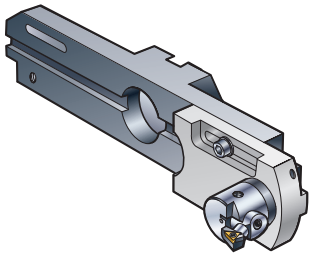
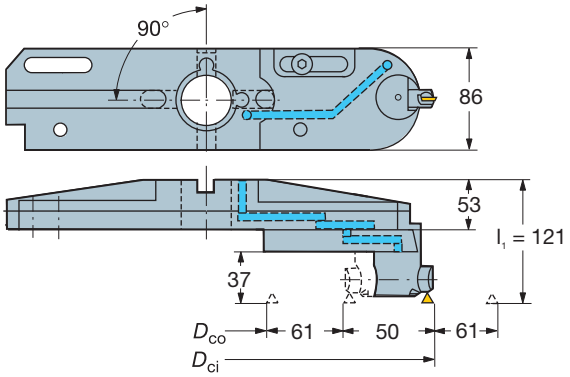
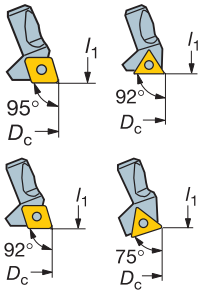
Fine boring tools R391.B…-F

Coromant Capto



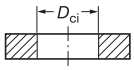
Hole tolerance:	IT7
Boring range	
Internal:	250–575 mm
External:	138–450 mm
Boring depth:	400 mm
Incr. of diam. adjust.:	0.01 mm
Cutting fluid	Internal



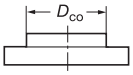


Application areas

Internal

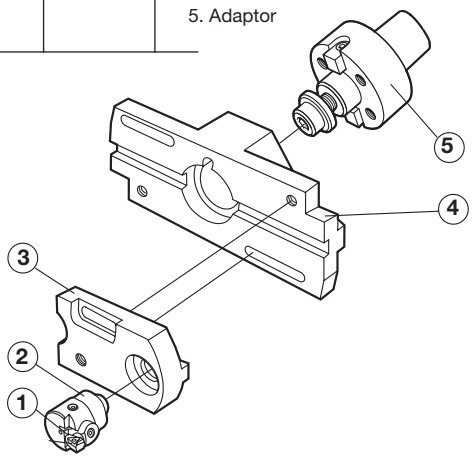


External



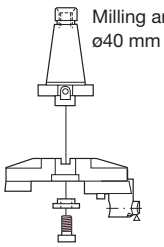
Direction of rotation

Boring range		Ordering code					Drawing for counterweight available at the following website: www.coromant.sandvik.com (Under - Find products - CAD drawings)
Internal D_{ci}	External D_{co}	Fine boring head	Extension slide	Bar	Adaptor		
250–372	138–250						1. Cartridge 75° = 391.38B 391.38K 92° = 391.38A 391.38U 95° = 391.38L 2. Fine boring head 3. Extension slide 4. Bar 5. Adaptor
253–375	135–247			R391.B01R-40 D 053A	C8-391.05HD-40 040	CW-R	
350–472	238–350	391.38A-2-046 28 043A	R391.B01F-020	R391.B02R-40 E 053A	C8-391.05HD-40 040	CW-R	
353–475	235–347						
450–572	338–450			R391.B03R-40 F 053A	C8-391.05HD-40 040	CW-R	
453–575	335–447						

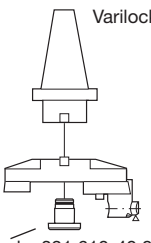


Alternative mountings

Without internal coolant supply



Milling arbor
ø40 mm

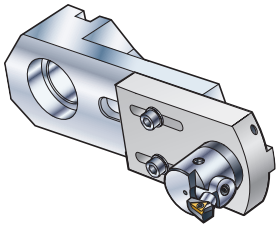


Varilock 80

Ordering code: 391.610-40 80 053

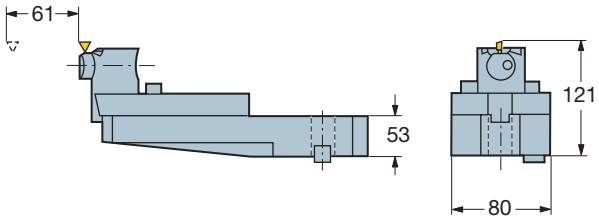
Fine boring tool 391.B…F

Coromant Capto, Varilock, Solid milling arbor



Boring range 250–672 mm

Boring range int.	250-975 mm
Boring range ext.	0-678 mm
Boring depth:	400 mm
Hole tolerance:	IT7
Incr. of diam. adjust.:	0.01 mm
Cutting fluid	External
Application area	Internal and external fine boring



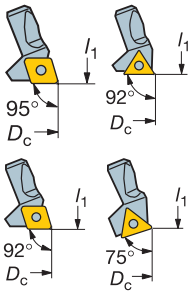
Application areas

Internal D_{ci}

External D_{co}

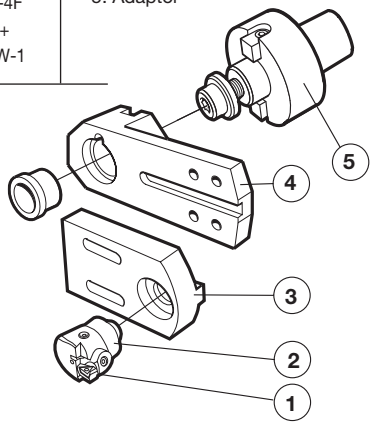
Direction of rotation

R L

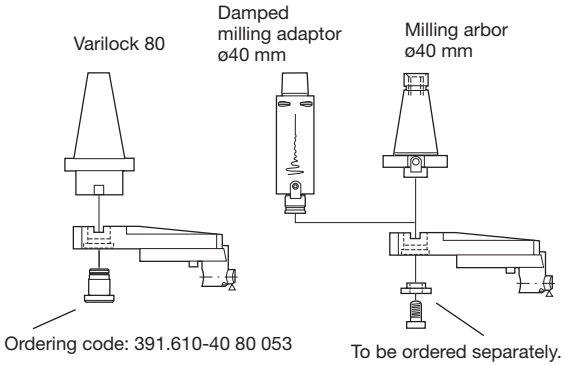


Boring range Internal D_{ci}	Ordering code Fine boring head	Extension slide	Bar	Adaptor		Drawing for counterweight available at the following website: www.coromant.sandvik.com (Under - Find products - CAD drawings)
250–372					B-1F + BW-1	
253–375			391.B01F-40 D 053	C8-391.05-40 030A		
350–472	391.38A-2-046 28 043A	R391.B01F-020	391.B02F-40 E 053	C8-391.05-40 030A	B-2F + BW-1	
353–475						
450–572			391.B03F-40 F 053	C8-391.05-40 030A	B-3F + BW-1	
453–575						
550–672			391.B04F-40 G 053	C8-391.05-40 030A	B-4F + BW-1	

1. Cartridge
   75° = 391.38B
   391.38K
   92° = 391.38A
   391.38U
   95° = 391.38L
2. Fine boring head
3. Extension slide
4. Bar
5. Adaptor



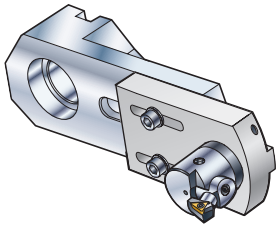
Alternative mountings



Continued

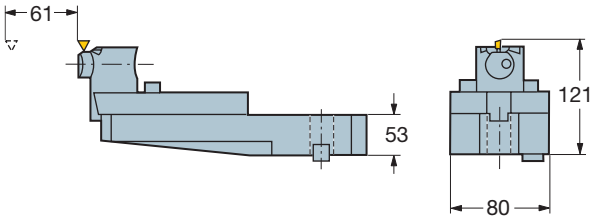
Fine boring tool 391.B…F

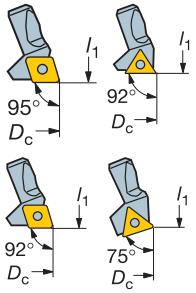
Coromant Capto, Varilock, Solid milling arbor



