000	I132.05001
5.50 - 4.50	0.2165 - 0.1772	-	I132.05500	I132.05501
6.00 - 5.00 *	0.2362 - 0.1969	7/32"	I132.06000	I132.06001
6.50 - 5.50	0.2559 - 0.2165	1/4"	I132.06500	I132.06501
7.00 - 6.00 *	0.2756 - 0.2362	-	I132.07000	I132.07001
7.50 - 6.50	0.2953 - 0.2559	9/32"	I132.07500	I132.07501
8.00 - 7.00 *	0.3150 - 0.2756	5/16"	I132.08000	I132.08001
8.50 - 7.50	0.3347 - 0.2953	-	I132.08500	I132.08501
9.00 - 8.00 *	0.3543 - 0.3150	11/32"	I132.09000	I132.09001
9.50 - 8.50	0.3740 - 0.3347	-	I132.09500	I132.09501
10.00 - 9.00 *	0.3937 - 0.3543	3/8"	I132.10000	I132.10001
10.50 - 9.50	0.4134 - 0.3740	13/32"	I132.10500	I132.10501
11.00 - 10.00 *	0.4330 - 0.3937	-	I132.11000	I132.11001
11.50 - 10.50	0.4528 - 0.4134	7/16"	I132.11500	I132.11501

Clamping Capacity [mm]	Clamping Capacity [Inch]	Ø [Inch]	ER 32 Part No.	ER 32-UP Part No.
12.00 - 11.00 *	0.4724 - 0.4375	15/32"	I132.12000	I132.12001
12.50 - 11.50	0.4921 - 0.4528	-	I132.12500	I132.12501
13.00 - 12.00 *	0.5118 - 0.4724	1/2"	I132.13000	I132.13001
13.50 - 12.50	0.5315 - 0.4921	17/32"	I132.13500	I132.13501
14.00 - 13.00 *	0.5512 - 0.5118	-	I132.14000	I132.14001
14.50 - 13.50	0.5709 - 0.5315	9/16"	I132.14500	I132.14501
15.00 - 14.00 *	0.5905 - 0.5512	-	I132.15000	I132.15001
15.50 - 14.50	0.6102 - 0.5709	19/32"	I132.15500	I132.15501
16.00 - 15.00 *	0.6300 - 0.5905	5/8"	I132.16000	I132.16001
16.50 - 15.50	0.6496 - 0.6102	-	I132.16500	I132.16501
17.00 - 16.00 *	0.6693 - 0.6300	21/32"	I132.17000	I132.17001
17.50 - 16.50	0.6890 - 0.6496	11/16"	I132.17500	I132.17501
18.00 - 17.00 *	0.7087 - 0.6693	-	I132.18000	I132.18001
18.50 - 17.50	0.7284 - 0.6890	23/32"	I132.18500	I132.18501
19.00 - 18.00 *	0.7480 - 0.7087	-	I132.19000	I132.19001
19.50 - 18.50	0.7677 - 0.7284	3/4"	I132.19500	I132.19501
20.00 - 19.00 *	0.7874 - 0.7480	25/32"	I132.20000	I132.20001
21.00 - 20.00	0.8267 - 0.7874	13/16"	I132.21000	I132.21001
22.00 - 21.00	0.8661 - 0.8267	-	I132.22000	I132.22001

\*Included in collet set.



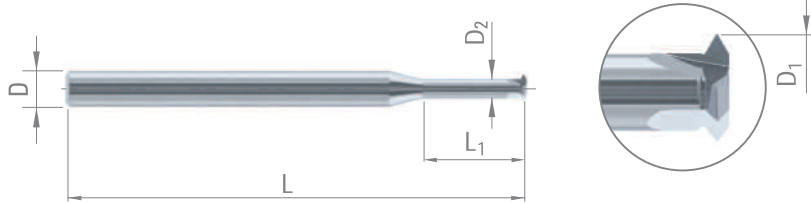
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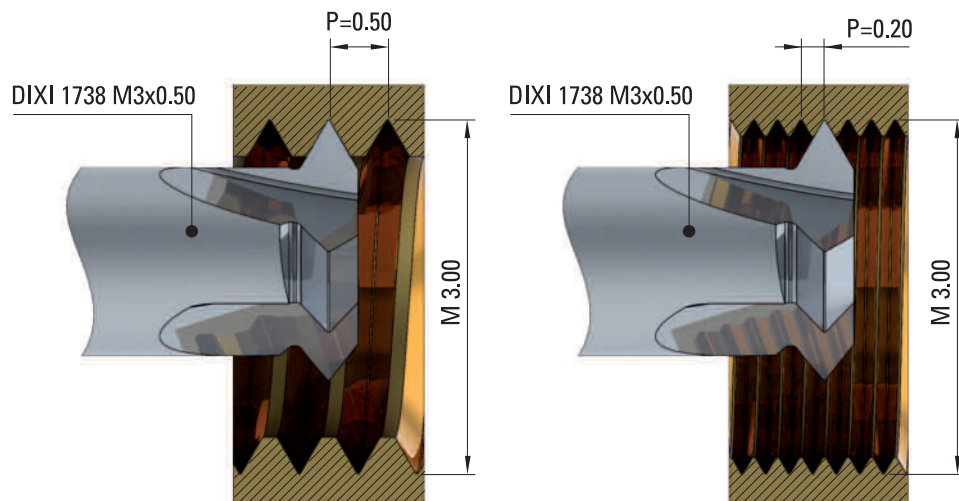

 DUPLEX  
stainless  
steel

 Refractory  
alloy

 Titanium,  
titanium  
alloy


D nom.	Pitch	Drilling Ø	D <sub>1</sub>	L <sub>1</sub>	D <sub>2</sub>	D <sub>h5</sub>	L	Z	CARBIDE CUTINOX	
S 0.70	0.175	0.56	0.54	1.80	0.23	3	38	3	984319	985156
S 0.80	0.20	0.64	0.62	2.30	0.29	3	38	3	965997	966008
S 0.90	0.225	0.72	0.70	2.50	0.35	3	38	3	965996	966007
M 1.00 S 1.00	0.25	0.80	0.78	2.80	0.38	3	38	3	964485	966006
M 1.20 S 1.20	0.25	1.00	0.98	3.40	0.62	3	38	3	965664	965943
M 1.40 S 1.40	0.30	1.15	1.12	4.00	0.68	3	38	3	965988	965999
M 1.40	0.20	1.22	1.18	4.00	0.74	3	38	3	965989	965998
M 1.60	0.35	1.30	1.26	4.50	0.72	3	38	3	965990	966000
M 1.80	0.35 (0.20)	1.50	1.45	5.10	0.77	3	38	3	965991	966001
		1.62	1.45	5.10	0.77	3	38	3		
M 2.00	0.40 (0.20)	1.65	1.60	5.60	0.85	3	38	3	965992	966002
		1.82	1.60	5.60	0.85	3	38	3		
M 2.20	0.45 (0.25)	1.80	1.70	6.20	0.91	3	38	3	965993	966003
		1.93	1.70	6.20	0.91	3	38	3		
M 2.50	0.45 (0.35) (0.25) (0.20)	2.10	2.00	7.00	1.20	3	38	3	965994	966004
		2.15	2.00	7.00	1.20	3	38	3		
		2.25	2.00	7.00	1.20	3	38	3		
		2.30	2.00	7.00	1.20	3	38	3		
M 3.00	0.50 (0.35) (0.25) (0.20)	2.50	2.40	8.40	1.60	3	38	3	965995	966005
		2.65	2.40	8.40	1.60	3	38	3		
		2.75	2.40	8.40	1.60	3	38	3		
		2.80	2.40	8.40	1.60	3	38	3		

Un seul outil pour usiner plusieurs pas (exemple, de 0.20 à 0.50)



## WHIRLING TOOLS

Z = 3-6

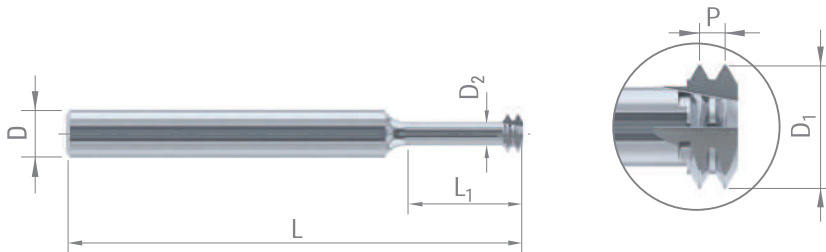
$$L_1 = 2 \times \varnothing \text{ nom.}$$



P. 261



P. 262

ISO  
60°

Steel + Pb	Low alloyed steel	High alloyed steel	DUPLEX stainless steel	Steel Hardened cast iron
Cast iron	Refractory alloy	Titanium, titanium alloy	Cu alloy Silver Gold	Cu alloy difficult to machine
Alu	Graphite	Plastic		

D nom.	Pitch	D <sub>1</sub>	L <sub>1</sub>	D <sub>2</sub>	D <sub>h5</sub>	L	Z	CARBIDE	TiAIN
M 0.8	0.20	0.60	1.85	0.27	3	38	3	958853	960446
M 0.9	0.225	0.66	2.10	0.33	3	38	3	953216	960117
M 1.0	0.25	0.73	2.30	0.34	3	38	3	953217	960118
M 1.2	0.25	0.92	2.80	0.53	3	38	3	953218	960450
M 1.4	0.30	1.05	3.20	0.60	3	38	3	953219	960451
M 1.6	0.35	1.21	3.70	0.69	3	38	3	953220	960453
M 1.8	0.20	1.41	4.10	0.89	3	38	3	961128	961130
M 1.8	0.35	1.41	4.10	0.89	3	38	3	953221	960454
M 2.0	0.40	1.55	4.60	0.96	3	38	3	953222	960455
M 2.2	0.20	1.72	5.10	1.08	3	38	3	961129	961132
M 2.2	0.45	1.72	5.10	1.08	3	38	3	953223	960456
M 2.5	0.25	2.00	5.80	1.35	3	38	3	960062	960459
M 2.5	0.35	2.00	5.80	1.35	3	38	3	960063	960460
M 2.5	0.45	2.00	5.80	1.35	3	38	3	953225	960461
M 3.0	0.50	2.44	7.00	1.70	4	42	3	955698	960462
M 4.0	0.70	3.20	9.30	2.25	4	42	3	955699	960463
M 5.0	0.80	4.00	11.50	2.80	6	57	4	957925	960464
M 6.0	1.00	4.85	13.80	3.15	6	57	4	957982	960465
M 8.0	1.25	6.50	18.40	4.65	8	75	6	958039	960466
M 10.0	1.50	7.90	23.00	5.60	8	75	6	958040	960467

## CUTTING CONDITIONS

## MACHINING WITH A FIXED WORKPIECE

Materials to be machined			CARBIDE		TiAlN		CUTINOX	
			Vc [m/min]		Vc [m/min]		Vc [m/min]	
<b>P</b>	Unalloyed steel / Low alloyed steel	< 600 N/mm <sup>2</sup>	65	80	70	100		
<b>P</b>	Unalloyed steel / Low alloyed steel	600 – 1500 N/mm <sup>2</sup>			40	60		
<b>P</b>	High alloyed steel	700 – 1500 N/mm <sup>2</sup>			25	50	60	80
<b>M</b>	Stainless steel	400 – 700 N/mm <sup>2</sup>	35	40	40	60	70	90
<b>M</b>	DUPLEX stainless steel	> 800 N/mm <sup>2</sup>			25	50	60	80
<b>K</b>	Tool steel and cast iron	> 1500 N/mm <sup>2</sup> (50 - 65 HRC)	65	80	70	100		
<b>K</b>	Grey cast iron / Nodular pearlitic iron	< 250 HB	35	40	40	60		
<b>K</b>	Alloyed cast iron / Nodular pearlitic iron	> 250 HB	35	40	40	60		
<b>S</b>	Special alloys / Heat resistant stainless steel	Inconel Nimonic Hastelloy			25	50	40	60
<b>S</b>	Titanium, titanium alloys		15	35				
<b>N</b>			100	200				
<b>N</b>								
<b>N</b>								

