TOOL HOLDING/MACHINES

Introduction

Coromant Capto® is the most stable tool holding system on the market and makes it possible to use only one system for the entire workshop, regardless of machine type: turning centre, machining centre, multi-task machine; manual or fully automatic. The tool system permits standardization, reduces inventory costs, and simplifies physical and administrative handling of tools.

The unique polygon shaped Coromant Capto® coupling, which was introduced in 1990, has proven its excellence over the years and became an ISO-standardized coupling type (ISO 26623).

CoroGrip and HydroGrip are precision chucks suitable for milling, drilling and boring/reaming; they were developed for minimum run-out, maximum torque transmisson and high speed machining.

Trends

Machines and machining methods

- Multi-task machines requiring one holder system for both spindle and turrets.
- Several turrets on multi-task machines and turning centres.
- More multi-function tools for multi-task machines.
- Driven tools in turning centres.
- Powerful interfaces in the machine control system for higher degrees of automation.
- 3-D models of tools and holders to virtually check the machining process.
- Integration of various manufacturing technologies into fewer machine types.
- High pressure coolant.

Getting started

Tool holding options

The clamping of a cutting tool can dramatically influence the productivity and performance of the tool. Therefore, it's important to choose the right holding tools. This chapter will simplify the decision process and provide guidelines for how to apply and maintain the holding products.

Getting started - general guidelines about Coromant Capto system, CoroGrip, HydroGrip and other holders are described. See page G 3 - G 19.

Machines - tooling systems
Machines - tooling systems - describes the principle machining methods for different machine concepts (turning centres, machining centres, multi-task machines and sliding head machines) and presents the tool holding options from a machine perspective. See page G 20 - G 35.

Tool holding
Tool holding - describes the tool holding options from a cutting tool perspective. The section is divided into turning, milling, drilling, boring and tapping, and provides recommendations as to which holder types should be used for different cutting tools. See page G 36 - G 56.

Tool holding products
Thish section provides more details about each of the tool holding products.

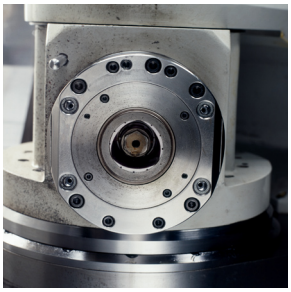
It is divided in two areas:

Machine interfaces - see page G 59 - G 84.

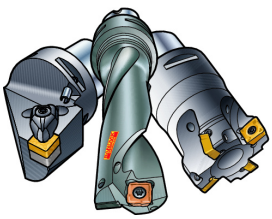
Products close to the machine interface, like clamping units for turning tools and basic holders for rotating tools; the Coromant Capto system for turret conversion and spindle integration; accessories for alignment, gauges, torque wrenches etc.

Adaptors and chucks - see page G 85 - G 123.

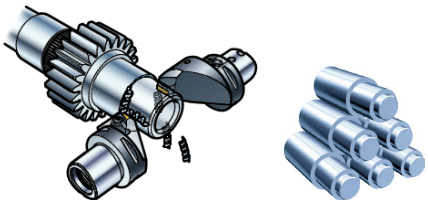
Products holding the cutting tool, like adaptors for turning tools, including the CoroTurn SL system, adaptors for rotating tools, dampened adaptors and CoroGrip, HydroGrip chucks etc.



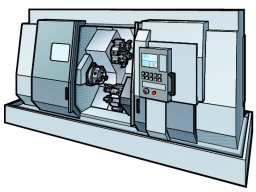
Choice of tool holding solution
Three different areas may be considered to determine the best tool holding solution.



1. Cutting operation



2. Component shape and quantity



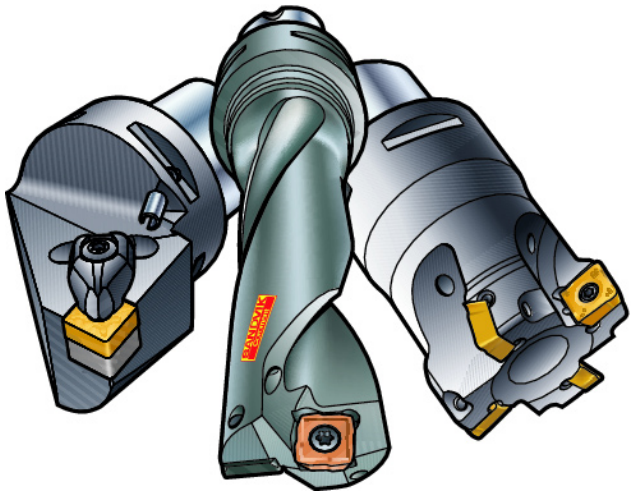
3. Machine performance

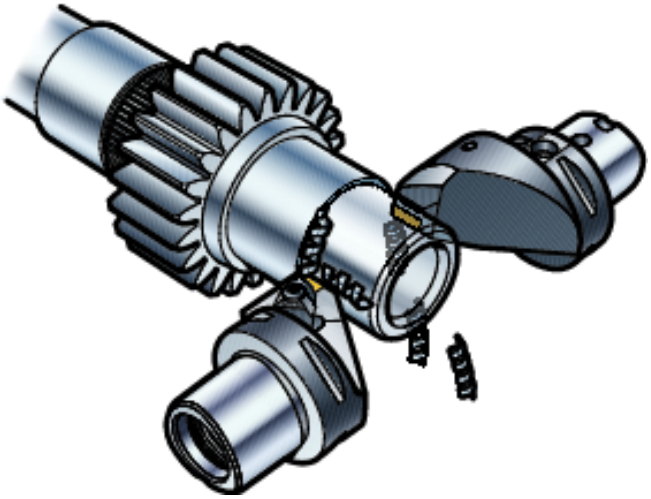
Initial considerations

1. The cutting operation

Start with an analysis of the operation:

- Turning, milling, drilling, boring/reaming or tapping? Operation type affects the tool holding choice.
- Quality (tolerance, surface finish)?
- Quantity (of cutting operations)?





2. The component

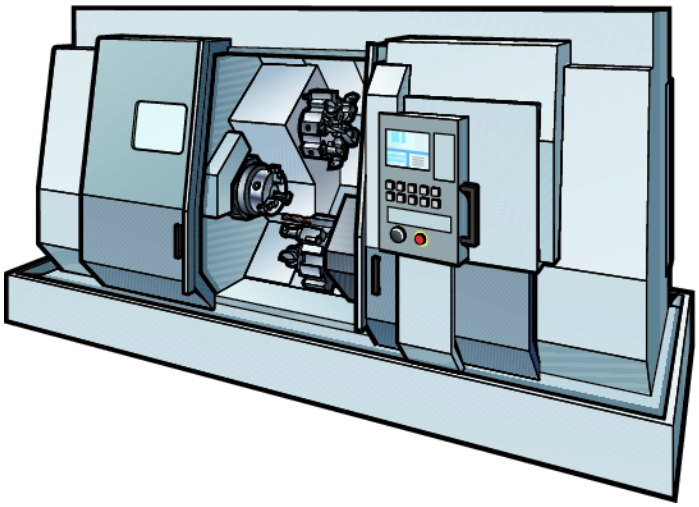
After analysing the cutting operation, it's time to look at the component:

- Can the component be fixed securely?
- Single cut or mass production?
- Is there any need for two or more functions in one tool (to minimize the number of tool changes)?

3. The machine

Finally, we take a look at the machine:

- Stability, power and torque requirements, especially for larger components?
- Machining centre, turning centre or multi-task machine?
- Type of machine spindle interface?
- Type of turret?
- Manual or automatic clamping units?
- Modular or solid tooling system?



Choice of method – example

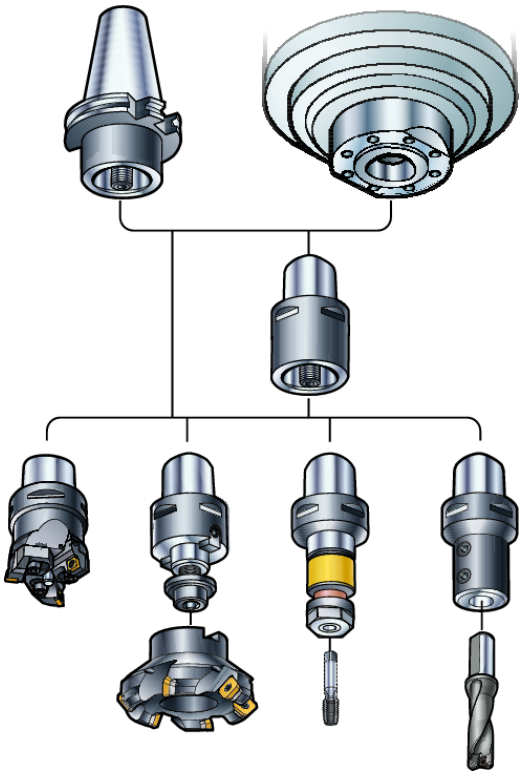
A tool holding system can be adopted either by retro-fitting existing machines, or as a part of the equipment in new machinery.

Make sure that the tool holding system, can be used for any type of machining operation, without requiring compromises.

Ensure that the system is suitable for all foreseeable machine tool types and machining requirements.

In a multi-task machine, for example, a small difference in length can be the determining factor for your productivity.

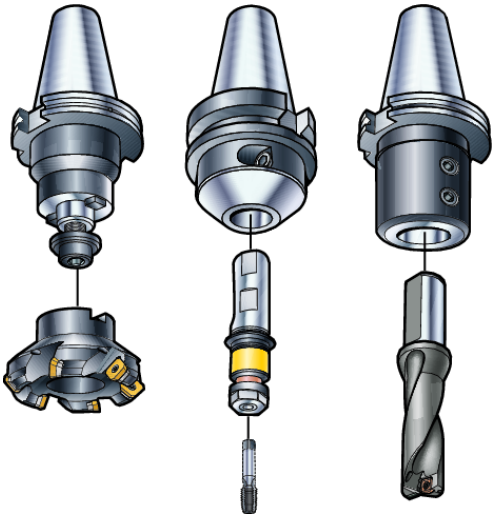
Modular tooling system



Advantages

- One system for all machining operations
- Always maximum performance
- Reduced tool inventory and cost.

Solid tooling system



Advantages

- Standard tool holders
- Fast way to unchanging production.

Disadvantages

- Less flexible
- High number of tool holders.

First choice for all application areas

The use of modular tools provides high performance with a minimum overall inventory.

Comparison of different tool holding systems

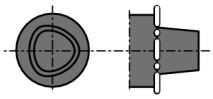
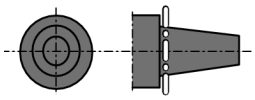
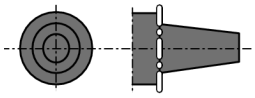
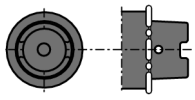
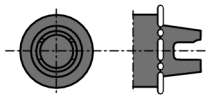
For rotating:

- Bending stiffness
- Torque stiffness
- Run-out
- Rapid tool change properties.

For workpiece turning:

- Torque stiffness
- Bending stiffness
- Precision, cutting edge location
- Rapid tool change properties.

Comparison coupling types

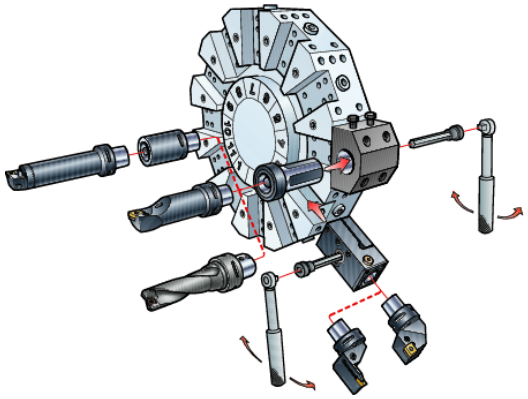
Type	Advantages	Limitations
Coromant Capto® coupling 	The only universal coupling that can be used in all applications without compromise.	
7/24 taper (ISO 40, 50 and 60) 	Most common couplings for machining centres. Good coupling for bending and torque. Easy to change tools automatically.	Not very accurate. Not possible to locate centre height of the insert (turning). Large and heavy coupling: it is not ”operator friendly” from an ergonomic point of view.
7/24 taper with flange contact (BIG +) 	Good coupling for bending and torque. Easy to change tools automatically. Improved capability to take up bending moment. More accurate because of a fixed stop in the Z-axis.	Not very accurate. Not possible to locate centre height of the insert (turning). Large and heavy coupling: it is not ”operator friendly” from an ergonomic point of view.
HSK form A/C (B, D, E, F, T) 	Easy to change tools automatically.	Not strong enough to take up transmission torque in turning area. Not possible to locate centre height of the insert (turning).
KM (KM- UT, KM-XMZ and KM- XMS) 	Similar to HSK. Clamping bolts inside coupling improve torque transmission and also help to locate cutting edge.	Three different types, KM- UT, KM-XMZ and KM- XMS.

For coupling details, see page G 17.

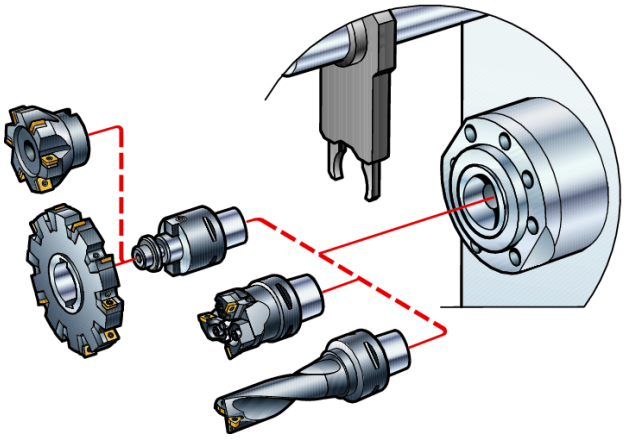
Coromant Capto® system minimizes tool inventory

Coromant Capto is a modular quick change tooling system that makes it possible to use only one system for the entire workshop.

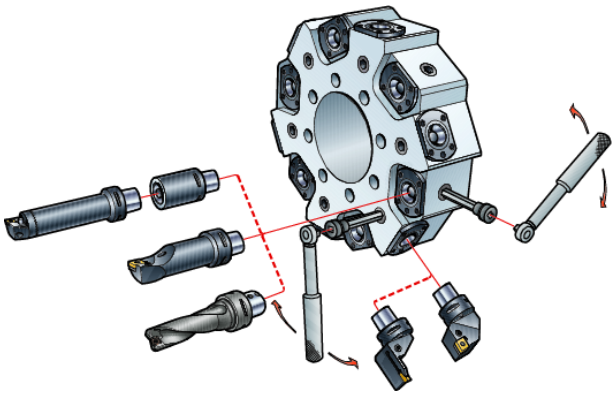
The same tools can be used in other machines providing unique flexibility and minimized tool inventory.



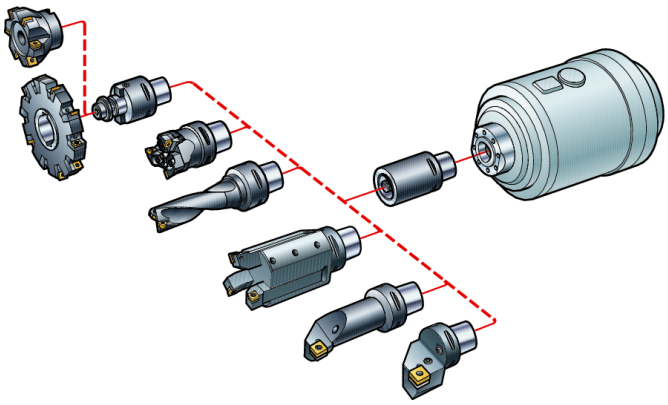
CNC lathes can easily be converted to the Coromant Capto system quick-change tools using standard clamping units.



Coromant Capto system in machining centres, vertical lathes and multi-task machines provides flexibility and substantial reduction of inventory.



Coromant Capto system can be integrated directly into the turret using the standard clamping mechanism.



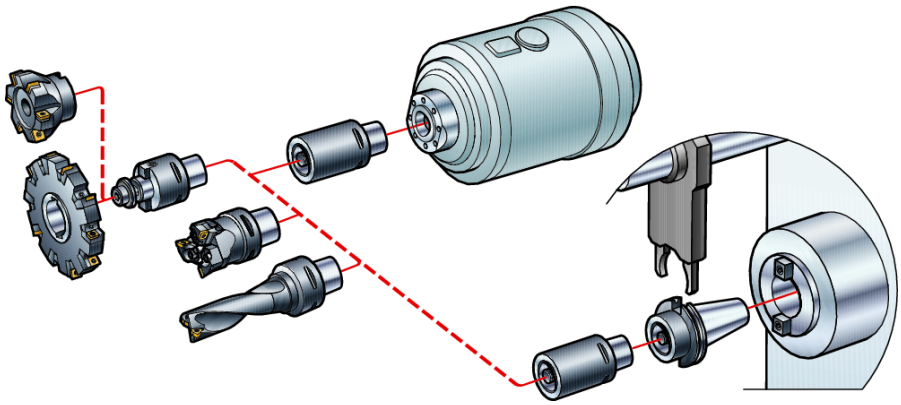
Coromant Capto system integrated into multi-task machines provides many advantages:

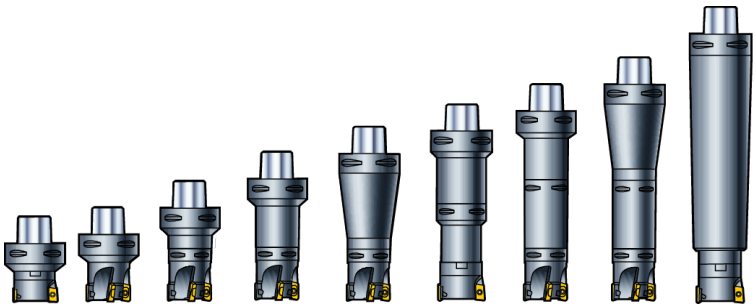
- One single system in the machine.
- Maximum power of the machine can be utilized due to the rigidity of the coupling.
- Tools are relatively small in size and weight.

Minimize tool inventory with Coromant Capto® system

Use Coromant Capto system as a modular interface to combine adaptors, extensions and basic holders (when needed) for greater flexibility.

- Modular tools provide access to a large tool assortment, with few interface items.
- It is possible to build optimized tools for each operation.
- Precision and stability allows higher cutting data.
- Dampened boring bars for milling and boring operations.
- Reduced tool inventory and tool investment cost.

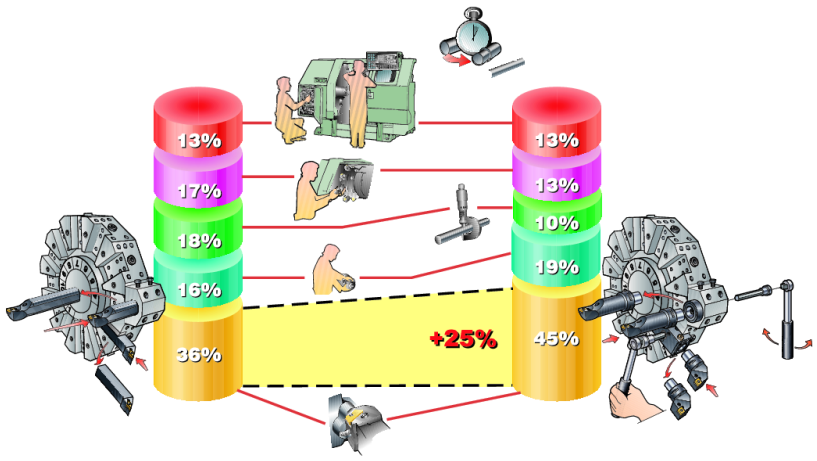




Build the desired length for your operation.

Reduce downtimes in your machines

Only thirty-six percent of the machine time is used for metal cutting.



Conventional tools **Modular tooling**

Modular tooling offers a productivity increase by 25%

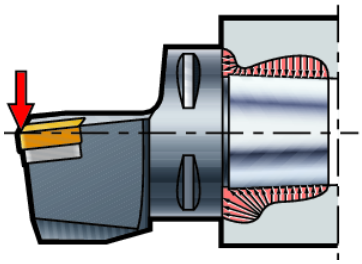
- 13% - service and maintenance.
- 17% - Insert change-out and tool change-out.
- 18% - measuring of the tool and workpiece.
- 16% - workpiece change-out.

Transmission of torque – Coromant Capto® coupling

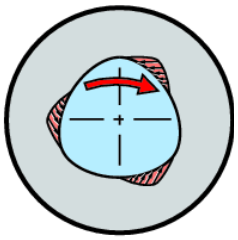
The distinctive feature of the Coromant Capto system is its ingenious coupling, which has a tapered polygon and a unique profile.

The polygon shape transmits torque without any loose parts, such as pins or keys, which means that the coupling has outstanding stability characteristics.

The tight press fit guarantees that there is no play in the coupling. Loads are spread symmetrically, irrespective of peaks or rotation, and without losing centre height.



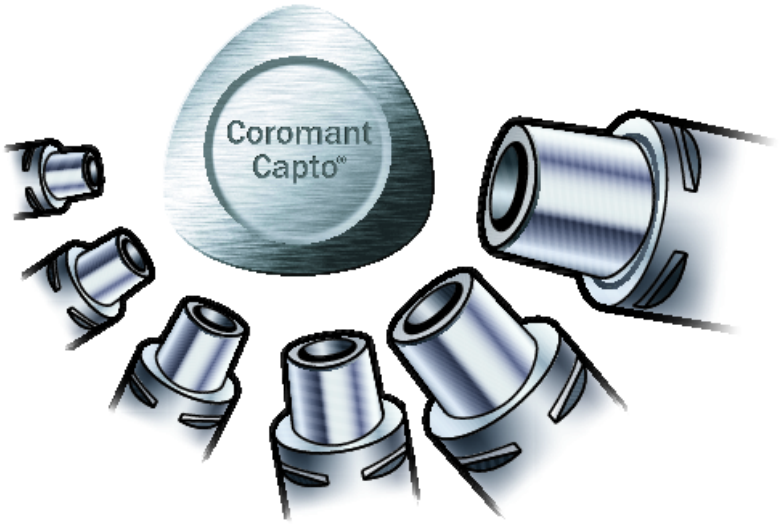
Self-centering



Large contact surfaces

Symmetric distribution of forces

There are six sizes in the Coromant Capto coupling programme. From size C3 (32 mm) up to the most rigid C10 (100 mm).

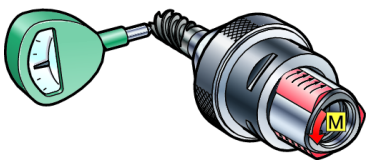


Stability for productivity – Coromant Capto® couplings

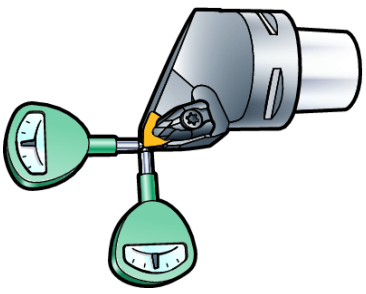
In more detail:

The repeatable accuracy for the same cutting unit in the same clamping unit is ±2 microns in the x-, y- and z-axes. The accuracy of the Coromant Capto system provides excellent resistance to both bending and twisting.

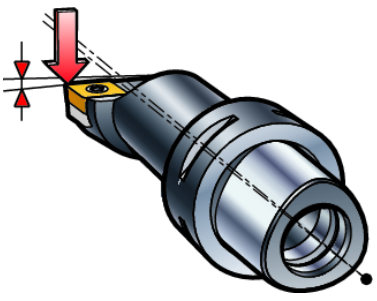
An increase in feed of 0.1 mm/r offers a productivity increase equal to 250 extra machining hours per year.



Minimum run-out



Repetitive accuracy



Always correct centre hight

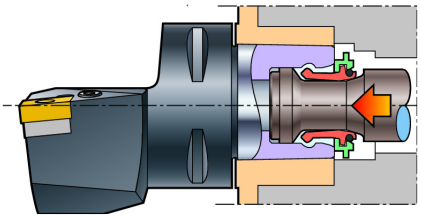
Clamping principle – Coromant Capto® system

The clamping system is based on the interplay between a segmented, expandable bushing in the clamping unit and an inner groove on the cutting unit: lips on the outer periphery of the bushing segments lock into the inner groove and hold the two components securely together.

On a few types of clamping units, a centre bolt is used instead of the expandable bushing.

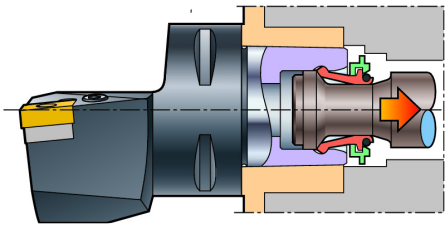
Unclamped position

With the drawbar in the forward position, the forward ends of the segmented bushing move towards the centre line of the coupling. The diameter is reduced and the lips on the outer edge of the bushing disconnect from the inner groove of the cutting unit. The drawbar pushes the cutting unit out.

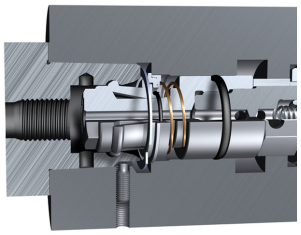


Clamped position

With the drawbar in the retracted position, the forward ends of the segmented bushing are forced outwards away from the centre line of the coupling by the shoulder on the drawbar. The lips on the outer edge of the bushing lock into the inner groove of the cutting unit which is pulled into its working position.



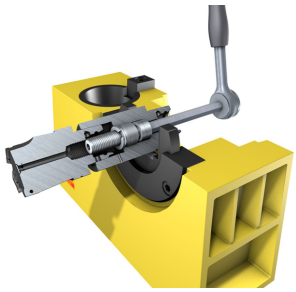
Three methods of clamping – Coromant Capto® system



Segment

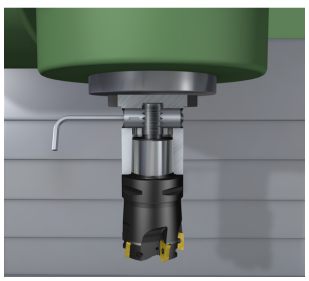
Machine interface for tool clamping in manual and automatic clamping units and spindles.

A camshaft, spring or hydro- mechanical device activates the drawbar. A half turn is needed to lock and unlock the drawbar in a manual clamping unit.



Centre bolt

The centre bolt clamping is used with basic holders and extension adaptors to connect them with Coromant Capto system cutting tools, or when there is a need to build longer tools.



Front clamping

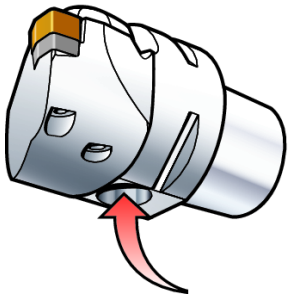
Machine interface for quick tool change in milling and drilling machines without automatic tool changer. The clamping force is about 50% of the centre bolt system.

Tool holding identification

All Coromant Capto system tools and adaptors can be equipped with both axial and radial ID-chips for efficient storage, access and handling.

Holes for radial ID-chips are not manufactured on standard tools.

Note: the ID-chip must be fixed with Loctite if it is mounted in the centre bolt hole. Otherwise it can obstruct the clamping mechanism.



Equip your tools with ID-chips for easy storage and handling.

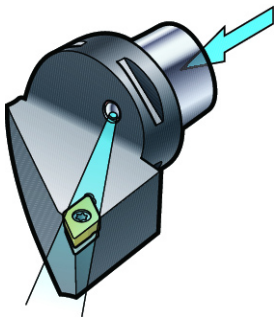
Cutting fluid and coolant

Internal coolant

Coolant applied directly to the cutting edge eliminates downtime due to interruptions for the adjustment of cooling tubes. An effective and consistent supply of coolant also improves tool life.

All Coromant Capto adaptors are designed with the best solutions for internal coolant.

The solution handles coolant pressures up to 80 bar.



Coromant Capto coupling with through coolant.

High pressure coolant

High pressure coolant is standard on all Coromant Capto couplings. It is also a standard option on most machine types, such as turning centres, machining centres and multi-task machines.

CoroTurn HP (a special program) can be used for the correct application of coolant within a turning machining.

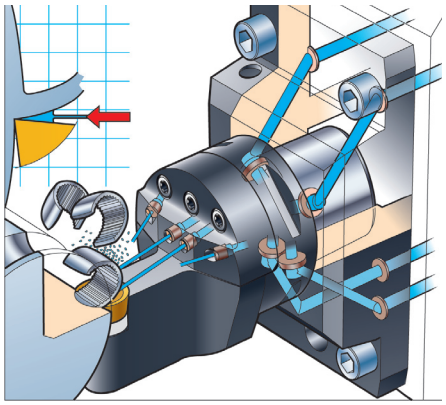
The solution handles coolant pressures up to 80 bar.

Ultra high pressure coolant – Jet Break™

Jet Break is a complete technology that provides a High Pressure Coolant (HPC) system.

The coolant, which is applied through the cone of the coupling into the nozzle jet, is directed towards the cutting edge to form a hydraulic wedge between the chip and the rake face of the tool.

The solution offers up to four independent channels with a maximum pressure of 1000 bar.



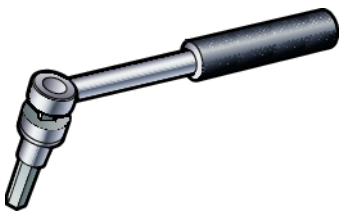
Torque wrench

To get the best performance out of each tool holder, a torque wrench should be used for correct tightening.

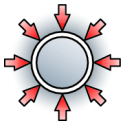
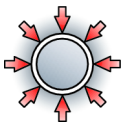
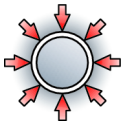
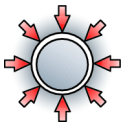
Torque that is too high will affect the performance negatively and cause holder breakage.

Torque that is too low will cause vibrations and diminish the machining accuracy.

See page G 83, for correct tool tightening torque.