Boring range 553–975 mm

Boring range int.	250-975 mm
Boring range ext.	0-678 mm
Boring depth:	400 mm
Hole tolerance:	IT7
Incr. of diam. adjust.:	0.01 mm
Cutting fluid	External
Application area	Internal and external fine boring

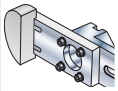




Application areas

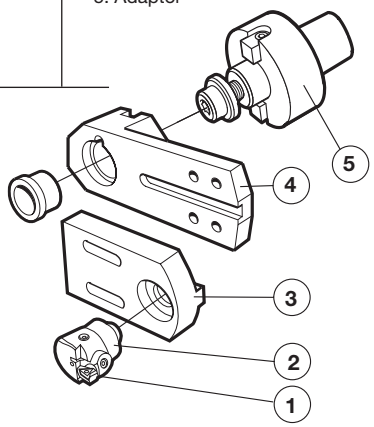
Internal **External**

Direction of rotation

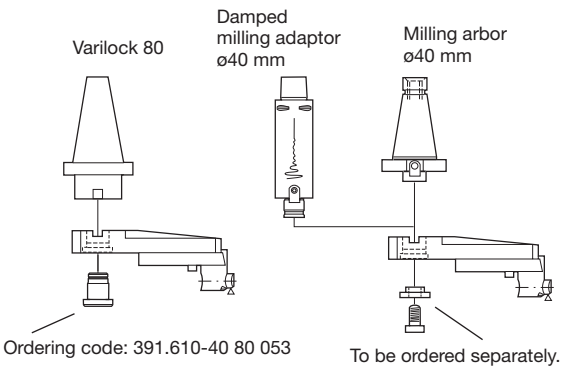
Boring range Internal D_{ci}	Ordering code Fine boring head	Extension slide	Bar	Adaptor	
553–675					B-4F + BW-1
650–772			391.B04F-40 G 053	C8-391.05-40 030A	
653–775	391.38A-2-046 28 043A	R391.B01F-020	391.B05F-40 H 053	C8-391.05-40 030A	
750–872					
753–875			391.B06F-40 I 053	C8-391.05-40 030A	
850–972					
853–975			391.B07F-40 J 053	C8-391.05-40 030A	

Drawing for counterweight available at the following website: www.coromant.sandvik.com (Under - Find products - CAD drawings)

1. Cartridge
   - 75° = 391.38B, 391.38K
   - 92° = 391.38A, 391.38U
   - 95° = 391.38L
2. Fine boring head
3. Extension slide
4. Bar
5. Adaptor

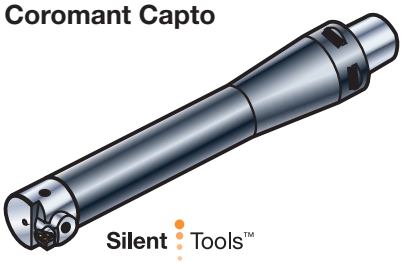


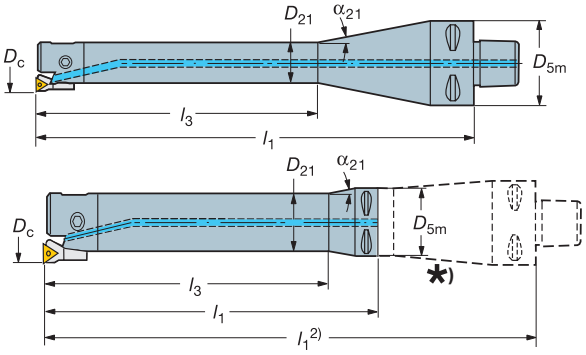
Alternative mountings

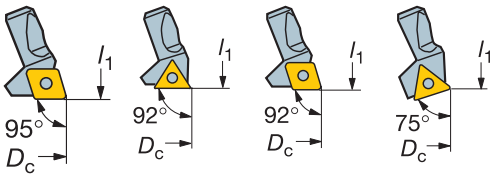


Damped single edge fine boring tool 391.39A

Coromant Capto







Boring range:	25—103.5 mm
Boring depth:	6 x D_c
Hole tolerance:	IT7
Incr. of diam. adjust.:	0.01 mm
Cutting fluid:	Internal
Application area:	Fine boring
Max. rotation speed:	6.000 rpm

Always adjust from centre towards periphery

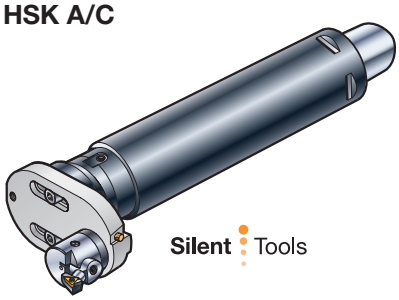
*) With boring diameter >-57-mm, the conical reduction C6-391.02-50-110 must be used to achieve a boring depth of 6 x D_c.

l_1 = programming length

Boring range[3] D_c min-max	Ordering code Adaptor	KG	Dimensions, mm D_{5m}	D_{21}	l_1	l_1	l_3	$\alpha°_{21}$
25.0–35.5	C3-391.39A-1-024 209A	0.9	32	24	213	–	150	4.8
26.8–38.5	C3-391.39A-1-024 209A	0.9	32	24	213	–	150	4.8
34.5–50.5	C5-391.39A-1-033 326A	2.8	50	33	329	–	207	4.8
37.5–53.5	C5-391.39A-1-033 326A	2.8	50	33	329	–	207	4.8
49.5–71.5	C5-391.39A-2-046 336A*)	4.3	50	46	341	451	297	4.8
52.5–74.5	C5-391.39A-2-046 336A*)	4.3	50	46	341	451	297	4.8
70.5–100.5	C6-391.39A-2-065 407A	10.1	63	63	412	–	–	–
73.5–103.5	C6-391.39A-2-065 407A	10.1	63	63	412	–	–	–

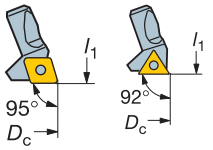
Damped single edge fine boring tool 391.39A

Coromant Capto HSK A/C

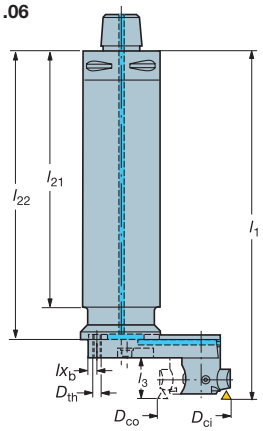


Boring range:	99.5-269.5 mm
Boring depth:	600-700 mm
Hole tolerance:	IT7
Incr. of diam. adjust.:	0.01 mm
Cutting fluid:	Internal
Application area:	Fine boring