## MACHINING ON A SWISS-TURNING MACHINE - Workpiece turns

Materials to be machined		CARBIDE	fz [mm] Pitch 0.20 - 0.25	fz [mm] Pitch 0.30 - 0.35	fz [mm] Pitch 0.40 - 0.50	fz [mm] Pitch 0.70 - 1.00
		Vc [m/min]				
<b>P</b>	Steel	50 - 100	0.002 - 0.004	0.002 - 0.004	0.003 - 0.006	0.005 - 0.013
<b>M</b>	Stainless steel	40 - 80	0.002 - 0.003	0.002 - 0.004	0.002 - 0.005	0.004 - 0.01
<b>S</b>	Titanium, titanium alloys	50 - 90	0.002 - 0.003	0.002 - 0.004	0.002 - 0.005	0.004 - 0.01
<b>N</b>	Copper alloys	60 - 150	0.002 - 0.005	0.002 - 0.006	0.003 - 0.007	0.005 - 0.013

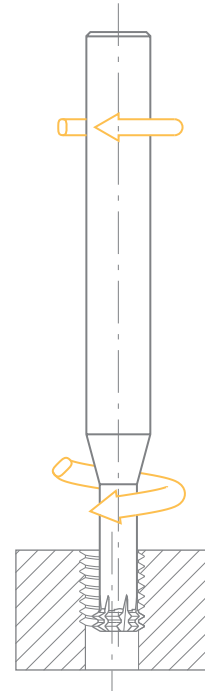
$$n \text{ (tr/min)} = \frac{V_c \text{ (m/min)} \times 1000}{\pi \times D_1 \text{ (mm)}}$$

$$V_f \text{ (mm/min)} = n \text{ (tr/min)} \times f_z \text{ (mm)} \times z$$

Feed per tooth

$f_z \text{ (mm)}$

$\emptyset D_1$ 0.20 - 0.60	$\emptyset D_1$ 0.60 - 1.20	$\emptyset D_1$ 1.20 - 2.00	$\emptyset D_1$ 2.00 - 3.00	$\emptyset D_1$ 3.00 - 5.00	$\emptyset D_1$ 5.00 - 8.00
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07
0.003 - 0.006	0.004 - 0.01	0.01 - 0.03	0.02 - 0.04	0.03 - 0.05	0.04 - 0.07



Example for M2 x 0.40 in titanium, DIXI 1730  $\emptyset D_1 = 1.55$

❶ Tool rotation  $n \text{ (min}^{-1}\text{)} = \frac{1000 \times V_c}{\pi \times \emptyset D_1}$

$$\frac{1000 \times 90}{(\pi \times 1.55)} \Rightarrow 19'000 \text{ min}^{-1}$$

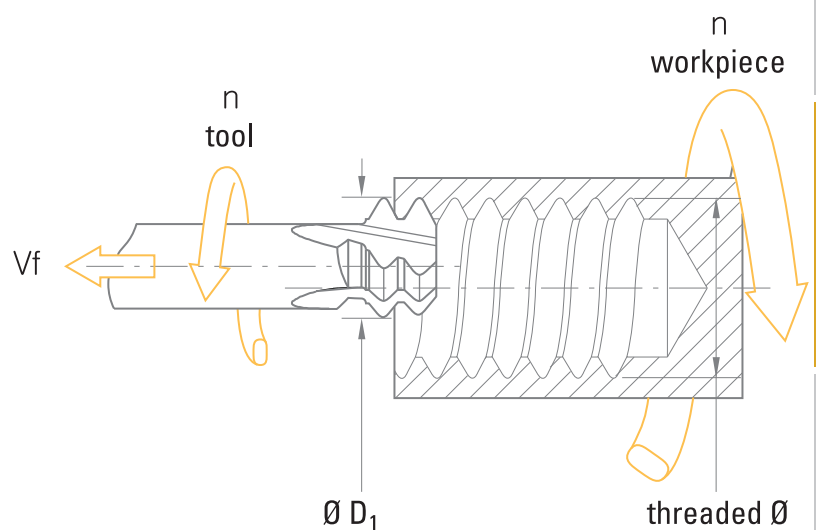
❷ Feed  $V_f \text{ mm/min} = n \times f_z \times z$

$$19'000 \times 0.004 \times 3 = 223 \text{ mm/min}$$

❸ Piece rotation  $\text{min}^{-1} = \frac{V_f}{\text{threaded } \emptyset \times \pi}$

$$\frac{223}{M2 \times \pi} \Rightarrow 36 \text{ min}^{-1}$$

When necessary, convert in degrees  $nb^\circ = \text{min}^{-1} \times 360^\circ \Rightarrow 36 \text{ min}^{-1} \times 360^\circ = 12960^\circ$









# manigley



**MANIGLEY SWISS**

Table of contents for thread plug gauges/rauges



				
	701	703	704	714
M	•	•	•	•
MF	•	•	•	•
UNC	•	•	•	•
UNF	•	•	•	•
UNEF	•	•	•	
G	•	•	•	

8. REAL

9. LOUIS

10. PCM

11. WTO

12. REGOFIX

13. DIXI

14. Manigley



# DIN ISO 1502

**M**

\*ISO-5H 701 / 703  
\*ISO-6H 704 / 714

ISO-6H  
ISO-6g

701



703



704



714



Class of tolerance Type of gauge d	ISO(6H) go Art.	ISO(6H) go/no go Art.	ISO(6H) go Art.	ISO(6g) no go Art.
M1*	42315	27359	34878	17345
M1.2*	42366	44938	34894	17353
M1.4*	42382	45640	34908	17361
M1.6	29858	45624	34916	17388
M1.7	57398	45616	36307	
M1.8	42390	45969	34940	17396
M2	29939	44776	34959	17418
M2.2	29971	44970	34967	19860
M2.3	41823	55328	36323	
M2.5	40436	46868	34983	20117
M2.6	42420	46078	34991	20184
M3	42439	28525	35009	20192
M3.5	42463	48763	35017	20206
M4	40584	49670	35025	22209
M4.5	40657	57843	35033	22217
M5	40665	63649	35041	22225
M6	57231	63703	56480	22241
M7	40479	63762	35068	22268
M8	42528	63819	35076	22284
M9	85057	85049		
M10	42552	63878	35084	22306
M11	42560	63924	35092	22314
M12	42587	63959	35106	22322
M14	42609	64009	35114	22330
M16	40959	64068	35122	22349
M18	29785	64114	35130	22365
M20	41041	64165	35149	22373
M22	29793	64238	35157	22381
M24	41092	64289	35165	22403
M27	41106	64335	35173	22411
M30	41122	64394	35181	22438
M33	29807	64440	56499	22446
M36	29815	64491	35203	22454
M39	41297	64556	35211	26875
M42	29823	64602	56502	26883
M45	29831	64653	35238	26891
M48	51950	64726	35246	26905
M52	29866	64777	25259	36129

# DIN ISO 1502

**MF**

\*ISO-4H 701 / 703  
\*ISO-4h 704 / 714

ISO-6H  
ISO-6g

701



703



704



714



Class of tolerance

Type of gauge

d

ISO(6H)

go

Art.

ISO(6H)

go/no go

Art.

ISO(6g)

go

Art.

ISO(6g)

no go

Art.

MF2*	28878	28886	35262	
MF2.2*	29025	29033	35270	
MF2.5	29076	29084	35297	44504
MF3	29165	29173	35319	44512
MF3.5	29238	29246	35327	44598
MF4	28304	28312	35335	44601
MF4.5	28401	28428	35343	44628
MF5	27839	27847	35351	44636
MF6	27898	27901	56510	44962
MF7	27952	27960	35378	44997
MF8	28002	28010	35386	45004
MF8	25607	25615	35408	45055
MF9	40819	40835	39535	
MF9	40878	40916	39543	49263
MF10	26980	25305	35394	49352
MF10	46485	46493	35416	49360
MF10	46574	46582	35521	49557
MF11	25437	25445	39551	
MF11	25569	25542	39578	49654
MF12	27626	27634	35424	49662
MF12	27103	27111	56529	49697
MF12	47651	47686	35556	49719
MF14	47775	47759	35432	49727
MF14	47899	47902	35548	49735
MF14	47953	47961	35564	49778
MF15	48593	48607	35440	49824
MF15	48658	48666	35572	49859
MF16	48704	48712	35459	49891
MF16	48771	48798	35580	50709
MF17	46132	46140	39586	
MF18	46191	45063	35467	50970
MF18	45136	45144	35599	51225
MF18	45195	45209	40150	51802
MF20	45241	45268	35475	51977
MF20	45314	45322	35602	51985
MF20	45454	45403	40509	53090
MF22	49476	49484	35483	54917
MF22	49522	49549	35610	54925
MF22	49220	49212	40568	54933
MF24	46280	46299	35491	54941
MF24	48348	48364	35629	54968
MF24	48437	48496	35785	55077
MF25	44784	44792	35505	55085
MF25	44849	44857	35637	55298
MF25	48038	48046	35793	55301
MF26	48143	48151	40606	55352
MF27	47090	47120	40827	55638
MF27	47228	47236	35645	55646
MF27	47325	47333	35087	57312
MF28	47406	47414	41033	57320

8. REAL

9. LOUIS

10. PCM

11. WTO

12. REGOFIX

13. DIXI

14. Manigley

## ANSI/ASME B1.2



701



703



704



714



Norm/Norme/  
Norm  
Class of tolerance  
Type of gauge

p*	d Nom.	d	ANSI/ASME B1.2 2B		ANSI/ASME B1.2 2B		ANSI/ASME B1.2 -2A	
			go	Art.	go/no go	Art.	go	Art.
0.397	1.854	1-64 UNC	Art.	41831	Art.	34479	Art.	43338
0.454	2.184	2-56 UNC		41920		34487		43346
0.529	2.515	3-48 UNC		42501		34495		43354
0.635	2.845	4-40 UNC		43540		34509		43362
0.635	3.175	5-40 UNC		42692		34517		43389
0.794	3.505	6-32 UNC		42196		34525		43397
0.794	4.166	8-32 UNC		42226		34541		43400
1.058	4.826	10-24 UNC		42227		56448		43419
1.058	5.486	12-24 UNC		43567		34568		43435
1.270	6.350	1/4 -20 UNC		43575		34576		43443
1.411	7.938	5/16 -18 UNC		43583		34584		43451
1.588	9.525	3/8 -16 UNC		43605		34592		43478
1.814	11.113	7/16 -14 UNC		43621		34606		43486
1.954	12.700	1/2 -13 UNC		78220		34614		43494
2.117	14.288	9/16 -12 UNC		43648		34622		43508
2.309	15.875	5/8 -11 UNC		43710		34630		43516
2.540	19.050	3/4 -10 UNC		43796		34649		43524
2.822	22.225	7/8 -9 UNC		43818		34657		43556
3.175	25.400	1"-8 UNC		43826		34665		43966
3.629	28.575	1 1/8 -7 UNC		43842		35513		43974
3.629	31.750	1 1/4 -7 UNC		43869		35696		44423
4.233	34.925	1 3/8 -6 UNC		43893		35882		44431
4.233	38.100	1 1/2 -6 UNC		43915		35947		44458
5.080	44.450	1 3/4 -5 UNC		43931		35955		44466
5.644	50.800	2"-4,5 UNC		43958		35971		44474