Choice of chucks and adaptors

Rank	Style	Type of chuck/ adaptor	Clamping area	Torque transmission		Run out	Balanced
				Small diameter < 20 mm	Large diameter ≥ 20 mm		
First choice		HydroGrip Hydraulic chucks		+++	+++	+++	Balanced by rotational testing
First choice		CoroGrip Hydro-mechanical chucks		+++	+++	+++	Balanced by rotational testing
		Shrink fit adaptor		+++	++	+++	Balanced by design (C4-C5)
		Collet chuck adaptor ER type		+	+	+	Balanced by design (C3-C5)
		Endmill (Weldon) holders, screw type		+++	+++	+	Balanced by design (C3-C5)
		Drill adaptor screw type		+++	+++	+	No

+++ Very good
++ Good
+ OK

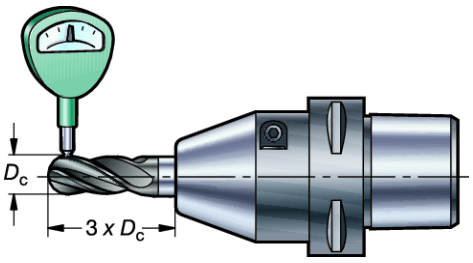
CoroGrip® and HydroGrip® for minimum run-out

The run-out at the front of a CoroGrip or HydroGrip chuck is less than 3 µm.

At a distance of 3 × tool diameter from the front, the run-out is less than 10 µm.

An individual measuring report is enclosed with each chuck, containing:

- Balance quality code.
- Rotational speed at balance quality.
- Radial run-out at a distance of 3 × D_c from the front.
- Measured clamping power (Nm).



Balancing of tool holders

Balancing becomes a critical factor as spindle speeds rise. Centrifugal forces act on tool holder and cutting tool. Any imbalance creates vibrations. Individually balanced tool holders are critical when spindle speeds approach those of high speed machining.

What can cause unbalance?

- Mass misalignment (grooves, slots etc).
- Eccentricity (distance between the rotational centre and centre of gravity for the tool).
- Additional components (e.g. a tool that is unbalanced).
- Fitting and tolerances between the spindle and the coupling of the tool.

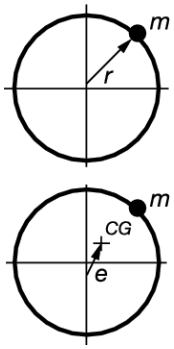
Within the industry, the level of balance is often specified with a balance quality class (a G-value) calculated according to ISO standard 1940/1.

Sandvik Coromant tool holder balance qualities

All ISO (7/24 inches) taper tool holders have AT3 taper tolerance. Coromant Capto system, HSK and metric solid ISO taper tool holders are “Balanced by design” (ISO 40/HSK 63) and can normally be used up to 15,000 rpm in a modern CNC machine without extra balancing.

For the Coromant Capto system, the maximum recommended spindle speed is reduced to 8,000 rpm when extensions and/or reductions are used between the basic holder and adaptor.

Calculation of unbalance G-value ISO 1940/1



Unbalance
u = unbalance x radius
= m x r (gmm)

Eccentricity
(distance between rotational centre and centre of gravity)

e = unbalance/mass of tool
= u/kg (µm)

n = **spindle speed** (rpm)
G = e x n/9549

Example: **A taper 40 tool holder with a cutting tool**

m = 1.0 g

r = 20 mm

u = m x r = 20.0 gmm

Mass of tool = 1.25 kg

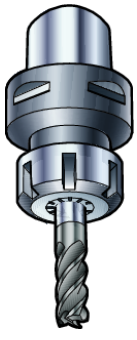
e = u /m tool = 16.0 µm

n = 15.000 rpm

G value at 15.000 rpm = e x n / 9549 = **G 25**

G 2.5 is often requested for tool holders without considering:

- The total weight of the tool holder, including the cutting tool.
- The spindle speed at which the assembly should run.
- That the total unbalance mass in the example above should be only 0.1 g, and unbalance u = 2 gmm, which is difficult and expensive to measure and repeat.



Balanced by design symbol

Balanced by design basic holders and adaptors

All Coromant Capto coupling sizes C3-C5, HSK 63 and metric solid ISO 40 taper tool holders marked with the ”Balanced by design” symbol are designed as solid 3-D CAD models and the mass and the position of the unbalance is calculated for the tool holder.

The controlled removal of material from exactly the correct locations allows imbalance to be counteracted. Special consideration of the way the holder is clamped during manufacture allows the different surfaces to remain concentric around the rotational centre.

Measured pre-balance levels achieved for an adaptor clamped in a taper 40 basic holder differ for the different Coromant Capto coupling sizes. Total weight and material movements in the heat treatment process also cause some fluctuations in the values achieved.

Taper 40 basic holder with an assembled adaptor

The values result in a balance value of approximately G 16 at 10,000 RPM according to ISO 1940/1.

Unbalance in gmm		
Size	Min.	Max.
C3	2	13
C4	5	25
C5	10	35

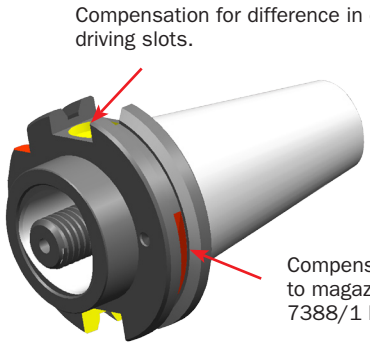
Unbalance values for an adaptor

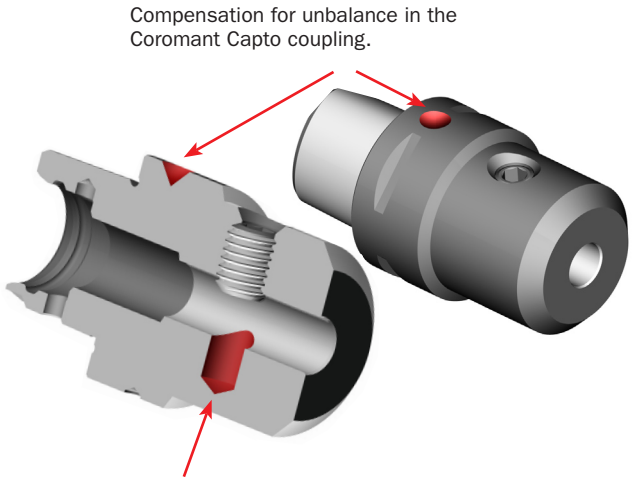
The balance values in gmm for an individual balanced by design C3-C5 adaptor fluctuate between these values.

Unbalance in gmm		
Size	Min.	Max.
C3	0.3	8
C4	0.7	20
C5	1.0	30

Use CoroGrip or HydroGrip chucks, which are individually balanced, for high speed machining.

Example for a Coromant Capto® basic holder and a Weldon adaptor

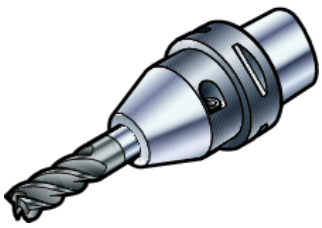




Balanced CoroGrip® and HydroGrip® tool chucks for High Speed Machining

Modern machines and tools place greater demands on tool holders. This is particularly true when cemented carbide endmills and drills are used at very high speeds, where a very low run-out is required to achieve long tool life. CoroGrip and HydroGrip fulfill all the demands on a tool holder for HSM.

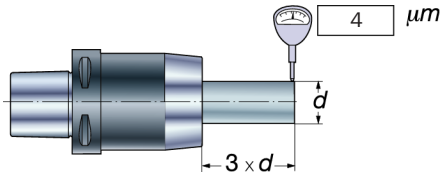
Three requirements have to be fulfilled when using holders with cemented carbide endmills or drills at high speed:



C5-391.HMD-20 070

1. Low run-out. A rule of thumb is that the tool life decreases by 50 % if the run-out is increased by 0.01 mm.

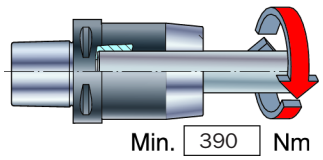
1.



Low run-out provides high precision.

2. High clamping force. Both tool and component can be destroyed if the tool is moving in the holder during machining. Many holding concepts can't be used at high rpm because centrifugal forces reduce the transmittable torque to unacceptable levels.

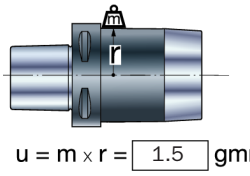
2.



High clamping forces provide high transmission torque capability.

3. Balanced holders. Too much imbalance creates vibrations which can negatively influence tool performance and spindle life.

3.



Balanced holders required for high rpm.

For spindle speeds over 15,000 rpm, individually balanced holders are recommended.

All CoroGrip high precision power chucks are individually balanced to a quality of G 2.5 at 25,000 rpm for small sizes (Taper 40, HSK 32-40-50-63, Coromant Capto coupling sizes C3-C6), and G 2.5 at 14,000 rpm for larger sizes (Taper 50, HSK 100, Coromant Capto coupling C8). All tools for use with CoroGrip are required to be symmetrical and well balanced.

CoroGrip also fulfills demands when it comes to excellent run-out and high clamping force. Due to the very high clamping force, it is possible to clamp tool shanks with h7 tolerances, which is not recommended for shrink fit holders.

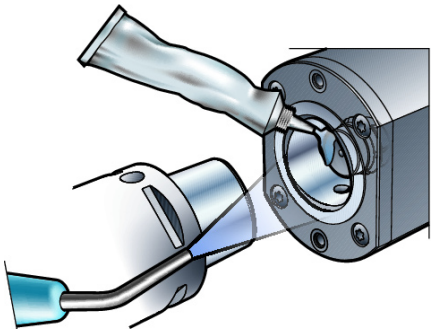
Note:

The CoroGrip chuck is individually balanced to specified balance quality levels. However, an unbalanced tool, collet or retention stud will influence the total balance of the assembly. Complementary balancing can be required for very high speeds.

Individually balanced

Tool holder maintenance

It is important to ensure that the tool holder has not been damaged and the parts are free from dust. To achieve the best performance, we recommend dissembling the tool assemblies and cleaning all male and female parts. Lubricate the parts with oil at least once a year.



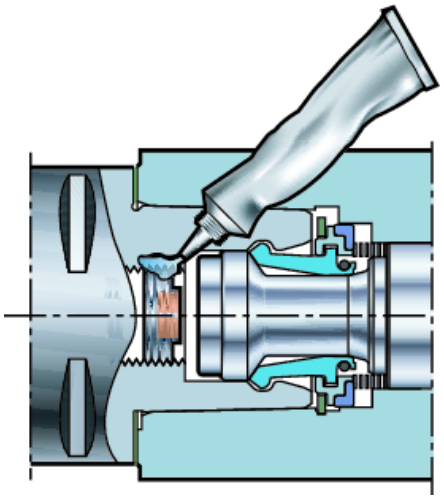
Avoid clamping problems

Under certain circumstances, a Coromant Capto tool could get stuck in the spindle or clamping unit. This happens if the drawbar does not reach the ejecting surface.

Possible reasons:

1. Chip mounted in centre bolt hole is becoming loose. The chip must be fixed with Loctite, otherwise it can obstruct the clamping mechanism.
2. Tool inserted too deep in the adaptor due to lack of stop screws (old holders).

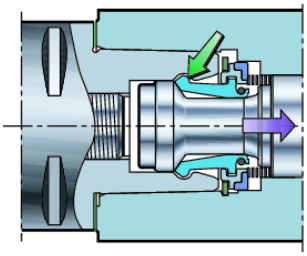
All new collet chucks and Weldon adaptors have a permanent stop, therefore, a stop screw is not required. For collet chuck type 391.14 and 391.15, see page G 121. For Weldon adaptor type 391.20, see page G 92.



Stop screws for old collet chucks and weldon adaptors

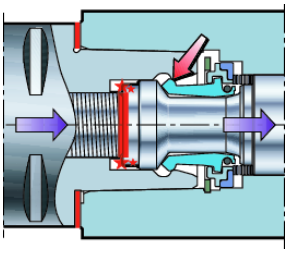
When clamping tools with cylindrical shanks in old collet chucks that have a Coromant Capto coupling - with hole through the centre - be careful that the tool, if smaller than the hole through the adaptor, is not inserted past the drawbar ejecting surface. This will cause misclamping, create a faulty clamping cycle and thus increase the risk of damage to the clamping mechanism.

By using a stop screw, this risk is eliminated and the function of both the adaptor and the clamping mechanism is maintained. All adaptors type 391.14 and 391.15 have an internal thread to suit the stop screw.



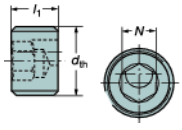
Correct mounting

Clamped tool, segments in correct position.



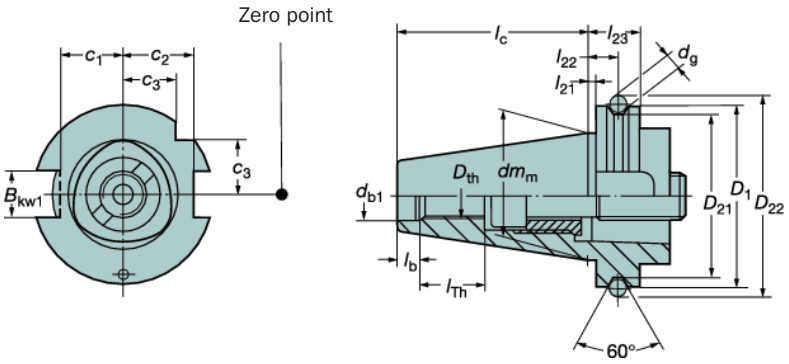
Incorrect mounting

Drawbar hits the tool instead of the ejecting surface when you insert the tool. Segments will not be in correct position. Tool can fall out during cutting process.

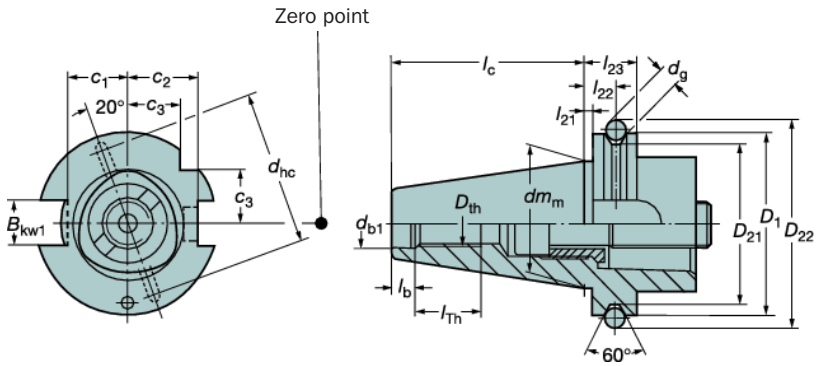
	Size	Ordering code	Dimensions, mm		
			D_{th}	l	N
	C3	5514 070-01	M12x1.5	8	5
	C4	5514 070-02	M14x1.5	9	6
	C5	5514 070-03	M16x1.5	11	8
	C6	5514 070-04	M20x2.0	13	10

Coromant Capto® - coupling details, basic holders

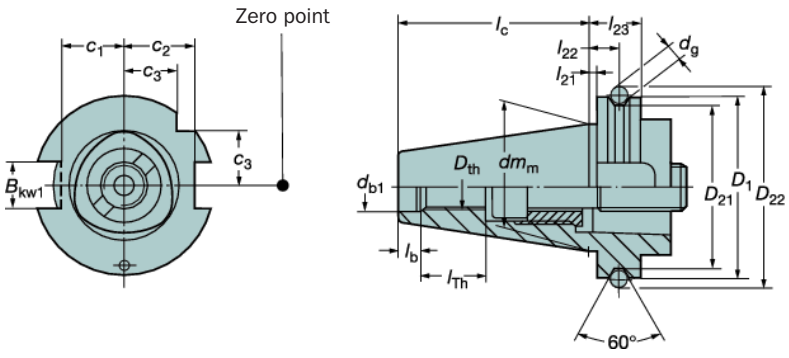
ISO 7388/1
(DIN 69871–A)



DIN 69871
Form B

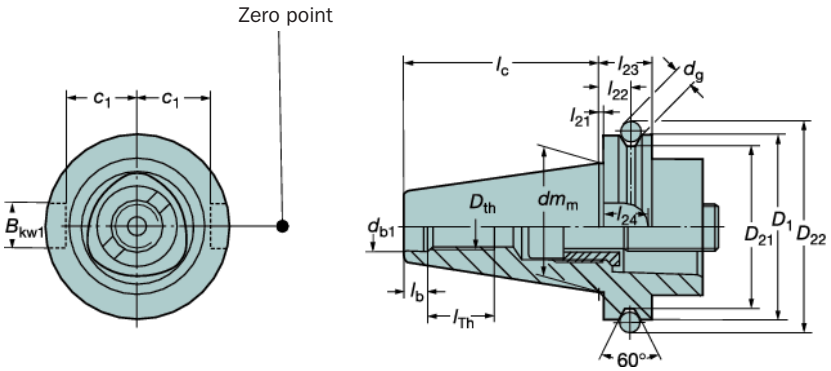


Big Plus
ISO 7388/1

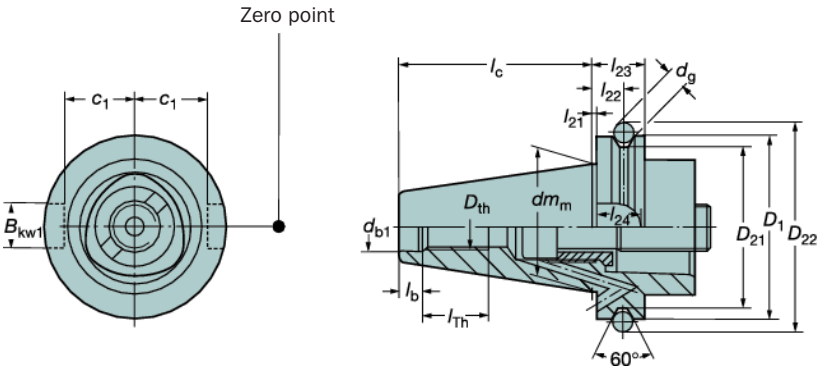


Machine design	Taper	Dimensions, mm																
	ISO	B_{KW1}	c_1	c_2	c_3	d_{b1}	d_g	d_{hc}	dm_m	D_1	D_{21}	D_{22}	l_c	l_b	l_{Th}	l_{21}	l_{22}	l_{23}	D_{th}
ISO 7388/1 (DIN 69871–A)	30	16.1	16.4	19	15	13	7.00	–	31.75	50	44.3	59.3	47.8	5.5	18.5	3.2	11.1	19.1	M12
	40	16.1	22.8	25	18.5	17	7.00	–	44.45	63.55	56.25	72.35	68.4	8.2	23.8	3.2	11.1	19.1	M16
	45	19.3	29.1	31.3	24	21	7.00	–	57.15	82.2	75.25	91.35	82.7	10	30	3.2	11.1	19.1	M20
	50	25.7	35.5	37.7	30	25	7.00	–	69.85	97.5	91.25	107.3	101.6	11.5	35.5	3.2	11.1	19.1	M24
DIN 69871–B Form B	40	16.1	22.8	25	18.5	17	7.00	54	44.45	63.55	56.25	72.35	68.4	8.2	23.8	3.2	11.1	19.1	M16
	50	25.7	35.5	37.7	30	25	7.00	84	69.85	97.5	91.25	107.3	101.6	11.5	35.5	3.2	11.1	19.1	M24
Big Plus ISO 7388/1	40	16.1	22.8	25	18.5	17	7.00	–	44.45	63.55	56.25	72.35	68.4	8.2	23.8	1	11.1	19.1	M16
	50	25.7	35.5	37.7	30	25	7.00	–	69.85	97.5	91.25	107.3	101.6	11.5	35.5	1.5	11.1	19.1	M24

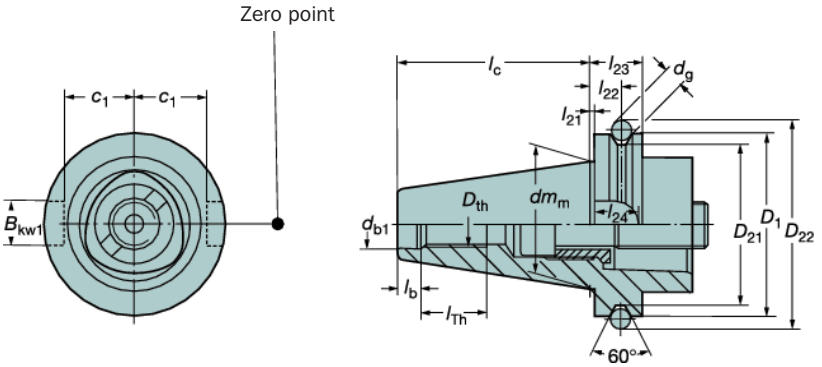
MAS BT 403



MAS BT 403
Form B

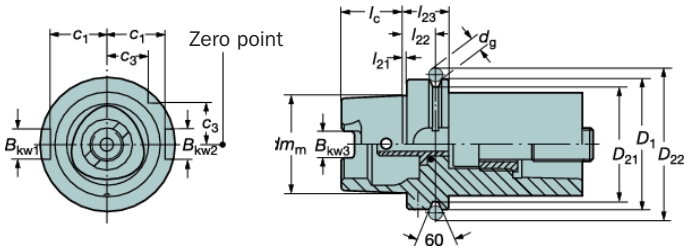


BIG-PLUS
MAS BT 403

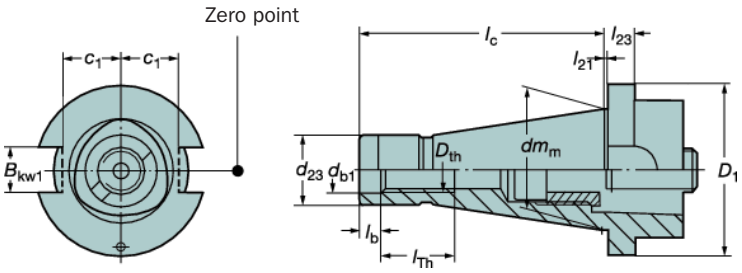


Machine design	Taper	Dimensions, mm															
	ISO	B_{kw1}	c_1	d_{b1}	d_g	d_{mm}	D_1	D_{21}	D_{22}	l_c	l_b	l_{Th}	l_{21}	l_{22}	l_{23}	l_{24}	D_{th}
MAS BT 403	30	16.1	16.3	12.5	8.00	31.75	46	38	56.144	48.4	7	17	2	13.6	22	17	M12
	40	16.1	22.6	17	10.00	44.45	63	53	75.68	65.4	9	21	2	16.6	27	21	M16
	50	25.7	35.4	25	15.00	69.85	100	85	119.02	101.8	13	32	3	23.2	38	31	M24
MAS BT 403 Form B	40	16.1	22.6	17	10.00	44.45	63	53	75.68	65.4	9	21	2	16.6	27	21	M16
	50	25.7	35.4	25	15.00	69.85	100	85	119.02	101.8	13	32	3	23.2	38	31	M24
BIG-PLUS MAS BT 403	40	16.1	22.6	17	10.00	44.45	63	53	75.68	65.4	9	21	1	16.6	27	22	M16
	50	25.7	35.4	25	15.00	69.85	100	85	119.02	101.8	13	32	1.5	23.2	38	32.5	M24

HSK A/C



DIN 2080



Machine design	Taper	Dimensions, mm										
	ISO	B_{kw1}	B_{kw2}	B_{kw3}	c_1	c_2	c_3	d_{b1}	d_{b2}	d_g	d_{mm}	d_{23}
Yamazaki	40	16.4	–	–	22.6	25	–	17	9.5	7	44.45	–
	50	25.7	–	–	35.3	37.2	–	25	9.5	7	69.85	–
HSK A/C	40	11	9	8	17	–	12	–	–	4	30	–
	50	14	12	10.5	21	–	15.5	–	–	7	38	–
	63	18	16	12.5	26.5	–	20	–	–	7	48	–
	80	20	18	16	34	–	25	–	–	7	60	–
	100	22	20	20	44	–	31.5	–	–	7	75	–

	ISO	D_1	D_{21}	D_{22}	l_b	l_c	l_{Th}	l_{21}	l_{22}	l_{23}	l_{24}	D_{th}
Yamazaki	45	63.55	56.36	72.32	7	68.25	23	3.18	11.1	19.1	0.5	M16
	50	98.4	91	107.27	11	101.6	34	3.18	11.1	19.1	0.5	M24
HSK A/C	40	40	34.8	45	–	16	–	4	20	24	–	–
	50	50	43	59.3	–	20	–	5	23	31	–	–
	63	63	55	72.3	–	25.7	–	6.3	24.3	32.3	–	–
	80	80	70	88.8	–	32	–	8	26	34	–	–
	100	100	92	109.75	–	40	–	10	30	39	–	–

	ISO	D_1	D_{21}	D_{22}	l_b	l_c	l_{Th}	l_{21}	l_{22}	l_{23}	l_{24}	D_{th}
DIN 2080	40	63	–	–	8.2	93.4	23.8	1.6	–	11.6	–	M16
	45	80	–	–	10	106.8	30	3.2	–	15.2	–	M20
	50	97.5	–	–	11.5	126.8	45.5	3.2	–	15.2	–	M24

Machines - tooling systems

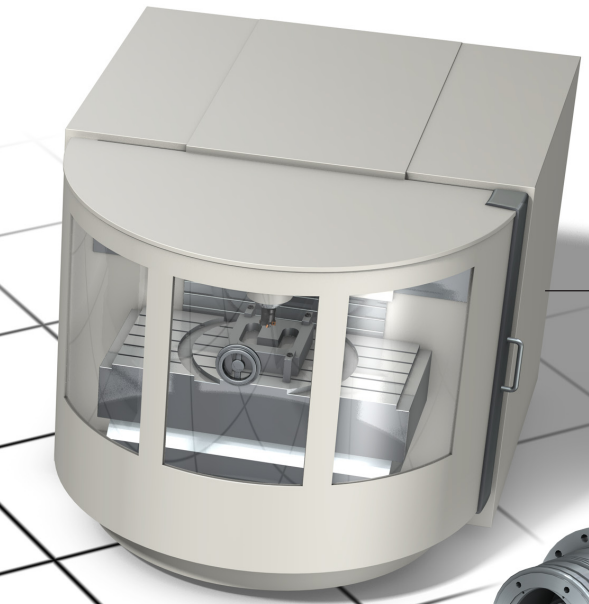
Application overview

Turning centres

Choice of tool holding **G 22**

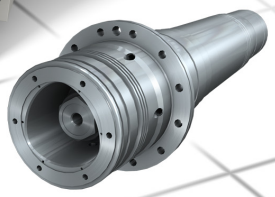
Small part machining – sliding head machines

Choice of tool holding **G 32**



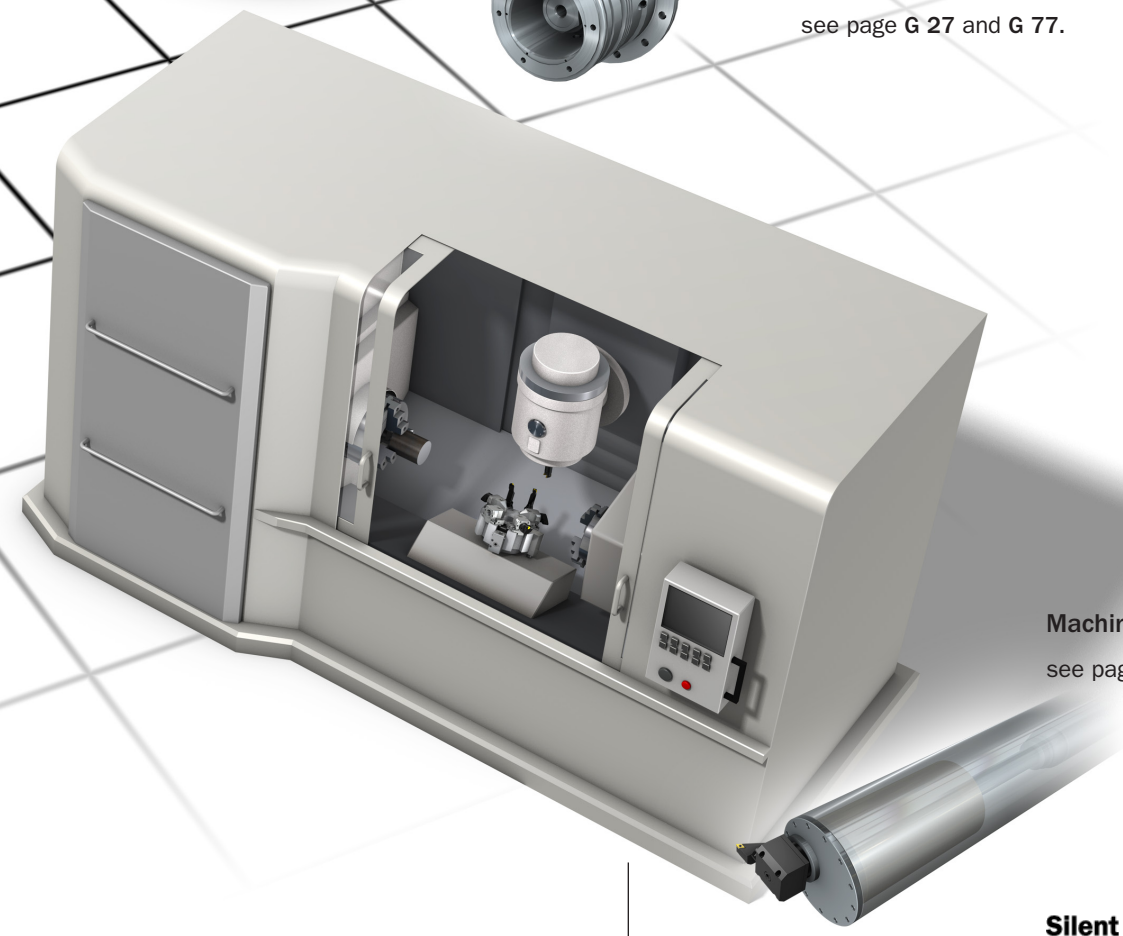
Machining centres

Choice of tool holding **G 26**



Coromant Capto® spindle integration

see page **G 27** and **G 77**.



Machine integrated dampened bars

see page **G 29**.