Always adjust from centre towards periphery



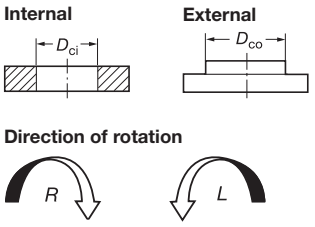
Coromant Capto C8-391.06

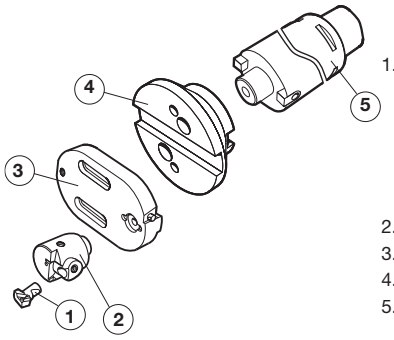


*Thread for counterweight

l_1 = programming length

Application areas





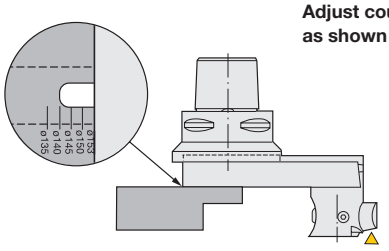
1. Cartridge
   - 75° = 391.38B
   - 391.38K
   - 92° = 391.38A
   - 391.38U
   - 95° = 391.38L
2. Fine boring head
3. Extension slide
4. Arbor adaptor
5. Damped milling adaptor

Boring range		Ordering code				Dimensions, mm						
Internal D_{ci} min–max	External D_{co} min–max	Fine boring head	Extension slide	Arbor adaptor	Damped milling adaptor	KG	l_1	l_3	l_{21}	l_{22}	lxb	D_{th}
99.5–164.5	–	391.38A-2-046 28 043A	391.38A-0-096 022A	393.39A-0-27 033A	C8-391.06-27 320	12.4	423	–	320	353	10	M8
					392.41006-63-27 260A	7.1	363	–	260	293	10	M8
				393.39A-0-32 036A	C8-391.06-32 320	15.3	426	–	320	356	10	M8
102.5–167.5	–			393.39A-0-27 033A	C8-391.06-27 320	12.4	423	–	320	353	10	M8
					392.41006-63-27 260A	7.1	363	–	260	293	10	M8
				393.39A-0-32 036A	C8-391.06-32 320	15.3	426	–	320	356	10	M8
163.5–266.5	45.0–145.0	391.38A-2-046 28 043A	391.38A-0-160 022A	393.39A-0-27 033A	C8-391.06-27 320	12.4	423	48	320	353	10	M8
					392.41006-63-27 260A	7.1	363	48	260	293	10	M8
				393.39A-0-32 036A	C8-391.06-32 320	15.3	426	48	320	356	10	M8
166.5–269.5	48.0–148.0			393.39A-0-27 033A	C8-391.06-27 320	12.4	423	48	320	353	10	M8
					392.41006-63-27 260A	7.1	363	48	260	293	10	M8
				393.39A-0-32 036A	C8-391.06-32 320	15.3	426	48	320	356	10	M8

Counterweight for fine boring tools

Boring range Internal D_{ci} min–max	For extension slide	Ordering code
99.5–135.0	391.38A-0-096 022A	5624 010-01
135.0–167.5	391.38A-0-096 022A	5624 010-02
163.5–269.5	391.38A-0-160 022A	5624 010-03

For internal boring only

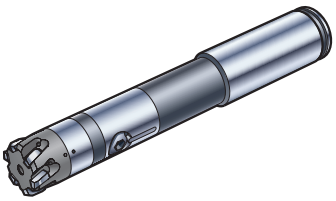


Max. cutting speed: 1600 m/min
Adjust counterweight to boring diameter as shown in the picture.

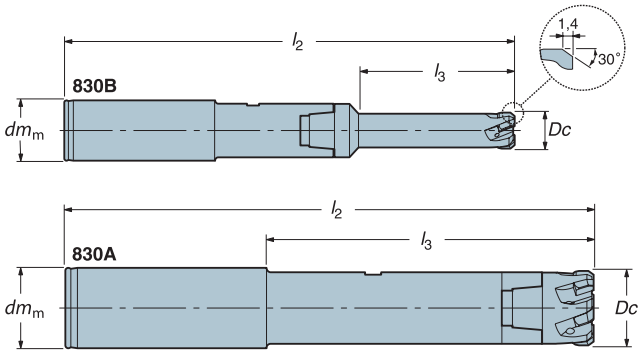
Reamer 830

for finishing of through holes

For hole diameters 10.00 – 31.75 mm
Max hole depth, l_3



Rake angle	6°
Brazed inserts	grade P10R
Hole tolerance	H7
Cutting fluid	internal
Shank design	cylindrical
Tolerance dm_m	h6

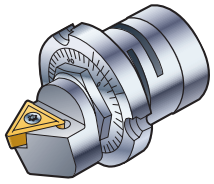


For hole diameter	Head		Short shank				Long shank				
D_c mm	z_n	Ordering code	Ordering code	l_2	l_3	dm_m	Ordering code	l_2	l_3	dm_m	KG
10.0 11.0 12.0	4 4 4	830B-E06D1000H7S12 830B-E06D1100H7S12 830B-E06D1200H7S12	830-S12A20069F	178.5	45	20	830-S12A20130F	239.5	45	20	0.3-0.4
13.0 14.0 15.0	6 6 6	830B-E06D1300H7S12 830B-E06D1400H7S12 830B-E06D1500H7S12	830-S12A20069F	178.5	45	20	830-S12A20130F	239.5	45	20	0.3-0.4
16.0 17.0 18.0	6 6 6	830B-E06D1600H7S12 830B-E06D1700H7S12 830B-E06D1800H7S12	830-S12A20069F	178.5	45	20	830-S12A20130F	239.5	45	20	0.4-0.5
19.0 19.05 20.0 21.0	6 6 6 6	830A-E06D1900H7S12 830A-E06D1905H7S12 830A-E06D2000H7S12 830A-E06D2100H7S12	830-S12A20069F	133	83	20	830-S12A20130F	194	144	20	0.4-0.5
22.0 23.0	6 6	830A-E06D2200H7S14 830A-E06D2300H7S14	830-S14A20070F	135	85	20	830-S14A20131F	196	146	20	0.5-0.6
24.0 25.0 25.4 26.0 27.0 28.0 29.0	6 6 6 6 6 6 6	830A-E06D2400H7S16 830A-E06D2500H7S16 830A-E06D2540H7S16 830A-E06D2600H7S16 830A-E06D2700H7S16 830A-E06D2800H7S16 830A-E06D2900H7S16	830-S16A25090F	166	106	25	830-S16A25151F	227	167	25	0.5-0.7
30.0 31.75	8 8	830A-E06D3000H7S20 830A-E06D3175H7S20	830-S20A25089F	166	106	25	830-S20A25150F	227	167	25	0.7-1.1

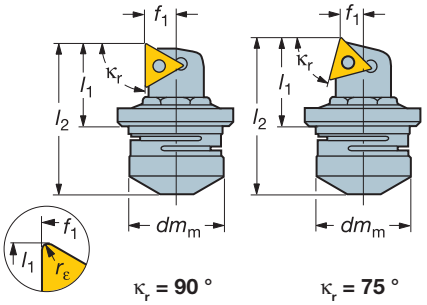
Cutting data for Reamer 830

ISO	CMC No.	Material		HB	Grade	Cutting speed V_c (m/min)	Feed f_z (mm/insert)	Radial depth of cut a_p (mm)
P	01.1	Unalloyed steel	Non-hardened (C=0.1-0.25%)	90-200		150-200	0.15-0.25	
	01.2		Non-hardened (C=0.25-0.55%	125-225	P10R	150-200	0.15-0.25	0.1-0.3
	01.3		Non-hardened (C=0.55-0.8%)	150-225		140-180	0.15-0.25	
	01.4		High carbon & carbon tool steel	180-225		140-180	0.15-0.25	
	02.1	Low alloy steel	Non-hardened	150-260	P10R	110-180	0.15-0.25	0.1-0.3
	02.2		Hardened and tempered	220-400		70-130	0.10-0.20	
	06.1	Steel castings	Unalloyed	90-225	P10R	140-180	0.15-0.25	0.1-0.3
	06.2		Low alloyed	150-250		100-150	0.15-0.25	
K	07.2	Mallable cast iron	Perlitic	150-270	P10R	150-200	0.15-0.25	0.1-0.3
	09.2	Nodular cast iron	Perlitic	200-300		110-190	0.15-0.25	