G

## ANSI/ASME B1.2

0.794	5.496	12-32 UNEF	70101	64939	48224	68411
0.794	6.350	1/4 -32 UNEF	70102	64947	48232	68438
0.794	7.938	5/16 -32 UNEF	70103	64955	48267	71400
0.794	9.525	3/8 -32 UNEF	70104	64963	48275	68446
0.907	11.112	7/16 -28 UNEF	70105	64971	48453	68462
0.907	12.700	1/2 -28 UNEF	70106	64998	48526	68470
1.058	14.288	9/16 -24 UNEF	70107	65005	48755	68489
1.058	15.875	5/8 -24 UNEF	70108	65013	48801	68497
1.270	19.050	3/4 -20 UNEF	70109	65021	48844	68500
1.270	22.225	7/8 -20 UNEF	70110	65048	48852	68519
1.270	25.400	1-20 UNEF	70111	65056	48879	68527

p\*= Pitch in mm

## ANSI/ASME B1.2

**UNF**
**2B  
2A**

Norm/Norme/  
Norm  
Class of tolerance  
Type of gauge  
p\*

701



703



704



714



ANSI/ASME B1.2

ANSI/ASME B1.2

2B

2B

-2A

-2A

go

go/no go

go

go no go

d Nom.	d		Art.	Art.	Art.	Art.
0.318	1.524	0-80 UNF	43125	34673	46353	68152
0.353	1.854	1-72 UNF	42978	34681	46361	68160
0.397	2.184	2-64 UNF	49395	56456	46388	68179
0.454	2.515	3-56 UNF	42986	34703	46647	68187
0.529	2.845	4-48 UNF	42994	34711	46655	68195
0.577	3.175	5-44 UNF	43001	34738	46663	68209
0.635	3.505	6-40 UNF	43028	31852	46671	68217
0.706	4.166	8-36 UNF	43680	34746	46795	68225
0.794	4.826	10-32 UNF	43702	34754	46809	68233
0.907	5.486	12-28 UNF	43036	34762	46876	68241
0.907	6.350	1/4 -28 UNF	43044	34770	46884	68268
1.058	7.938	5/16 -24 UNF	42900	34789	46892	68276
1.058	9.525	3/8 -24 UNF	43745	34797	46930	68284
1.270	11.112	7/16 -20 UNF	43052	34800	46973	68292
1.270	12.700	1/2 -20 UNF	43060	34819	46981	68306
1.411	14.288	9/16 -18 UNF	43761	34827	47301	68314
1.411	15.875	5/8 -18 UNF	57363	34835	47139	68322
1.588	19.050	3/4 -16 UNF	43788	34843	47449	68330
1.814	22.225	7/8 -14 UNF	43079	34851	47465	68349
2.117	25.400	1" -12 UNF	57371	56472	47503	68357
2.117	28.575	1 1/8 -12 UNF	43087	57789	47546	
2.117	31.750	1 1/4 -12 UNF	43095	57797	47554	
2.117	34.925	1 3/8 -12 UNF	43109	57819	47996	
2.117	38.100	1 1/2 -12 UNF	43117	57835	48208	

p\* = Pitch in mm

**G**

## DIN EN ISO 228-2

d	P		DIN EN ISO 228-2	DIN EN ISO 228-2	DIN EN ISO 228-2	
0.907	9.728	G 1/8 28	27006	27448	36188	
1.337	13.157	G 1/4 19	27014	27472	36196	
1.337	16.662	G 3/8 19	27057	27502	56618	
1.814	20.995	G 1/2 14	27200	27553	36218	
1.814	22.911	G 5/8 14	27235	27596	36226	
1.814	26.441	G 3/4 14	27243	27677	36234	
1.814	30.201	G 7/8 14	27251	27731	36242	
2.309	33.249	G1 11	27278	27774	3625	
2.309	37.897	G1 1/8 11	27286	27871	36269	
2.309	41.910	G1 1/4 11	27294	28029	36277	
2.309	44.323	G1 3/8 11	27308	28185	36285	
2.309	47.803	G1 1/2 11	27316	28223	36293	
2.309	53.746	G1 11	27324	28266	36315	
2.309	59.614	G2 1/4 11	27367	28347	36331	
2.390	65.710	G2 1/2 11	27375	28398	56626	
2.309	75.184	G2 3/4 11	27383	28592	36358	
2.309	81.534	G2 11	27391	29676	36366	
2.309	87.884	G3 11	27405	28827	36374	

p\* = Pitch in mm p = threads/1"

## 진성홀더 (HOLDER)

DIAMETAL Y축홀더 (10R, 12R)	너링 홀더 $\phi 8.9$ (8R, 8L)	드릴 홀더
		
배면 나사 홀더 (BIMU)	배면 너링홀더 ( $\phi 16 \times \phi 8.9$ )	배면 홀더 DCGT(ISO)
		
배면홀더 VCGT (ISO)	보링 슬리브	보링 슬리브-1
		
스타전용 배면 보링 슬리브	스타전용 배면 홀더 DCGT (ISO)	쌍다이 너링 홀더
		
일자너링 홀더 14.5	커터 홀더 ( $\phi 9 \times \phi 5$ , $\phi 10 \times \phi 6$ )	스타전용 링
		

## 절삭조건표

### 1. 절삭속도

$$V = \frac{\pi DN}{1000} \quad (\text{m/min}) \quad \begin{array}{l} \pi = 3.14 \\ D = \text{소재 } \phi \end{array}$$

### 2. 회전수

$$N = \frac{1000 \times V}{\pi D} \quad (\text{rpm/min})$$

### 3. 분당이송

$$F = N \times Z \times f \quad \begin{array}{l} Z = \text{날수} \\ f = \text{회전당 이송 (rev)} \end{array}$$

### 4. 커팅시간

$$L_T = \frac{L_{mm}}{F} \quad \begin{array}{l} L_m = \text{가공길이} \\ F = \text{분당이송} \end{array} \quad \begin{array}{l} \text{ex) } L_m : 100\text{mm (가공길이)} \\ F : 50\text{mm (피트)} \end{array}$$

$$\ast \frac{100(\text{가공길이})}{50(\text{피트})} = 2 \times 60\text{sec} = 120\text{ sec (2분)}$$

### 5. T&T Time □ Tool Change 시간

### 6. R&T Time □ 기계 Rapid 속도

### 7. 정미효율 □ 75%적용



# 나사절입량과 패스 수

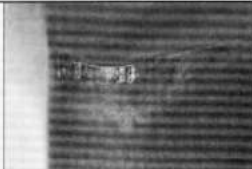



■ 11/16/22( 정삭날 ) 타입

( 절입량은 편축을 나타냅니다 )