Silent Tools®

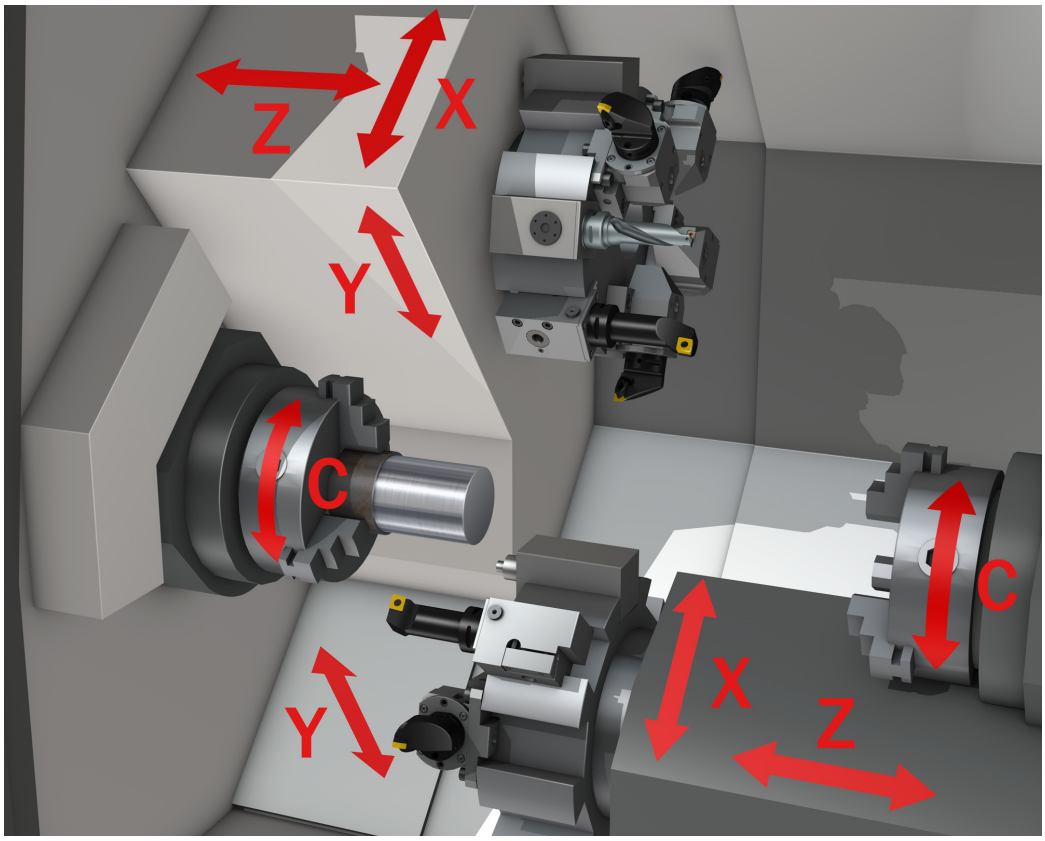
Multi-task machines

Choice of tool holding **G 28**

Tool holding / machines

Trouble shooting **G 57**

Turning centres



Lathes and turning centres are manufactured to meet most industry needs.

The principle of lathes and turning centres is cutting a rotating component using a stationary cutting tool. The cutting tool moves parallel and perpendicular to the workpiece axis to provide the desired finished shape.

The turning centre has a choice of functions:

- Horizontal and vertical design
- Sub-spindle for two-sided machining
- Driven tools
- Y-axis for eccentric boring and milling
- Several product ranges for multi-axis machine tool can provide turning results from roughing and grooving to threading and finishing.

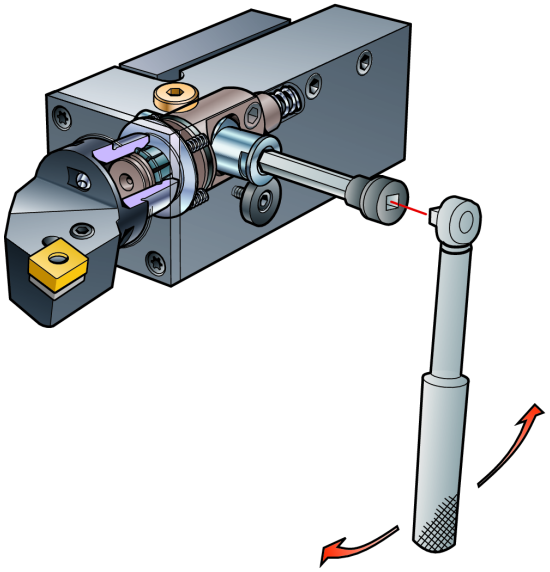
Quick change

Short set-up time

Segment clamping makes it possible to change tools five times faster than with conventional tools.

This means:

- Higher machine tool utilization
- Exact positioning
- Few measuring cuts – improved profitability
- Small batch production – quicker set-up times
- Few or no measuring cuts
- Operations with frequent insert changes
- Faster and efficient tool changing
- Pre-setting possibilities.

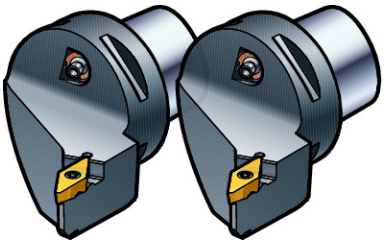


Less than 180° for clamping and unclamping.

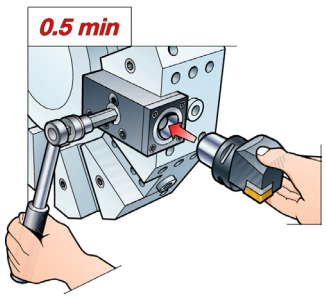
Insert change by using tools from the same family

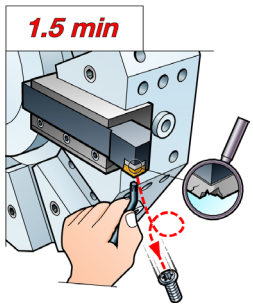
To use the machine as much as possible, tools from the same family with a quick-change system, like Coromant Capto.

- Less downtime – faster tool change
- Inserts can be changed outside the machine
- Stable cutting process
- No risk of losing insert screws in the chip conveyer
- Ergonomic
- Easy to clean the tip seat and inspect the shim outside the machine.



Sister tools with Coromant Capto coupling.



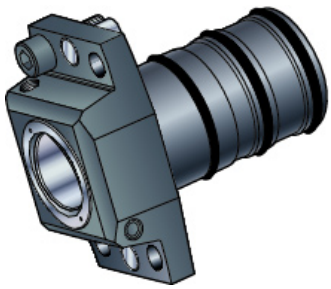


Automatic clamping units

Automatic clamping units are used with all types of turning centres and vertical lathes with automatic tool changes.

The units operate at pressures up to 100 bar.

See page G 70, for more information.

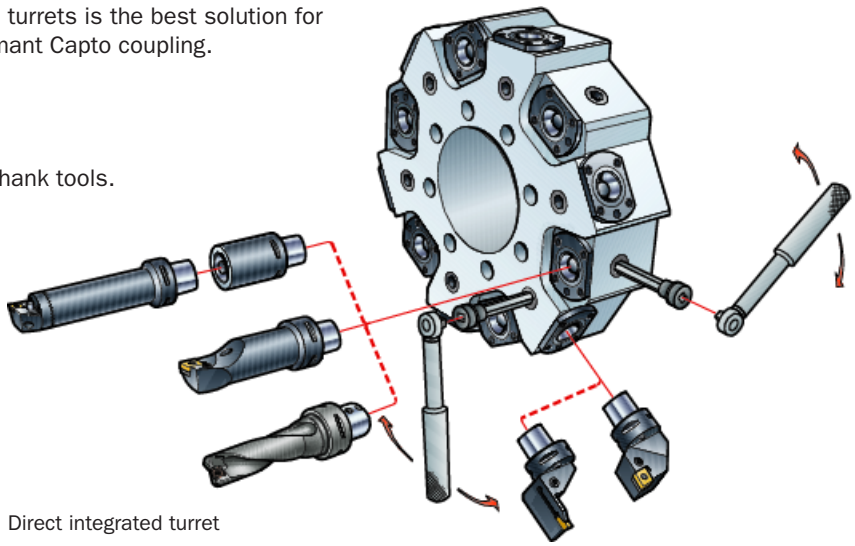


Static turrets

Coromant Capto® system – the best solution for static clamping units

Integrating the Coromant Capto system directly in turrets is the best solution for obtaining maximum performance out of the Coromant Capto coupling.

- Short set-up time.
- Highest stability.
- Faster tool change out than with conventional shank tools.
- Cost effective solutions for many applications.
- Minimized incision because the clamping mechanism is inside the turret. This provides the possibility for machining longer components.

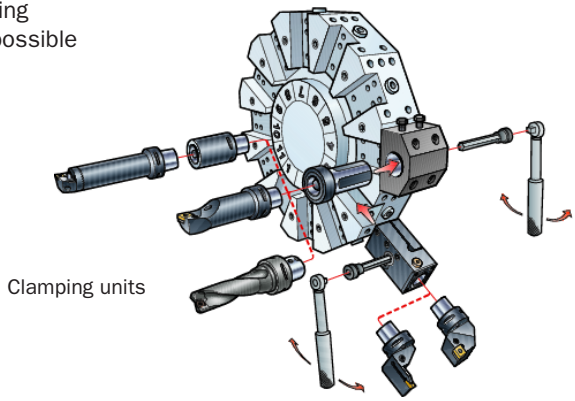


Direct integrated turret

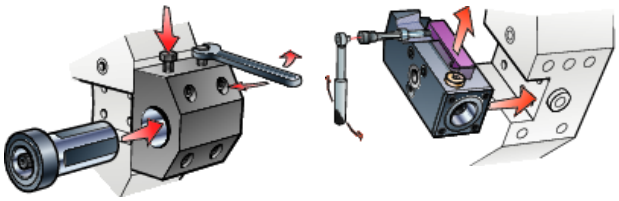
Conversion of standard turret to Coromant Capto® system

The Coromant Capto system can also be integrated in existing turrets = using standard clamping units. A good alternative when direct integration is not possible (existing machines).

- No modification to the turret is needed and no special adaptors are required.
- Quick tool change resulting in less down time.
- Less stability compared to an integrated turret.
- Takes more space than an integrated turret with the result that smaller components can be machined.



Clamping units



Conversion of a standard turret to Coromant Capto system

Machine adapted clamping unit

A machine adapted clamping unit is a machine specific Bolt-on Mounted Turret (BMT) unit. Due to the number of bolt-on designs, there are several types of units on the market which can be converted to Coromant Capto quick change system.

Contact your nearest Sandvik Coromant representative for more information.

BMT

Turret for driven tool holders

Coromant Disc Interface (CDI)

The Coromant Disc Interface (CDI) functions between the turret and the clamping units.

Compared to a regular “bolt-on” style (BMT) or Vertical Disc Interface (VDI), the CDI offers several advantages:

- High stability and rigidity.
- Identical interface for static and driven tool holders.
- Flexible and symmetric interface (180° mountable).
- Centreline adjustment for right-angle tool holders.
- Shorter tool projection resulting in longer tool capabilities.

CDI

Machine adapted clamping unit

A machine adapted clamping unit is a machine specific bolt-on mounted turret (BMT) unit. Due to the number of bolt-on designs, there are several types of units on the market which can be converted to Coromant Capto quick change system.

Contact your nearest Sandvik Coromant representative for more information.

BMT

Coromant Capto® system for VDI turret

The Coromant Capto system can be used with a clamping unit as a quick change system in a VDI adapted turret.

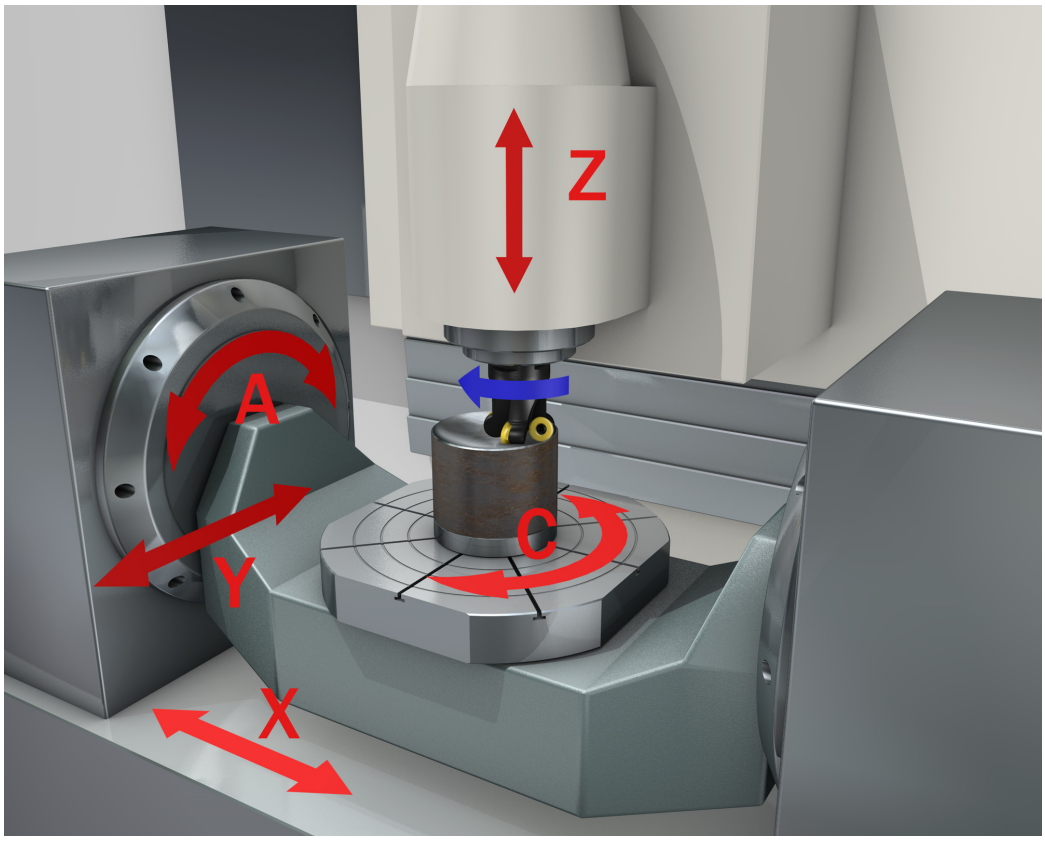
- Intended both for driven and static tools.
- Camshaft activated.
- Change cutting tools outside the machine.
- Off-line pre-setting outside the machine.
- External coolant.
- Less stable compared to CDI.
- Clamping mechanism is not built in the turret - longer tool projection.

VDI

Comparsion	CDI	BMT	VDI
Quick change	+++	+	++
Short projection	+++	++	+
Stability, rigidity	++	++	+
Symmetric interface	++	++	+
Fine adjustment	++	+	++

+++ Very good ++ Good + OK

Machining centres



A machining centre is a multi-function machine that typically combines boring, drilling, and milling tasks. In a machining centre, the material is removed by a rotating cutter that moves laterally around the workpiece mounted on a table or fixture.

Machining centres can be horizontal and vertical designs:

- The basic type has 3 axes. The spindle is mounted along the Z-axes.
- 4- and 5-axes machining centres adds more axes (A/B/C) in addition to the three normal axes (X/Y/Z).
- The A-axis is parallel to the X-axis, B parallel to Y and C parallel with the Z-axis.
- Often the B-axis controls the tilt of the cutting tool itself and the A- and C-axes allow the workpiece to be rotated.

When all these axes are used in combination with conical tools or a ball nose cutter, extremely complicated geometries can be accomplished, such as die sinking, engraving applications, turbine blades and surfaces, such as relief sculptures.

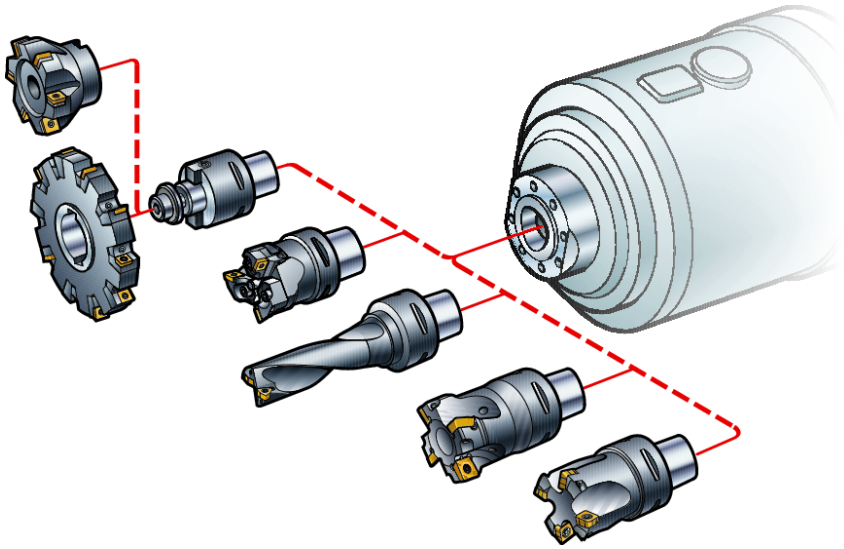
Coromant Capto® coupling as spindle interface

Coromant Capto coupling can be integrated directly into the spindle if the machine is equipped with a Coromant Capto spindle integration. This option offers:

- Better torque transmission and stability.
- The ability to run at higher rpm.
- Shorter tool overhang due to integrated tools.
- More space in the machine.
- No need for basic holders.
- Access to Coromant Capto tooling assortment.

Coromant Capto spindle integration

For more information, see page G 77.

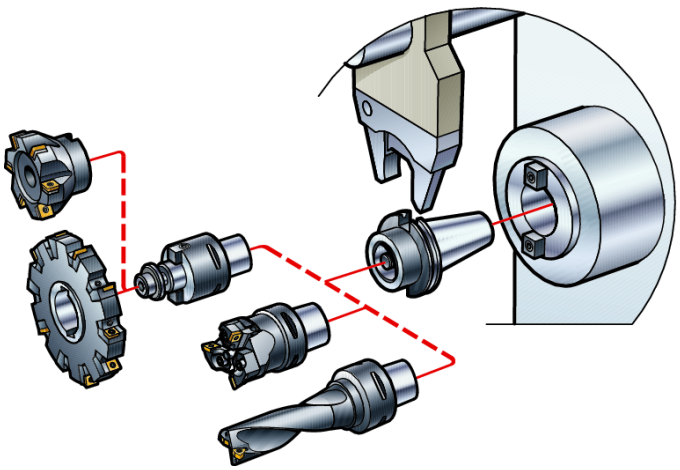


Coromant Capto coupling directly integrated in the machine...

Coromant Capto® interface on basic holders

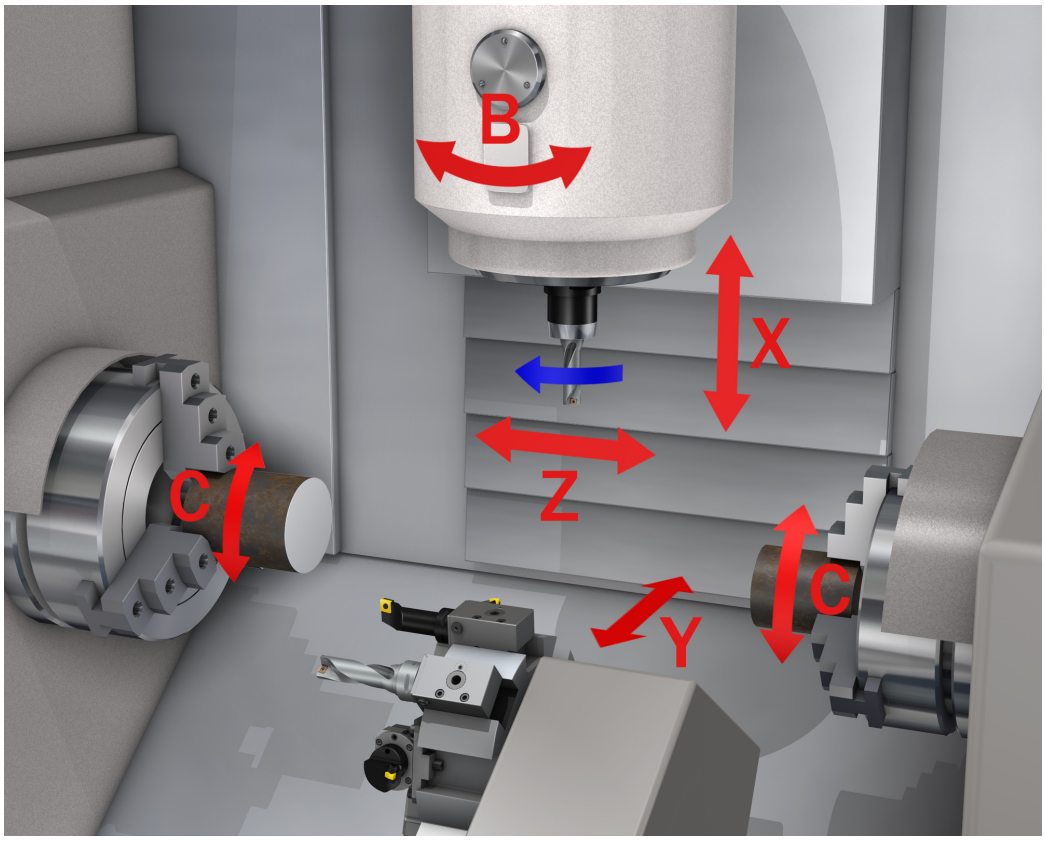
With a basic holder, the Coromant Capto system can also be used in machines with a steep taper or HSK machine interface.

- Modular system.
- Basic holder is an adaptor between the steep taper or HSK and the Coromant Capto system.
- Cutting tool and/or extensions assembled by centre screw, see page G 72.
- Access to Coromant Capto tooling assortment.



...or via basic holder.

Multi-task machine



In a multi-task machine, the workpiece can be completed in a single machine set-up, e.g. turning, milling, contouring and milling of angled surfaces, and grinding large diameters as well as small ones. The machine selects and changes to the needed tools automatically.

Multi-task machines come in a variety of configurations:

- Horizontal or vertical designs.
- Two spindles (main and sub) and a B-axis spindle enable milling and turning operations on both the front and back faces of the workpiece.
- Each spindle acts as a workpiece holder, allowing multi-axes machining on either the front or back face of the workpiece.

The workpiece can be passed from the main to the sub-spindle. An entire operation, including milling and turning on the front face, followed by milling and turning on the back face, is completed in a single set-up. Separate milling and turning machines require four set-ups for this sequence.

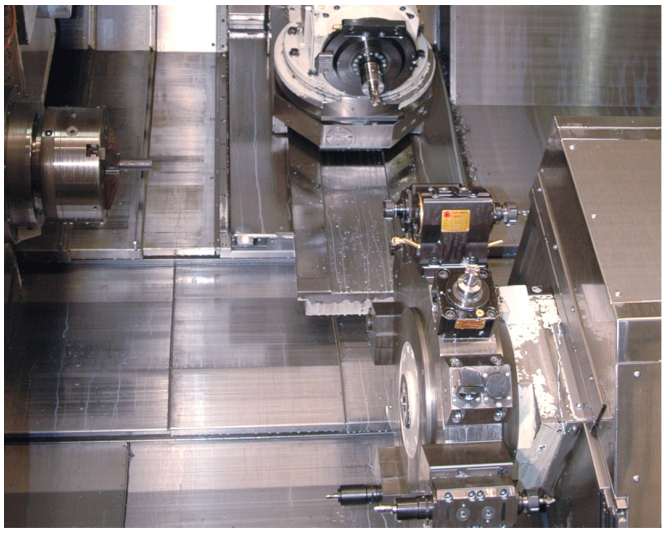
Note: A multi-task machine is a combination of a turning centre and a machining centre. For more information, see page G 22 and G 26.

Coromant Capto® systems – the best solution for multi-task machines

Coromant Capto couplings fulfill the requirements for the operational demands of stationary and rotating tools.

A tooling system for multi-task machines has to:

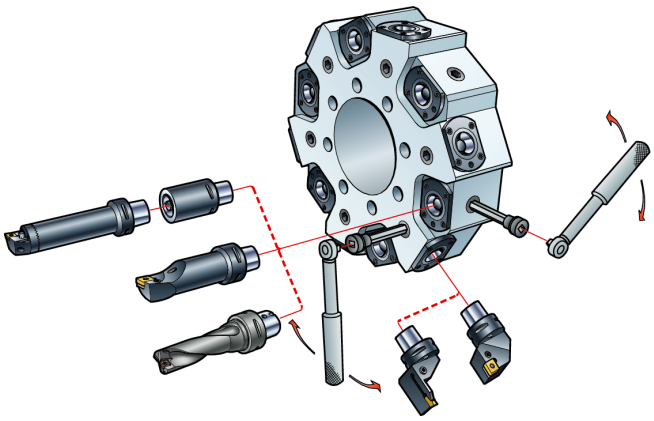
- Transmit satisfactory torque levels.
- Be capable of high spindle speeds.
- Have high bending strength.
- Offer high precision couplings for accurate repeatability using pre-measurements or settings initiated from outside the machine.



Standard turrets can easily be converted to a modular quick-change system, by using a Coromant Capto coupling with standard clamping units or machine adapted clamping units.

Conversion of standard turret to Coromant Capto® system

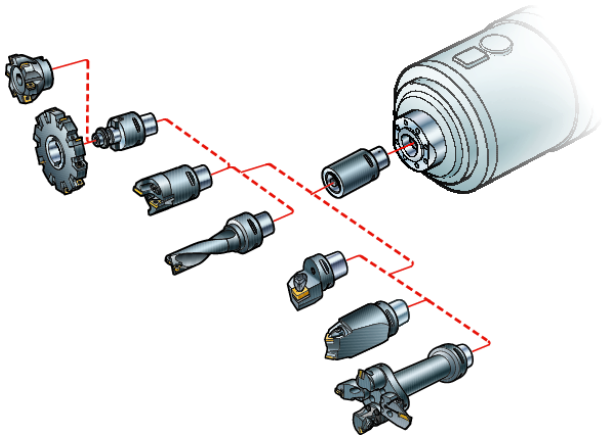
For more information about the lower turret, see page G 24.



Turret with integrated Coromant Capto couplings.

Coromant Capto® coupling as spindle interface

For more information, see page G 77.



The milling spindle in a multi-task machine should be able to carry both rotating and non rotating tools.

Integrated dampened bar

For internal machining of deep and large holes, a dampened boring bar can be integrated in the machine and equipped with Coromant Capto coupling for automatic tool change.

Contact your nearest Sandvik Coromant representative for more information.

Dedicated tools for multi-task machines

To take advantage of versatile multi-task machine centres and to optimize their efficiency, there is a demand for running with dedicated tooling.

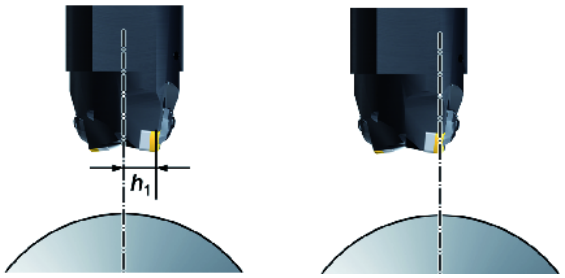
CoroPlex tools use Coromant Capto couplings and are designed for multi-task machining:

- Accessibility, stability and higher productivity.
- Reduced tool changing time.
- Reduced tool pockets in tool magazine.
- Cost reduction - one tool replaces many tools.

See General turning chapter, for more detailed information about CoroPlex.

CoroPlex™ TT twin tools – two turning tools in one

A rational solution with two turning inserts in one holder. It allows quick changing of tooling operations through quick indexing of the tool.



To apply CoroPlex TT, move the Y-axis distance h, so that the insert will cut on centre line of workpiece.

When working against a sub-spindle, the Y-axis must be offset in opposite direction in relation to main spindle.

CoroPlex™ MT – one milling and four turning tools in one

A combination of to CoroMill 390 and CoroTurn 107 provides effective milling machining.

Can also be indexed for use in a number of optional positions for stationary turning, external and internal, using two different CoroTurn 107 inserts.

CoroPlex™ SL mini-turret – four turning tools in one

Build your own multifunctional tool using the Coromant Capto tool adaptor. Apply a CoroPlex SL mini- turret adaptor plate, combine with four cutting heads and/or blades for turning, threading and grooving operations.

CoroPlex MT is designed with all inserts positioned on tool centre line.

Optimized tools for best accessibility

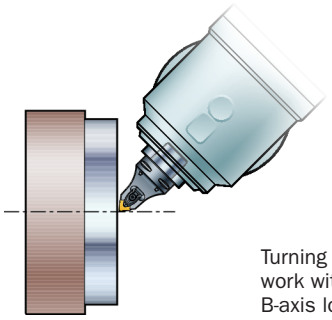
Short overhangs could cause interference problems between the tool spindle head and the component/spindle chuck.

The Coromant Capto modular tooling system is designed to avoid these problems:

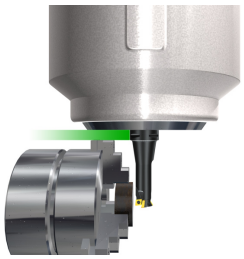
- Customers can build longer tools using standard articles to the correct length to suit their application and the machine tool.
- There is less need to purchase expensive, specialized tool holders with long delivery times.

The tool bodies are extended by 65 mm compared with a corresponding conventional tool – which allows freer use of the working positions without any need for extensions.

Length and design of the tool body are optimized by each Coromant Capto coupling size to provide best accessibility relative to the most common chuck sizes.



Turning tools are designed to work with the machine tool B-axis locked at a 45° angle.



Multi-task tools are designed in correct lengths for accessibility close to the chuck.

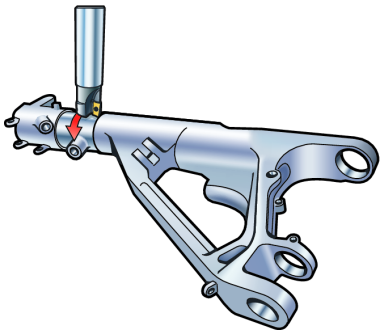
Optional machining methods

Turn milling

Defined as milling a rotating curved surface. The workpiece is rotated around its centre point using a fourth machine axis.

- To machine a conical shape requires a fifth axis.
- To machine an eccentric form requires simultaneous movement along one or more of the axes.
- Alternative to facing the end of a bar with a milling tool. This avoids the center tap and offers a better surface not affected by built-up-edge.

See chapter D and application guide Turn Milling C-2920:26 for more information.



Example of a turn milling component.

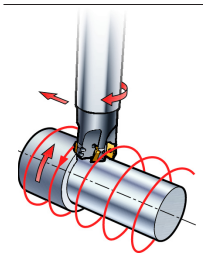
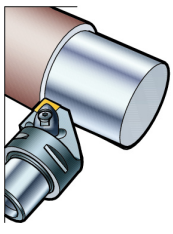
Comparison of methods

Turning is normally the most productive and flexible process. However, turn milling can have some clear advantages, which mean that the shapes and materials of the component determine the optimal method.