T-MAX U fine boring units R/L 148C

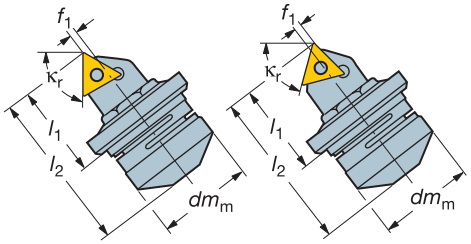


Straight mounting

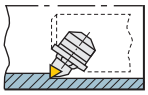
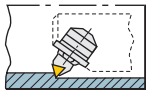
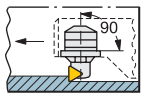
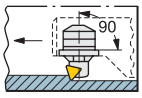


κr = 90 ° κr = 75 °

Angular mounting

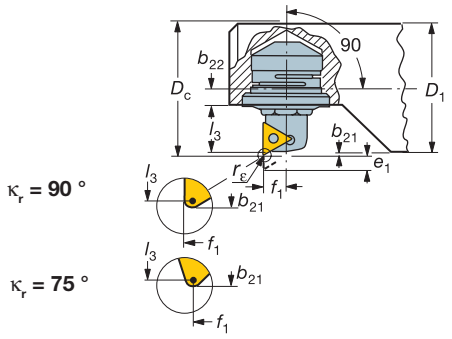


κr = 90 ° κr = 75 °

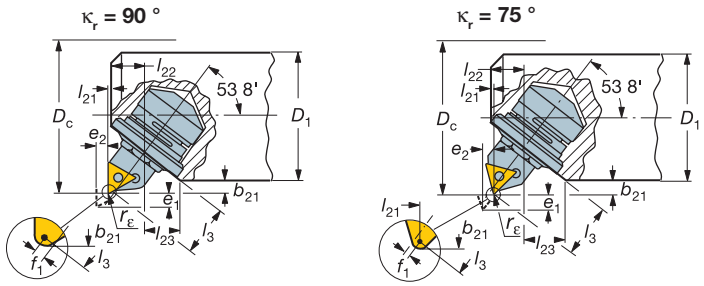
Entering angle / Feed direction	Dimensions, mm dm$_m$	l_1 [2]	l_2	f_1	D_{min}	λ	Cartridge R	Cartridge L
Angular mounting								
κ_r = 90° 	16	14.3	25.15	0.45	25.2	–3°	R148D-31-06 02	L148D-31-06 02
	16	14.3	25.0	0.2	24.8	0°	–	L148D-31-06 T1
	20	19.1	33.7	0.9	32.5	0°	R148D-32-09 02	L148D-32-09 02
	22	23	45.3	1.1	42.0	0°	R148D-33-11 02	L148D-33-11 02
	32	33.3	62.3	1.2	59.4	0°	R148D-34-16 T3	L148D-34-16 T3
Nose radius, r_ε: 0.0 Angle of inclination: λ								
κ_r = 75° 	16	14.4	25.3	0.95	26.6	–3°	–	L148D-41-06 02
	16	14.4	25.0	1.3	26.3	0°	–	–
	20	19.2	33.8	0.8	34.0	0°	–	L148D-42-09 02
	22	22.9	45.2	0.55	43.5	0°	–	L148D-43-11 02
	32	31.6	62.3	2.6	60.8	0°	–	L148D-44-16 T3
Nose radius, r_ε: 0.0 Angle of inclination: λ								
Straight mounting								
κ_r = 90° 	16	13.3	24.1	5.1	27	–3°	R148D-11-06 02	L148D-11-06 02
	20	18.3	32.9	6.3	36.5	0°	R148D-12-09 02	L148D-12-09 02
	22	22.1	44.3	7.2	48.5	0°	R148D-13-11 02	L148D-13-11 02
	32	32	62.7	10.3	68.4	0°	–	–
Nose radius, r_ε: 0.0 Angle of inclination: λ								
κ_r = 75° 	16	14.2	25.0	2.7	28.6	–3°	–	–
	20	19.2	33.8	3.9	38.1	0°	–	L148D-22-09 02
	22	23.1	45.4	4.5	50.1	0°	–	L148D-23-11 02
	32	33.4	64.1	6.0	70.65	0°	–	–
Nose radius, r_ε: 0.0 Angle of inclination: λ								

Mounting dimensions for T-MAX U fine boring units R/L148C

Straight mounting



Angular mounting

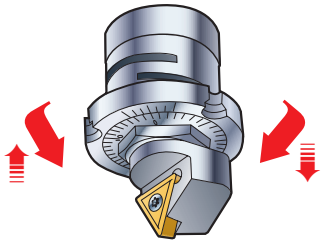


Entering angle / Feed direction			Insert radius	Dimensions, mm											
			r_ε	D_1 min	D_c min	b_{21} min	e_1 max	e_2 max	b_{22} min	l_3* min	l_{21}	l_{22}	l_{23}	f_1
Straight mounting $\kappa_r = 90°$	06	06	0.2 0.4 0.8	26	27.9 27.6 27	0.60 0.55 0.5	2.5	–	3.6	9.8 9.6 9.1	–	–	–	5.1
	09		0.2 0.4 0.8	34.5	37.4 37.1 36.5	1.45 1.3 1	3.5	–	4.55	13.95 13.6 12.9	–	–	–	6.3
	11		0.2 0.4 0.8	46.5	49.4 49.1 48.5	1.45 1.3 1	6	–	7.75	16.75 16.4 15.7	–	–	–	7.2
	16		0.4 0.8 1.2	67	69.6 69 68.4	1.3 1 0.7	10	–	9.4	25.0 24.3 23.6	–	–	–	10.3
Straight mounting $\kappa_r = 75°$	06	06	0.2 0.4 0.8	26	29.7 29.35 28.6	1.55 1.45 1.3	2.5	–	3.6	10.75 10.45 9.9	–	–	–	2.6 2.45 2.2
	09		0.2 0.4 0.8	34.5	39.2 38.85 38.1	2.35 2.2 1.8	3.5	–	4.55	14.9 14.5 13.7	–	–	–	3.8 3.7 3.5
	11		0.2 0.4 0.8	46.5	51.2 50.85 50.1	2.35 2.2 1.8	6	–	7.75	17.7 17.3 16.5	–	–	–	4.4 4.3 4.1
	16		0.4 0.8 1.2	67	72.15 71.4 70.65	2.6 2.2 1.85	10	–	9.4	26.3 25.5 24.7	–	–	–	5.8 5.6 5.4
Angular mounting $\kappa_r = 90°$		06	0.2 0.4 0.8	22	226.2 25.9 25.3	1.7 1.65 1.6	2	1.5	–	11 10.7 10.1	0.5	6.6	9.55	0.40 0.40 0.45
	06		0.2 0.4 0.8	22	25.7 25.4 24.8	1.5 1.45 1.4	2	1.5	–	10.9 10.6 10	0.5	6.6	9.55	0.40 0.40 0.45
	09		0.2 0.4 0.8	28.5	33.4 33.1 32.5	2.45 2.3 2.0	2.8	2.1	–	14.9 14.5 13.7	0.5	9.4	12.15	0.95 1.0 1.1
	11		0.2 0.4 0.8	38	42.9 42.6 42.0	2.45 2.3 2.0	4.8	3.6	–	17.6 17.2 16.4	0.5	11.2	14.85	1.15 1.2 1.3
	16		0.4 0.8 1.2	55	60.6 60.0 59.4	2.8 2.5 2.2	8	6	–	26.2 25.4 24.6	0.5	16.65	23.7	1.3 1.4 1.5
Angular mounting $\kappa_r = 75°$	06		0.2 0.4 0.8	22	27.7 27.3 26.6	2.5 2.4 2.25	2	1.5	–	11.1 10.8 10.8	0.7 0.8 1.1	6.6	9.55	0.90 0.85 0.7
	06		0.2 0.4 0.8	22	27.4 27 26.3	2.4 2.3 2.15	2	1.5	–	11.0 10.7 10.1	0.7 0.8 1.1	6.6	9.55	0.90 0.85 0.7
	09		0.2 0.4 0.8	28.5	35.1 34.7 34.0	3.3 3.1 2.75	2.8	2.1	–	14.8 14.45 13.7	1.0 1.1 1.3	9.4	12.15	0.65 0.5 0.2
	11		0.2 0.4 0.8	38	44.6 44.2 43.5	3.3 3.1 2.75	4.8	3.6	–	17.5 17.15 16.4	1.0 1.1 1.3	11.2	14.85	0.4 0.25 0.05
	16		0.4 0.8 2	55	62.2 61.5 60.8	3.6 3.25 2.9	8	6	–	24.55 23.8 23.05	3.75 3.95 4.15	16.65	23.7	2. 2.0 1.7