종류	피치·산수 mm·산/inch	규격	(구규격)	C (mm)	※공정 입량 (mm)	패스 수 (회)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
미터 나사	수 나사	0.50mm	16E%	050ISO	TNN32E%	050M	0.33	0.38	4	0.14	0.12	0.08	0.04															
		0.75mm		075ISO		075M	0.48	0.53	5	0.17	0.14	0.10	0.08	0.04														
		1.00mm		100ISO		100M	0.64	0.72	5	0.23	0.19	0.15	0.10	0.05														
		1.25mm		125ISO		125M	0.80	0.88	6	0.26	0.21	0.16	0.12	0.08	0.05													
		1.50mm		150ISO		150M	0.95	1.03	6	0.26	0.24	0.21	0.16	0.11	0.05													
		1.75mm		175ISO		175M	1.11	1.19	8	0.26	0.22	0.19	0.16	0.13	0.10	0.08	0.05											
		2.00mm		200ISO		200M	1.27	1.35	10	0.26	0.21	0.18	0.16	0.14	0.12	0.10	0.08	0.05	0.05									
		2.50mm		250ISO		250M	1.57	1.65	12	0.26	0.23	0.21	0.18	0.14	0.12	0.12	0.10	0.10	0.08	0.06	0.05							
	암 나사	3.00mm	22E%	300ISO	TNN43E%	300M	1.87	1.95	14	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.10	0.08	0.08	0.05	0.02					
		3.50mm		350ISO		350M	2.18	2.26	15	0.28	0.25	0.22	0.20	0.20	0.18	0.16	0.15	0.15	0.12	0.10	0.10	0.08	0.05	0.02				
		4.00mm		400ISO		400M	2.48	2.56	17	0.28	0.25	0.24	0.22	0.20	0.18	0.16	0.15	0.15	0.14	0.12	0.12	0.10	0.10	0.08	0.05	0.02		
		4.50mm		450ISO		450M	2.79	2.87	18	0.30	0.28	0.26	0.24	0.22	0.20	0.18	0.16	0.16	0.14	0.14	0.13	0.12	0.10	0.10	0.07	0.05	0.02	
		5.00mm		500ISO		500M	3.10	3.18	19	0.30	0.28	0.27	0.26	0.23	0.20	0.18	0.18	0.17	0.16	0.16	0.15	0.15	0.13	0.12	0.10	0.07	0.05	0.02
		0.50mm	11I%	050ISO	TNN22I%	050M	0.31	0.36	4	0.14	0.10	0.08	0.04															
		0.75mm		075ISO		075M	0.45	0.50	5	0.15	0.14	0.10	0.07	0.04														
		1.00mm		100ISO		100M	0.60	0.68	5	0.20	0.18	0.15	0.11	0.04														
		1.25mm		125ISO		125M	0.74	0.82	7	0.20	0.18	0.14	0.12	0.08	0.06	0.04												
		1.50mm		150ISO		150M	0.88	0.96	8	0.24	0.18	0.14	0.10	0.10	0.08	0.07	0.05											
		1.75mm		175ISO		175M	1.02	1.10	9	0.24	0.18	0.16	0.14	0.10	0.10	0.08	0.05	0.05										
	암 나사	1.00mm	16I%	100ISO	TNN32I%	100M	0.60	0.68	5	0.20	0.18	0.15	0.11	0.04														
		1.25mm		125ISO		125M	0.74	0.82	7	0.20	0.18	0.14	0.12	0.08	0.06	0.04												
		1.50mm		150ISO		150M	0.88	0.96	8	0.22	0.18	0.14	0.12	0.10	0.08	0.07	0.05											
		1.75mm		175ISO		175M	1.02	1.10	9	0.22	0.18	0.16	0.14	0.12	0.10	0.08	0.05	0.05										
		2.00mm		200ISO		200M	1.18	1.26	10	0.24	0.20	0.18	0.14	0.12	0.10	0.10	0.08	0.05	0.05									
		2.50mm		250ISO		250M	1.46	1.54	12	0.26	0.22	0.18	0.16	0.14	0.12	0.10	0.10	0.08	0.08	0.05	0.05							
		3.00mm	22I%	300ISO	TNN43I%	300M	1.76	1.84	14	0.26	0.24	0.21	0.18	0.16	0.15	0.13	0.12	0.10	0.10	0.07	0.05	0.05	0.02					
		3.50mm		350ISO		350M	2.05	2.13	15	0.26	0.24	0.22	0.20	0.17	0.17	0.14	0.14	0.12	0.12	0.10	0.10	0.08	0.05	0.02				
		4.00mm		400ISO		400M	2.34	2.42	17	0.26	0.24	0.22	0.20	0.18	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.10	0.10	0.05	0.05	0.02		
		4.50mm		450ISO		450M	2.63	2.71	18	0.27	0.26	0.24	0.22	0.22	0.20	0.18	0.17	0.15	0.13	0.13	0.12	0.12	0.10	0.10	0.05	0.05	0.02	
		5.00mm		500ISO		500M	2.92	3.00	19	0.28	0.26	0.24	0.22	0.20	0.20	0.18	0.18	0.16	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.10	0.05	0.05
인치 나사	수 나사	24 산 /inch	16E%	24UN	TNN32E%	24UN	0.67	0.75	5	0.24	0.20	0.16	0.10	0.05														
		20 산 /inch		20UN		20UN	0.80	0.88	6	0.24	0.20	0.16	0.13	0.10	0.05													
		18 산 /inch		18UN		18UN	0.89	0.97	6	0.26	0.22	0.18	0.15	0.11	0.05													
		16 산 /inch		16UN		16UN	1.01	1.09	7	0.26	0.22	0.18	0.15	0.12	0.11	0.05												
		14 산 /inch		14UN		14UN	1.15	1.23	8	0.26	0.22	0.18	0.16	0.14	0.12	0.10	0.05											
		12 산 /inch		12UN		12UN	1.34	1.42	11	0.26	0.22	0.18	0.16	0.13	0.12	0.10	0.08	0.07	0.05	0.05								
		8 산 /inch	22E%	08UN	TNN43E%	08UN	1.98	2.06	15	0.30	0.26	0.22	0.20	0.16	0.15	0.14	0.13	0.10	0.10	0.10	0.07	0.06	0.05	0.02				
		24 산 /inch	16I%	24UN	TNN32I%	24UN	0.62	0.70	5	0.22	0.19	0.15	0.10	0.04														
	암 나사	20 산 /inch		20UN		20UN	0.75	0.83	6	0.22	0.20	0.16	0.12	0.08	0.05													
		18 산 /inch		18UN		18UN	0.83	0.91	6	0.24	0.18	0.16	0.14	0.10	0.05													
		16 산 /inch		16UN		16UN	0.94	1.02	7	0.24	0.20	0.18	0.14	0.11	0.10	0.05												
		14 산 /inch		14UN		14UN	1.07	1.15	8	0.24	0.22	0.18	0.14	0.12	0.10	0.10	0.05											
		12 산 /inch		12UN		12UN	1.24	1.32	11	0.24	0.22	0.16	0.15	0.12	0.10	0.10	0.07	0.07	0.05	0.04								
		8 산 /inch	22I%	08UN	TNN43I%	08UN	1.84	1.92	15	0.24	0.22	0.20	0.18	0.16	0.14	0.13	0.12	0.12	0.10	0.10	0.09	0.05	0.05	0.02				
	수 나사	19 산 /inch	16E%	19W	TNN32E%	19W	0.89	0.97	6	0.27	0.22	0.18	0.15	0.10	0.05													
		14 산 /inch		14W		14W	1.19	1.27	9	0.27	0.22	0.18	0.16	0.11	0.10	0.10	0.08	0.05										
		11 산 /inch		11W		11W	1.50	1.58	12	0.27	0.22	0.18	0.16	0.12	0.12	0.12	0.10	0.10	0.07	0.07	0.05							
	암 나사	14 산 /inch	16I%	14W	TNN32I%	14W	1.19	1.27	9	0.27	0.22	0.18	0.16	0.11	0.10	0.10	0.08	0.05										
		11 산 /inch		11W		11W	1.50	1.58	12	0.27	0.22	0.18	0.16	0.12	0.12	0.12	0.10	0.10	0.07	0.07	0.05							
		14 산 /inch	16E%	14W	TNN32E%	14W	1.19	1.27	9	0.27	0.22	0.18	0.16	0.11	0.10	0.10	0.08	0.05										
	관공 테이퍼 나사	수 나사	14 산 /inch		11W		11W	1.50	1.58	12	0.27	0.22	0.18	0.16	0.12	0.12	0.12	0.10	0.10	0.07	0.07	0.05						
28 산 /inch			16E%	28BSPT	TNN32E%	28PT	0.58	0.63	5	0.20	0.15	0.13	0.11	0.04														
19 산 /inch				19BSPT		19PT	0.86	0.94	6	0.26	0.20	0.18	0.15	0.10	0.05													
14 산 /inch				14BSPT		14PT	1.16	1.24	9	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.04										
11 산 /inch			11BSPT		11PT	1.48	1.56	12	0.26	0.22	0.18	0.16	0.12	0.12	0.11	0.10	0.10	0.07	0.07	0.05								
암 나사		28 산 /inch	11I%	28BSPT	TNN22I%	28PT	0.58	0.63	5	0.20	0.16	0.13	0.10	0.04														
		19 산 /inch		19BSPT		19PT	0.86	0.94	7	0.22	0.20	0.18	0.14	0.10	0.06	0.04												
		14 산 /inch		14BSPT		14PT	1.16	1.24	9	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.04										
		11 산 /inch	16I%	14BSPT	TNN32I%	14PT	1.16	1.24	9	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.04										
수 나사		18 산 /inch	16E%	18NPT	TNN32E%	18NPT	1.14	1.22	13	0.20	0.16	0.14	0.12	0.10	0.10	0.08	0.08</											



## ■ 공구의 손상과 그에 대한 대책

대표적인 손상형태		현상	원인	대책
선단마모 (2차 경계 마모)		• 정삭면조도 및 치수 정도에 영향	• 절삭속도가 높음 • 공구수명	• 절삭속도를 낮춤 • 내마모성이 우수한 재종으로 변경
1차 경계 마모		• 버의 발생 • 절삭저항의 증가	• 이송, 절삭속도가 높음	• 절삭성의 향상 • 절삭속도를 낮춤 • 열에 강한 재종으로 변경
크레이터 마모		• 칩처리가 열화 • 정삭면이 열화 (보풀 발생)	• 절삭속도가 높음	• 절삭속도를 낮춤 • 싸메트 또는 Al2O3코팅의 고속타입으로 변경
소 성 변 형		• 치수 변화 • 선단의 결손	• 절삭부하가 높음 • 공구재종의 미스매치	• 경도가 높은 재종으로 변경 • 이송, 절입량을 낮춤
마 모 성 결 손		• 절삭면이 급속히 열화 • 치수가 어긋남	• 절삭속도가 높음	• 공구수명 설정치가 단축 • 내마모성이 우수한 재종으로 변경
칩 핑		• 절삭저항이 증가 • 정삭면조도가 열화	• 이송이 높음 • 절삭시의 떨림 • 재종의 인성부족	• 이송, 절입량을 낮춤 • 홀더의 강성을 높임 • 인성이 높은 재종으로 변경
용 착 · 구 성 인선에 결손		• 정삭면이 열화 • 정삭저항의 증가	• 절삭속도가 낮음	• 절삭속도를 높임 • 절삭성(경사각, 챔퍼)을 좋게함
기계적 결손		• 돌발적 결손 • 수명이 불안정	• 이송, 절입량이 높음 • 절삭시의 떨림	• 인성이 좋은 재종으로 변경 • 챔퍼를 크게 함 • 코너R을 크게 함 • 홀더의 강성을 높임
열균열성 결손		• 열사이클에 의한 결손 • 단속절삭, 밀링가공에 많음	• 절삭속도, 이송이 높음	• 이송을 낮춤 • 절삭속도를 낮춤 • 건식가공을 행함
플 래 킹		• 고경도재 가공에 많음 • 떨림으로 인한 발생이 쉬움	• 팁 재종의 인성부족 • 홀더강성의 부족	• 보다 고경도인 재종으로 변경 (TiC계 세라믹->CBN) • 강성이 높은 홀더로 변경 • 인선사양의 변경

## ■ 선박 가공

[illegible]

주1) 알림의 억제 대안으로써 이송을 늦게(빠르게)하는 것이 좋은 경우가 있습니다.

주2) 보물이 없어지고 의제 대안으로 세 미션(세 가지)에 빠지게(빠르게)하는 것이 중요할 경우가 있습니다.

주3) 연감 저탄소강용 브레이커(X시리즈)에서는 절삭속도를 높게(빠르게)하는 것이 힘이 짧게 절단됩니다.

- 주1) 필름의 액체 대안으로써 이송을 늦게(빠르게)하는 것이 좋은 경우가 있습니다.
- 주2) 필름의 액체 대안으로써 점입량을 깊게 하는 것이 좋은 경우가 있습니다.
- 주3) 이송을 늦게(빠르게)하는 것이 좋은 경우가 있습니다.
- 주4) 필리컬엔드밀은 다운커링을 추천합니다.
- 주5) 절삭열에 의한 워크의 '열화'의 경우
- 주6) 에어브로우의 사용을 추천합니다.

## ■ 드릴 가공

[illegible]

주1) 선반가공에서는 중요합니다.



## ■ 선삭편

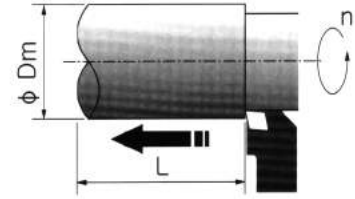
### ● 절삭속도

$$V_c = \frac{\pi \times D_m \times n}{1000}$$

$V_c$  : 절삭속도 [m/min]

$D_m$  : 피삭재 직경 [mm]

$n$  : 주축 회전수 [rpm]



### ● 소요동력

$$P_c = \frac{K_s \times V_c \times a_p \times f}{6120 \times \eta}$$

$P_c$  : 소요동력 [kW]

$P_{HP}$  : 소요동력(마력) [HP]

$V_c$  : 절삭속도 [m/min]

$a_p$  : 절입량 [mm]

$f$  : 1회전당 이송 [mm/rev]

$K_s$  : 비절삭 저항치 [kgf/mm<sup>2</sup>]

$\eta$  : 기계효율 (0.7 ~ 0.8)

Ks의 대략치		
연 강		190
중 탄 소 강		210
고 탄 소 강		240
저 합 금 강		190
고 합 금 강		245
주 철		93
가 단 주 철		120
청동·황동		70

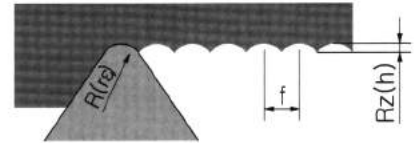
### ● 정삭면 조도

$$R_z(h) = \frac{f^2}{8 \times R(r\epsilon)} \times 1000$$

$R_z(h)$  : 이론 정삭면 조도 [ $\mu$ m]

$f$  : 1회전당 이송 [mm/rev]

$R(r\epsilon)$  : 팁의 코너 반경 [mm]



### ● 칩 배출량

$$Q = V_c \times a_p \times f$$

$Q$  : 칩 배출량 [cm<sup>3</sup>/min=cc/min]

$V_c$  : 절삭속도 [m/min]

$a_p$  : 절입량 [mm]

$f$  : 1회전당 이송 [mm/rev]