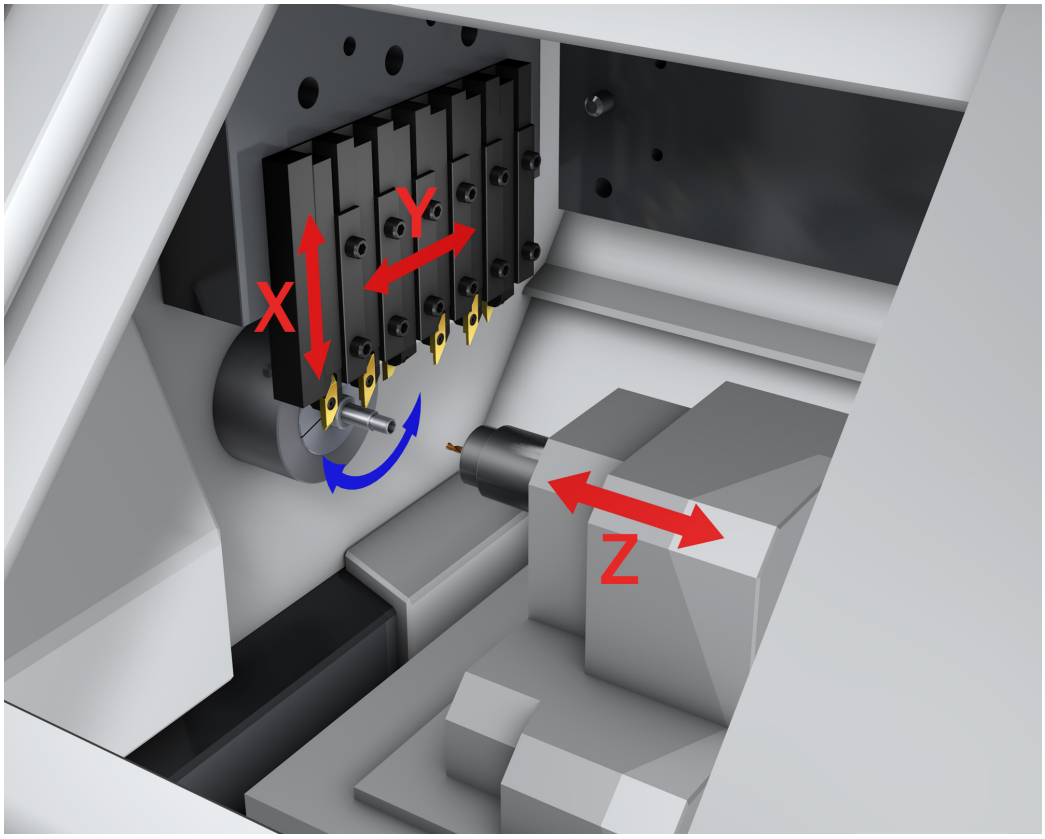
Normal face mill tools, such as CoroMill 300, CoroMill 210, CoroMill 200 and CoroMill 245 with wiper, can be used.

CoroMill 390 and CoroMill 590 have wiper geometry specially designed for turn milling.

One wiper is used together with the normal inserts. The primary function of this insert is producing a flat surface.

Turn milling		Turning	
	+ Eccentric + Interrupted cuts + Less than 360° round (obstructions) + Cylindrical or conical + Chip breaking + Out of balance components + Facing, clean cut		+ Concentric + Continuous cuts + 360° round + Profiling + Thin wall components + Accessibility + Easy to programme

Small part machining – sliding head machines



Small part machining and sliding head machines focus on components smaller than 32 mm in diameter, which are manufactured in large batches and in the most productive way.

Several axes, front end and back end machining, turning tools, rotary tools and drilling tools are some of the features these machines offer.

The machines can be equipped with gang tools to offer further flexibility for standard tool holders, as well as quick change tooling such as QS™ holding system.

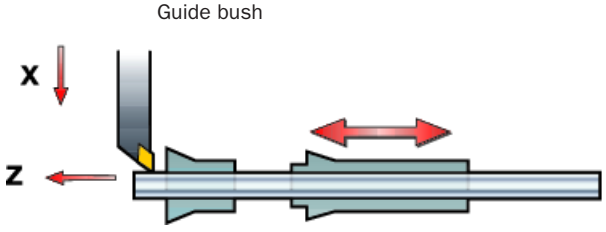
Oil is used as coolant and has different effects on the metal cutting action compared to standard lathe cutting fluid, such as different chip flow, varied chip breaking and tool life.

Principle of the sliding head machine

The material slides through a guide bush and is rotated by a second spindle that also pushes the material through the guide bush.

The material movement functions as the z-axis in the machine and the tools stay close to the guide bush for maximum stability.

Note:
In parting-off machining, the tool must be stable enough to be used as a stop for the bar material.



Sliding head lathe

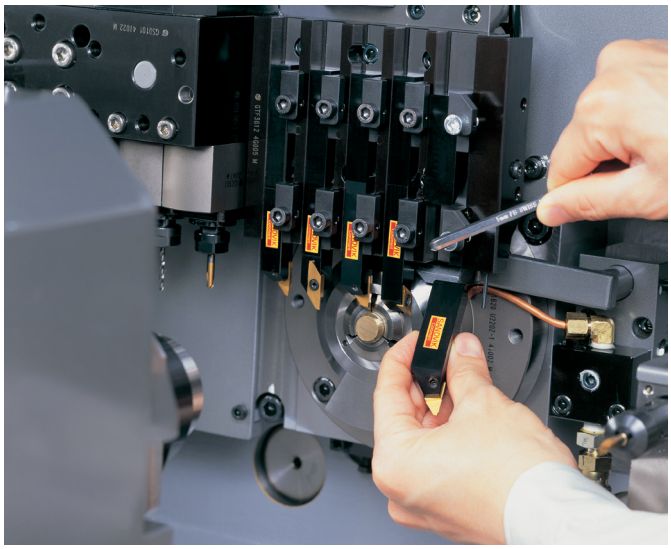
Tool post for external machining

QS™ holding system

This is a quick-change system of tool holders used to maximize effective production time. The QS™ system saves valuable machining time, gives easy set-up, and dramatically reduces insert changing time.

Conventional wedges can be easily replaced and do not require any modification to the machine.

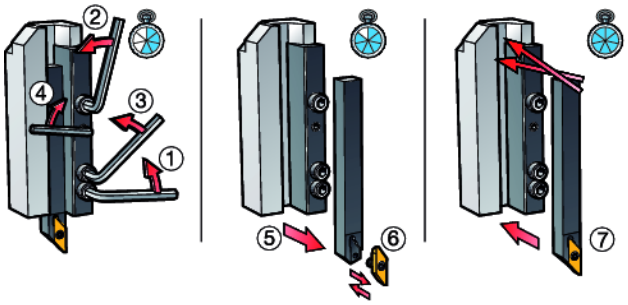
The QS holding system is available for CoroTurn 107 and the CoroCut tool system.



Assembly instruction

- Remove conventional wedge from tool post.
- Replace with two QS wedges.
- Adjust insert edge position and clamp short holder with the wedge located close to the guide bush.
- Clamp stop with the other wedge in contact in the short holder.

Conventional wedge system

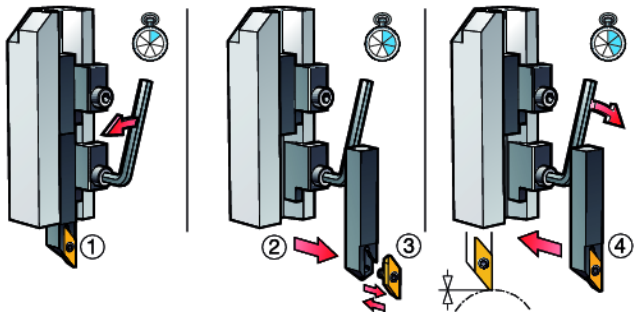


1. Untighten 3 screws, unfasten wedge

2. Take out the holder and index the insert

3. Replace holder, re-tighten screws, and reset the diamater

QS™ holding system



1. Untighten screw, take out holder

2. Index the insert

3. Replace holder, tighten, produce components

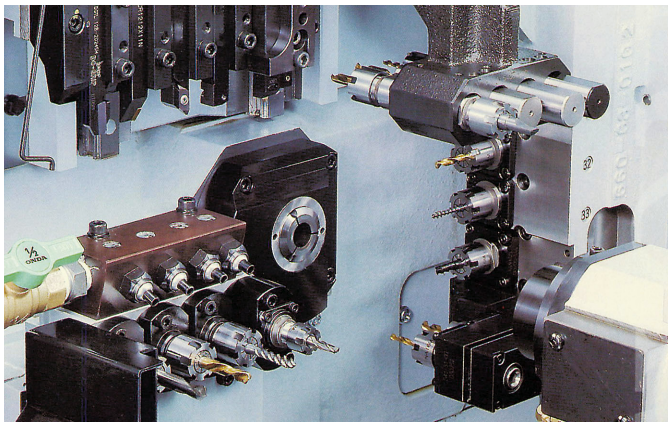
For clamping the external CoroTurn 107, CoroCut and T-Max U-Lock, use tool holders with no offset (cutting edge parallel to the side). These have –S in our codes.

These variants are also available in the QS-system to achieve fast set-up of machine and reduce insert changing time.

Tool post for internal machining

For internal machining, sliding head machines are equipped with one or several tool posts.

It is possible to use standard tool holders and quick change tools, such as the Coromant Capto system, for easy set-up and reduced insert changing time.



For internal machining, the tool post can be equipped with:

- CoroTurn XS boring adaptor with flats.
- EasyFix sleeves (132L) for cylindrical boring bars.

Note: The tool post can also be equipped with CoroTurn SL boring bars for external machining.

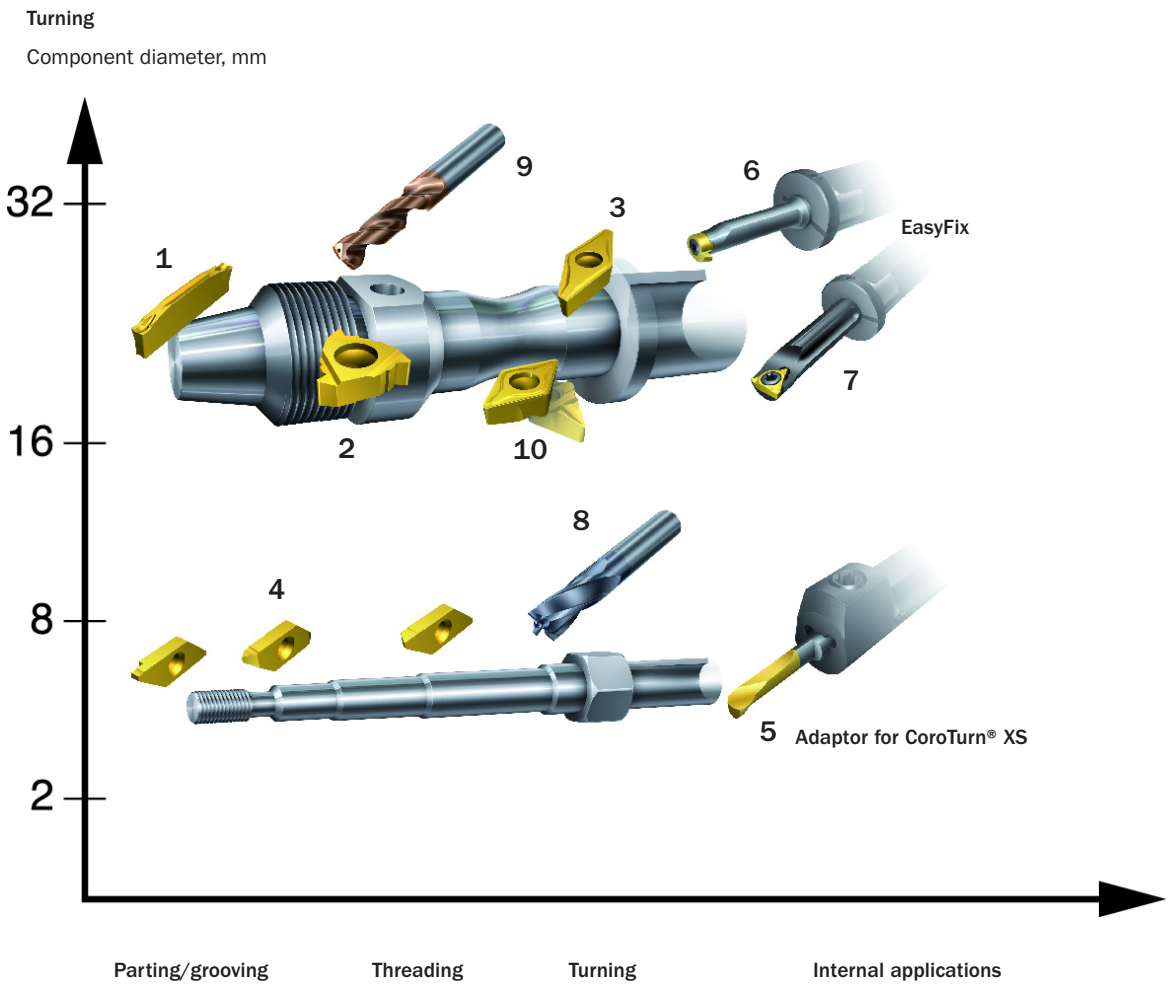
CoroTurn XS boring bar

EasyFix with CoroCut MB

Dedicated tools

To optimize manufacturing process and increase output, choose cutting tools from these recommendations for sliding head machines.

For more specific information about small part machining, see chapter A, General Turning.



1 CoroCut®
1- 2-edge and CoroCut® 3 inserts for productive parting and grooving.

2 T-Max U-Lock®
Productive threading product range.

3 CoroTurn® 107
Precision inserts for turning and copying operations.

4 CoroCut® XS
For external parting and grooving, turning and threading of small components from 1 mm in diameter.

5 CoroTurn® XS
For internal turning, grooving and threading of small components from 0.3 mm in diameter.
For precise and stable clamping, use dedicated CoroTurn XS adaptors, available for most sliding head machines.

6 CoroCut® MB
Precision grooving, turning and threading from 10 mm diameter bore.
For exact clamping, use dedicated EasyFix sleeves, available for most sliding head machines.

7 CoroTurn® 107 – Internal
Indexable inserts for minimum 6 mm bore. To be used together with EasyFix.

8 CoroMill Plura®
Precision milling cutters in diameters from 0.4 mm.

9 CoroDrill Delta-C®
Drills in diameters from 0.3 mm. Also available as step and chamfer drills as standard.

10 CoroTurn® TR
For maximum stability for profiling operations.

Tool holding

Application overview

Tool holding – Turning

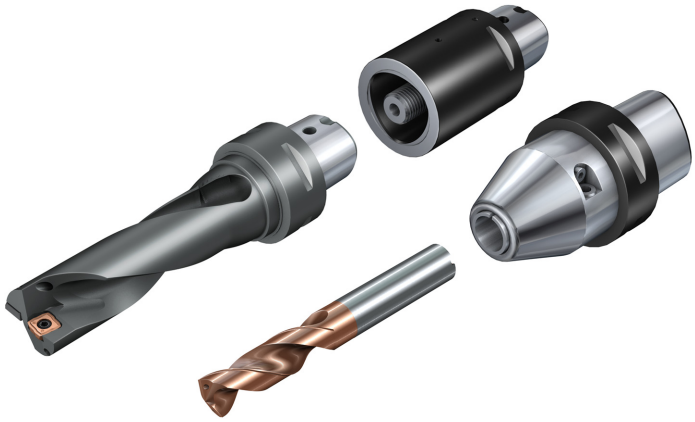
Choice of tool holding **G 38**

Tool holding – Milling

Choice of tool holding **G 42**

Tool holding – Drilling

Choice of tool holding **G 49**

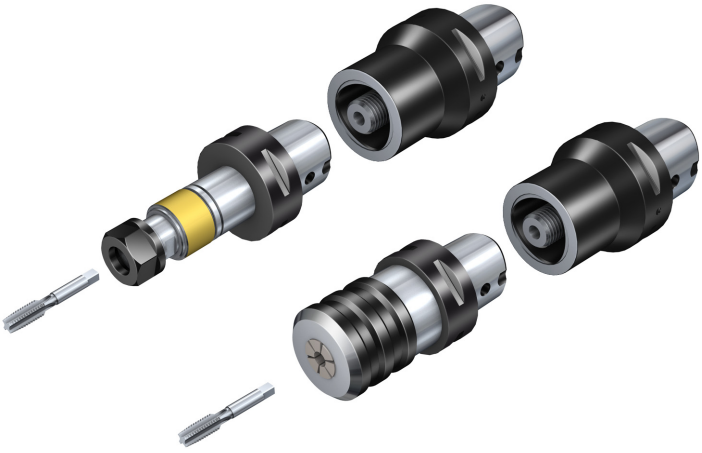


Tool holding – Boring

Choice of tool holding **G 52**

Tool holding – for tapping

Choice of tool holding **G 55**



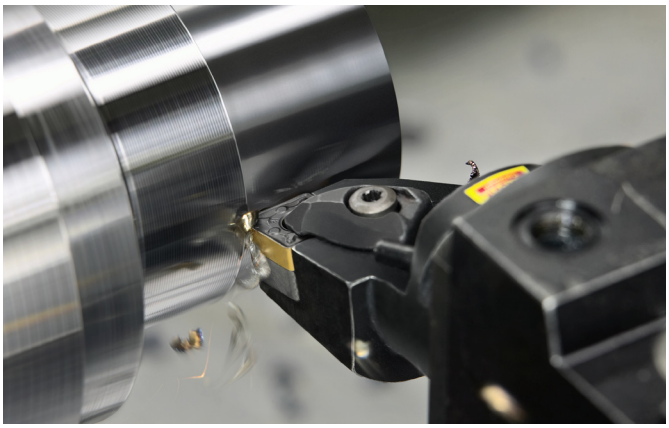
Tool holding / machines

Trouble shooting **G 57**

Tool holding - turning

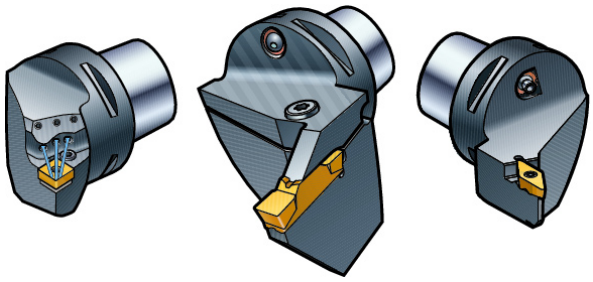
Sandvik Coromant offers several holding systems for turning applications. Bending and torque stiffness, cutting edge location and tool change time are the important factors when choosing tool holders.

For best productivity and cost efficiency, we recommend the Coromant Capto system.



Coromant Capto® system the first choice

First choice should always be tools with Coromant Capto couplings for excellent repeatability and the best stability.

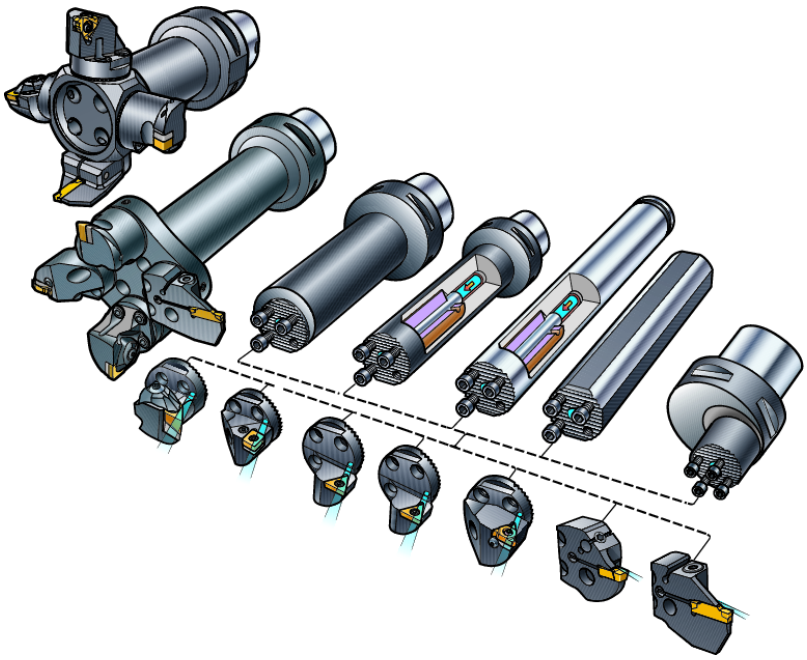


CoroTurn® SL for internal turning

CoroTurn SL should always be considered as first choice in all internal turning operations.

- Flexible system with the possibility of building a large range of tools.
- Full product range of clamping units, cutting units, adaptors and dampened boring bars.
- Tool set-up time reduced from hours to minutes.
- Tool change time reduced from minutes to seconds.
- Reduced inventory.

For more information about CoroTurn SL, see page G 86.



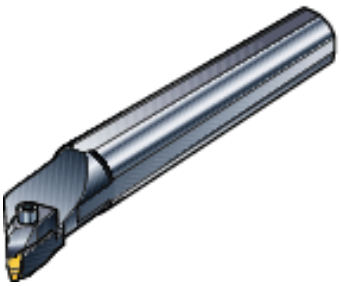
CoroTurn SL quick change system

Adaptors for round shank tools

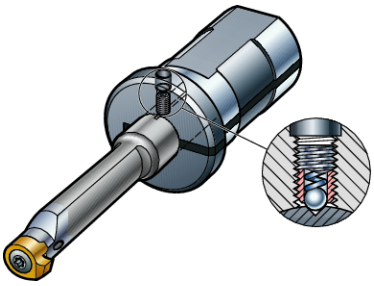
Adaptors used in turning centres and multi-task machines.

Universal adaptor for general turning, parting and grooving, and threading machining.

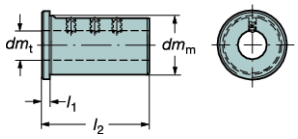
Adaptor for multi-task machines is used with through coolant, see page G 91.



Available round shank tools are used



EasyFix

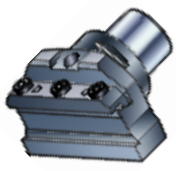


Reduction sleeves and boring bar adaptors for multi-task machines can be used with cylindrical sleeves.

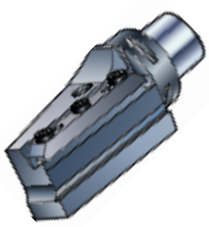
Adaptors for external turning

CoroCut® and T-Max Q-Cut®

Universal adaptors for parting and grooving with CoroCut and T-Max Q-Cut parting blades.



Radial mounting

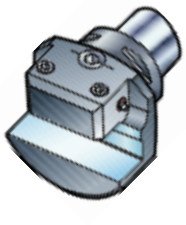


Axial mounting

Available parting blades are used

Square shank tools

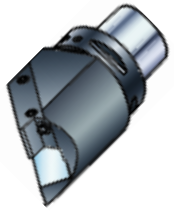
Universal adaptors for general grooving, parting and grooving, and threading machining.



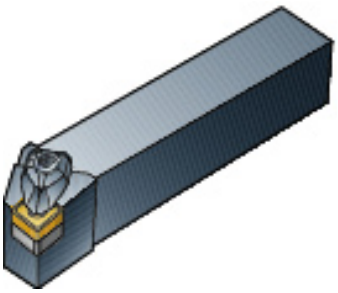
Radial mounting

Axial mounting

Radial mounting



Angular mounting



Available square shank tools are used

Warning!

The adaptors are designed for hand-operated tool set-up and automatic tool change:

- Measure the tool set-up length and program the machine with this value. Make sure that there is no risk of interference between tool and workpiece.
- Make sure that there is no risk of interference in the magazine and tool changing cycles.

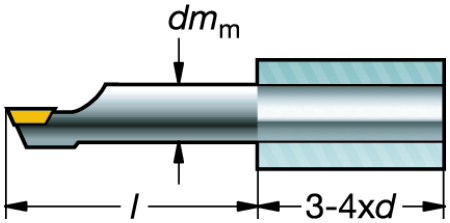
Boring bars for turning machining

To make full use of the tools, a boring bar is often needed.

To minimize vibrations with longer overhangs, a dampened bar must be used.

The following boring bar materials can be selected to suit the length to diameter ratio overhangs.

Bar type	Overhang
Steel boring bars:	Up to 4 x dm_m
Carbide boring bars:	Up to 6 x dm_m
Steel dampened boring bars short design:	Up to 7 x dm_m Silent Tools
Steel dampened boring bars long design:	Up to 10 x dm_m Silent Tools
Carbide reinforced dampened boring bars:	Up to 14 x dm_m Silent Tools

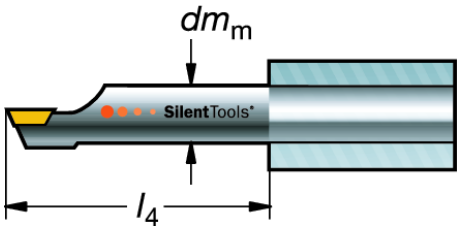


Solid bars

Smallest possible overhang.

Max. recommended overhang for steel bars 4 x dm_m (l).

Max. recommended overhang for carbide bars 6 x dm_m (l).

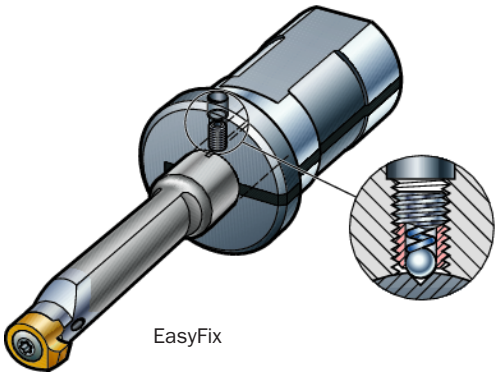


Tuned dampened bars

l_4 = dampened part, do not clamp on this area (is indicated on the boring bar).

Max. recommended overhang for dampened bars, short design 7 x dm_m, and long design 10 x dm_m.

See page G 87, for information about CoroTurn SL boring bars, and page G 100, for dampened boring bars.



EasyFix

Use EasyFix clamping sleeves for accurate machining with less vibration and precise height. For more information, see page G 89.

Tool holding – milling

Sandvik Coromant offers many different milling concepts for a range of applications. Each concept has its own properties and advantages for machines and holding systems.

Bending and torque stiffness and tool run-out are the important factors when choosing the tool holder.

- Modular tools increase the flexibility and the possible number of combinations.
- Use the largest possible diameter on holding tools (extensions, adaptors), relative to cutter diameter.
- Use stiff modular tools with good run-out accuracy.
- CoroGrip or HydroGrip chucks are individually balanced and can be used for spindle speeds over 20,000 rpm. Both chucks are individually balanced and each chuck is delivered with a number and protocol. See page G 103, for more information.

Choice of adaptors/chucks for milling cutters

			Adaptor and chuck systems									
Choose coupling/chuck first then adaptors/chucks			Coromant Capto®	HydroGrip®	CoroGrip®	Shrink fit adaptor	Collet chuck adaptor	Weldon	Threaded adaptor	Face mill holder adaptor	HydroGrip® face mill holder	Dampened milling adaptor
+++	Very good	Torque transmission	+++	+++	+++	+++	+	++	+	+++	+++	+++
++	Good	Run-out	+++	+++	+++	+++	+	+	+	++	+++	++
+	OK	Balance	+++	+++	+++	+++	+	+	++	+	+++	+
Milling cutter couplings												
Indexable insert shank cutters		Coromant Capto®	1									
		Cylindrical		1	1	2	3					
		Weldon		2	2			1				
		Threaded coupling							1			
Face & square shoulder cutters		Coromant Capto®	1									
		Arbor								1	2	2
Side & facemill cutter		Coromant Capto®	1									
		Arbor								1		
CoroMill Plura®		Cylindrical		1	1	2	3					
		Weldon		2	2			1				

1 = First choice

2 3 = Complementary choices

Coromant Capto® system – first choice for milling

First choice should always be tools with Coromant Capto coupling which offers excellent repeatability and best stability.

CoroMill® 490

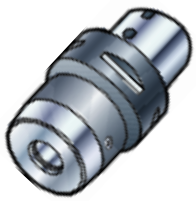
CoroMill® 390
Long edge milling cutter

CoroGrip® for a wide range of milling applications

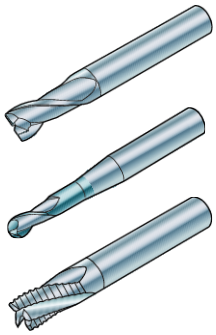
CoroGrip precision chucks can be used in a wide range of applications, from superfinishing to heavy roughing.

Extremely high torque transmission capability prevents the tool from slipping. Due to a self-locking mechanism, the clamping force remains constant during the entire operation and in long term use.

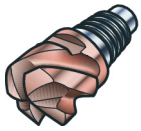
All types of cutting tools with cylindrical, Whistle Notch or Weldon shanks can be retained savely.
Can be used with or without collets, see page G 115.



CoroGrip® precision power chuck



CoroMill® Plura



CoroMill® 316

CoroMill® 390 cylindrical

CoroMill® 300 cylindrical

HydroGrip® for light to heavy milling

The HydroGrip chuck family should always be considered as first choice.

The range of short, slender and pencil chucks provides the best choice for most light to medium profile milling operations.

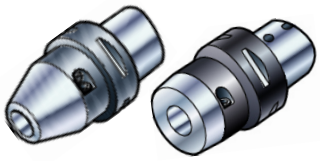
Maximum spindle speeds are recommended for each chuck type and size.

Can be used with or without collets, see page G 117.

HydroGrip chucks can clamp any form of cylindrical tool shank.

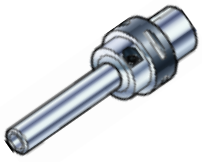
Note: 6 mm diameter shanks can only clamp cylindrical shafts.