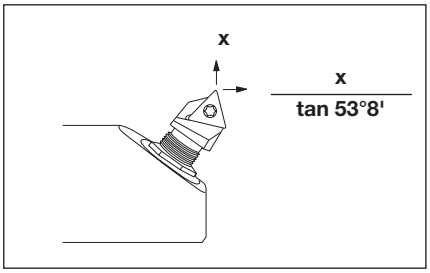
* On completely screwed in cartridge.

Setting the boring unit R/L148C

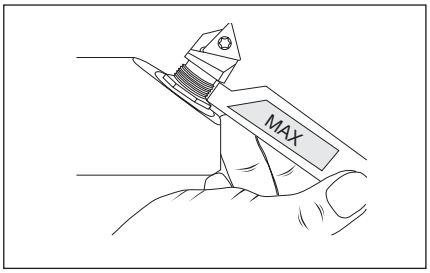
T-Max fine boring units are precision tools for mounting in special tools capable of machining close tolerances.
Features:
– Can be mounted in blind holes
– Adjustment is made from the front
– The units are self-locking, i.e. there is no need for unlocking before or locking after setting
– T-Max-U screw clamping



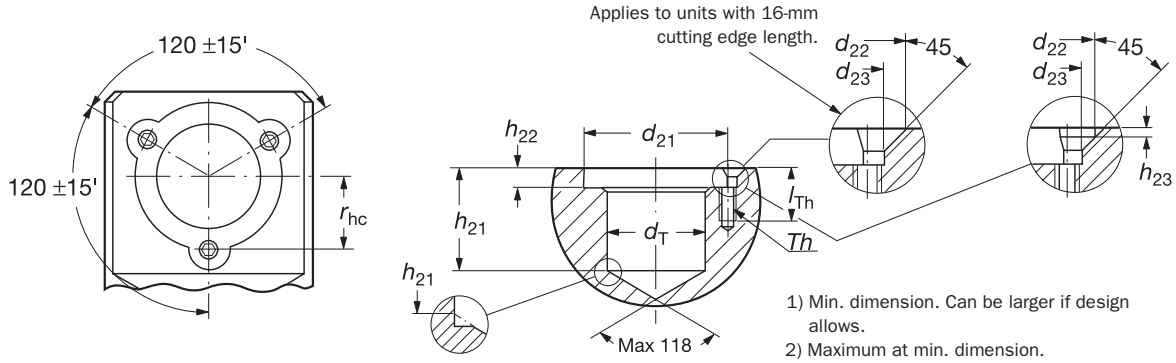
Turning the adjusting nut sets the bore diameter. The nut has a scale where each division is equivalent to 0.01 mm change of radial depth of cut.
With the exception of the smallest size, all units have vernier scales on the collar, which facilitates radial adjustments of 0.001 mm.



Please note:
– When setting a unit, mounted in angular position, the axial position changes equal to-radial movement/tan 53° 8'.
– When designing special tools, please calculate the nominal diameter to be machined with the unit set to the centre of the adjustment range, e1. This makes it possible to adjust the nominal bore plus and minus.
– Never unscrew the cartridge further than indicaed by the tongue of the setting key for the unit concerned.
If the limit is exeeded the unit can not be repaired.
The dimensions and tolerances in the table below must be adhered to for the units to be able to function.



Mounting dimensions for T-MAX U fine boring units



1) Min. dimension. Can be larger if design allows.
2) Maximum at min. dimension.

		Dimensions, mm									
		d_T H7	d_{21} +0.1 −0	d_{22} +0.1 −0	d_{23}	h_{21} +0.2 −0	h_{22} ±0.2	h_{23} +0.1 −0	l_{Th}	r_{hc}	Th
06		16	19	4.6	3.2	11.5	2.8	1.6	9	9.65 ±0.02	M3
09		20	25	4.6	3.2	15.5	4	1.6	9	12.5 ±0.05	M3
11		22	30	6.5	4.3	24	5	1.8	13	15.4 ±0.05	M4
16		32	46	11.9	5.4	33	6.3	–	16	23 ±0.05	M5
	06	16	19	4.6	3.2	11.5	2.8	1.6	9	9.65 ±0.02	M3

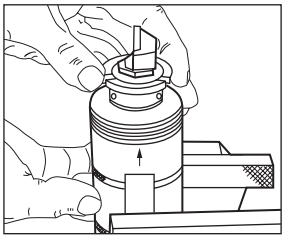
Cartridge replacement in fine boring unit R/L148C

When replacing a cartridge, the mounting fixture 148A-20 must be used. Failure to do this may result in damage to the unit. The mounting fixture takes up the pre-tension when the cartridge is removed. The same fixture is used for right and left hand units.

The following procedure should be observed

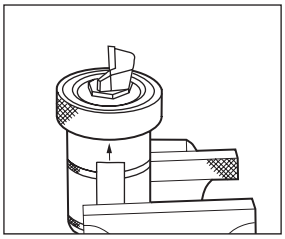
1. Clamp the mounting fixture in a vice.
2. Place the fine boring unit in the fixture (fig A) and turn it until the spring loaded plunger fits into the slot in the pilot at the back of the cartridge. Check that it has located by turning the unit round, making sure the plunger follows with it.
3. Fit the fixture nut over the unit.

A



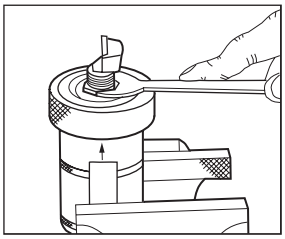
4. Press the unit in and turn until the fixture pin locates in one of the holes in the sleeve. The correct position is when the arrow on the fixture body is in line with the cutting edge (fig B).

B



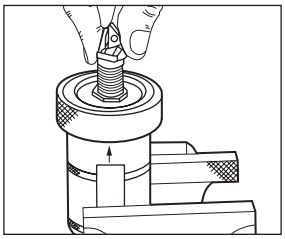
5. Tighten the fixture nut so that play can be felt in the thread of the fine boring unit. This occurs when the adjusting nut becomes easier to turn (fig C).