### ● 코너R(rε)을 변경한 경우의 인선 보정량

$$\Delta X = (R - R') \times \left\{ \frac{\cos\left(\frac{\alpha}{2} + (\beta - 90^\circ)\right)}{\sin\frac{\alpha}{2}} - 1 \right\}$$

$$\Delta Z = (R - R') \times \left\{ \frac{\sin\left(\frac{\alpha}{2} + (\beta - 90^\circ)\right)}{\sin\frac{\alpha}{2}} - 1 \right\}$$

$\Delta X$  : X축 방향 인선보정량 [mm]

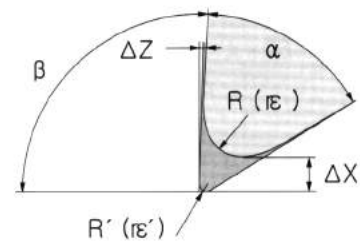
$\Delta Z$  : Z축 방향 인선보정량 [mm]

$R$  : 변경전 팁코너R [mm]

$R'$  : 변경후 팁코너R [mm]

$\alpha$  : 팁 인선각 [°]

$\beta$  : 홀더 절입각 [°]



홀더 타입	팁 인선각 α	절입각 β	ΔX	ΔZ
PCLN	80°	95°	0.100 × (R - R')	0.100 × (R - R')
PTGN	60°	91°	0.714 × (R - R')	0.030 × (R - R')
PDJN	55°	93°	0.866 × (R - R')	0.099 × (R - R')
PDHN	55°	107.5°	0.531 × (R - R')	0.531 × (R - R')
PVLN	35°	95°	2.072 × (R - R')	0.273 × (R - R')
PVPN	35°	117.5°	1.351 × (R - R')	1.351 × (R - R')
PSBN	90°	75°	0.225 × (R - R')	-0.293 × (R - R')

계산예: PCLN형 홀더를 사용하고 코너R을 0.8부터 0.4로 변경할 때의 보정량은,  
 $\Delta X = 0.100 \times (0.8 - 0.4) = 0.04(\text{mm})$

## ■ 선삭편(가공시간)

### ● 가공시간 (외경가공1 : 1패스로 가공하는 경우)

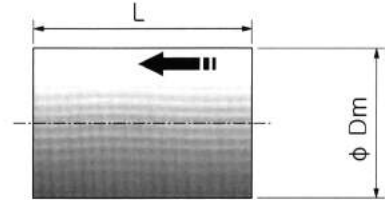
- 회전수 일정의 경우

$$T = \frac{60 \times L}{f \times n}$$

- 절삭속도 일정의 경우

$$T = \frac{60 \times \pi \times L \times D_m}{1000 \times f \times V_c}$$

T : 가공시간 [초]  
L : 가공길이 [mm]  
f : 1회전당 이송 [mm/rev]  
n : 주축 회전수 [min<sup>-1</sup>]  
Dm : 피삭재 직경 [mm]  
Vc : 절삭속도 [m/min]



### ● 가공시간 (외경 가공2 : 복수 패스로 가공하는 경우)

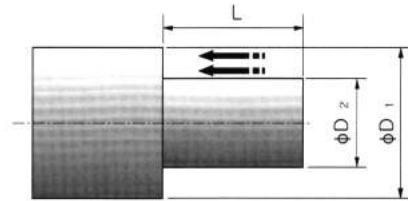
- 회전수 일정의 경우

$$T = \frac{60 \times L}{f \times n} \times N$$

- 절삭속도 일정의 경우

$$T = \frac{60 \times \pi \times L \times (D_1 + D_2)}{2 \times 1000 \times f \times V_c} \times N$$

T : 가공시간 [초]  
L : 1패스당 가공길이 [mm]  
ap : 1패스당 절입량 [mm]  
f : 1회전당 이송 [mm/rev]  
n : 주축 회전수 [min<sup>-1</sup>]  
D1 : 피삭재 최대직경 [mm]  
D2 : 피삭재 최소직경 [mm]  
Vc : 절삭속도 [m/min]  
N : 패스수 = (D1 - D2) / ap (완전히 떨어지지 않는 경우는 소수점 아래에서 반올림)



### ● 가공시간 (단면가공)

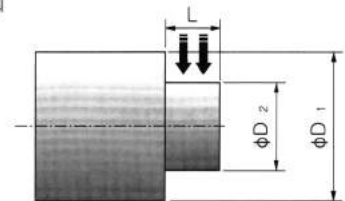
- 회전수 일정의 경우

$$T = \frac{60 \times (D_1 - D_2)}{2 \times f \times n} \times N$$

- 절삭속도 일정의 경우

$$T_1 = \frac{60 \times \pi \times (D_1 + D_2) \times (D_1 - D_2)}{4000 \times f \times V_c} \times N$$

T : 가공시간 [초]  
T1 : 최고회전수까지 도달하지 않았을 시의 가공시간(초)  
L : 가공폭 [mm]  
ap : 1패스당 절입량 [mm]  
f : 1회전당 이송 [mm/rev]  
n : 주축 회전수 [min<sup>-1</sup>]  
D1 : 피삭재 최대직경 [mm]  
D2 : 피삭재 최소직경 [mm]  
V : 절삭속도 [m/min]  
N : 패스수 = L / ap (완전히 떨어지지 않는 경우는 소수점 아래에서 반올림)



### ● 가공시간 (홀 가공)

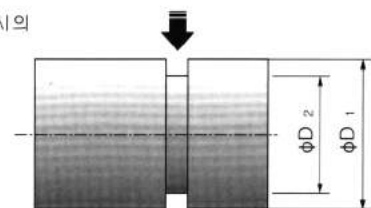
- 회전수 일정의 경우

$$T = \frac{60 \times (D_1 - D_2)}{2 \times f \times n}$$

- 절삭속도 일정의 경우

$$T_1 = \frac{60 \times \pi \times (D_1 + D_2) \times (D_1 - D_2)}{4000 \times f \times V_c}$$

T : 가공시간 [초]  
T1 : 최고회전수까지 도달하지 않았을 시의 가공시간(초)  
L : 가공길이 [mm]  
f : 1회전당 이송 [mm/rev]  
n : 주축 회전수 [min<sup>-1</sup>]  
D1 : 피삭재 최대직경 [mm]  
D2 : 피삭재 최소직경 [mm]  
Vc : 절삭속도 [m/min]



### ● 가공시간 (절단 가공)

- 회전수 일정의 경우

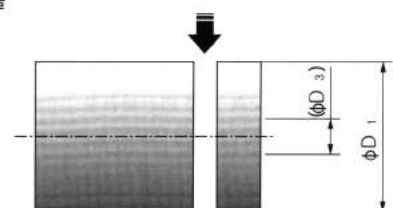
$$T = \frac{60 \times D_1}{2 \times f \times n}$$

- 절삭속도 일정의 경우

$$T_1 = \frac{60 \times \pi \times (D_1 + D_3) \times (D_1 - D_3)}{4000 \times f \times V_c}$$

$$T_3 = T_1 + \frac{60 \times D_3}{2 \times f \times n_{max}}$$

T : 가공시간 [초]  
T1 : 최고회전수까지 도달하지 않았을 시의 가공시간(초)  
T3 : 최고회전수까지 도달했을 시의 가공시간(초)  
f : 1회전당 이송 [mm/rev]  
n : 주축 회전수 [min<sup>-1</sup>]  
nmax : 주축 최고 회전수 [min<sup>-1</sup>]  
D1 : 피삭재 최대직경 [mm]  
D3 : 최고 회전수에 도달했을시의 직경 [mm]  
Vc : 절삭속도 [m/min]





# TAP 나사가공 구멍지름치수(Tapping Drill Size)

미터 보통나사							유니파이 보통나사							단위 : mm	
나사		드릴경					나사			드릴경					
호칭	피치	100%	90%	85%	80%	75%	호칭	외경	피치	100%	90%	85%	80%	75%	
M 1	0.25	0.73	0.76	0.77	0.78	0.80	NO.1-64	1.854	64	1.42	1.47	1.49	1.51	1.53	
M 1.2	0.25	0.93	0.96	0.97	0.98	1.00	2-56	2.184	56	1.69	1.74	1.77	1.79	1.82	
M 1.4	0.3	1.08	1.11	1.12	1.14	1.16	3-48	2.515	48	1.94	2.00	2.03	2.06	2.09	
M 2	0.4	1.57	1.61	1.63	1.65	1.68	4-40	2.845	40	2.16	2.23	2.26	2.30	2.33	
M 2.5	0.45	2.01	2.06	2.09	2.11	2.13	5-40	3.175	40	2.49	2.56	2.59	2.63	2.66	
M 3	0.5	2.46	2.51	2.54	2.57	2.59	6-32	3.505	32	2.65	2.73	2.77	2.82	2.86	
M 3.5	0.6	2.85	2.92	2.95	2.98	3.01	8-32	4.166	32	3.31	3.39	3.44	3.48	3.52	
M 4	0.7	3.24	3.32	3.36	3.39	3.43	10-24	4.826	24	3.68	3.79	3.85	3.91	3.97	
M 4.5	0.75	3.69	3.77	3.81	3.85	3.89	12-24	5.486	24	4.34	4.45	4.51	4.57	4.63	
M 5	0.8	4.13	4.22	4.26	4.31	4.35	1/4-20	6.350	20	4.98	5.11	5.18	5.25	5.32	
M 6	1.0	4.92	5.03	5.08	5.13	5.19	5/16-18	7.938	18	6.41	6.56	6.64	6.72	6.79	
M 7	1.0	5.92	6.03	6.08	6.13	6.19	3/8-16	9.525	16	7.81	7.98	8.06	8.15	8.24	
M 8	1.25	6.65	6.78	6.85	6.92	6.99	7/16-14	11.112	14	9.1	9.3	9.4	9.5	9.6	
M 9	1.25	7.65	7.78	7.85	7.92	7.99	1/2-13	12.700	13	10.6	10.8	10.9	11.0	11.1	
M 10	1.5	8.38	8.54	8.62	8.70	8.78	9/16-12	14.288	12	12.0	12.2	12.3	12.5	12.6	
M 11	1.5	9.38	9.54	9.62	9.70	9.78	5/8-11	15.875	11	13.4	13.6	13.8	13.9	14.0	
M 12	1.75	10.1	10.3	10.4	10.5	10.6	3/4-10	19.050	10	16.3	16.6	16.7	16.8	17.0	
M 14	2.0	11.8	12.1	12.2	12.3	12.4	7/8-9	22.225	9	19.2	19.5	19.6	19.8	19.9	
M 16	2.0	13.8	14.1	14.2	14.3	14.4	1-8	25.400	8	22.0	22.3	22.5	22.7	22.8	
M 18	2.5	15.3	15.6	15.7	15.8	16.0	윗드워즈 보통나사								
M 20	2.5	17.3	17.6	17.7	17.8	18.0									
M 22	2.5	19.3	19.6	19.7	19.8	20.0	1/16	1.5875	60	1.04	1.10	1.13	1.15	1.18	
M 24	3.0	20.8	21.1	21.2	21.4	21.6	1/8	3.175	40	2.36	2.44	2.48	2.52	2.56	
M 27	3.0	23.8	24.1	24.2	24.4	24.6	5/32	3.969	32	2.95	3.05	3.10	3.16	3.21	
M 30	3.5	26.2	26.6	26.8	27.0	27.2	3/16	4.762	24	3.41	3.54	3.61	3.68	3.75	

비고 : 위표는 KS B 1006(암나사용 구멍지름)에 따른 치수로써 요구되는 암수나사의 결합 걸림율에 해당되는 구멍지름 치수를 적용합니다.