HydroGrip® HydroGrip® HD

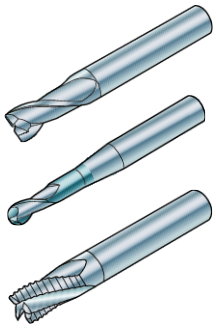


Short version

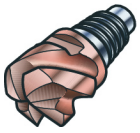
Slender version



Pencil version



CoroMill® Plura



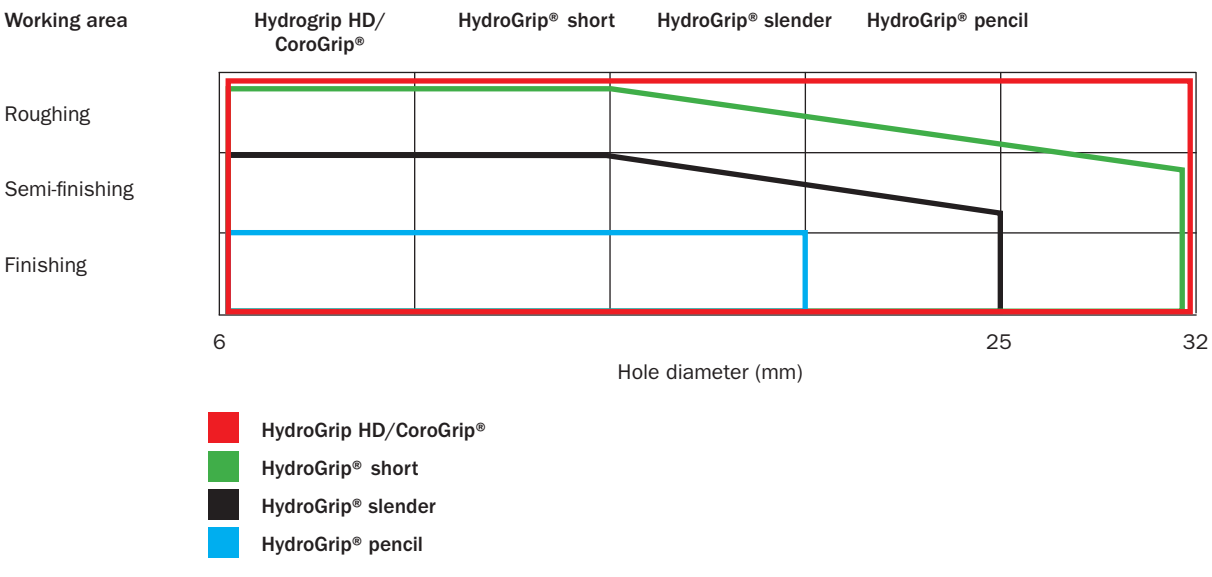
CoroMill® 316

CoroMill® 390 cylindrical

CoroMill® 300 cylindrical

CoroGrip® and HydroGrip® precision chucks

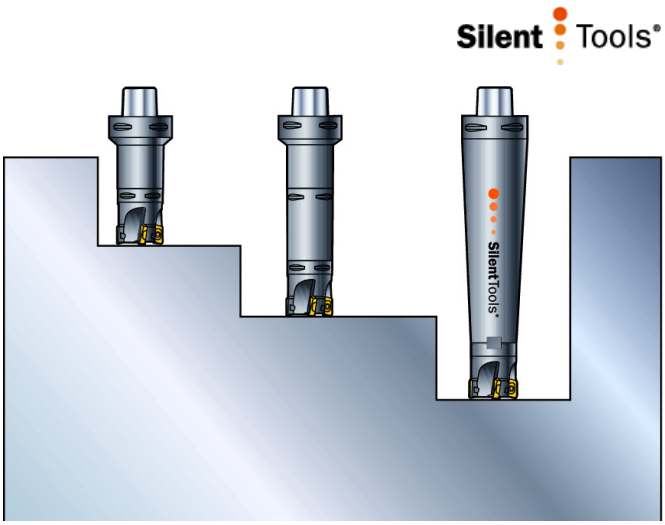
Application range



Dampened bars for long overhangs

The Coromant Capto modular tool holding system allows combinations of long and short tools by using extensions and/or reductions.

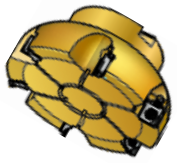
- Choose the shortest possible adaptor
- Adapt cutting data for each tool length
- Use a dampened bar to minimize vibrations with longer overhangs (>5xD), See page G 101, for more information.



Adaptors for arbor coupling

The HydroGrip face mill chuck with arbor coupling is the first choice in mills, when high finish surface is needed. Minimal radial run-out ensures an even tooth load and wear pattern.

HydroGrip® face mill adaptor

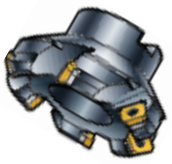


CoroMill® Century

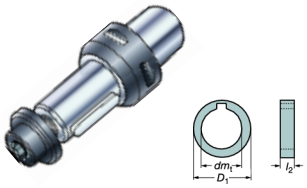
These are universal tool holders for milling machining.

Use the side and face mill adaptor for high side stability.
Note: Spacing collars must be ordered separately.

Face mill adaptor



CoroMill® 245



Side and face mill adaptor

CoroMill® 331

Adaptors for cylindrical shanks

A Weldon adaptor is an alternative for clamping round tools, such as end mills.

Note: One adaptor size is used for each shaft diameter.

Weldon shank adaptor

CoroMill® 390 Weldon

Collet chucks are used for medium milling machining. Standard, short and long lengths are available.

For better accessibility in narrow machining, use a collet chuck extension.

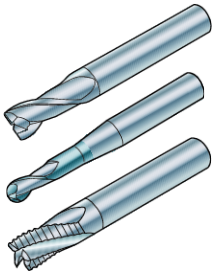
Collet chucks are always used with a collet nut. Use a torque wrench to tighten the nut. For correct torque, see page G 120.

Collet chuck adaptor

CoroMill® 390 cylindrical

Collet chuck extension

CoroMill® 300 cylindrical

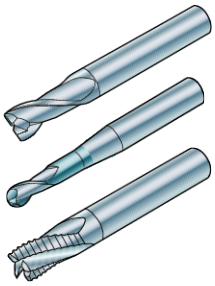


CoroMill® Plura

Shrink fit adaptors are used for both roughing and finishing milling machining.

Note: One adaptor size is used for each shaft diameter. Only cylindrical shafts can be clamped.

Shrink fit adaptor



CoroMill® Plura

Integrated holders with EH interface

To be used with CoroMill® 316 for the following benefits:

- Reduced tool inventory
- Increased tooling stability
- Quicker tool set-ups
- Secure machining performance
- Greater tooling flexibility

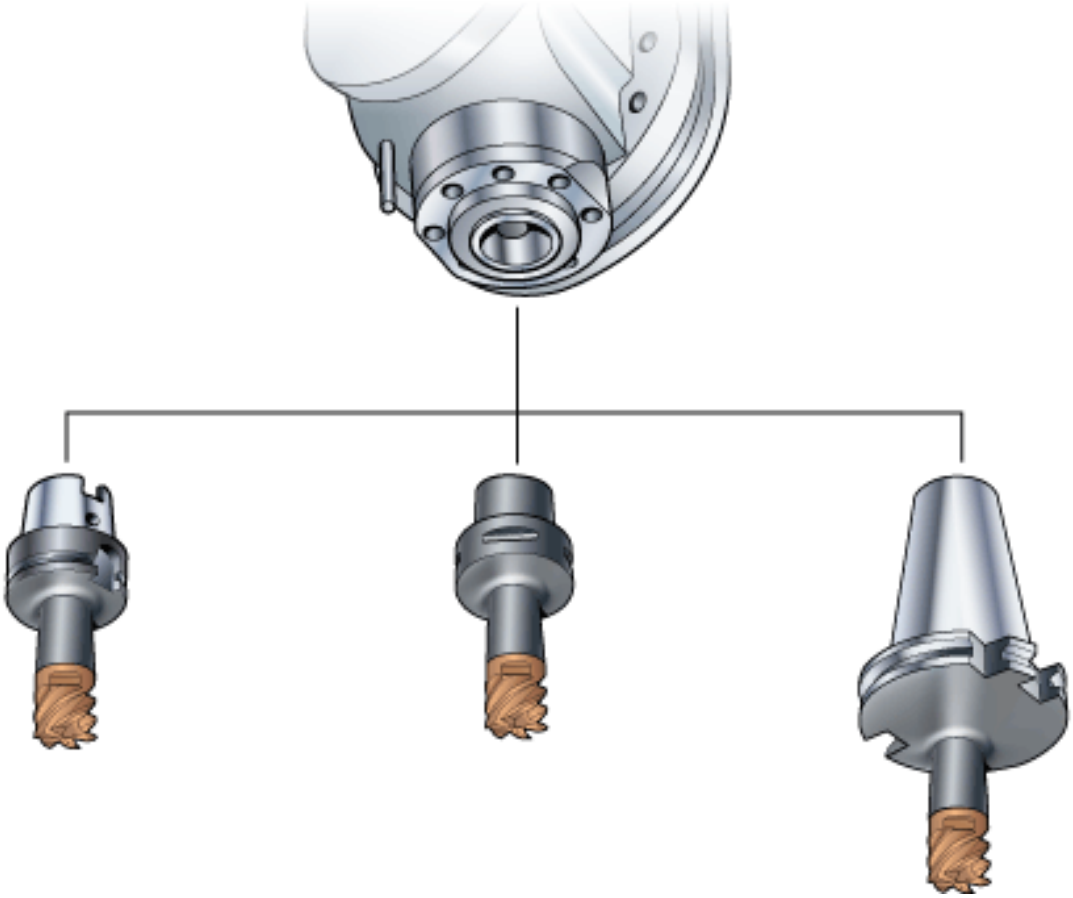
Introducing the next innovation in exchangeable-head (EH) tooling. The integrated holders enable EH tools, such as CoroMill 316, to be used over a wider application area, in a complement to the secure EH interface between holder and exchangeable carbide head.

CoroMill 316 – exchangeable heads with EH interface (see milling chapter page D 186).

All common interfaces available

Integrated holders with EH interface are available in a wide range of tool holder options for direct integration into many machine types.

- Coromant Capto® C3-C6
- Extra short Coromant Capto for driven tool holders without gripper groove: C3-C4
- HSK 63 A/C
- ISO 7388.1: steep taper 40
- MAS-BT 403: steep taper 30 and 40

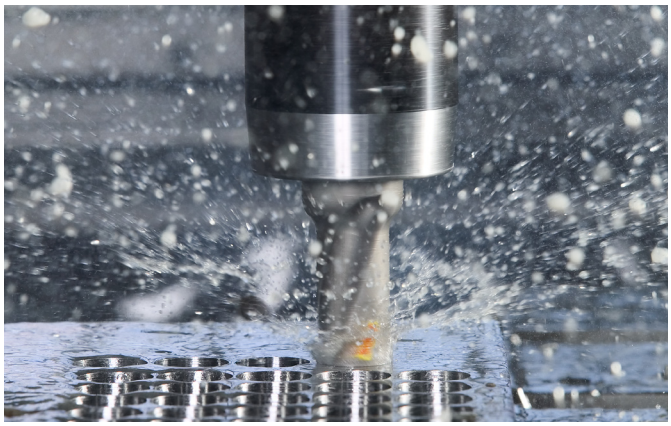


Tool holding – drilling

Sandvik Coromant offers different drilling concepts for a number of applications. Each concept has its own properties and advantages for machine and holding system.

Radial run-out, bending strength, torque transmission, balance for high spindle speeds and internal cutting fluid supply are the important factors when choosing tool holder.

- Modular tools increase the flexibility and the possible number of combinations – use the largest possible diameter on holding tools (extensions, adaptors) relative to drill diameter.
- Use stiff modular tools with good run-out accuracy.
- CoroGrip or HydroGrip chucks are individually balanced and can be used for spindle speeds over 20,000 rpm. Both chucks are individually balanced and each chuck is delivered with a number and protocol. See page G 103 for more information.



Choice of adaptors/chucks for drilling tools

Choose coupling/chuck first, then adaptors/chucks		Adaptor and chuck systems							
		Coromant Capto®	HydroGrip®	CoroGrip®	Drill adaptor ISO 9766	Adjustable drill adaptor	Shrink fit adaptor	Collet chuck adaptor	Whistle Notch® adaptor
+++ Very good	Torque transmission	+++	+++	+++	+++	+++	++	+	+++
++ Good	Run-out	+++	+++	+++	+	+	+++	+	+
+ OK	Balance	+++	+++	+++	+	+	+++	+	+
Drilling tool couplings									
CoroDrill® 880	Coromant Capto®	1							
	ISO 9766		2	2	1	2			
CoroDrill Delta-C®	Cylindrical		1	2			3	4	
	Whistle Notch®		2	2					1
Coromant Delta®	ISO 9766		2	2	1		3		
	Whistle Notch®		2	2					1

1 = First choice

2 3 4 = Complementary choices

Coromant Capto® coupling for CoroDrill® 880

CoroDrill 880 with integrated Coromant Capto coupling minimizes tool overhang and adds stability and precision to the drilling process.

Coromant Capto® basic holders and adaptors

CoroDrill® 880

HydroGrip®and CoroGrip® for all drilling applications

Both HydroGrip and CoroGrip chucks are suitable for drilling applications with shank diameters up to 32 mm.

All types of drilling tools with cylindrical, ISO 9766 or Whistle Notch shanks can be retained safely.

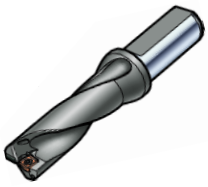
Note: Not applicable for dm_t = 6 mm.

All other shank sizes and types can be used with or without collets, see page G 114.

For CoroGrip all shank types can be used with or without collets, see page G 106.

HydroGrip® precision chucks

CoroGrip® precision power chuck



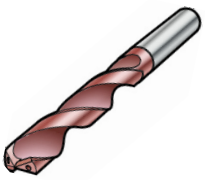
CoroDrill® 880

Coromant Delta®

HydroGrip® for long reach

The HydroGrip range of short, slender and pencil chucks provides the best choice when accessibility and long reach are required.

Pencil version



CoroDrill Delta-C®

Slender version

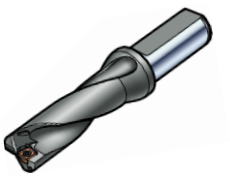
Adaptors for cylindrical shanks with flat according to ISO 9766

Adaptors for ISO 9766 shanks.

Universal alternative for drilling machining when the demand for tool run-out is not as high.

Note: One adaptor size is used for each shank diameter.

Drill adaptor for ISO 9766 shanks



CoroDrill® 880

Coromant Delta®

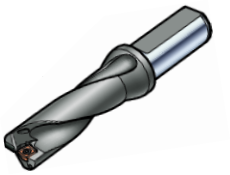
Adjustable drill adaptors for pre-setting a CoroDrill 880 drill to achieve closer hole tolerance, or to drill a hole larger than the normal drill diameter.

For drills with shanks according to ISO 9766, the slide must be ordered separately.

Working area is up to 1.4 mm on the diameter, adjustable in increments of 0.05 mm.

Note: Working area of the holder can exceed the chosen area of the drill.

Adjustable drill adaptor



CoroDrill® 880

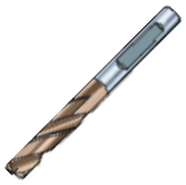
Complementary adaptors

Adaptors with Whistle Notch are available for Coromant Delta and CoroDrill Delta-C drills, but should not be considered as first choice due to tool run-out.

Drill adaptor for Coromant Whistle Notch® shanks

Coromant Delta®

Whistle Notch® adaptor for DIN 6535-HE shanks



CoroDrill Delta-C®

Shrink fit adaptor is used for all drilling.

Note: One adaptor size is used for each shank diameter. Only cylindrical shafts.

Shrink fit adaptor

CoroDrill Delta-C®

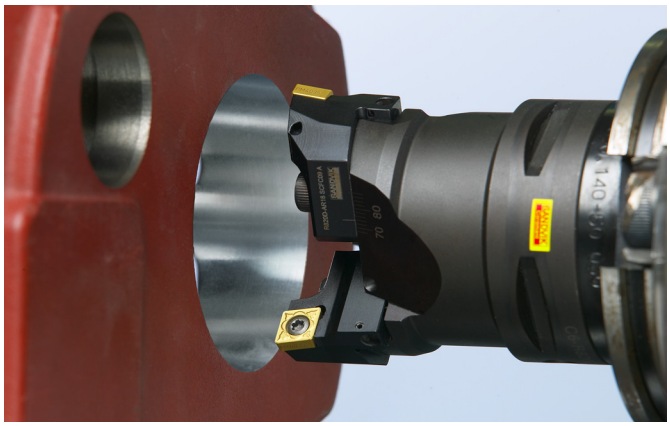
Tool holding - boring

Sandvik Coromant offers several boring concepts for a number of applications. Each concept has its own specific properties and advantages, depending on the machines and holding system.

Bending stiffness and torque transmission are the most important factors when choosing tool holders for boring operations.

A small run-out is the most important factor when choosing tool holders for reaming operations.

- Make sure to have rigid clamping, use Coromant Capto coupling.
- Choose the shortest possible adaptor.
- Choose the strongest coupling size.
- If reductions are needed, use a tapered version if possible.
- For long overhangs (>4 x D_{mm}), use dampened adaptors.
- For long overhangs, ensure rigid clamping with flange contact to spindle.
- Maximum recommended run-out for reamers is 5 microns.



Choice of adaptors/chucks for boring and reamer tools

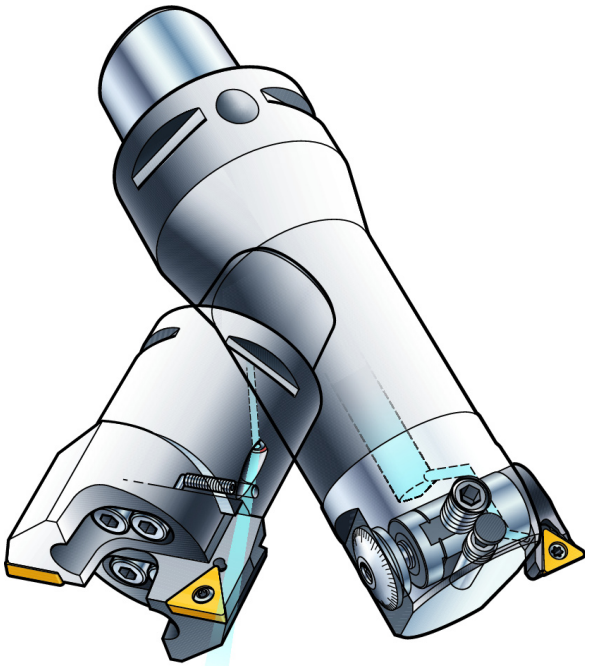
			Adaptor and chuck systems							
Choose coupling/chuck first, then adaptors/chucks			Coromant Capto®	HydroGrip®	CoroGrip®	Shrink fit adaptor	Collet chuck adaptor	Face mill holder adaptor	HydroGrip® face mill holder	Dampened milling adaptor
+++	Very good	Torque transmission	+++	+++	+++	++	+	+++	+++	+++
++	Good	Run-out	+++	+++	+++	+++	+	+	+++	++
+	OK	Balance	+++	+++	+++	+++	+	+	+++	+
Boring tool couplings										
CoroBore® 820		Coromant Capto®	1							
DuoBore™		Coromant Capto®	1							
		Arbore								1
Heavy duty		Coromant Capto®	1							
		Arbore						1	2	
CoroBore® 825		Coromant Capto®	1							
		Cylindrical		1	2	3	4			
		Arbore						1	2	
Fine boring head 391.37A/B		Coromant Capto®	1							
Reamer 830		Cylindrical		1	2	3				

1 = First choice

2 3 4 = Complementary choices

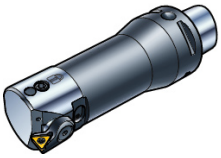
Coromant Capto® system - first choice

First choice should always be tools with Coromant Capto coupling, which offers excellent repeatability and the best stability characteristics on the market.

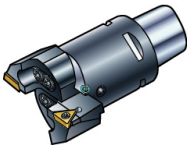


Coromant Capto® basic holders and adaptors

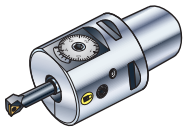
CoroBore® 820



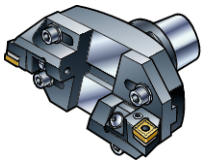
CoroBore® 825



DuoBore™



Fine boring head



Heavy duty boring tools

HydroGrip® - first choice for reamers and boring tools with cylindrical shanks

HydroGrip precision chucks should always be considered as first choice for reaming and fine boring tools with cylindrical shanks. HydroGrip precision chucks have a very good run-out accuracy and high clamping forces. Each chuck is individually balanced and is delivered with a measuring report. For more information, see page G 114.

Short version

Slender version

CoroBore® 825 Cylindrical shank

Reamer 830

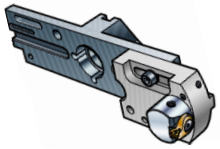
Arbor coupling

Face mill adaptors are universal tool holders with high torque transmission capacity.

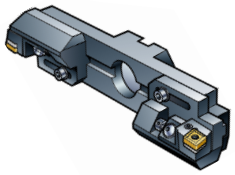
Use Duobore, together with a dampened adaptor when machining at long overhangs.

HydroGrip face mill adaptors can be used to minimize the run-out.

Facemill adaptor



CoroBore® 825



Heavy duty boring tools

Dampened milling adaptor

DuoBore™

Complementery adaptors

CoroGrip®

CoroGrip precision chucks have a very good run-out accuracy and high clamping force. Each chuck is individually balanced and is delivered with a measuring report. For more information, see page G 103. The extremely high torque transmission capacity is not completely utilized in light cutting operations such as reaming and fine boring.

CoroGrip® precision power chuck

CoroBore® 825 Cylindrical shank

Reamer 830

Shrink fit

Shrink fit adaptors can be used for accessibility purposes. However, the CoroBore 825 with integrated dampening mechanism is preferable, if accessibility is required.

Shrink fit adaptor

CoroBore® 825 Cylindrical shank

Reamer 830

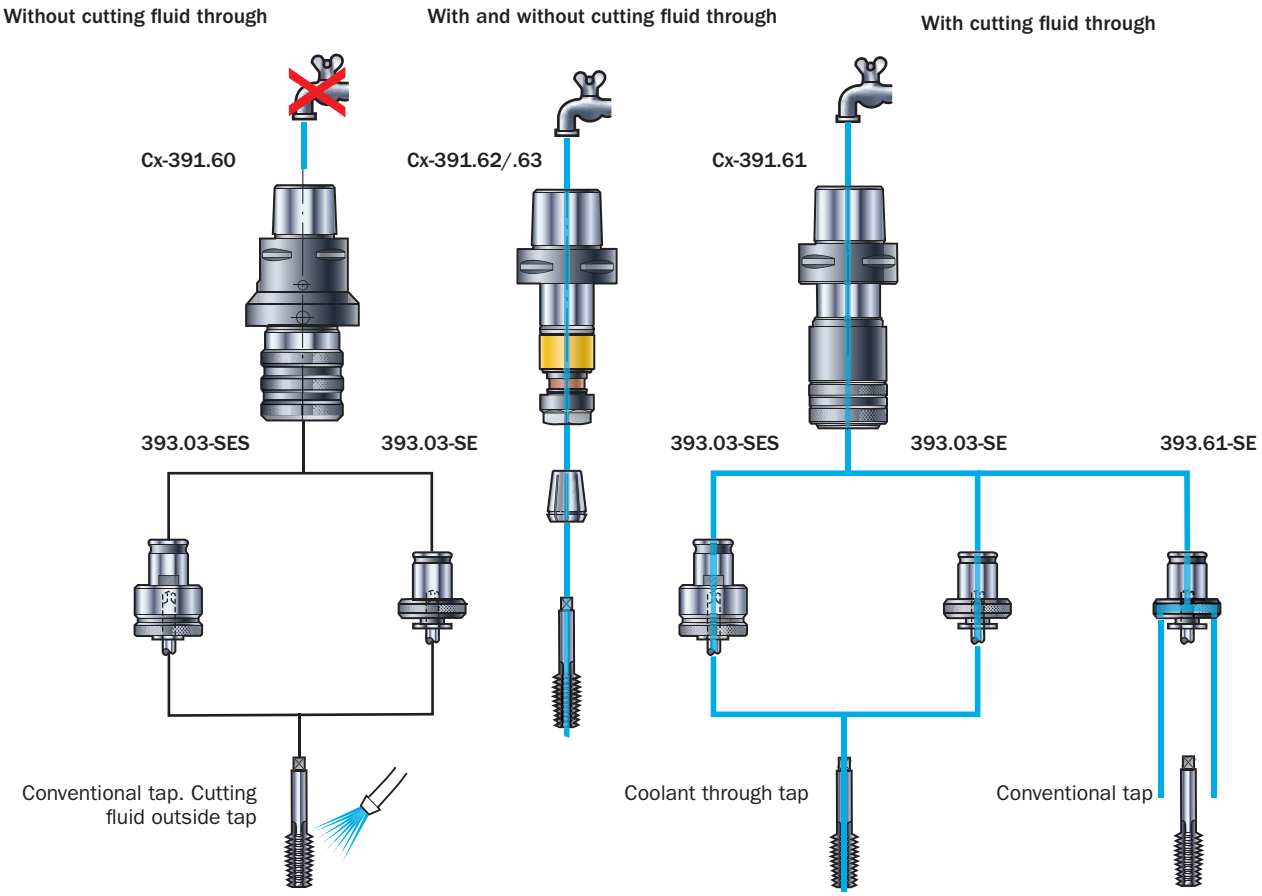
Collet chuck

Collet chucks can be used together with CoroBore 825 cylindrical shanks; however it is not the optimal solution, due to lower-though clamping forces and larger run-out compared with HydroGrip. Furthermore, it is not individually balanced.

Collet chuck adaptor

CoroBore® 825 Cylindrical shank

Tool holding – for tapping



Choice of tool holder

Tap adaptors

The tap adaptors are designed for tapping operations in machines equipped with automatic tool changing. A tension and compression design compensates for differences between spindle feed and thread pitch.

Tap holder with tap adaptor

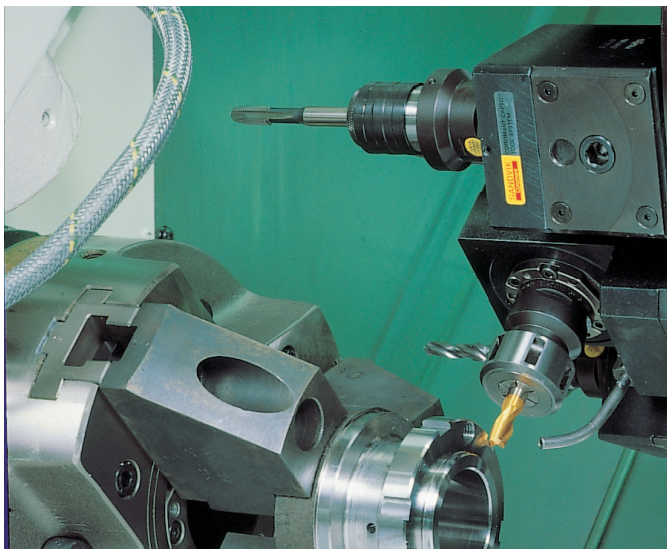
Two styles are available:

- Positive drive tap holder, style SE
- Torque controlled tap holders, style SES.

Both with drive on tap square.

Style SES has a pre-set safety clutch that will slip when tapping torque exceeds pre-set value.

Adaptors for left-hand threads are available on request.



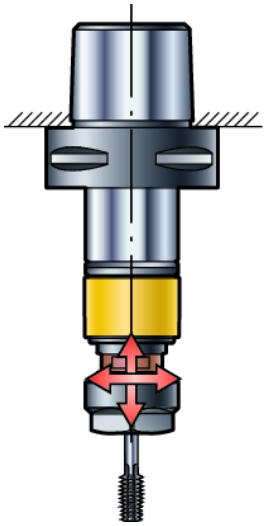
Special machining

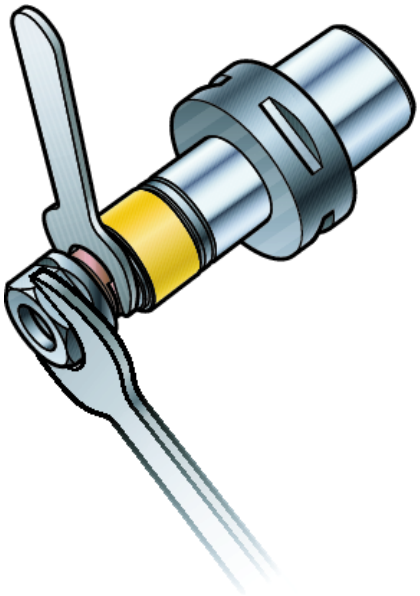
Synchronized tapping

Even micro differences between calculated feed and actual pitch of the tap can lead to extremely high thrust forces on the tap flanges and an increase in cutting pressure.

The synchronized tap adaptor 391.62 / 391.63 is based on a micro compensator, which compensates for radial and axial deviations.

With this tap adaptor, thrust forces are reduced on the tap flanks, which results in better surface quality and longer tool life.





Assembly instruction:

1. Locate collet size for tap diameter.
2. Use two open end wrenches to tighten the nut.
3. Tighten the nut with a torque wrenches to recommended value:

ER11: 16 Nm

ER20: 32 Nm

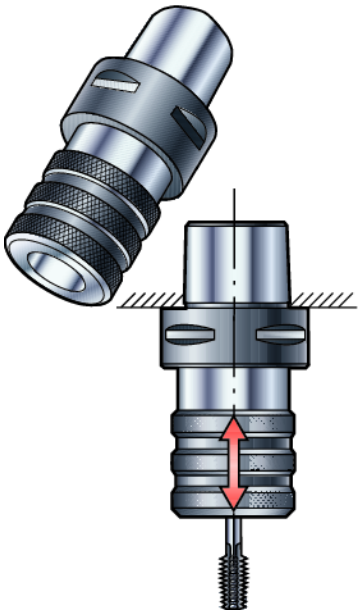
ER25: 108 Nm

ER40: 170 Nm

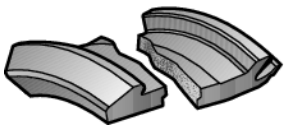
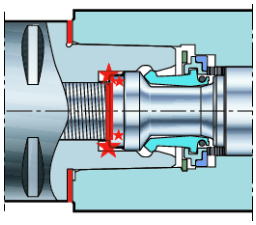
Tapping without synchronized tap holder

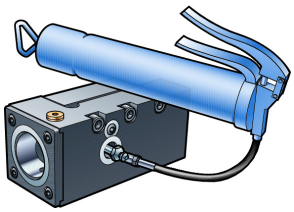
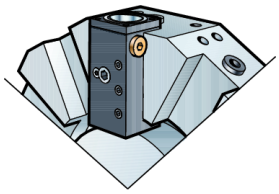
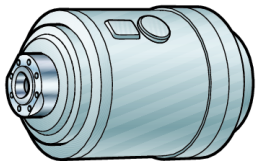
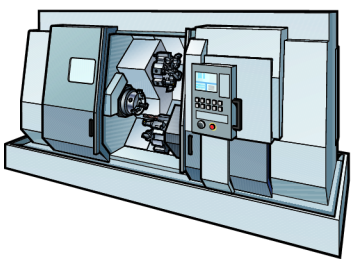
To get the best result from machines not equipped for synchronized tapping, the following recommendations should be observed:

- Program machine feed 10% lower than theoretical value (thread pitch rpm). This enables the tap to cut precisely on pitch.
- Reduce tapping depth by 10% to avoid tap breakage.
- When tapping deep holes in soft materials, e.g. aluminium, feed and depth should be reduced by 3-5%.