C



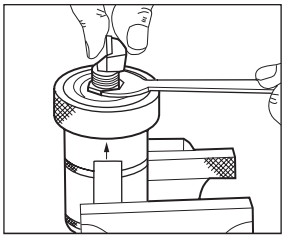
6. Remove the cartridge by turning the adjusting sleeve clockwise using the setting-key. When the cartridge starts to rotate with the sleeve unscrew it counter-clock-wise.
   Please note. If the fixture nut is loosened in this position a cartridge can not be mounted and the fine boring unit is destroyed.
   Make sure that all parts are clean before assembly.

D



7. Screw in the cartridge by hand until the plunger locates in the cartridge slot. The cutting edge should then be in line with the arrow on the fixture body. If the cutting edge lies at 180° relative to this arrow, use the follow-ing procedure:
   a) Turn the adjusting sleeve half a revolution clockwise with the setting key.
   b) Turn the cartridge clockwise by hand to the correct position. Hold the cartridge in this position while turning the adjusting sleeve counter-clockwise with the setting key (fig E). When the cartridge pilot reaches the pilot hole of the bottom of the unit a critical point is reached, as the pilot must locate in the pilot hole without being damaged.
   Fitting is facilitated by slightly turning the cartridge backwards and forwards, and at the same time gently turning the adjusting sleeve counter-clockwise.

E



8. Loosen the fixture nut and remove the fine boring unit.

Cutting speed recommendations for boring

The recommendations are valid for use with cutting fluid.

ISO	CMC No.	Material		Specific cutting force k_c 0.4 N/mm²	Hardness Brinell HB	WEAR RESISTANCE CT5005	CT5015	GC1525
						h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°		
						0.05 – 0.1 – 0.2	0.05 – 0.1 – 0.2	0.05 – 0.1 – 0.2
						Cutting speed, v_c m/min		
P Steel	01.1	Unalloyed steel	C = 0.1 – 0.25 %	2000	125	365 – 295 – 245	325 – 270 – 220	280 – 235 – 190
	01.2		C = 0.25 – 0.55 %	2100	150	325 – 265 – 210	285 – 240 – 195	250 – 210 – 165
	01.3		C = 0.55 – 0.80 %	2200	170	- - -	255 – 215 – 170	215 – 185 – 150
	02.1	Low-alloy steel, (alloying elements ≤ 5 %)	Non-hardened	2150	180	265 – 225 – 180	240 – 200 – 160	190 – 160 – 125
	02.12		Ball bearing steel	2300	210	- - -	- - -	- - -
	02.2		Hardened and tempered	2550	275	200 – 160 – 125	140 – 115 – 95	100 – 85 – 65
	02.2		Hardened and tempered	2850	350	160 – 130 – 100	115 – 95 – 75	80 – 65 – 55
	03.11	High-alloy steel (alloying elements >5 %)	Annealed	2500	200	- - -	200 – 165 – 125	130 – 110 – 85
	03.21		Hardened tool steel	3900	325	- - -	100 – 80 – 65	70 – 55 – 45
	06.1	Steel castings	Unalloyed	2000	180	- - -	130 – 105 – 90	115 – 90 – 70
	06.2		Low-alloy (alloying elements ≤ 5 %)	2100	200	- - -	135 – 110 – 85	90 – 70 – 55
	06.3		High-alloy, alloying elements >5 %)	2650	225	- - -	100 – 85 – 65	70 – 55 – 45

ISO	CMC No.	Material		Specific cutting force k_c 0.4 N/mm²	Hardness Brinell HB	WEAR RESISTANCE GC1025	GC2015	GC2025
						h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°		
						0.1 – 0.2 – 0.3	0.2 – 0.4 – 0.6	0.2 – 0.4 – 0.6
						Cutting speed, v_c m/min		
M Stainless steel	05.11	Stainless steel – Bars/forged Ferritic/martensitic	Non-hardened	2300	200	140 – 105 – 85	120 – 100 – 90	105 – 90 – 70
	05.12		PH-hardened	3550	330	75 – 60 – 50	55 – 45 – 35	50 – 35 – 25
	05.13		Hardened	2850	330	85 – 70 – 60	70 – 60 – 40	55 – 40 – 25
	05.21	Stainless steel – Bars/forged Austenitic	Austenitic	2300	180	135 – 110 – 85	125 – 105 – 85	100 – 80 – 60
	05.22		PH-hardened	3550	330	75 – 60 – 50	55 – 45 – 35	50 – 35 – 25
	05.23		Super austenitic	2950	200	95 – 80 – 65	75 – 65 – 50	60 – 50 – 40
	05.51	Stainless steel – Bars/forged Austenitic-ferritic (Duplex)	Non-weldable ≥ 0.05%C	2550	230	105 – 85 – 65	110 – 90 – 70	95 – 75 – 55
	05.52		Weldable <0.05%C	3050	260	95 – 70 – 55	90 – 75 – 60	75 – 60 – 45
	15.11	Stainless steel – Cast Ferritic/martensitic	Non-hardened	2100	200	135 – 110 – 85	115 – 95 – 80	100 – 80 – 660
	15.12		PH-hardened	3150	330	70 – 55 – 40	50 – 35 – 25	40 – 25 – 20
	15.13		Hardened	2650	330	70 – 60 – 45	50 – 40 – 30	45 – 30 – 25
	15.21	Stainless steel – Cast Austenitic	Austenitic	2200	180	120 – 90 – 75	100 – 80 – 65	85 – 65 – 50
	15.22		PH-hardened	3150	330	70 – 55 – 40	45 – 35 – 25	40 – 30 – 20
	15.23		Super austenitic	2700	200	90 – 75 – 65	70 – 55 – 45	60 – 45 – 30
	15.51	Stainless steel – Cast Austenitic-ferritic (Duplex)	Non-weldable ≥ 0.05%C	2250	230	95 – 70 – 50	90 – 75 – 65	75 – 60 – 45
	15.52		Weldable <0.05%C	2750	260	85 – 65 – 45	80 – 70 – 55	65 – 55 – 40

ISO	CMC No.	Material		Specific cutting force k_c 0.4 N/mm²	Hardness Brinell HB	WEAR RESISTANCE CB7050/CB50	CC620	CC650
						h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°		
						0.1 – 0.25 – 0.4	0.1 – 0.25 – 0.4	0.1 – 0.25 – 0.4
						Cutting speed, v_c m/min		
K Cast iron	07.1	Malleable cast iron	Ferritic (short chipping)	940	130	- - -	400 – 350 – 300	400 – 350 – 300
	07.2		Pearlitic (long chipping)	1100	230	- - -	350 – 295 – 250	350 – 300 – 250
	08.1	Grey cast iron	Low tensile strength	1100	180	850 – 720 – 610	400 – 350 – 300	400 – 350 – 300
	08.2		High tensile strength	1150	220	740 – 610 – 530	380 – 325 – 270	380 – 325 – 270
	09.1	Nodular SG iron	Ferritic	1050	160	- - -	- - -	305 – 275 – 225
	09.2		Pearlitic	1750	250	- - -	- - -	255 – 225 – 175
	09.3		Martensitic	2700	380	- - -	- - -	175 – 155 – 130

[1] For boring tools 391.68A/B < 50 mm use max v_c=100 m/min, positive cutting geometry and coolant should be used.

[2] Rm = ultimate tensile strength measured in MPa.