관용나사												단위mm	
호칭	P T		P S		P F		호칭	N P T		N P S			
	기준외경	드릴경	기준외경	드릴경	기준외경	드릴경		기준외경	드릴경	기준외경	드릴경		
1/8-28	9.728	8.2	9.278	8.50	9.278	8.74	1/8-27	10.287	8.61	10.287	8.74		
1/4-19	13.157	10.9	13.157	11.40	13.157	11.70	1/4-18	13.716	11.13	13.716	11.28		
3/8-19	16.662	14.4	16.662	14.9	16.662	15.21	3/8-18	17.145	14.68	17.145	14.68		
1/2-14	20.955	18.0	20.955	18.5	20.955	19.0	1/2-14	21.336	17.86	21.336	18.26		
3/4-14	26.441	23.0	26.441	24.0	26.441	24.5	3/4-14	26.670	23.42	26.670	23.42		
1"-11	33.249	29.0	33.249	30.0	33.249	30.5	1"-11 1/2	33.401	29.36	33.401	29.36		
1 1/4-11	41.910	38.0	41.910	39.0	41.910	39.2	1 1/4-11 1/2	42.164	38.10	42.164	38.10		
1 1/2-11	47.803	44.0	47.803	45.0	47.803	45	1 1/2-11 1/2	48.260	44.04	48.260	44.45		
2"-11	59.614	55.0	59.614	56.0	59.614	57.0	2"-11 1/2	60.325	56.36	60.325	56.36		



# TAP 추천 전공드릴 직경 - 탭 기술자료

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
1" 1/2- 12 UNF	36.00	36.271	35.814
1" 1/2- 18 UNEF	36.50	36.881	36.576
1" 1/2- 8 UN	35.00	35.306	34.671
1" 5/8- 18 UNEF	39.80	40.081	39.751
1" 5/8- 8 UN	38.20	38.481	37.846
1" 5/8- 12 UN	39.20	39.446	38.969

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
1" 3/4- 5 UNC	39.50	39.827	38.964
1" 3/4- 8 UN	41.20	41.656	41.021
1" 3/4- 12 UN	42.20	42.621	42.164
2 - 4" 1/2 UNC	45.20	45.593	44.679
2 - 8 UN	47.80	48.006	47.371
2 - 12 UN	48.50	48.971	48.514

## 윌트워스 나사용 (For Whitworth Threads)

호칭치수 (Thread Size)	드릴직경 (Drill Size)(mm)	
	A	B
1/8 W40	2.65	2.60
5/32 W32	3.25	3.20
3/16 W24	3.75	3.70
1/4 W20	5.10	5.00
5/16 W18	6.60	6.50
3/8 W16	8.00	7.90
7/16 W14	9.40	9.30
1/2 W12	10.70	10.50
9/16 W12	12.30	12.00
5/8 W11	13.70	13.50
3/4 W10	16.70	16.50

호칭치수 (Thread Size)	드릴직경 (Drill Size)(mm)	
	A	B
7/8 W9	19.50	19.30
1 W8	22.40	22.00
1" 1/8 W7	25.00	24.80
1" 1/4 W7	28.30	28.00
1" 3/8 W6	30.50	30.30
1" 1/2 W6	33.80	33.50
1" 5/8 W5	36.00	35.70
1" 3/4 W5	39.20	39.00
1" 7/8 W4" 1/2	41.80	41.50
2 W4" 1/2	45.00	44.70

## PT 관용 테이퍼 나사용 (PT Taper Pipe Threads)

호칭치수 (Thread Size)	드릴직경 (Drill Size)(mm)		유효나사부 길이 (최소) 에 대한 압나사 내경 (mm) (Internal Thread Minot Dia. on (Min) Length of Useful Thread)	기준길이 (최소) 에 대한 압나사 내경 (mm) (Internal Thread Minor Dia. on (Min) Gauge Length)
	리이머 사용시 (mm) (With Reaming Before Tapping)	리이머 비사용시 (mm) (Without Reaming Before Tapping)		
PT 1/16 - 28	6.10	6.20	6.244	6.384
PT 1/8 - 28	8.10	8.20	8.249	8.388
PT 1/4 - 19	10.70	11.00	10.952	11.174
PT 3/8 - 19	14.20	14.50	14.448	14.658
PT 1/2 - 14	17.60	18.00	17.979	18.263
PT 3/4 - 14	23.00	23.50	23.378	23.683
PT 1 - 11	29.00	29.50	29.459	29.822
PT 1" 1/4 - 11	37.50	38.00	37.976	38.339
PT 1" 1/2 - 11	43.40	44.00	43.869	44.232
PT 2 - 11	54.90	55.50	55.412	55.844

## PS 관용 평행 나사용 (PS Straight Pipe Threads)

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
PS 1/16 - 28	6.50	6.632	6.490
PS 1/8 - 28	8.50	8.637	8.495
PS 1/4 - 19	11.40	11.549	11.341
PS 3/8 - 19	15.00	15.054	14.846
PS 1/2 - 14	18.50	18.772	18.489

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
PS 3/4 - 14	24.00	24.259	23.975
PS 1 - 11	30.20	30.471	30.111
PS 1" 1/4 - 11	38.80	39.132	38.772
PS 1" 1/2 - 11	44.80	45.025	44.665
PS 2 - 11	56.50	56.836	56.476

# TAP 추천 전공드릴 직경 - 탭 기술자료

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
M36 × 3	33.00	33.252	32.752
M36 × 2	34.00	34.210	33.835
M36 × 1.5	34.50	34.676	34.376
M38 × 1.5	36.50	36.676	36.376
M39 × 4	35.00	35.270	34.670
M39 × 3	36.00	36.252	35.752
M39 × 2	37.00	37.210	36.835
M39 × 1.5	37.50	37.676	37.376
M40 × 3	37.00	37.252	36.752
M40 × 2	38.00	38.210	37.835
M40 × 1.5	38.50	38.676	38.376
M42 × 4.5	37.50	37.799	37.129
M42 × 4	38.00	38.270	37.670
M42 × 3	39.00	39.252	38.752
M42 × 2	40.00	40.210	39.835

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
M42 × 1.5	40.50	40.676	40.376
M45 × 4.5	40.50	40.790	40.129
M45 × 4	41.00	41.270	40.670
M45 × 3	42.00	42.252	41.752
M45 × 2	43.00	43.210	42.835
M45 × 1.5	43.50	43.676	43.376
M48 × 5	43.00	43.297	42.587
M48 × 4	44.00	44.270	43.670
M48 × 3	45.00	45.252	44.752
M48 × 2	46.00	46.210	45.835
M48 × 1.5	46.50	46.676	46.376
M50 × 3	47.00	47.252	46.752
M50 × 2	48.00	48.210	47.835
M50 × 1.5	48.50	48.676	48.376

## 유니파이 나사용 (For Unified Threads)

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
#2 - 56 UNC	1.80	1.871	1.696
#2 - 64 UNF	1.85	1.912	1.756
#3 - 48 UNC	2.10	2.146	1.941
#3 - 56 UNF	2.10	2.197	2.025
#4 - 40 UNC	2.30	2.385	2.157
#4 - 48 UNF	2.40	2.458	2.271
#5 - 40 UNC	2.60	2.697	2.487
#5 - 44 UNF	2.70	2.740	2.551
#6 - 32 UNC	2.80	2.895	2.642
#6 - 40 UNF	2.90	3.022	2.820
#8 - 32 UNC	3.40	3.530	3.302
#8 - 36 UNF	3.50	3.606	3.404
#10 - 24 UNC	3.90	3.962	3.683
#10 - 32 UNF	4.10	4.165	3.963
#12 - 24 UNC	4.50	4.597	4.344
#12 - 28 UNF	4.60	4.724	4.496
#12 - 32 UNEF	4.70	4.826	4.623
1/4 - 20 UNC	5.10	5.257	4.979
1/4 - 28 UNF	5.50	5.588	5.360
1/4 - 32 UNEF	5.60	5.690	5.486
5/16 - 18 UNC	6.60	6.731	6.401
5/16 - 24 UNF	6.90	7.035	6.782
5/16 - 32 UNEF	7.10	7.264	7.087
3/8 - 16 UNC	8.00	8.153	7.798
3/8 - 24 UNF	8.50	8.636	8.362
3/8 - 32 UNEF	8.70	8.865	8.661
7/16 - 14 UNC	9.40	9.550	9.144
7/16 - 20 UNF	9.90	10.033	9.729
7/16 - 28 UNEF	10.20	10.388	10.135
1/2 - 13 UNC	10.80	11.023	10.592

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)
1/2 - 20 UNF	11.50	11.607	11.329
1/2 - 28 UNEF	11.80	11.938	11.709
9/16 - 12 UNC	12.20	12.446	11.989
9/16 - 18 UNF	12.90	13.081	12.751
9/16 - 24 UNEF	13.20	13.386	13.1312
5/8 - 11 UNC	13.60	13.868	13.386
5/8 - 18 UNF	14.50	14.681	14.351
5/8 - 24 UNEF	14.80	14.989	14.732
3/4 - 10 UNC	16.50	16.840	16.307
3/4 - 16 UNF	17.50	17.678	17.323
3/4 - 20 UNEF	17.80	17.958	17.678
7/8 - 9 UNC	19.50	19.761	19.177
7/8 - 14 UNF	20.50	20.675	20.270
7/8 - 20 UNEF	21.00	21.133	20.853
1 - 8 UNC	22.20	22.606	21.971
1 - 12 UNF	23.20	23.571	23.114
1 - 20 UNEF	24.00	24.308	24.028
1" 1/16 - 7 UNC	25.00	25.349	24.638
1" 1/16 - 12 UNF	26.50	26.746	25.289
1" 1/16 - 18 UNEF	27.20	27.381	27.051
1" 1/8 - 8 UN	25.50	25.781	25.146
1" 1/4 - 7UNC	28.20	28.524	27.813
1" 1/4 - 12 UNF	29.50	29.921	29.464
1" 1/4 - 18 UNEF	30.20	30.556	30.226
1" 1/4 - 8 UN	28.50	28.956	28.321
1" 3/8 - 6 UNC	30.80	31.115	30.353
1" 3/8 - 12 UNF	32.80	33.096	32.639
1" 3/8 - 18 UNEF	33.50	33.731	33.401
1" 3/8 - 8 UN	34.80	32.131	31.496
1" 1/2 - 6 UNC	34.00	34.290	33.528

# TAP 추천 전공드릴 직경 - 탭 기술자료

## PF 관용 평행 나사용 (PF Straight Pipe Threads)

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)		호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)			최대 (Max)	최소 (Min)
PF 1/16 - 28	6.70	6.843	6.561	PF 3/4 - 14	24.50	24.658	24.117
PF 1/8 - 28	8.70	8.848	8.566	PF 1 - 11	30.50	30.931	30.291
PF 1/4 - 19	11.70	11.890	11.445	PF 1" 1/4 - 11	39.20	39.592	38.952
PF 3/8 - 19	15.20	15.395	14.950	PF 1" 1/2 - 11	45.00	45.485	44.845
PF 1/2 - 14	19.00	19.172	18.631	PF 2 - 11	57.00	57.296	56.656