Trouble shooting

	Cause	Solution
Broken or damaged segment	• Segment is broken.	• Change segment.
	• Movement of the segment is jammed on the drawbar.	• Clean and make sure the segment runs along the drawbar without obstacle.
	• Damage on locking groove of the cutting unit.	• Replace cutting unit.
	• Incorrect clamping time.	• Change the clamping time cycle.
Incorrect clamping	• Cutting unit is not pushed in far enough to be in contact with the drawbar.	• Adjust the tool-change and/or the gripper-position.
	• Cutting unit does not come in contact with the drawbar because of resistance from air-blowing.	• Adjust air-blowing cycle so the air is shut off immediately before the cutting unit stops against the drawbar.
	• The drawbar is not in the front position when a new cutting unit is pushed in.	• Make sure hydraulic pressure for unclamping is activated.
	• The clamping motion starts before the tool has been pushed into the correct position.	• Check/adjust the cycle-time.
	• Movement of the segment is jammed on the drawbar.	• Clean and make sure the segment runs along the drawbar without obstacle.
	• Insufficient spring pressure to the segment.	• Change springs.

	Cause	Solution
No movement in manual clamping unit. 	• Clamping unit filled up with grease.	• Disassemble the clamping unit and remove the grease.
Cutting unit remains stuck in the clamping unit/spindle. 	• Low hydraulic pressure.	• Check/adjust hydraulic pressure.
	• Damaged/contaminated coupling surfaces.	• Replace coupling parts
	• Broken/damaged segment.	• Adjust the clamping cycle.
	• Burr on locking groove of the cutting unit.	• Replace cutting unit.
	• Incorrectly mounted cutting tool in adaptor with through hole. Cutting tool can-not be mounted as deep as it reaches into the drawbar's opening of the adaptor. This restricts the movement of the drawbar, which can make it impossible to free the coupling and/or cause damage to the segments and segment-holder.	• Check/adjust mounting depth of the cutting tool. • Check segment-set and segment-holder with respect to damage, and replace if necessary.
Machine cannot start after tool-change (effective only if machine is equipped with pneumatic Tool Presence Control). 	• Air leakage.	• Clean the tool and check if the clamping unit/spindle is free from damage.

Products – Machine interfaces

Coromant Capto® manual clamping units for turning tools

Manual clamping is recommended for all types of turning centres that do not have an automatic tool changer. On manually activated units, both segment clamping and centre bolt mechanisms are used. Always use a torque wrench when clamping the units.

Cam shaft activated drawbar

The movement of the drawbar is generated by a cam, acting from the side of the unit, which rotates in a slot in the drawbar.

A hexagon key is used with a torque wrench to lock/unlock the cutting head (less than a half turn is required).

Screw activated drawbar

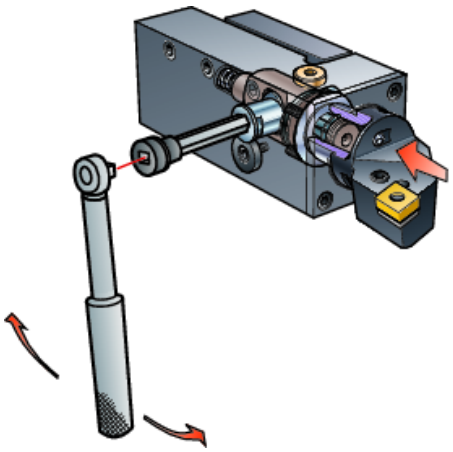
The movement of the drawbar is controlled by a screw, acting from the rear of the unit.

A hexagon key is used with a torque wrench to lock/unlock the cutting head (less than a half turn is required).

Centre bolt activated clamping

A rear activated centre bolt is used to clamp/unclamp the cutting head.

A hexagon key is used with a torque wrench to lock/unlock the cutting head (four to five revs are required).



Cam shaft activated draw bar

Shank type clamping units for conventional turrets

Round shank units for internal operations:

The 2000 type features:

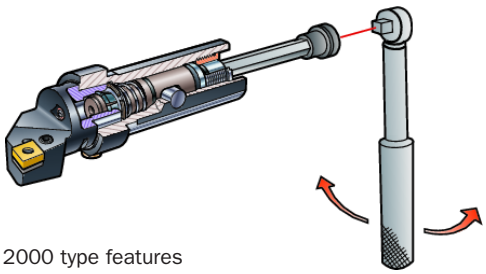
- Expandable segmented bushing clamp design
- Screw activated drawbar
- Less than one rev to clamp.

The 3000 type features:

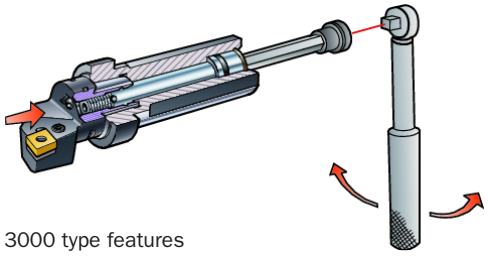
- Centre bolt design (four to five revs to clamp).

Installation is simple:

- Both are mounted in the turret like a standard boring bar.



2000 type features



3000 type features

Shank units for external operations:

Easily adaptable to most machines using 20, 25, 32 or 40 mm square shank tools.

The 2085 type features:

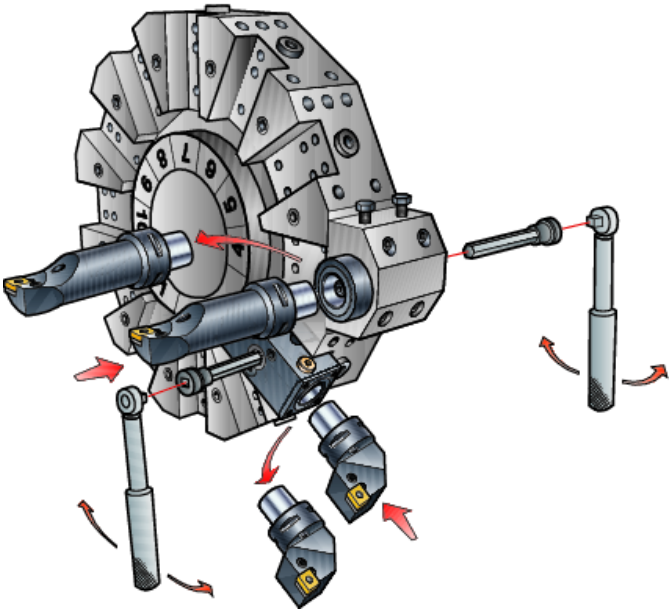
- Expandable segmented bushing
- Cam shaft activated drawbar.

Installation is simple:

- Remove the square shank tool and machine wedge
- Slide the Coromant Capto 2085 clamping unit into place and tighten the wedge.

These tools feature:

- No special adaptation to tool or turret
- Through tool coolant can be used
- Minimum overhang, allowing maximum working envelope
- Same key for clamping external and internal units
- Adjustable shank length (some shanks can be cut off if necessary).



2085 type features

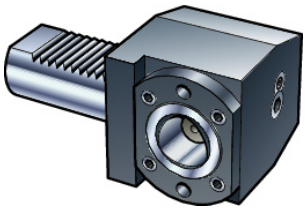
Clamping units for DIN 69880 (VDI) turrets

These tools feature:

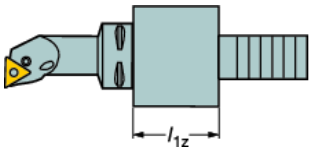
- No special adaptation to tool or turret
- Through tool coolant
- Same key for clamping external and internal units.

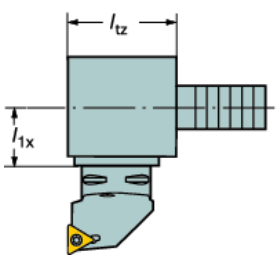
VDI clamping units for external and internal operations

- Expandable segmented bushing clamp design
- Quick change – less than a half turn to lock/unlock
- Same length dimension for corresponding angular l_{tz} and straight l_{1z} units to avoid risk of collision
- Two different l_{1x} dimensions available on angular units.



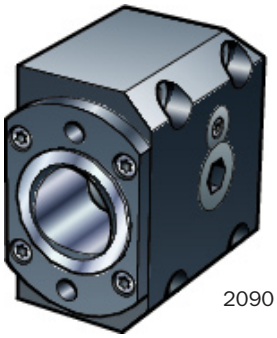
VDI clamping units





Manual clamping units for special applications

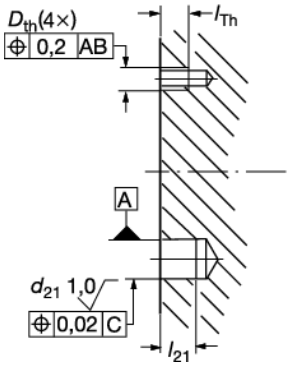
The 2090 type clamping unit is designed for special adaptations to the machine. For more information about building instruction, see Main catalogue.

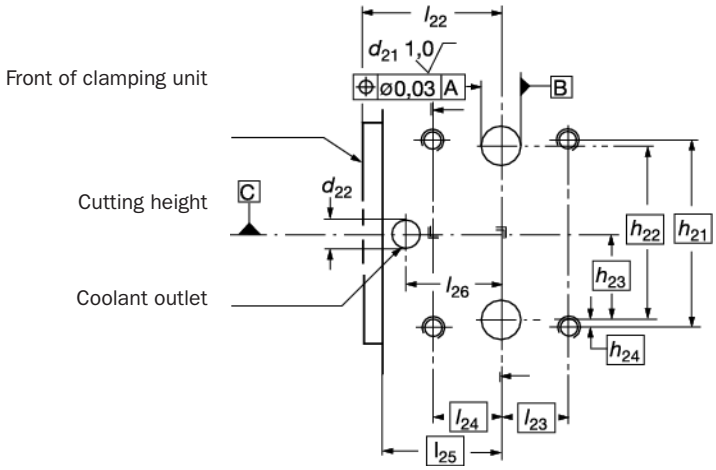


2090 camshaft activated clamp

Design instructions for application of clamping unit RC/LC 2090

Material hardness min.
270 HB



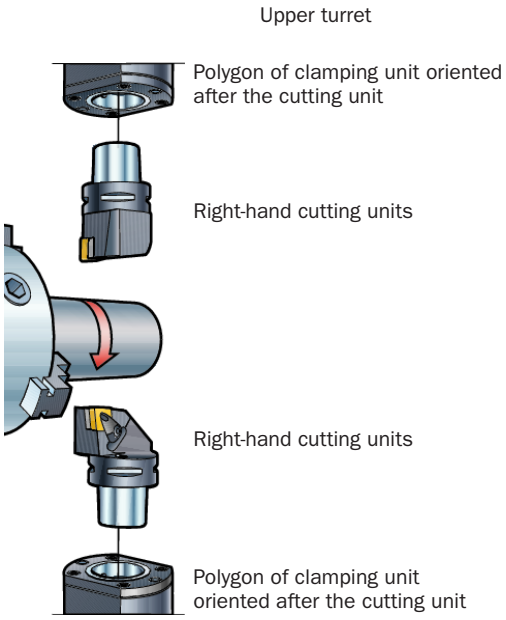


Right-hand style shown

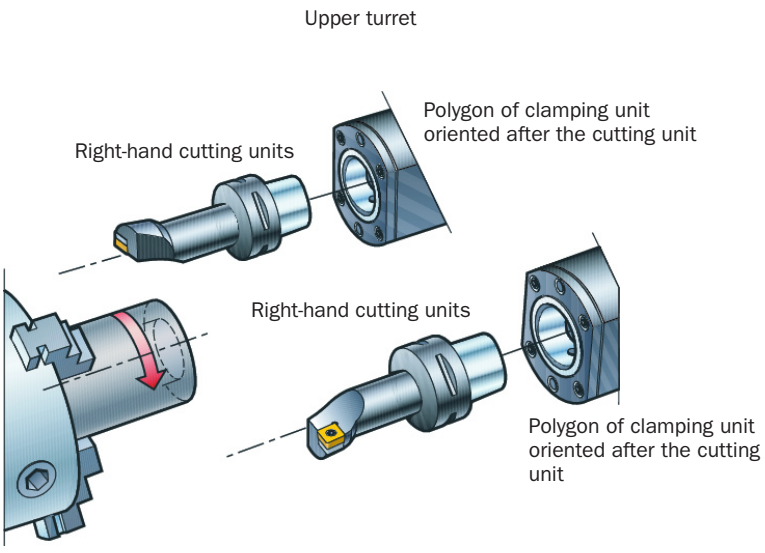
Clamping unit	Dimensions, mm													
	d_{21} H7	d_{22}	h_{21}	h_{22}	h_{23}	h_{24}	l_{21} min.	l_{22}	l_{23}	l_{24}	l_{25}	l_{26}	l_{th} min.	D_{th}
C3-R/LC2090-19039M	12	5	42	39	19.5	1.5	8.5	39	19	19	33.5	28	7.5	M6
C4-R/LC2090-24043A	16	7	60	55	27.5	2.5	11	43	19	19	36.5	30	11	M8
C5-R/LC2090-32048A	20	7	70	62	31	4	12	48	21	21	39.5	33	13	M10
C6-R/LC2090-42060	25	10	82	71	35.5	5.5	20	60	24.5	24.5	50.5	41	12	M10
C8-R/LC2090-50088	32	11	110	92	46	9	20	88	43	43	76	63	14.5	M12

How to choose clamping and cutting units

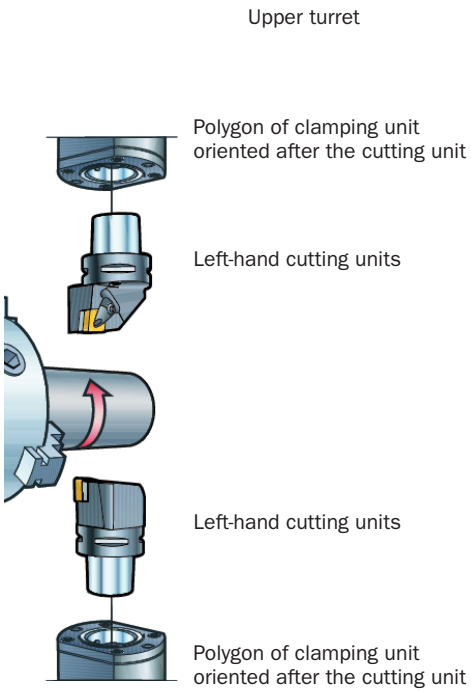
External machining



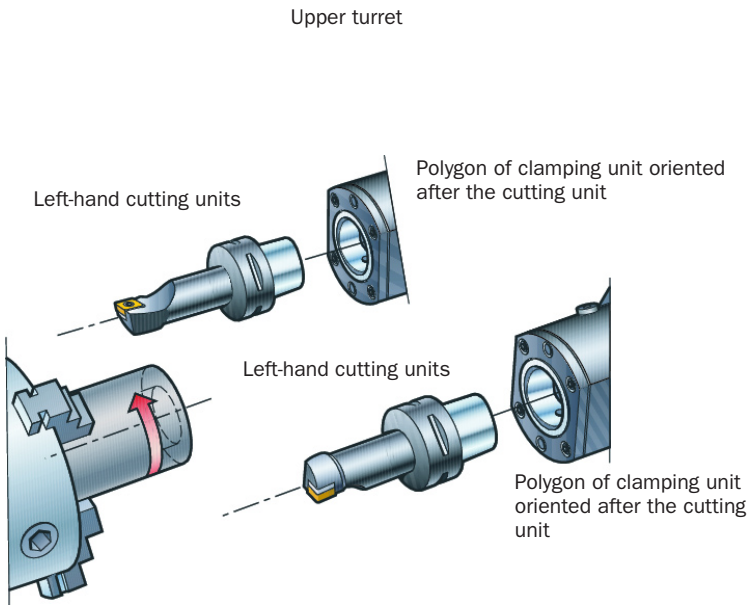
Internal machining



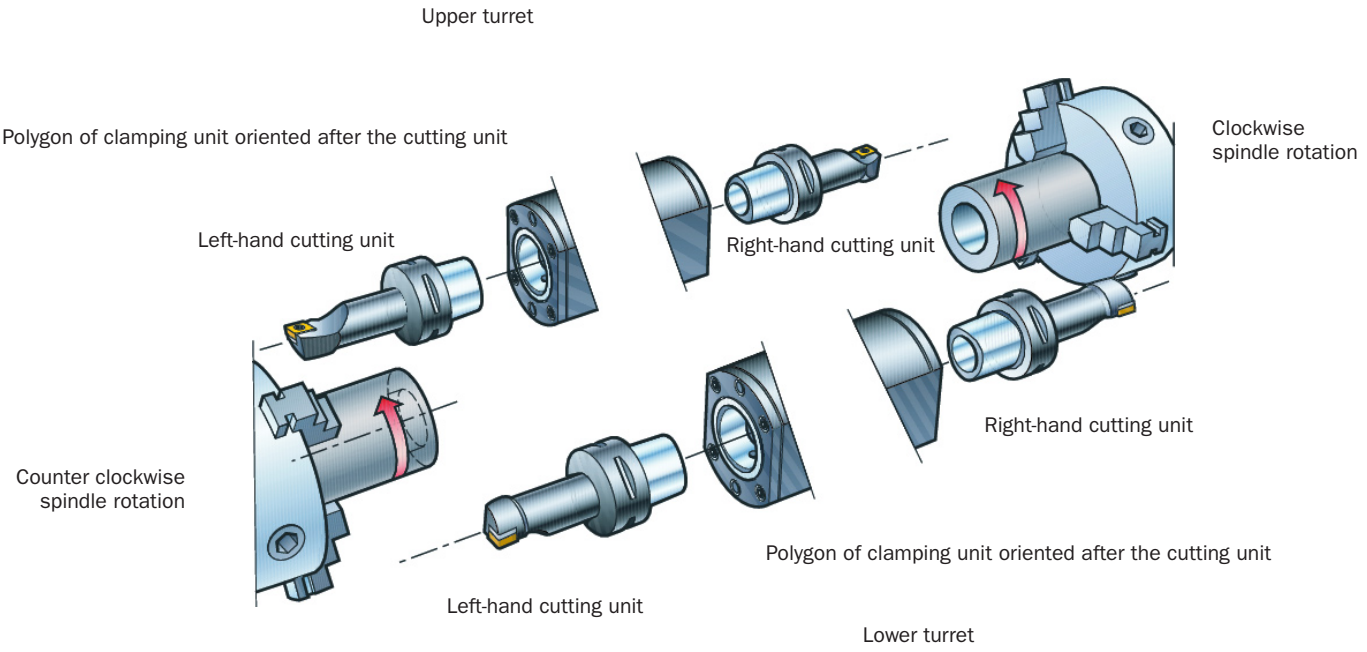
External machining



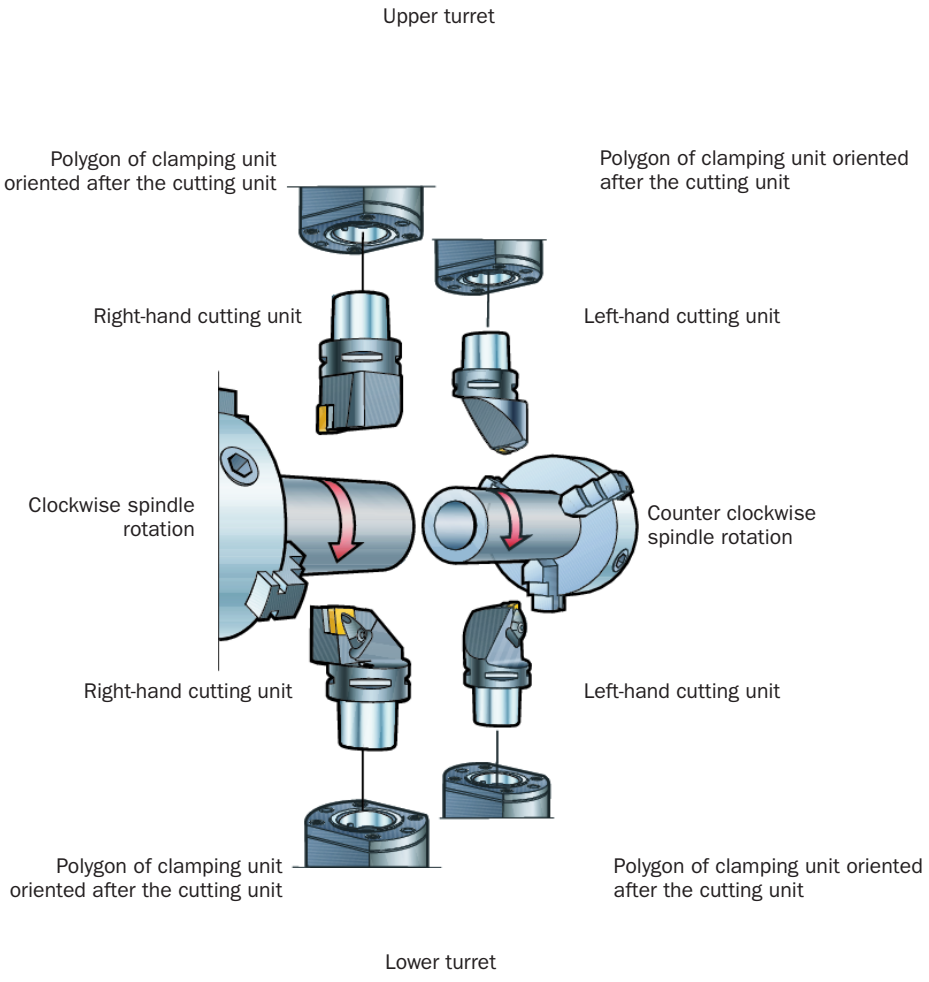
Internal machining



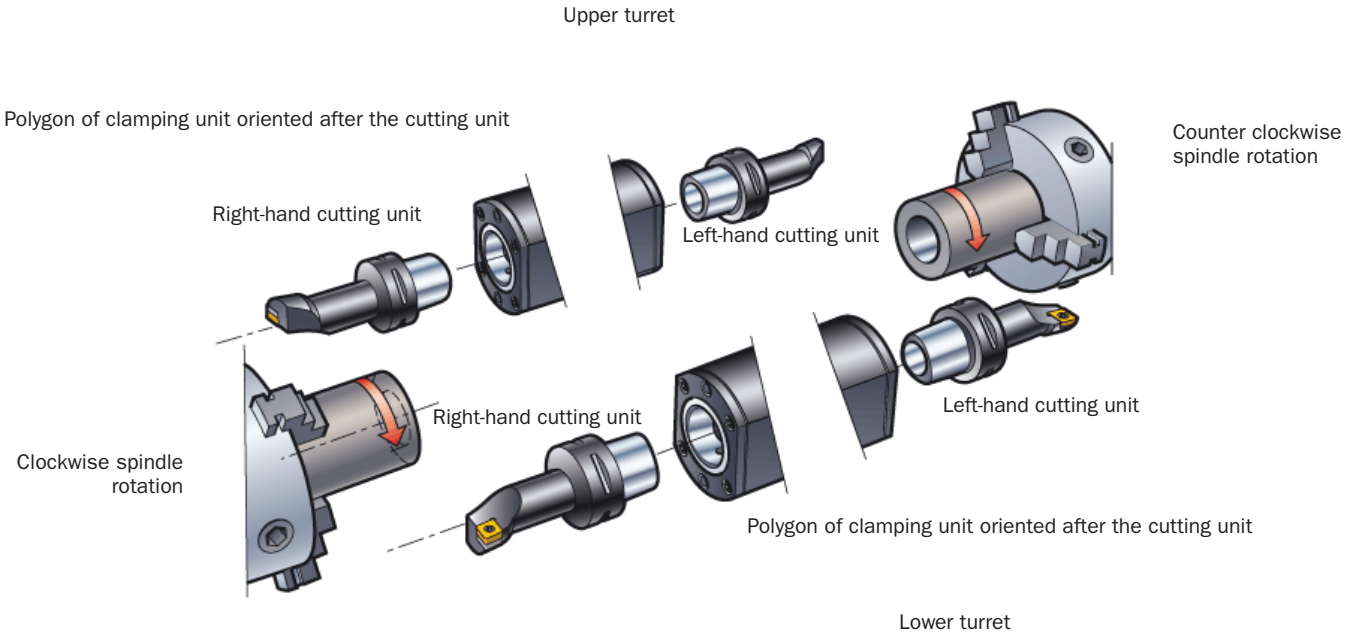
Internal machining with two spindles



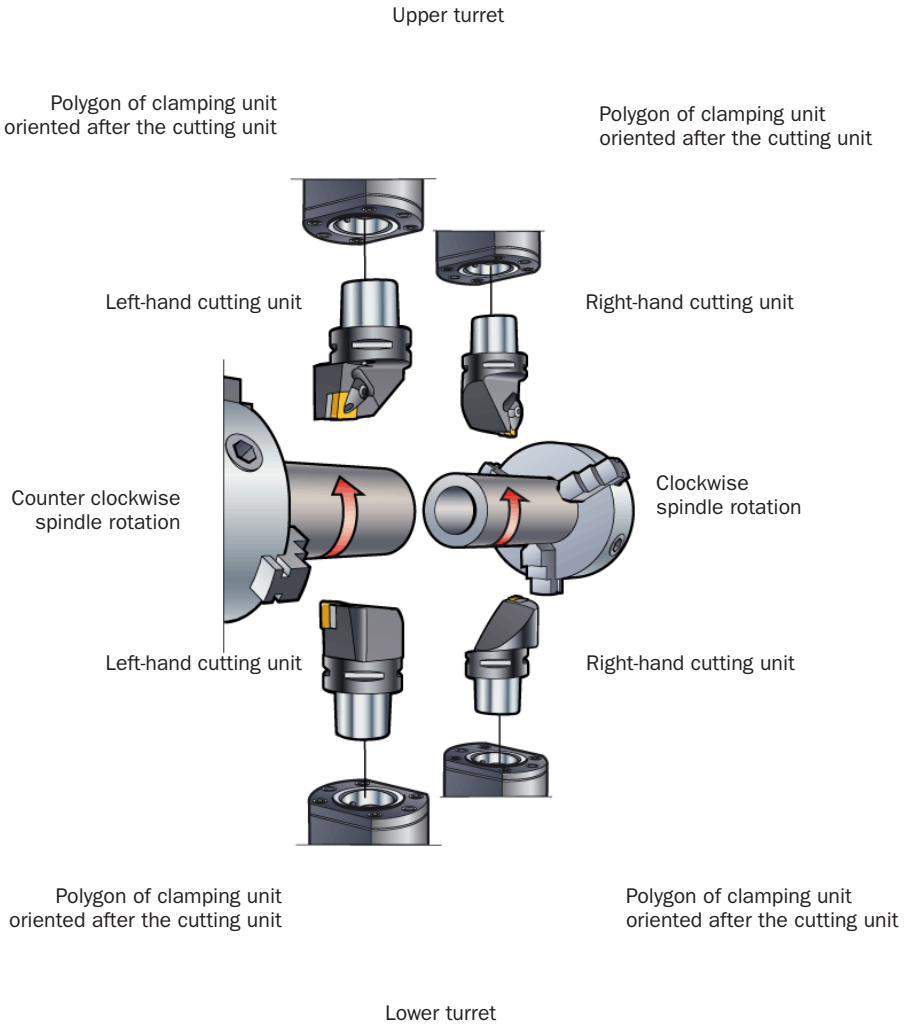
External machining with two spindles



Internal machining with two spindles

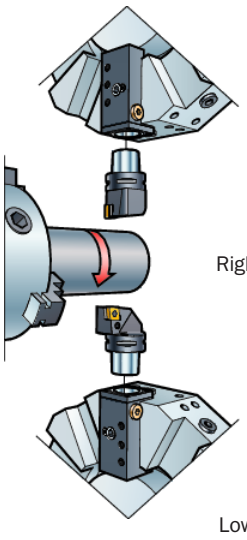


External machining with two spindles

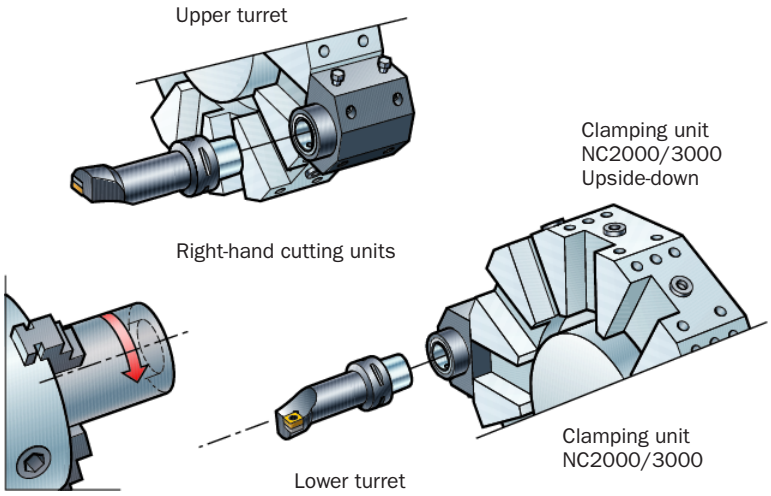


Clamping units 2000, 3000 and 2085

External machining

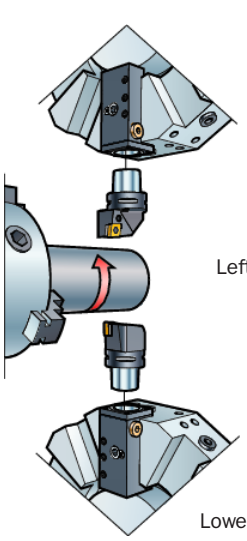


Internal machining

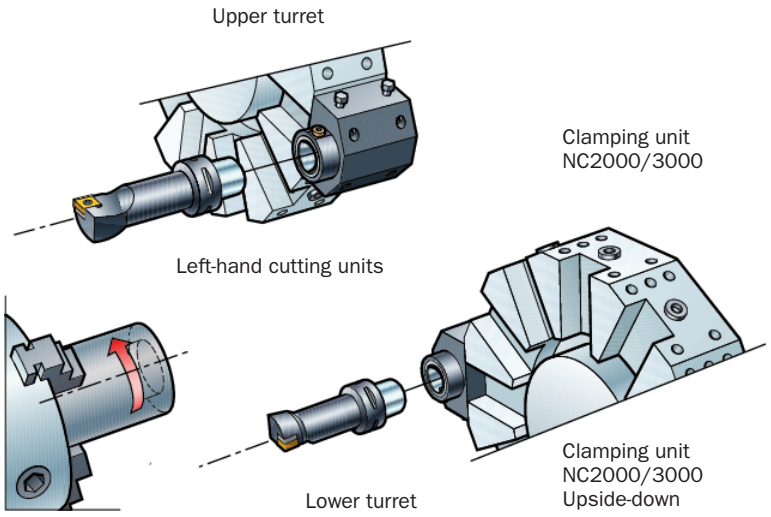


Clockwise spindle rotation

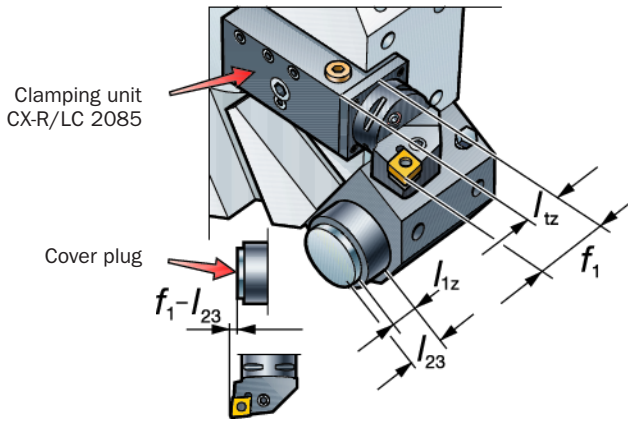
External machining



Internal machining



Counter clockwise spindle rotation



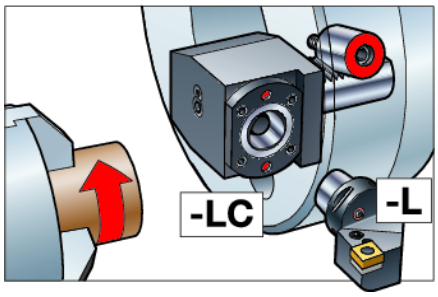
Application guide for type 2000 and 3000

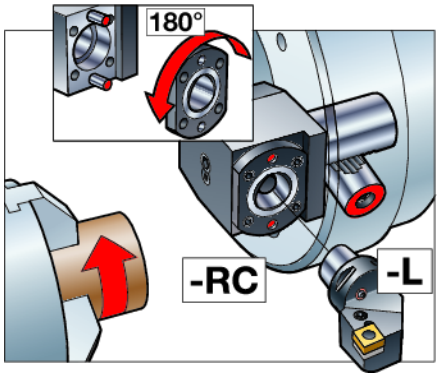
A cover plug (CX-CP-01) must be used in the clamping unit when no cutting unit is installed. As can be seen from the diagram and table, there is no risk of collision between the workpiece and cover plug during facing operations using clamping unit CX-R/LC 2085.