SANDVIK Coromant

TOUGHNESS

GC4005	GC4015	GC4025	GC4035						
h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°									
0.1 – 0.4 – 0.8	0.1 – 0.4 – 0.8	0.1 – 0.4 – 0.8	0.1 – 0.4 – 0.8						
Cutting speed, v_c m/min									
295 – 215 – 155 265 – 195 – 140 255 – 180 – 130	270 – 195 – 140 245 – 175 – 125 230 – 165 – 120	245 – 165 – 115 215 – 145 – 105 200 – 135 – 95	205 – 130 – 95 180 – 115 – 85 175 – 110 – 80						
290 – 195 – 135 255 – 165 – 120 155 – 110 – 80 125 – 90 – 65	265 – 175 – 125 230 – 155 – 110 145 – 100 – 75 115 – 80 – 60	220 – 145 – 100 190 – 125 – 90 140 – 100 – 75 115 – 80 – 60	145 – 90 – 65 125 – 75 – 55 90 – 55 – 40 70 – 45 – 30						
215 – 140 – 105 105 – 65 – 50	195 – 130 – 95 95 – 60 – 45	140 – 100 – 70 65 – 45 – 35	115 – 75 – 50 50 – 35 – 25						
160 – 110 – 90 140 – 95 – 75 105 – 70 – 55	145 – 100 – 80 125 – 90 – 70 95 – 65 – 50	115 – 85 – 60 100 – 65 – 45 90 – 60 – 45	90 – 65 – 50 80 – 45 – 35 70 – 45 – 30						

TOUGHNESS

GC2035	GC235								
h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°									
0.2 – 0.4 – 0.6	0.2 – 0.4 – 0.6								
Cutting speed, v_c m/min									
90 – 80 – 65 40 – 35 – 25 50 – 35 – 25	65 – 55 – 45 35 – 25 – 20 40 – 30 – 25								
85 – 70 – 55 40 – 35 – 25 50 – 45 – 35	60 – 50 – 40 35 – 25 – 20 40 – 35 – 30								
80 – 65 – 50 65 – 55 – 40	50 – 45 – 40 45 – 40 – 35								
85 – 70 – 55 35 – 25 – 20 35 – 30 – 25	60 – 50 – 40 30 – 20 – 15 35 – 25 – 20								
75 – 60 – 50 35 – 25 – 20 50 – 40 – 30	50 – 45 – 40 30 – 20 – 15 40 – 30 – 25								
65 – 55 – 45 55 – 45 – 35	50 – 40 – 35 45 – 35 – 30								

TOUGHNESS

CC6090	GC1690	CT5005	GC3205	GC3210	GC3215	GC3015	GC3005	GC3025	H13A
h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°									
0.2 – 0.4 – 0.6	0.2 – 0.4 – 0.6		0.1 – 0.3 – 0.6	0.1 – 0.3 – 0.6	0.1 – 0.3 – 0.6	0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.6	0.1 – 0.3 – 0.5
Cutting speed, v_c m/min									
370 – 300 – 250 320 – 250 – 200	370 – 300 – 250 320 – 250 – 200	- - - - - -	255 – 210 – 165 205 – 170 – 130	210 – 175 – 130 175 – 140 – 110	145 – 120 – 95 115 – 95 – 75	170 – 140 – 115 130 – 115 – 95	135 – 115 – 100 120 – 105 – 85	120 – 95 – 65 90 – 70 – 50	70 – 65 – 55 60 – 55 – 45
370 – 300 – 250 345 – 270 – 220	370 – 300 – 250 345 – 370 – 220	- - - - - -	300 – 240 – 185 235 – 190 – 150	250 – 200 – 150 195 – 160 – 120	155 – 135 – 105 135 – 110 – 85	190 – 160 – 135 150 – 125 – 110	145 – 130 – 120 140 – 120 – 105	115 – 90 – 60 105 – 75 – 55	90 – 75 – 55 70 – 55 – 45
- - - - - - - - -	200 – 225 – 175 240 – 175 – 125 160 – 130 – 110	160 – 125 – 100 120 – 100 – 85 - - -	200 – 180 – 140 175 – 165 – 125 135 – 125 – 95	180 – 170 – 125 165 – 150 – 110 125 – 115 – 85	135 – 110 – 85 125 – 95 – 75 90 – 75 – 60	150 – 120 – 100 135 – 110 – 90 105 – 85 – 65	150 – 115 – 95 130 – 110 – 90 100 – 80 – 60	115 – 85 – 55 100 – 75 – 50 75 – 55 – 40	70 – 65 – 50 60 – 55 – 45 50 – 40 – 30

Cutting speed recommendations

The recommendations are valid for use with cutting fluid.

ISO	CMC No.	Material		Specific cutting force k_c 0.4 N/mm²	Hardness Brinell HB	WEAR RESISTANCE CD10	CD1810	H10
						h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95° 0.05 – 0.4	0.15 – 0.8	0.15 – 0.8
						Cutting speed, v_c m/min		
N Non-ferrous metals	30.11	**Aluminium alloys**	Wrought or wrought and coldworked, non-aging	500	60	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]
	30.12		Wrought or wrought and aged	800	100	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]
	30.21	**Aluminium alloys**	Cast, non-aging	750	75	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]
	30.22		Cast or cast and aged	900	90	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]	1000 (1250 – 125)[1]
	30.41	**Aluminium alloys**	Cast, 13–15% Si	950	130	770 (960 – 95)[1]	385 (480 – 50)[1]	225 - (280 – 30)[1]
	30.42		Cast, 16–22% Si	950	130	385 (480 – 50)[1]	255 (320 – 30)[1]	150 - (190 – 20)[1]
	33.1	**Copper and copper alloys**	Free cutting alloys, ≥1% Pb	700	110	250 (315 – 30)[1]	250 (315 – 30)[1]	250 (315 – 30)[1]
	33.2		Brass, leaded bronzes, ≤1% Pb	700	90	250 (315 – 30)[1]	250 (315 – 30)[1]	250 (315 – 30)[1]
	33.3		Bronze and non-leadad copper incl. electrolytic copper	1750	100	150 (190 – 20)[1]	150 (190 – 20)[1]	150 (190 – 20)[1]

ISO	CMC No.	Material		Specific cutting force k_c 0.4 N/mm²	Hardness Brinell HB	WEAR RESISTANCE CC650	CC6080	CC670
						h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95° 0.1 – 0.2	0.1 – 0.2 – 0.3	0.1 – 0.2 – 0.3
						Cutting speed, v_c m/min		
S Heat resistant material		**Heat resistant super alloys**						
	20.11	Iron base	Annealed or solution treated	3000	200	- -	- - -	- - -
	20.12		Aged or solution treated and aged	3050	280	- -	- - -	- - -
	20.21	Nickel base	Annealed or solution treated	3300	250	275 – 220	210 – 175 – 150	275 – 220 – 165
	20.22		Aged or solution treated and aged	3600	350	225 – 175	175 – 150 – 125	225 – 175 – 135
	20.24		Cast or cast and aged	3700	320	110 – 80	160 – 135 – 115	110 – 90 – 70
	20.31	Cobalt base	Annealed or solution treated	3300	200	175 – 130	- - -	175 – 130 – 100
	20.32		Solution treated and aged	3700	300	150 – 110	- - -	150 – 110 – 90
	20.33		Cast or cast and aged	3800	320	145 – 115	- - -	145 – 115 – 85
						H10	H10A	H13A
		Titanium alloys[2]			Rm[3]	0.1 – 0.2 – 0.3	0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.5
	23.1	Commercial pure (99.5% Ti)		1550	400	205 – 170 – 145	195 – 160 – 135	180 – 150 – 125
	23.21	α, near α and α+β alloys, annealed		1700	950	85 – 70 – 55	80 – 65 – 55	75 – 60 – 50
	23.22	α+β alloys in aged cond., β alloys, annealed or aged		1700	1050	80 – 60 – 50	80 – 60 – 50	70 – 55 – 45

ISO	CMC No	Material		Specific cutting force k_c 0.4	Hardness Brinell	WEAR RESISTANCE CB7020/CB20	CB7050/CB50	CC650
						h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95° 0.05 – 0.15 – 0.25	0.1– 0.25 – 0.4	0.1 – 0.25 – 0.4
						Cutting speed, v_c m/min		
H Hardened material	04.1	**Hard steel**	Hardened and tempered	3250	45HRC	- - -	- - -	140 – 105 – 70
		Extra hard steel	Hardened and tempered	5550	60 HRC	180 – 150 – 120	150 – 120 – 100	120 – 90 – 60
	10.1	**Chilled cast iron**	Cast or cast and aged	2800	400	- - -	180 – 150 – 120	120 – 90 – 60

[1] The cutting speeds, shown in the table, are valid for all feeds within the feed range.
[2] 45–60° entering angle, positive cutting geometry and coolant should be used.
[3] Rm = ultimate tensile strength measured in MPa.