## NPT 미식 관용 테이퍼 나사용 (NPT American Taper Pipe Threads)

호칭치수 (Thread Size)	드릴직경 (Drill Size)(mm)			
	리이머 사용시 (mm) (With Reaming Before Tapping)		리이머 비사용시 (mm) (Without Reaming Before Tapping)	
	mm	inch	mm	inch
NPT 1/16 - 27	5.94	0.234	6.15	0.242
NPT 1/8 - 27	8.33	0.328	8.43	0.332
NPT 1/4 - 18	10.72	0.422	11.13	0.438
NPT 3/8 - 18	14.27	0.562	14.27	0.562
NPT 1/2 - 14	17.48	0.688	17.86	0.703
NPT 3/4 - 14	22.63	0.891	23.01	0.906
NPT 1 - 11" 1/2	28.58	1.125	28.98	1.141
NPT 1" 1/4 - 11" 1/2	37.31	1.469	37.69	1.484
NPT 1" 1/2 - 11" 1/2	43.26	1.703	43.66	1.719
NPT 2 - 11" 1/2	55.17	2.172	55.58	2.188
NPT 2 1/2 - 8	65.48	2.578	66.27	2.609

## NPTF 드라이셀 미식관용 테이퍼 나사용 (NPTF Dryseal American Taper Pipe Threads)

호칭치수 (Thread Size)	드릴직경 (Drill Size)(mm)			
	리이머 사용시 (mm) (With Reaming Before Tapping)		리이머 비사용시 (mm) (Without Reaming Before Tapping)	
	mm	inch	mm	inch
NPTF 1/16 - 27	5.94	0.234	6.15	0.242
NPTF 1/8 - 27	8.33	0.328	8.43	0.332
NPTF 1/4 - 18	10.72	0.422	11.13	0.438
NPTF 3/8 - 18	14.27	0.562	14.27	0.562
NPTF 1/2 - 14	17.48	0.688	17.86	0.703
NPTF 3/4 - 14	22.63	0.891	23.01	0.906
NPTF 1 - 11" 1/2	28.58	1.125	28.98	1.141
NPTF 1" 1/4 - 11" 1/2	37.31	1.469	37.69	1.484
NPTF 1" 1/2 - 11" 1/2	43.26	1.703	43.66	1.719
NPTF 2 - 11" 1/2	55.17	2.172	55.58	2.188
NPTF 2 1/2 - 8	65.48	2.578	66.27	2.609

# TAP 추천 전공드릴 직경 – 탭 기술자료

## 메트릭 인서트 코일 나사용 (For Metric Screw Threads Insert)

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)		호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)			최대 (Max)	최소 (Min)
M2.5 × 0.45	2.6	2.65	2.60	M10 × 1	10.3	10.42	10.25
M2.6 × 0.45	2.7	2.75	2.70	M10 × 1.25	10.4	10.52	10.31
M3 × 0.5	3.1	3.20	3.12	M12 × 1.25	12.5	12.52	12.31
M4 × 0.7	4.2	4.30	4.17	M12 × 1.5	12.5	12.62	12.37
M5 × 0.8	5.2	5.33	5.16	M14 × 1.5	14.5	14.62	14.37
M6 × 1	6.3	6.42	6.25	M16 × 1.5	16.5	16.62	16.37
M8 × 1.25	8.4	8.52	8.31	M18 × 1.5	18.5	18.62	18.37
M10 × 1.5	10.5	10.62	10.37	M20 × 1.5	20.5	20.62	20.37
M12 × 1.75	12.5	12.73	12.43	M20 × 2	20.5	20.83	20.47
M14 × 2	14.5	14.83	14.49	M22 × 1.5	22.5	22.62	22.37
M16 × 2	16.5	16.83	16.49	M24 × 1.5	24.5	24.62	24.37
M18 × 2.5	19.0	19.04	15.58	M24 × 2	24.5	24.83	24.47
M20 × 2.5	21.0	21.04	20.58	M30 × 1.5	30.5	30.62	30.37
M22 × 2.5	23.0	23.04	22.58				
M24 × 3	25.0	25.25	24.70				

## 유니파이 인서트 코일 나사용 (For Unified Screw Threads Insert)

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)		호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)	D1(mm)	
		최대 (Max)	최소 (Min)			최대 (Max)	최소 (Min)
No.2-56 UNC	2.3	2.39	2.29	No.4-48 UNF	3	3.05	2.97
No.3-48 UNC	2.7	2.74	2.64	No.6-40 UNF	3.7	3.78	3.66
No.4-40 UNC	3.0	3.07	2.95	No.8-36 UNF	4.4	4.44	4.32
No.5-40 UNC	3.3	3.38	3.25	No.10-32 UNF	2.0	5.13	4.98
No.6-32 UNC	3.7	3.81	3.66	No.1/4-28 UNF	6.6	6.71	6.53
No.8-32 UNC	4.4	4.47	4.32	No.5/16-24 UNF	8.2	8.38	8.20
No.10-24 UNC	5.1	5.21	5.05	No.3/8-24 UNF	9.8	9.96	9.78
No.12-24 UNC	5.7	5.77	5.61	No.7/16-20 UNF	11.5	11.63	11.43
No.1/4-20 UNC	6.7	6.78	6.63	No.1/2-20 UNF	13.1	13.26	13.03
No.5/16-18 UNC	8.4	8.48	8.33	No.9/16-18 UNF	14.7	14.88	14.66
No.3/8-16 UNC	10.0	10.11	9.91	No.5/8-18 UNF	16.3	16.48	16.26
No.7/16-14 UNC	11.5	11.76	11.51	No.3/4-16 UNF	15.9	19.68	19.43
No.1/2-13 UNC	13.1	13.34	13.08	No.7/8-14 UNF	22.7	22.86	22.61
No.9/16-12 UNC	14.7	14.94	14.68	No.1-12 UNF	26.0	26.04	25.76

## 유니파이 전조탭용 (For Unified Fluteless Taps)

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)							
	탭 등급 (Tap Limits)							
	GH4	GH5	GH6	GH7	GH8	GH9	GH10	GH11
#2 - 56 UNC	...	1.99	2.01	...	...	...	...	...
#4 - 40 UNC	...	2.55	2.56	2.58	...	...	...	...
#5 - 40 UNC	...	2.88	2.89	2.91	...	...	...	...
#6 - 32 UNC	...	3.12	3.13	3.15	3.16	...	...	...
#8 - 32 UNC	...	...	3.80	3.81	3.82	...	...	...
#10 - 24 UNC	...	...	...	4.32	4.33	4.34	...	...
#12 - 24 UNC	...	...	...	4.98	4.99	5.01	...	...
1/4 - 20 UNC	...	...	...	5.72	5.74	5.75	...	...

# TAP 추천 전공드릴 직경 – 탭 기술자료

## 매트릭 전조탭용 (For Metric Fluteless Taps)

호칭치수 (Thread Size)	드릴직경 (Drill Size) (mm)							
	탭 등급 (Tap Limits)							
	GH4	GH5	GH6	GH7	GH8	GH9	GH10	GH11
M2 × 0.4	1.83	1.84	...	...	...	...	...	...
M2.2 × 0.45	2.00	2.01	...	...	...	...	...	...
M2.3 × 0.4	2.13	2.14	...	...	...	...	...	...
M2.5 × 0.45	2.30	2.31	...	...	...	...	...	...
M2.6 × 0.45	2.40	2.41	...	...	...	...	...	...
M3 × 0.5	2.77	2.78	2.58	2.81	...	...	...	...
M3 × 0.35	2.85	2.87	2.91	2.89	...	...	...	...
M3.5 × 0.6	...	3.23	3.15	3.25	...	...	...	...
M4 × 0.7	...	3.67	3.81	3.70	...	...	...	...
M4 × 0.5	...	3.78	4.32	3.81	...	...	...	...
M5 × 0.8	...	4.61	4.98	4.64	...	...	...	...
M5 × 0.5	...	4.78	5.72	4.81	...	...	...	...
M6 × 1	...	5.50	4.63	5.53	...	...	...	...
M6 × 0.75	...	5.64	4.79	5.67	...	...	...	...
M6 × 0.5	...	5.78	5.51	5.81	...	...	...	...
M7 × 1	...	6.50	5.65	6.53	...	...	...	...
M8 × 1.25	...	...	5.79	7.39	7.40	...	...	...
M8 × 1	...	...	6.51	7.53	7.54	...	...	...
M10 × 1.5	...	...	7.37	9.24	9.26	9.27	...	...
M10 × 1.25	...	...	7.51	9.39	9.40	9.1	...	...
M10 × 1	...	...	9.23	9.53	9.54	9.55	...	...
M12 × 1.75	...	...	9.37	11.10	11.12	11.13	11.14	...
M12 × 1.5	...	...	9.51	11.24	11.26	11.27	11.28	...
M12 × 1.25	...	...	...	11.39	11.40	11.41	11.42	...
M12 × 1	...	...	...	11.53	11.54	11.55	11.56	...
M14 × 2	...	...	...	...	12.98	12.99	13.00	13.01
M14 × 1.5	...	...	...	...	13.26	13.27	13.28	13.30
M14 × 1	...	...	...	...	13.54	13.55	13.56	13.58
M16 × 2	...	...	...	...	14.98	14.99	15.00	15.01
M16 × 1.5	...	...	...	...	14.26	15.27	15.28	15.30
M16 × 1	...	...	...	...	15.54	15.55	15.56	15.58
M18 × 2.5	...	...	...	...	...	16.71	16.72	16.73
M18 × 1.5	...	...	...	...	...	17.27	17.28	17.30
M20 × 2.5	...	...	...	...	...	...	18.72	18.73
M20 × 1.5	...	...	...	...	...	...	19.28	19.30

## 미터나사 하이로탭

호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)		호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)	
	RH 정도	최소~최대 Min-Max(Thred Overlap Ratio%)	RH 정도	최소~최대 Min-Max(Thred Overlap Ratio%)		RH 정도	최소~최대 Min-Max(Thred Overlap Ratio%)	RH 정도	최소~최대 Min-Max(Thred Overlap Ratio%)
M1 × 0.25	2	0.858~0.879(100~85)	4	0.858~0.887(100~80)	M3 × 0.5	5	2.72~2.77 (100~80)	6	2.72~2.78 (100~75)
M1.2 × 0.25	2	1.058~1.079(100~85)	4	1.058~1.087(100~80)	M3 × 0.35	3	2.80~2.64 (100~80)	5	2.80~2.85 (100~75)
M1.4 × 0.3	2	1.23~1.26 (100~85)	4	1.23~1.26 (100~80)	M3.5 × 0.6	3	3.16~3.21 (100~85)	5	3.16~3.25 (100~75)
M1.6 × 0.35	2	1.40~1.44 (100~85)	4	1.40~1.45 (100~75)	M4 × 0.75	3	3.57~3.64 (100~85)	6	3.57~3.64 (100~85)
M1.7 × 0.35	—	1.50~1.54 (100~80)	4	1.50~1.55 (100~75)	M4 × 0.7	6	3.60~3.66 (100~85)	7	3.60~3.66 (100~85)
M1.8 × 0.35	2	1.60~1.64 (100~80)	4	1.60~1.65 (100~75)	M4 × 0.5	3	3.71~3.77 (100~80)	6	3.71~3.79 (100~75)
M2 × 0.4	2	1.77~1.82 (100~80)	4	1.77~1.82 (100~80)	M5 × 0.9	3	4.49~4.59 (100~85)	7	4.49~4.59 (100~85)
M2 × 0.25	2	1.858~1.887(100~80)	~	1.858~1.887(100~80)	M5 × 0.8	3	4.55~4.62 (100~85)	8	4.55~4.64 (100~80)
M2.3 × 0.4	—	2.07~2.12 (100~80)	4	2.07~2.13 (100~75)	M5 × 0.5	3	2.72~4.77 (100~80)	6	4.55~4.64 (100~75)
M2.5 × 0.45	3	2.24~2.30 (100~80)	5	2.24~2.31 (100~75)	M6 × 1	4	5.43~5.52 (100~85)	7	5.43~5.55 (100~80)
M2.6 × 0.45	—	2.34~2.40 (100~80)	5	2.34~2.41 (100~75)	M6 × 0.75	3	5.57~5.64 (100~85)	7	4.72~4.79 (100~80)
M3 × 0.6	3	2.72~2.73 (100~90)	5	2.66~2.73 (100~90)					