Dimensions, mm	f_1	l_{tz}	l_{1z}	l_{23}
C3-R/LC 2085	22	18	-	-
C3-NC2000/3000	-	-	18	21
C4-R/LC 2085	27	23	-	-
C4-NC2000/3000	-	-	20	24
C5-R/LC 2085	35	32	-	-
C5-NC2000/3000	-	-	24	29

VDI clamping units

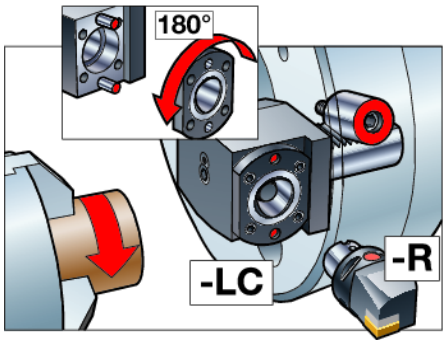
External machining



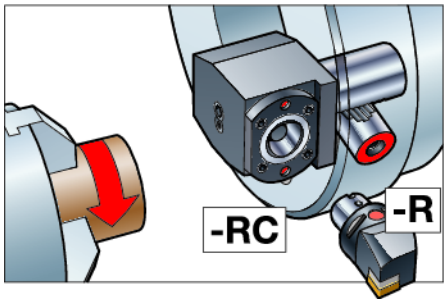


Note: Polygon sleeve must be turned 180°.

Counter clockwise spindle direction

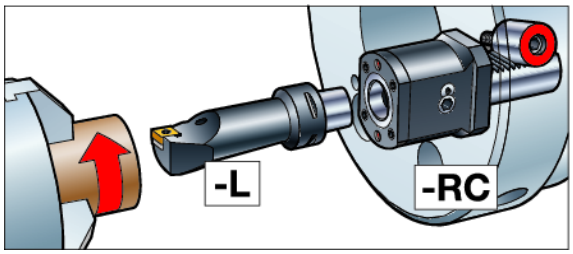


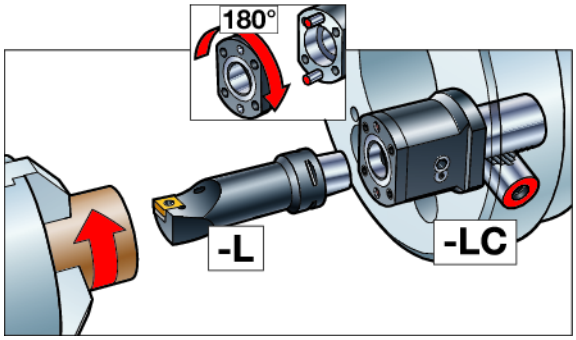
Note: Polygon sleeve must be turned 180°.



Clockwise spindle direction

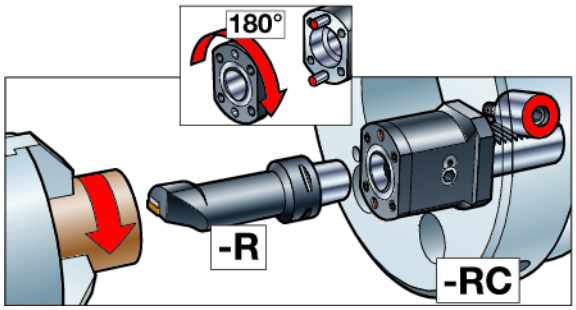
Internal machining



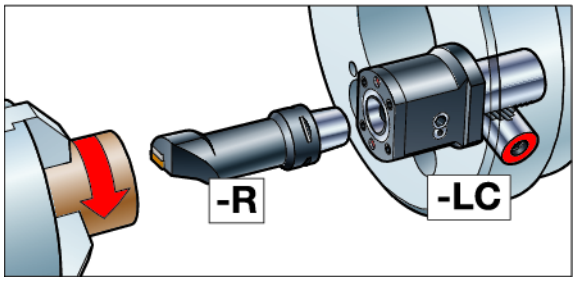


Note: Polygon sleeve must be turned 180°.

Counter clockwise spindle direction



Note: Polygon sleeve must be turned 180°.



Clockwise spindle direction

Drawbar movement

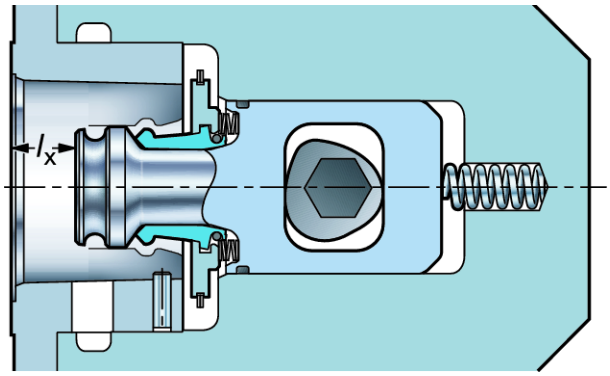
Note: Valid for clamping units with camshaft mechanisms.

Check the drawbar movement of the assembled clamping unit as shown in the figure.

Before measuring, ensure that the camshaft is turned firmly to its position, unclamped – clamped respectively.

Valid for new clamping units.

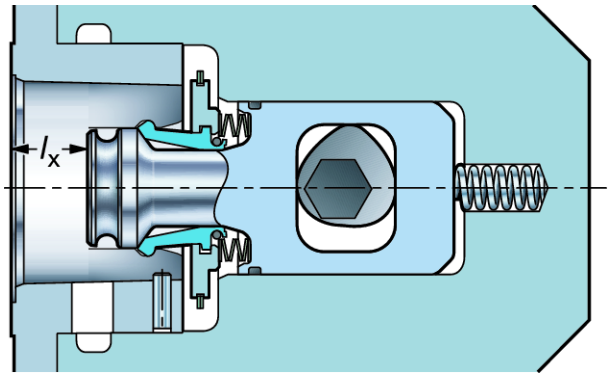
Coromant Capto coupling size	Unclamped position l_x, mm (max.)	Clamped position l_x, mm (min.)
C3	5.3	8.9
C4	8.2	12.3
C5	9.2	13.9
C6	10.1	16.1
C8	19.2	25.3
C10	18.8	27



Unclamped position

l_x min. in clamped position
Valid for used clamping units = limit for repair.

Coromant Capto coupling size	Clamped position l_x, mm (min.)
C3	8.5
C4	12.0
C5	13.6
C6	15.8
C8	25.0
C10	26.7



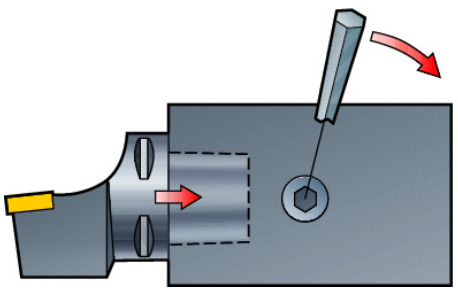
Clamped position

Setting clamping force

In order to obtain the necessary clamping force (F), the clamping unit should be tightened to the torque value as recommended in the table below.
For more information about setting clamping force, see page G 83.

Recommended tightening torque

Size	Torque Nm
C3	35
C4	50
C5	50
C6	70
C8	90
C10	285



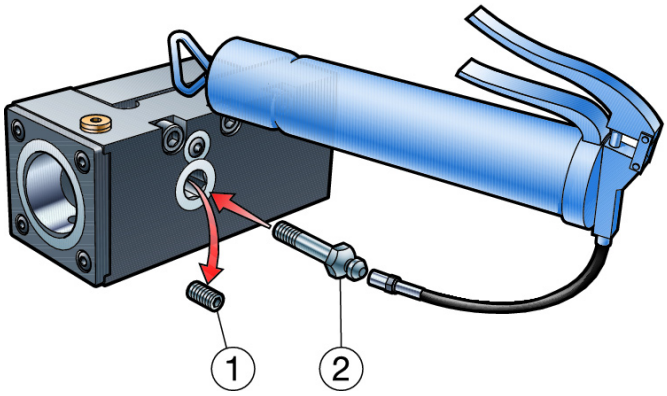
Lubrication

All manual clamping units with cam shaft mechanisms are lubricated with type EP2 prior to delivery. The lubrication should be checked every six months. New grease can be applied via the cam.

1. Remove screw in the cam (1).
2. Assemble grease nipple 5692 012-01 (2).
3. Ensure that the clamping mechanism is in the clamped position.
4. Pump in grease with grease gun, until it begins to seep out a round the key handle and the cam.
5. Remove grease nipple (2).
6. Replace screw into the cam (1).

Note: Clamping unit must be clamped during lubrication. Otherwise, the clumping unit fills with grease and it is impossible to clamp the tool. If this happens, demount the claming unit and remove the grease.

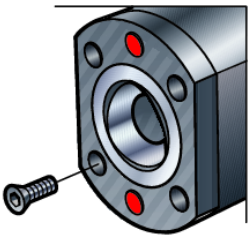
Use lubrication of type EP2 or universal grease.



Turning the cutting tool 180°

Should it be necessary to turn a cutting tool upside-down for a certain operation, the following steps should be taken.

The polygon socket should be rotated 180°



1. Loosen and remove the screws, 4 pieces.

Recommended keys to be ordered separately:

C3: 5680 046-02 (15IP)

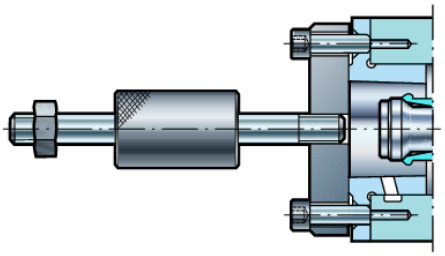
C4: 5680 046-06 (20IP)

C5: 5680 046-07 (25IP)

C6: 3021 010-050 (Hex 5 mm)

C8: 3021 010-060 (Hex 6 mm)

C10: 3021 010-080 (Hex 8 mm)



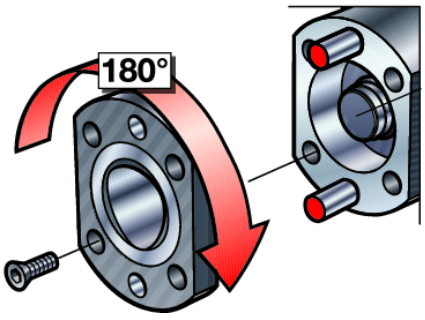
2. Dismantle the polygon socket. Use a disassembling tool.

– Place the disassembly tool over the polygon housing and secure it using the 4 larger screws.

– Carefully remove the sleeve from the clamping unit using the extracting tool or with drawal tool

3. Move the locating pin for the polygon socket to the opposite hole in the clamping unit body. Only valid for old clamping units. New clamping units have double locating pins.

4. Rotate the polygon socket 180° and re-assemble. Tap carefully with a plastic mallet.



Automatic clamping units for turning tools

Automatic clamping is recommended for all types of turning centres or vertical lathes with automatic tool changer.

On automatic clamping units, hydraulic pressure is used to activate the forward and backward movements of the drawbar. It also gives the cutting unit a “kick” to free it from the clamping unit when it is changed.

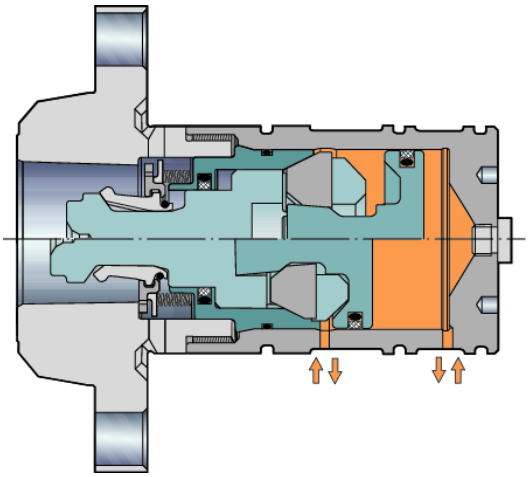
The clamping mechanism is mechanically self-locking, i.e. the oil pressure is not applied during the cutting process. The units operate with hydraulic pressures up to 100 bar.

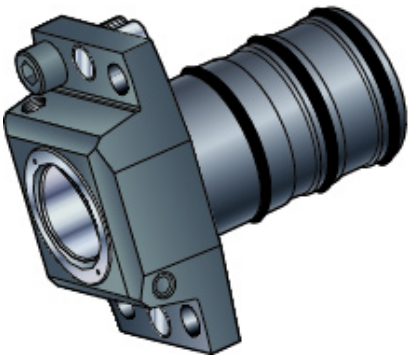
All NC5000 clamping units use segment clamping.

The 5000 type clamping unit is designed for special adaptations to the machine. It is used in connection with manual push button tool changing, or in fully automatic installations with magazines and tool changers.

Automatic clamp units are available in three coolant types:

- up to 80 bar;
- up to 80 bar with probe contacts;
- 80 to 1000 bar with Jetbreak™.

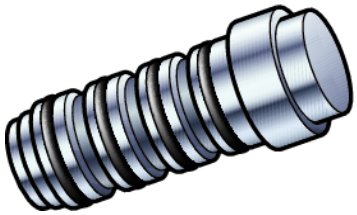




Push button valve

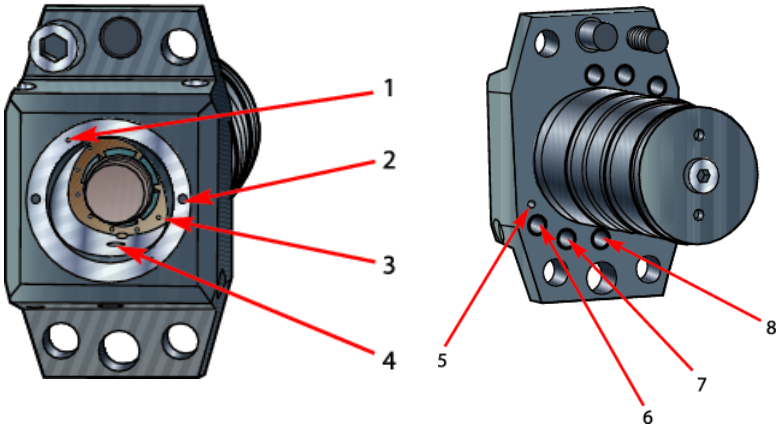
The push button operated valve is delivered ready - install in pockets at turret discs or in tool blocks designed for hydraulic operated clamping units.

Because the valve is produced as a cartridge in one size, it is possible to machine the pocket and simply assemble the valve and lock it with a screw.



Build-in instruction

Regarding detailed build-in instructions, contact your nearest Sandvik Coromant representative.



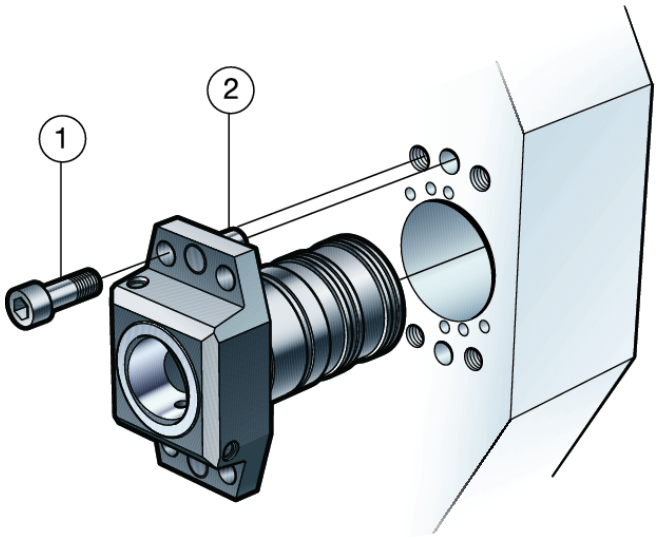
1. Tool presence air
2. Probe contact
3. Air blast
4. Coolant
5. Probe contact
6. Coolant inlet
7. Air inlet tool presence system
8. Air blast inlet

Turning the cutting tool 180°

Should it be necessary to turn a cutting tool upside-down for a certain operation, the following steps should be taken.

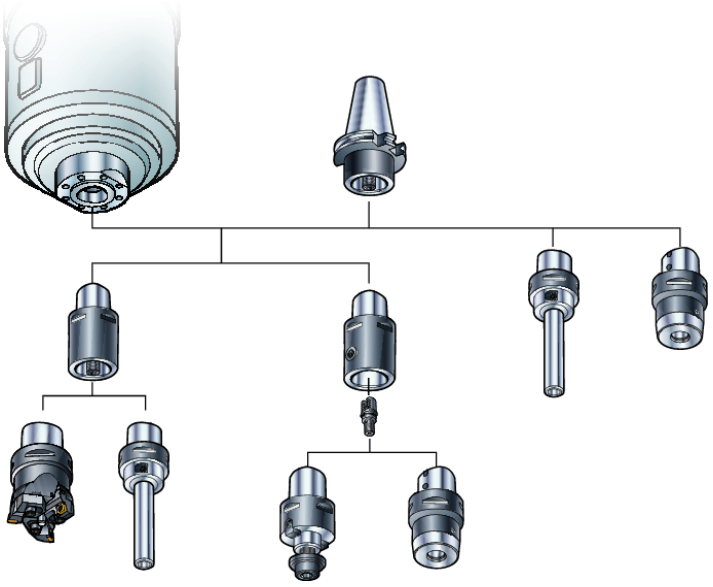
1. Remove the screws (1), 4 pieces.
2. Pull out the clamping unit until the dowel (2) is clear of the holder. If difficulties encounter, remove the clamping unit, go to item 5.
3. Rotate the clamping unit 180° and reassemble.
4. Assemble the screws (1), 4 pieces, and tighten to the recommended torque.
5. Screw the two larger screws into the threaded holes of the clamping unit, and use them to push the unit out. Return to item 3.

C3: Screw M8
C4: Screw M10
C5: Screw M12
C6: Screw M14
C8: Screw M14
C10: Screw M24



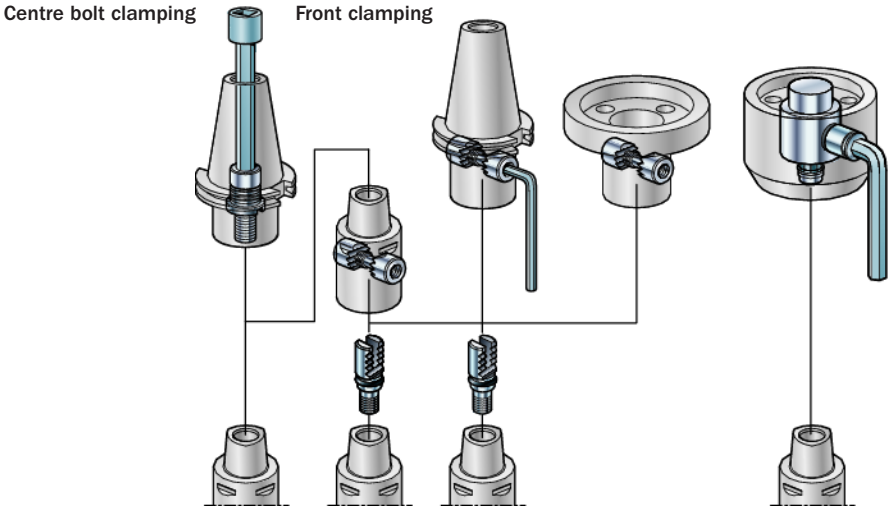
Coromant Capto® basic holders for rotating tools

With a basic holder, you can use Coromant Capto as a modular system in the front, and access the large Coromant Capto tooling assortment.



A standard Coromant Capto coupling is clamped using a large axial bolt, retained in the basic holder by a counter-nut. The large size of the bolt permits high torque values, allowing high clamping forces to be generated.

Through coolant capability is maintained irrespective of clamping method.



Centre bolt clamping

Centre bolt clamping should be considered as the optimum solution for heavy machining, particularly when long overhangs are employed.

Front clamping

Front clamping uses a differential screw and opposite sets of serrated clamping jaws to grasp and pull the adaptor/tool back into the coupling. Front clamping offers rapid and simple tool builds, and is ideal when a fast tool change is required in the magazine or spindle.

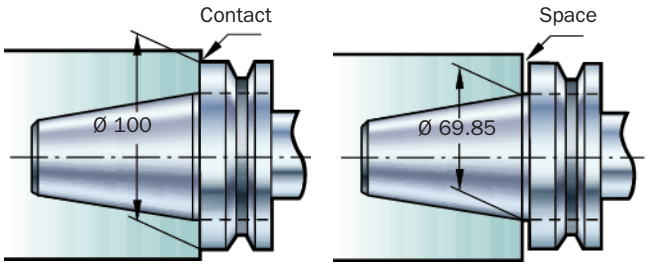
Basic holder information

Basic concept

The BIG-PLUS Spindle System offers simultaneous dual contact between the machine spindle face and tool holder flange face, and also the machine spindle taper and long tool holder taper shank.

Spindle taper	BIG PLUS	Conventional
MAS BT50	Ø 100	Ø 69.85
MAS BT40	Ø 63	Ø 44.45

Increased contact diameter (example of MAS BT)



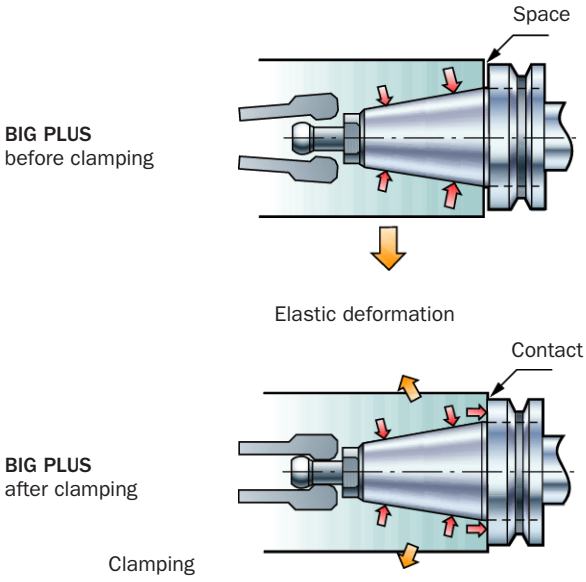
Working principle

Due to the pulling force on the pull stud, the spindle of the machine will expand from elastic deformation when the tool holder taper comes into contact with the machine spindle taper.

Spindle taper	Pulling force	Axial movement
BT40	800 kg	20 µm
BT50	2000 kg	29 µm

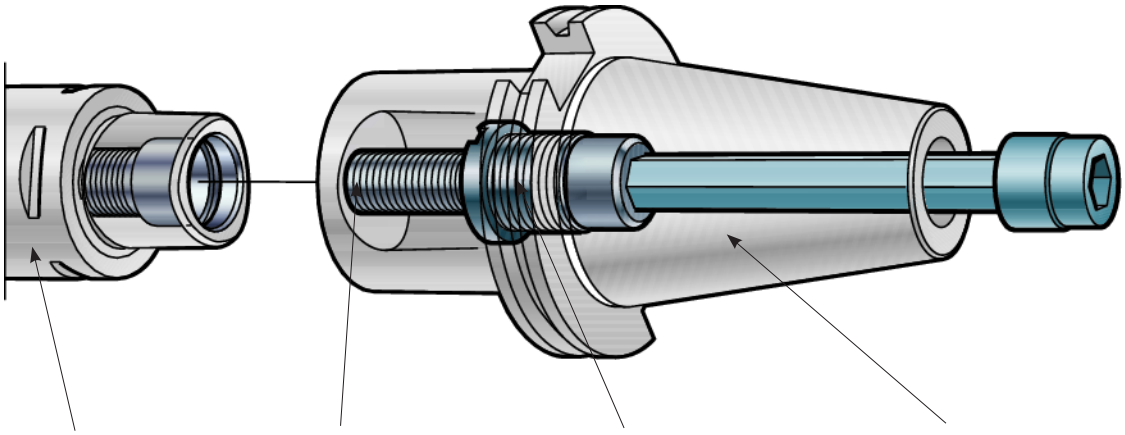
The above pulling forces and axial movements are different on each model of machine.

Axial movement is important for face contact

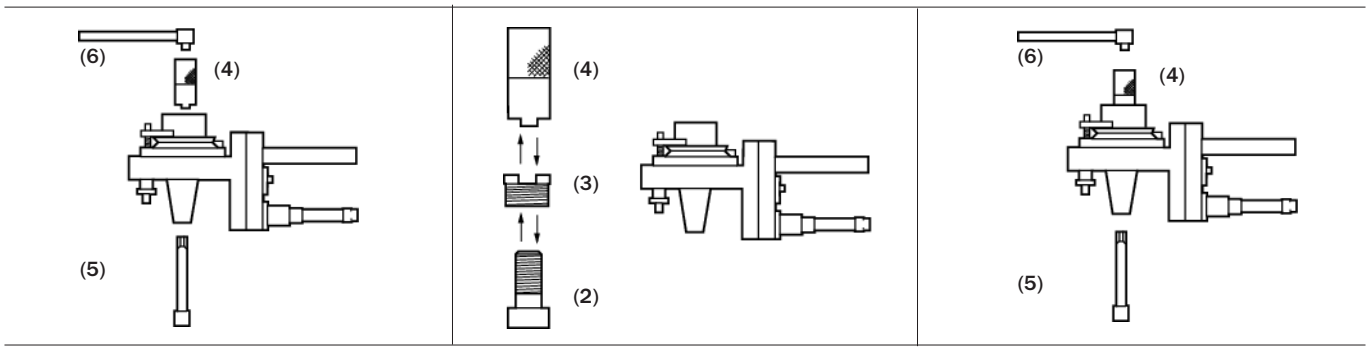


Changing the centre screw and retaining nut in a basic holder

The basic holder is delivered with the centre screw and retaining nut coated with Molykote 1000 and mounted in the holder. If the screw and/or nut is damaged for some reason, they can be easily changed.



Adaptor or cutting tool | Centre screw | Retaining nut (Left-hand thread) | Basic holder



1 Fit the retaining nut spanner (4) into the slots of the retaining nut (3). Use the extension key (5) to screw, by hand, the centre screw (2) into the spanner (4), so that the spanner and the nut are securely connected. Use the torque wrench (6) to loosen the retaining nut (3).

Note: The retaining nut is left-hand threaded.

2 Lift out the entire assembly (2), (3) and (4). Change the centre screw and/or the retaining nut coated with Molycote 1000. Replace the assembly in the holder.

3 Tighten the retaining nut (3) with the torque wrench and retaining nut spanner (6 + 4) to recommended value shown below. Loosen the centre screw with the key (5).

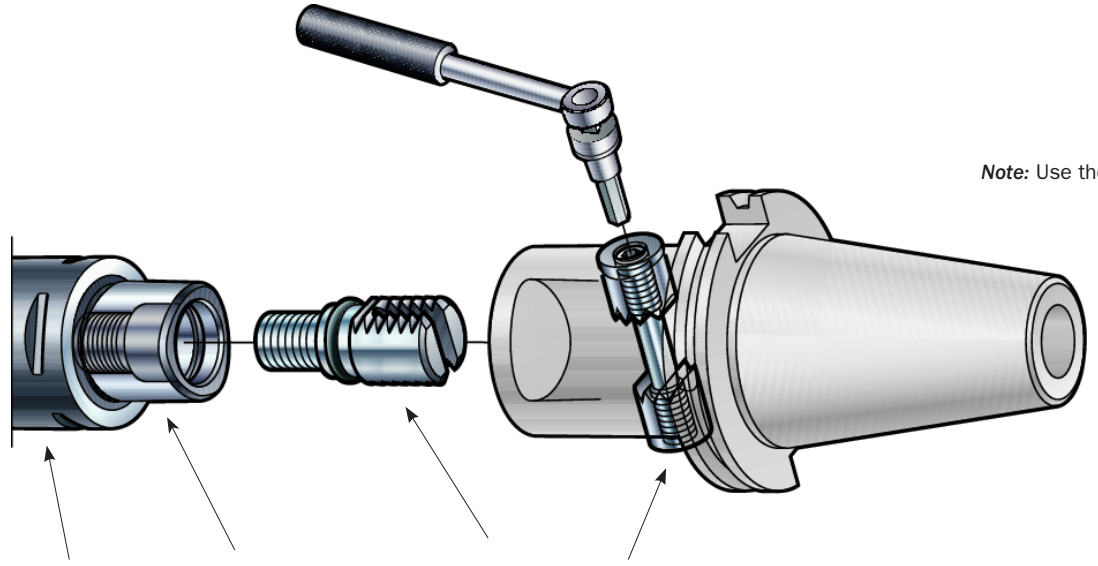
Note: The retaining nut is left-hand threaded.