Non-ferrous materials

Choosing polycrystalline diamond tipped inserts (PCD) or cemented carbide inserts?

The PCD grade CD10 and diamond coated grade CD1810 can be a useful alternative to cemented carbide for finishing and semi-finishing in non-ferrous metals and non-metallic materials.

Use diamond for improving:

– tool-life
– surface finish
– stable conditions
– machining economy

Use cemented carbide for imrpoving:

– chip control
– edge security
– low cost per edge
– setting up of new jobs
– unstable conditions

TOUGHNESS

h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°									
Cutting speed, v_c m/min									

TOUGHNESS

S05F	GC1005	H10A	H13A	GC1025	H10F				
h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°									
0.1 – 0.2 – 0.3	0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.5				
Cutting speed, v_c m/min									
160 – 135 – 110 125 – 105 – 85	120 – 100 – 75 90 – 75 – 60	85 – 70 – 55 65 – 55 – 40	80 – 65 – 50 60 – 50 – 40	75 – 60 – 45 55 – 45 – 35	70 – 55 – 40 50 – 40 – 30				
100 – 85 – 70 90 – 75 – 60 80 – 65 – 55	75 – 60 – 45 60 – 45 – 30 35 – 30 – 20	55 – 40 – 30 40 – 30 – 20 25 – 20 – 15	50 – 40 – 30 40 – 30 – 20 25 – 20 – 15	45 – 35 – 25 35 – 25 – 15 25 – 15 – 10	40 – 30 – 20 30 – 20 – 10 20 – 15 – 10				
100 – 85 – 70 90 – 75 – 60 80 – 65 – 55	75 – 60 – 45 60 – 45 – 30 35 – 30 – 20	55 – 40 – 30 40 – 30 – 20 25 – 20 – 15	50 – 40 – 30 40 – 30 – 20 25 – 20 – 15	45 – 35 – 25 35 – 25 – 15 25 – 15 – 10	40 – 30 – 20 30 – 20 – 10 20 – 15 – 10				
H10F	GC1025								
0.1 – 0.3 – 0.5	0.1 – 0.3 – 0.5								
160 – 135 – 115 65 – 55 – 45 65 – 50 – 40	160 – 135 – 115 65 – 55 – 45 65 – 50 – 40								

TOUGHNESS

CC670									
h_{ex}, mm ≈ feed, f_n mm/r at κ_r 90°-95°									
0.1 – 0.25 – 0.4									
Cutting speed, v_c m/min									
140 – 120 – 95 120 – 100 – 80									
120 – 90 – 60									

CBN in cast-iron, hardened and heat resistant materials

Cubic boron nitride grades CB7020, CB20, CB7050 and CB50

CBN inserts can increase productivity in many difficult metal cutting operations — up to 100 times better than carbide or ceramics in terms of longer tool-life and/or higher metal removal rate.

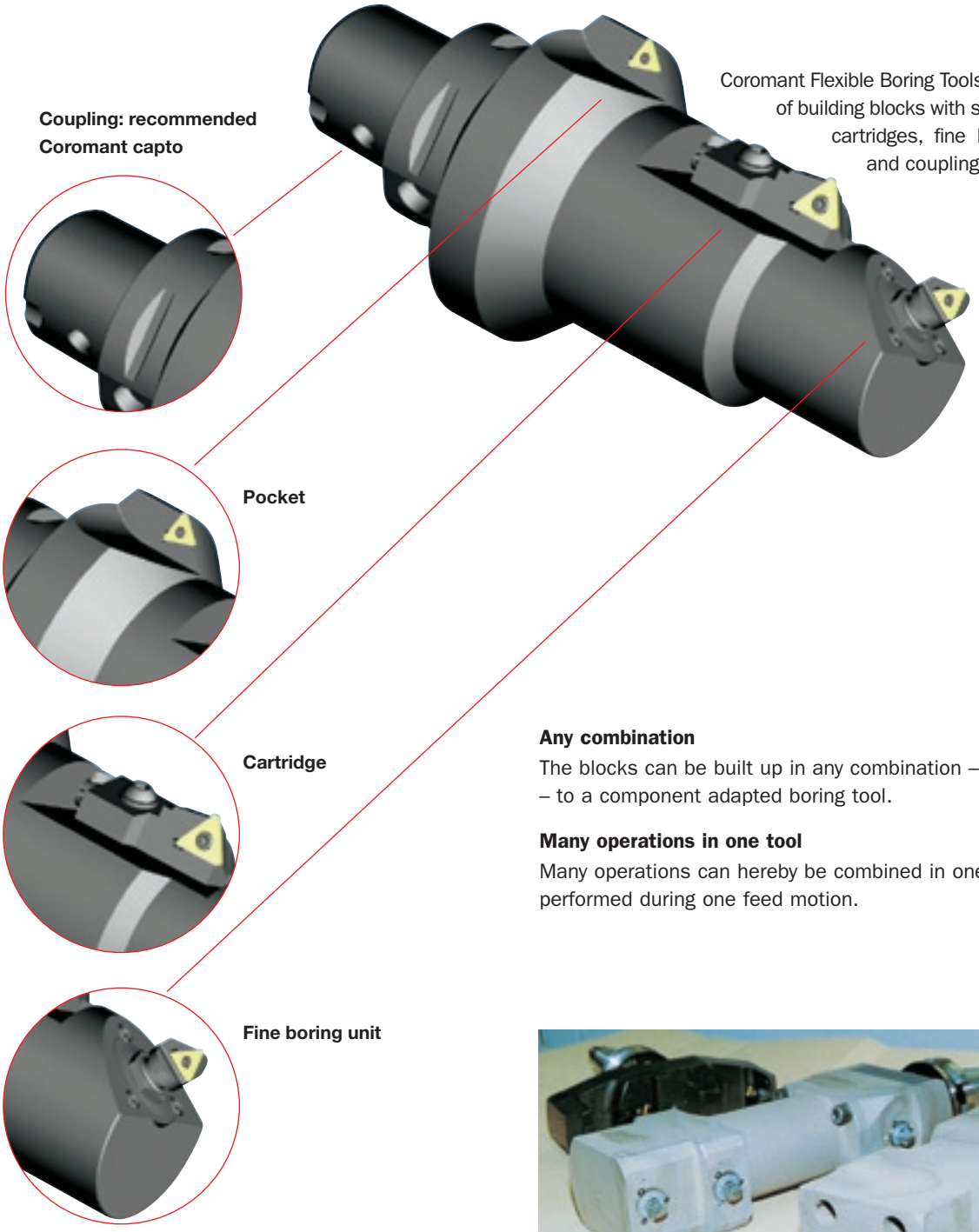
CBN is recommended primarily for finishing operations:

CB7050/CB50 for cast-iron and heat resistant materials.

CB7020/CB20 for continuous and light interrupted cuts in hardened parts.

Coromant flexible boring tool

Special concept for boring



Coromant Flexible Boring Tools are built up of building blocks with seat pockets, cartridges, fine boring units and couplings.

Any combination

The blocks can be built up in any combination – within limits – to a component adapted boring tool.

Many operations in one tool

Many operations can hereby be combined in one tool and be performed during one feed motion.