# TAP 추천 전공드릴 직경 – 탭 기술자료

## 미터나사 뉴롤탭

호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)	
	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
M1 × 0.25	2	0.858~0.879 (100~85)	4	0.90~0.92 (100~80)
M1.1 × 0.25	2	0.97~0.99 (100~85)	4	1.00~1.02 (100~80)
M1.2 × 0.25	2	1.07~1.09 (100~85)	4	1.10~1.12 (100~80)
M1.4 × 0.3	2	1.244~1.263 (100~85)	4	1.270~1.294 (100~80)
M1.7 × 0.35	2	1.51~1.54 (100~80)	4	1.54~1.58 (100~75)
M2 × 0.4	2	1.78~1.82 (100~80)	4	1.81~1.85 (100~75)
M2.3 × 0.4	2	2.08~2.12 (100~80)	4	2.11~2.15 (100~75)
M2.5 × 0.45	2	2.25~2.29 (100~80)	4	2.28~2.33 (100~75)
M2.6 × 0.45	2	2.35~2.39 (100~80)	4	2.38~2.43 (100~75)
M3 × 0.5	3	2.74~2.78 (100~80)	5	2.76~2.81 (100~75)
M3.5 × 0.6	3	3.18~3.21 (100~85)	5	3.20~3.26 (100~75)
M4 × 0.7	4	3.63~3.67 (100~85)	6	3.65~3.70 (100~85)
M5 × 0.8	4	4.57~4.62 (100~85)	6	4.59~4.66 (100~80)
M6 × 1	4	5.45~5.51 (100~85)	7	5.48~5.57 (100~80)
M7 × 1	4	6.45~6.51 (100~85)	7	6.48~6.57 (100~80)
M8 × 1.25	5	7.31~7.38 (100~85)	7	7.34~7.41 (100~85)

## 유니파이 병목나사 (뉴롤탭)

호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)	
	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
No. 2-56UNC	4	1.96~2.02 (100~85)	3	1.96~2.01 (100~65)
No. 3-48UNC	4	2.25~2.32 (100~65)	3	2.23~2.31 (100~65)
No. 4-40UNC	5	2.52~2.60 (100~70)	3	2.50~2.58 (100~70)
No. 5-40UNC	5	2.86~2.93 (100~70)	3	2.83~2.91 (100~70)
No. 6-32UNC	5	3.09~3.17 (100~70)	3	3.06~3.14 (100~75)
No. 8-32UNC	6	3.75~3.83 (100~75)	4	3.74~3.82 (100~75)
No.10-24UNC	6	4.26~4.35 (100~75)	4	4.24~4.32 (100~80)
No.12-24UNC	6	4.92~5.01 (100~80)	4	4.90~4.92 (100~85)
1/4-20UNC	6	5.66~5.76 (100~80)	4	5.64~5.74 (100~80)

## 유니파이 병목나사 (하이롤탭)

호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)	
	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
No. 2-64UNF	3	1.98~2.04 (100~65)	2	1.97~2.03 (100~65)
No. 3-56UNF	4	2.29~2.35 (100~65)	3	2.28~2.34 (100~65)
No. 4-48UNF	4	2.57~2.64 (100~70)	3	2.56~2.63 (100~70)
No. 5-44UNF	4	2.88~2.95 (100~70)	3	2.87~2.94 (100~70)
No. 6-40UNF	5	3.19~3.26 (100~75)	3	3.16~3.22 (100~75)
No. 8-36UNF	5	3.80~3.88 (100~75)	4	3.79~3.86 (100~75)
No.10-32UNF	5	4.41~4.48 (100~80)	4	4.40~4.46 (100~80)
No.12-28UNF	5	5.00~5.08 (100~80)	4	4.99~5.06 (100~85)
1/4-28UNF	5	5.86~5.93 (100~80)	4	5.85~5.92 (100~80)

## 영국식관용평행나사 PF (뉴롤탭)

호칭치수 (Thread Size)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
PF 1/8	6	9.24~ 9.35 (100~80)
PF 1/4	7	12.41~12.62 (100~75)
PF 3/8	7	15.92~16.12 (100~75)

호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)	
	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
M8 × 1	4	7.45~7.51 (100~85)	7	7.48~7.57 (100~80)
M10 × 1.5	5	9.16~9.22 (100~90)	7	9.18~9.28 (100~85)
M10 × 1.25	5	9.31~9.38 (100~85)	7	9.34~9.41 (100~85)
M10 × 1	5	9.46~9.52 (100~85)	7	9.48~9.57 (100~80)
M12 × 1.75	5	11.01~11.08 (100~90)	8	11.05~11.15 (100~85)
M12 × 1.	5	11.18~11.22 (100~90)	7	11.18~11.28 (100~85)
M12 × 1.25	5	11.31~11.38 (100~85)	7	11.34~11.41 (100~85)
M12 × 1	5	11.46~11.52 (100~85)	7	11.48~11.57 (100~80)
M14 × 2	6	12.83~12.95 (100~90)	10	12.92~13.04 (100~85)
M14 × 1.5	5	13.16~13.22 (100~90)	9	13.21~13.30 (100~85)
M16 × 2	6	14.87~14.95 (100~90)	10	14.92~15.04 (100~85)
M16 × 1.5	5	15.16~15.22 (100~90)	9	15.21~15.30 (100~80)
M18 × 2.5	6	16.57~16.67 (100~90)	11	16.63~16.78 (100~85)
M18 × 1.5	6	17.17~17.23 (100~90)	10	17.22~17.31 (100~85)
M20 × 2.5	6	18.57~18.67 (100~90)	11	18.63~18.78 (100~85)
M20 × 1.5	6	19.17~19.23 (100~90)	10	19.22~19.31 (100~85)

호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)	
	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
5/16-18UNC	7	7.18~7.29 (100~85)	5	7.15~7.24 (100~85)
3/8-16UNC	7	8.66~8.78 (100~80)	5	8.63~8.73 (100~85)
7/16-14UNC	7	10.11~10.25 (100~80)	5	10.08~10.19 (100~85)
1/2-13UNC	8	11.62~11.78 (100~80)	6	11.60~11.68 (100~90)
9/16-12UNC	10	13.14~13.27 (100~85)	8	13.11~13.24 (100~85)
5/8-11UNC	11	14.62~14.76 (100~85)	8	14.58~14.67 (100~90)
3/4-10UNC	12	17.67~17.88 (100~80)	9	17.63~17.74 (100~90)
7/8-9UNC	12	20.68~20.85 (100~85)	9	20.64~20.75 (100~90)
1-8UNC	13	23.65~23.84 (100~85)	10	23.61~23.74 (100~90)

호칭치수 (Thread Size)	1급나사용밀구멍지름 (for JIS class 1 drill hole dia)		2급나사용밀구멍지름 (for JIS class 2 drill hole dia)	
	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
5/16-24UNF	6	7.38~7.46 (100~80)	5	7.36~7.43 (100~85)
3/8-24UNF	6	8.96~9.05 (100~80)	5	8.95~9.02 (100~85)
7/16-20UNF	7	10.44~10.54 (100~80)	5	10.41~10.49 (100~85)
1/2-20UNF	7	12.02~12.12 (100~80)	5	12.00~12.05 (100~90)
9/16-18UNF	9	13.55~13.66 (100~80)	7	13.53~13.58 (100~85)
5/8-18UNF	9	15.14~15.25 (100~80)	7	15.11~15.17 (100~90)
3/4-16UNF	10	18.22~18.32 (100~85)	7	18.18~18.25 (100~90)
7/8-14UNF	11	21.27~21.38 (100~85)	8	21.23~21.27 (100~95)
1-12UNF	12	24.28~24.41 (100~85)	9	24.24~24.32 (100~90)

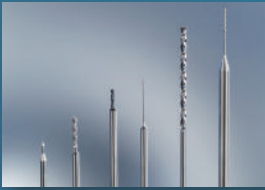
호칭치수 (Thread Size)	RH 정도	최소 ~ 최대 Min~Max(Thread Overlap Ratio:%)
PF 1/2	8	19.93~20.15 (100~80)
PF 3/4	8	25.41~25.64 (100~80)

## 나사규격 일람표

나사기호	나사의 종류		규 격	나사산의 각도
M	매트릭 나사	보통나사	JIS B 0205	60°
		가는나사	JIS B 0207	
S	미니어처 나사		JIS B 0201	
UNC	유니파이 나사	보통나사	JIS B 0206	
UNF		가는나사	ANSI B1.1	
			JIS B 0208	
UNEF		극히 가는나사	ANSI B1.1	
UNS		특수나사		
UN		( )산계에		
UNJC	유니파이 나사 (MIL 규격)	보통나사	MIL-S-8879	
UNJF		가는나사		
UNJEF		극히 가는나사		
UNJ		( )산계에		
Tr	매트릭 사다리꼴 나사		JIS B 0216	30°
TM	30° 사다리꼴 나사		JIS B 0126 부속서	
TW	29° 사다리꼴 나사		JIS B 0222	29°
R	관용테이퍼 수나사		JIS B 0203	55° 1/16 테이퍼
Rc	관용테이퍼 암나사			
Rp	관용테이퍼 수나사에 체결하는 관용평행나사			
G	관용평행나사 (기계적결합 )		JIS B 0202	55°
PF	ISO에 없는 관용평행나사 (기계결합용 )		JIS B 0202 부속서	
PT	ISO에 없는 관용테이퍼나사 (내밀용 )		JISB 0203 부속서	55° 1/16 테이퍼
PS	PT 수나사에 체결하는 관용평행 암나사 (내밀용 )			55°
NPT	미식 관용테이퍼 나사		ANSI/ASEM B1.20.1	60° 1/16 테이퍼
NPSC	미식 관용직관 결수용 암나사			60°
NPSM	미식 관용 기계적결합 취부구용 평행나사			
NPTF	미식 드라이셀 관용테이퍼 나사		ANSI B1.20.3	60° 1/16 테이퍼
NPSF	미식 드라이셀 관용평행 암나사			
CTG	후강 전선관 나사		JIS B 0204	55°
CTC	박강 전선관 나사			80°
BC	자전거 나사		JIS B 0225	60°
SM	미심용 나사		JIS B 0226	
CTV	자전거 타이어 밸브 나사		JIS D 9422	
TV	자동차 타이어 밸브 나사		JIS D 4208	
E	전구나사		JIS C 7709	47° 30°
BA	영국협회나사		BS 93	
BSC	영국 자전거용 나사		BS 811	60°
BSW	영국 윗트위스 보통나사		BS 84	55°
BSF	영국 윗트위스 가는나사			
BSMO	영국 현미경 나사		BS 3569	
FG	독일 자전거용 나사		DIN 79012	60°
Pg	독일 강관용 나사		DIN 40430	80°



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