Coupling sizes C3-C5: 45-55 Nm

Coupling sizes C6-C8: 65-75 Nm

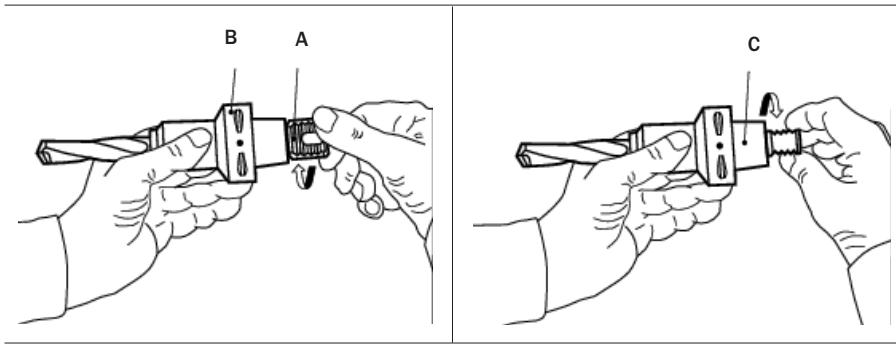
Coupling sizes C10: 145-155 Nm

Mounting instructions, front clamp



Note: Use the correct draw bolt!

Assembly of the Coromant Capto® coupling with front clamp draw bolt

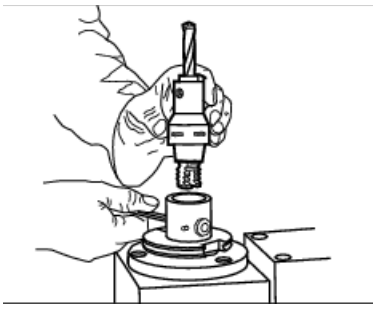


1 Screw the draw bolt (A) fully into the adaptor or cutting tool (B).

Important! Make sure that the head of the bolt contacts the face of the adaptor/ cutting tool.

2 Turn back the draw bolt – maximum half a turn - until the serrated faces are parallel with the positioning groove on the Coromant Capto coupling (C).

Mounting the Coromant Capto® front clamp unit



3 Unlock the gripping jaws in the front clamp unit by unscrewing the clamping screw 4 revs. Fit the tool adaptor or cutting tool into the coupling, check that the serrations of the draw bolt and the gripping jaws match.

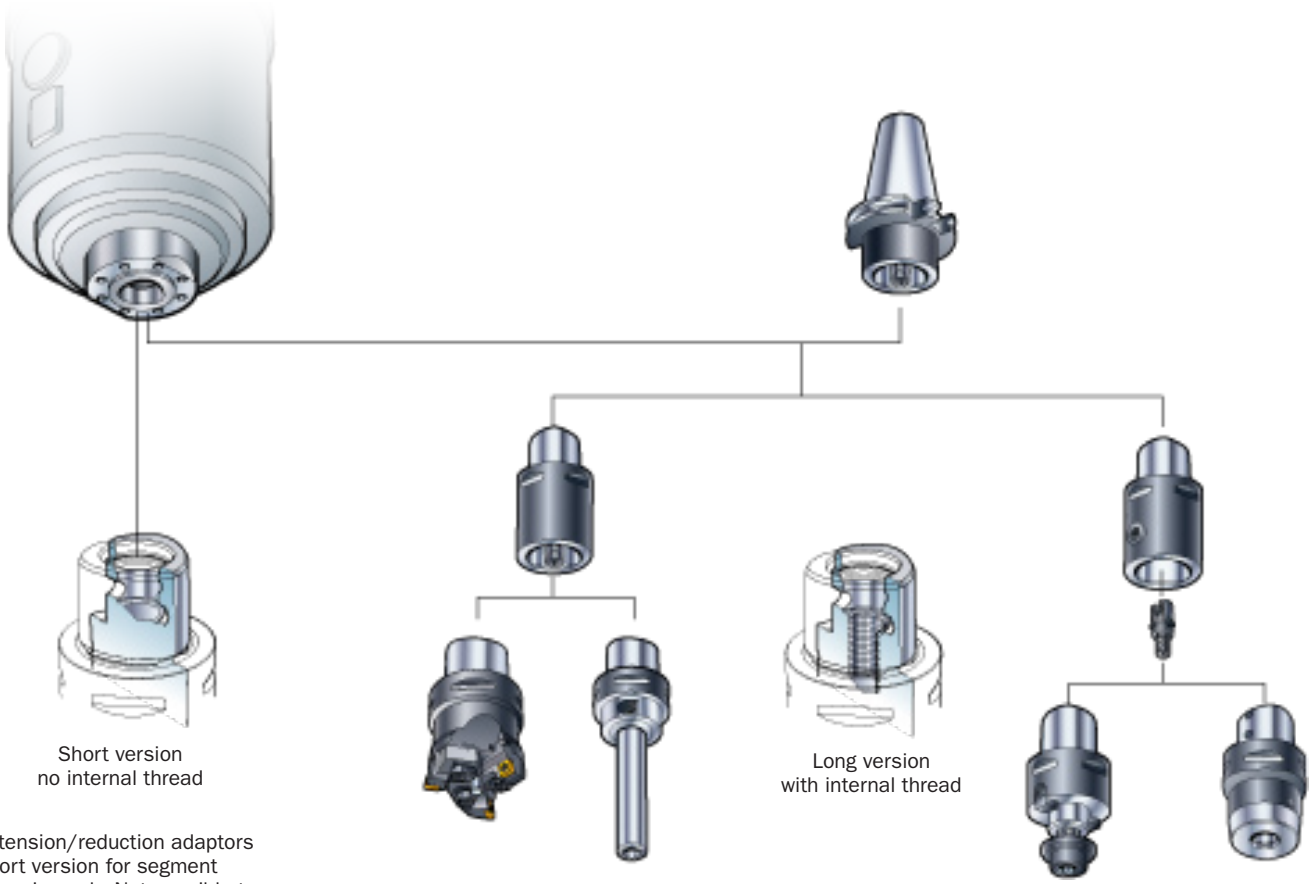
Lock the coupling by tightening the clamping screw 4 revs to the recommended torque. See page G 84.

Coromant Capto® extension/reduction adaptors

When changing production, the tool holding system should be flexible, as different component sizes often lead to varying gauge lengths.

Different types of extension and reduction adaptors are available and allow the correct length of tool to be built in order to maintain maximum performance.

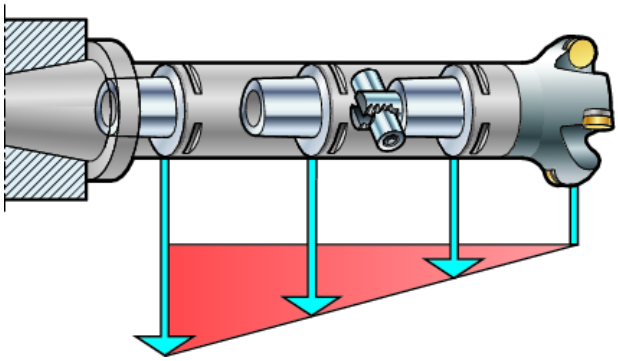
- When tooling is required for a variety of machines with different taper size or designs.
- When component complexity demands a high number of special tools.
- Makes it possible to have a standard system of modular tools for a variety of operations on lathes and machining centres.



Short version
no internal thread

Long version
with internal thread

Extension/reduction adaptors short version for segment clamping only. Not possible to use together with basic holders using centre bolt clamping.



The front clamping extension should be used at the cutting end of the assembly (as shown above) where the bending moment and torque is at its minimum.

Coromant Capto® spindle integration

Sandvik Coromant has developed a spindle clamping sets that use gas springs as force generator in order to meet the machine tool builders demand for:

- Higher speeds
- Longer tool life
- More stable balancing
- Safe and easier assembly.

With a Coromant Capto coupling integrated in the machine spindle, a wide range of tools is available without compromising other interface adaptors.

The Coromant Capto clamping set:

- Is balanced by design
- Can be used in most low as well as high speed spindle machines
- Offers excellent repeatability – less than ±2 µm measured on the insert tip when changing tool.

Contact your Sandvik Coromant representative for more information.

Balanced by design for stable properties

Gas springs and traditional helical springs have different properties when the spindle is balanced.

Gas spring:

- Balanced by design while all parts are machined.
- Clamping set with gas springs does not change properties at any rpm as a helical spring does.
- Makes it easy to obtain stable balance on the spindle.

Helical spring:

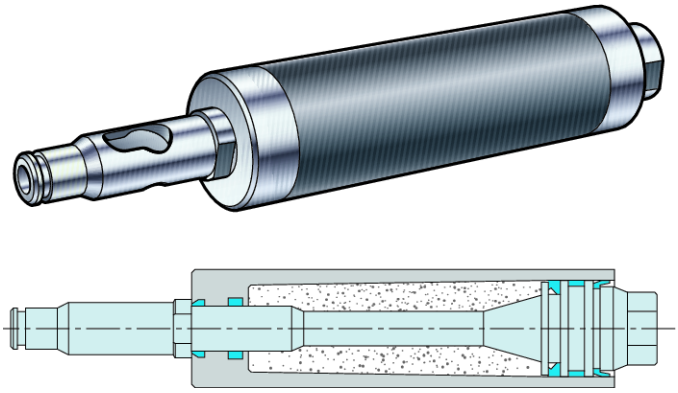
- Easy to balance, even on first use.
- After a couple of clamping cycles, the spring changes position and the spindle is unbalanced again.

How gas springs work

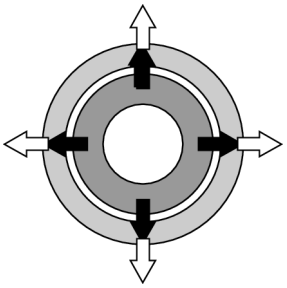
The gas spring is charged with nitrogen gas inside the chamber to generate force. Gaskets seal both sides.

A gas spring has force properties equal to a helical spring. Due to the use of gas, the force is contained in a chamber and thereby the gas spring is reduced in length and outside diameter compared to a helical spring.

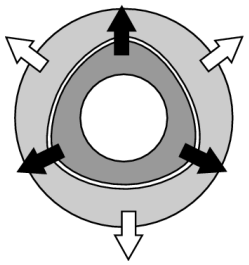
The clamping set is delivered as a cartrigde, which makes it easy and safe to handle.



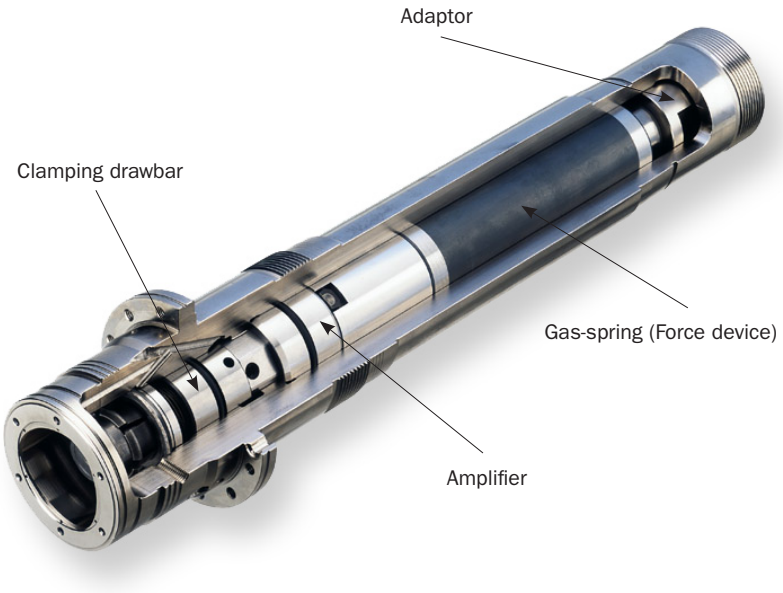
The shape of the coupling and the characteristics of the polygon shape at high speeds, together with a symmetrical design of the clamping mechanism, provide advantages in high speed machining and make it easy to balance and retain the property of the balanced spindle.



Cylindrical interface



Coromant Capto coupling



A spindle clamping set consists of:

Clamping drawbar:

- This part grabs the tool and pulls it into face contact.

Amplifier:

- Multiplies the force by app. 3.9 times.

Gas spring:

- This device generates the clamping force.

Adaptor:

- The adaptor is the interface through which the coolant is led in and where the ejecting piston applies the ejecting force.

Spindle integration

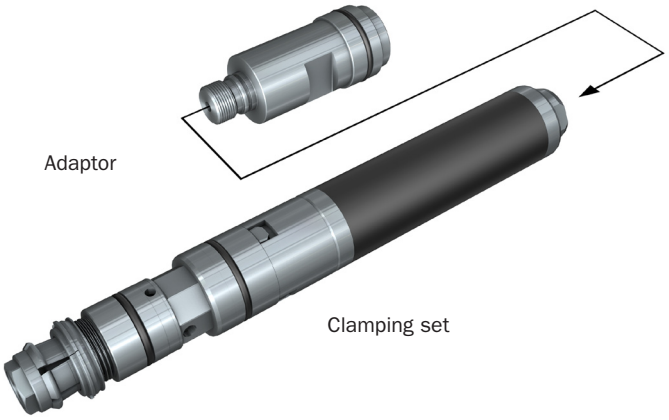
The clamping set is delivered as a cartridge ready to mount in a spindle shaft. All clamping sets have instructions enclosed on how to assemble the set in the spindle.

The clamping set has several built in options, depending on the machine situation.

For more information and a complete list of options, contact your Sandvik Coromant representative.

The machine builder places the adaptor where the ejecting piston applies the ejecting force and where the coolant is led in.

See the Coromant Capto Spindle clamping set handbook for more information.



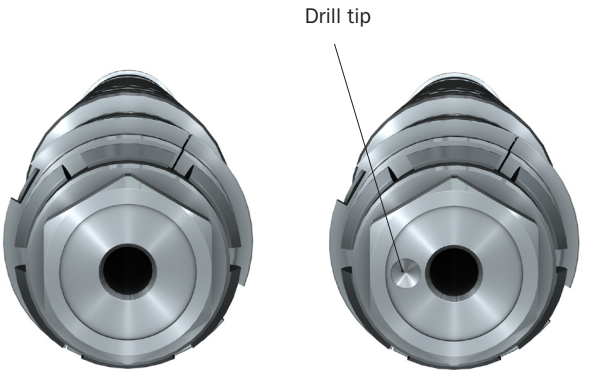
Clamping drawbar

A clamping set can be equipped with or without a drawbar with holding function that holds the tool holder in position until the ATC (Automatic Tool Change) grabs and removes it.

When using a drawbar with holding function, the tool holder can feel as if it is stuck, when removing it by hand, in some situations.

To remove a tool holder by hand, push it in, and then pull it out firmly.

See the Coromant Capto Spindle clamping set handbook for correct holding force.



Standard drawbar

Drawbar with holding function

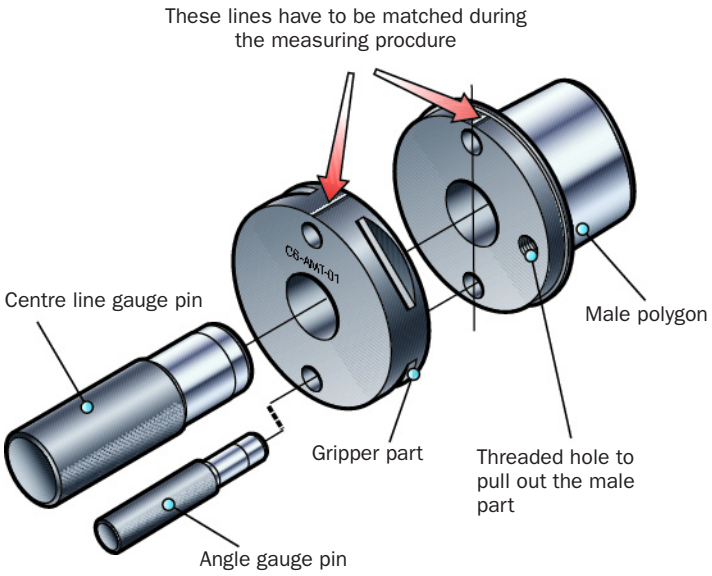
The drill tip is the only visible difference for determining whether it is a standard drawbar, or a drawbar with holding function.

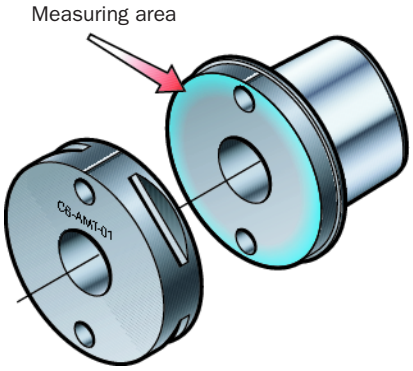
Accessories

Alignment tool

The alignment tool is used to check the ATC (Automatic Tool Change) tolerances, to adjust the gripper arm position and magazine, and the clamping unit/spindle.

Note: Incorrect position can result in abnormal wear on cutting tool or on the coupling, incorrect clamping, dropped tools, personal injuries etc.





1. Clean the interfaces and clamp the part with the male polygon (2) in the clamping unit/spindle.
2. Mount the part with the gripper slots to the ATC. One option is to mount the part when the ATC is at the tool change position.
3. Run the machine in steps until the ATC reaches the other part that is clamped to the unit/spindle.
4. The gauge pins (1) and (4) are designed with two diameters; the small OD is equal to max. out of centre/angle tolerance, the large OD is equal to a perfect centreline/angle.
5. Begin with the centreline gauge pin (1), and push it into the hole. If it is possible to have the large OD through both parts, the alignment is perfect.
6. Continue with the angle gauge pin (4). Make sure that the centreline gauge pin is fully inserted when the angle gauge pin is inserted.
7. Adjust the angular misalignment of the ATC/spindle until the angle gauge pin fits the holes.

To check the angular misalignment:

8. Run the machine in steps until the ATC is in the loading position with the gripper part (3).
9. Insert a feeler gauge all around the marked area and measure the max. difference between the surfaces. See the table below for maximum difference:

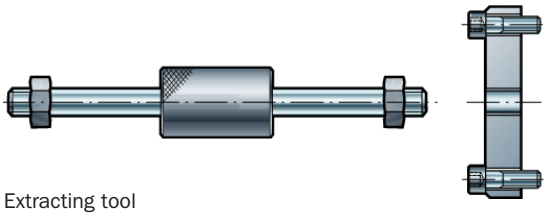
Coupling size	Maximum difference (mm)
C3	0.28
C4	0.35
C5	0.44
C6	0.55
C8	0.70
C10	0.87

10. If necessary, adjust the ATC and/or the spindle to bring the misalignment within tolerance.

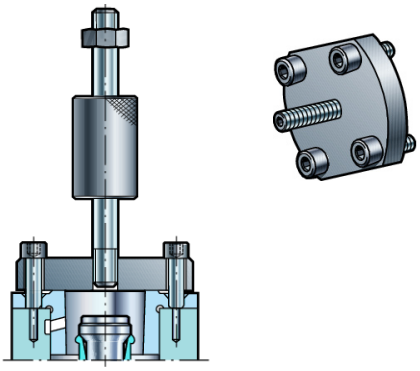
Extracting tool/withdrawal tool

Use the extracting tool to disassemble the polygon sleeve on manual clamping units.

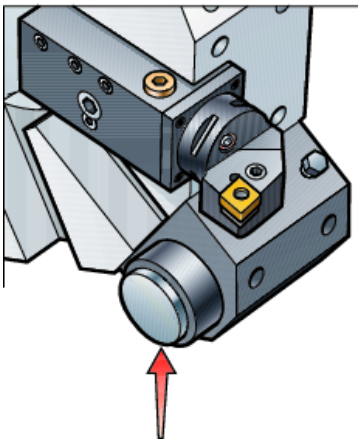
Use the withdrawal tool to remove the polygon sleeve from clamping unit.



Extracting tool



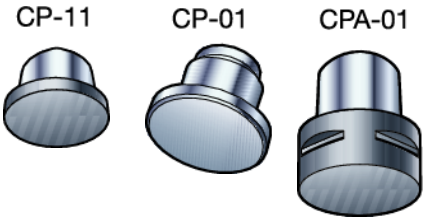
Withdrawal tool



Cover plug

Cover plug

A cover plug should always be used to protect the ground surface of the connecting sleeve from dirt, chips and coolant water. Damage could occur on manual or automatic clamping units if they are not covered with a plug or cutting unit.



There are three models of cover plugs available:

CP-11 for type 3000

CP-01 for manual unit

CPA-01 for automatic unit

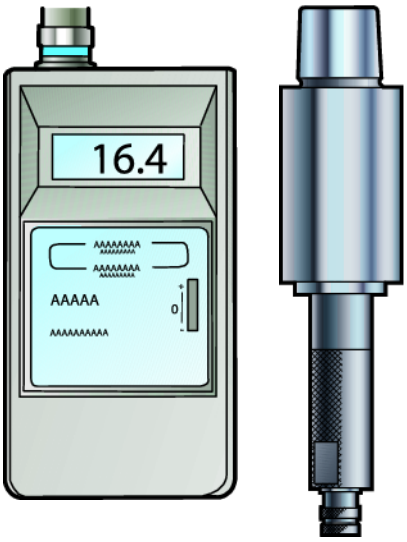
Safe control

The safe control is used for measuring the clamping force of the machine clamping system. If the clamping force is low, the system performance might not be optimal.

The safe control consists of a:

- Handheld display that can be used with several sensing devices.
- Sensing device. This is inserted into the machine spindle and pulled back by the machine's clamping system. Actual pull-back power is read on the handheld device. Sensing devices can be ordered for Coromant Capto coupling size C3-C10.

Contact your local Sandvik Coromant representative for more information.

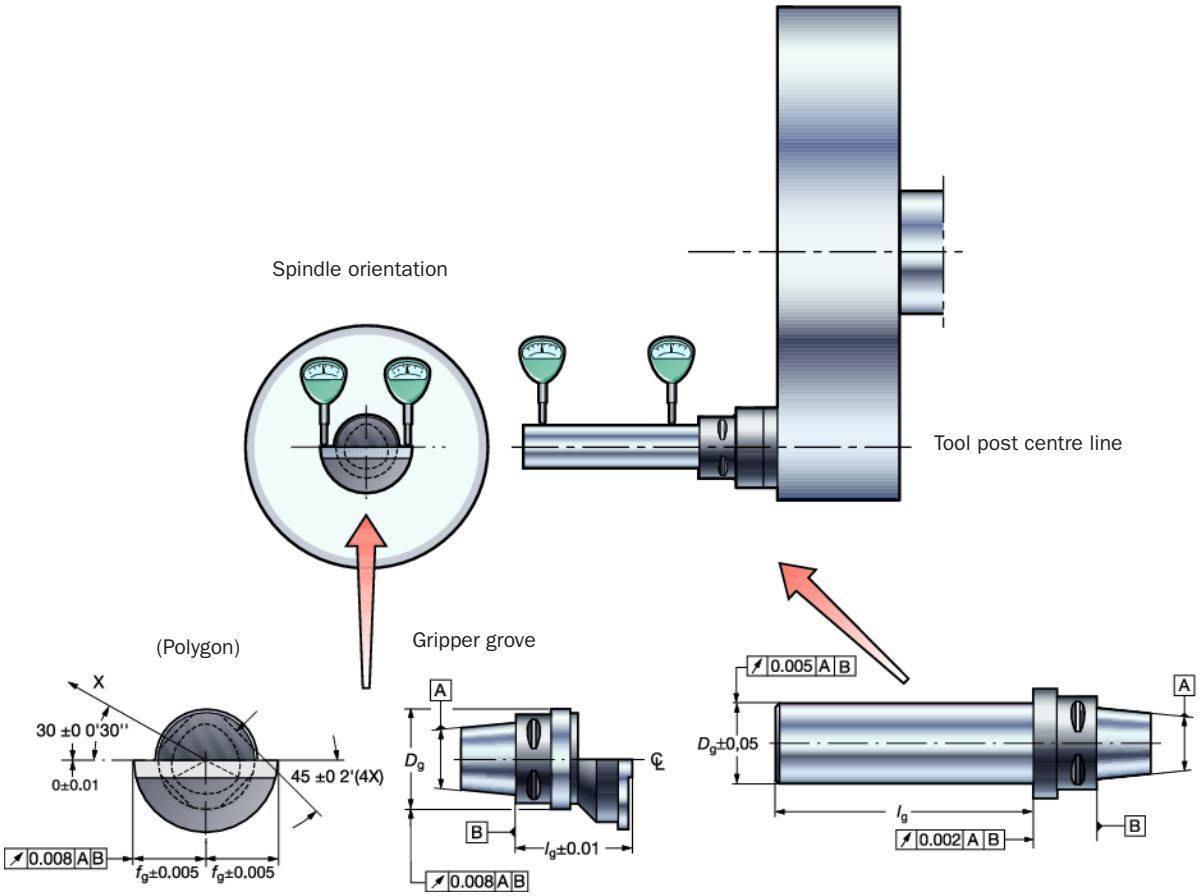


Master setting gauges

For the best machining accuracy, it is important that the components in the total machining process are accurately positioned.

Sandvik Coromant offers a range of axial and centre height master setting gauges for various coupling sizes. These gauges are strongly recommended for setting important parameters such as:

- The centre line of the tool post and the run-out of the spindle
- The position of the tool for grippers
- Tool centre height and cutting edge position
- Component fixtures.



Centre height gauge

Master setting gauges MAS-01

Axial gauge

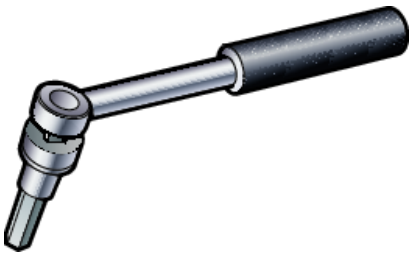
Master setting gauges MAS-11

Torque wrench for tool changing and torque recommendations

To get the best performance and highest repeatability out of each tool holder, a torque wrench should be used to obtain the correct tightening.

Torque that is too high will affect the performance negatively and might cause holder breakage.

Torque that is too low will cause vibrations and impair the machining accuracy.



Tightening torque recommendations for Coromant Capto® coupling

Manually clamping units type NC2000 and NC3000

Coupling size	Torque (Nm)	Clamping force min. (kN) NC2000	Clamping force min. (kN) NC3000
C3	35	16	16
C4	50	21	21
C5	70	27	27

Manual clamping units and driven tool holders with camshaft mechanisms

Coupling size	Clamping torque (Nm)	Force in (kN)
C3	35	16
C4	50	21
C5	70	27
C6	90	30
C8	130	37
C8X	130	37
C10	285	70

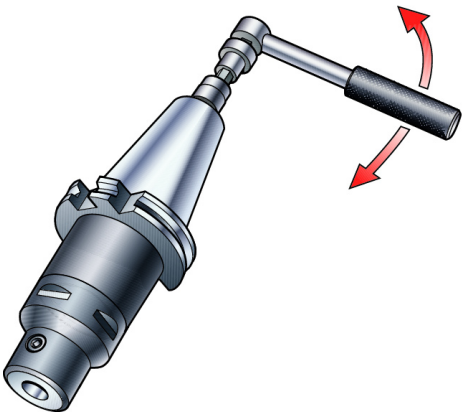
Hydro-mechanical clamping units type 5000

	Clamping		Ejecting	
Coupling size	Pressure (bar)	Force min./max. (kN)	Pressure (bar)	Force min. (kN)
C4	100	28/38	100	10
C5	80	36/50	80	12
C6	80	47/63	80	18
C8	80	64/86	80	25
C8X	80	64/86	80	25
C10	80	85/115	80	40

Required oil flow in all cases: 6 l/min.

Centre bolt clamping

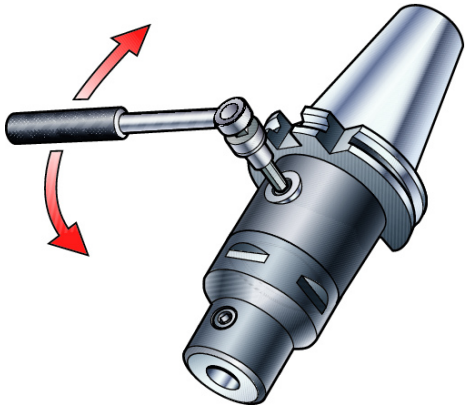
Coupling size	Tightening torque (Nm)	App force (kN)
C3	45	27
C4	55	35
C5	95	37
C6	170	65
C8	170	65
C8X	170	65
C10	380	95



Coromant Capto basic holders

Front clamp

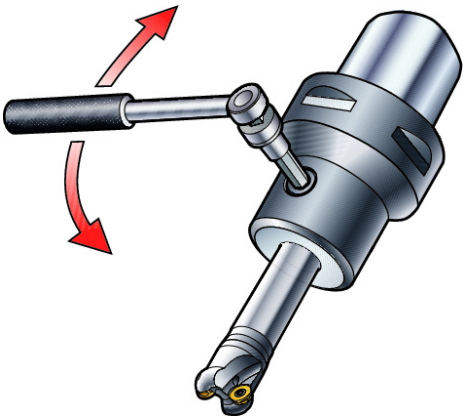
Coupling size	Torque (Nm)	App force (kN)
C5	30	20
C6	30	20
C8	60	35
C8X	60	35



Front clamping

Tightening torque recommendations for Weldon screws

Weldon size (dia)	Thread	Recommended torque (Nm)
6	M6	3
8	M8	7
10	M10	10
12 and 14	M12	12
16 and 18	M14	15
20	M16	20
25	M18x2	25
32 and 40	M20x2	45
50	M24x2	60



Weldon

Products – Adaptors and chucks

Adaptors for turning tools

CoroTurn® SL

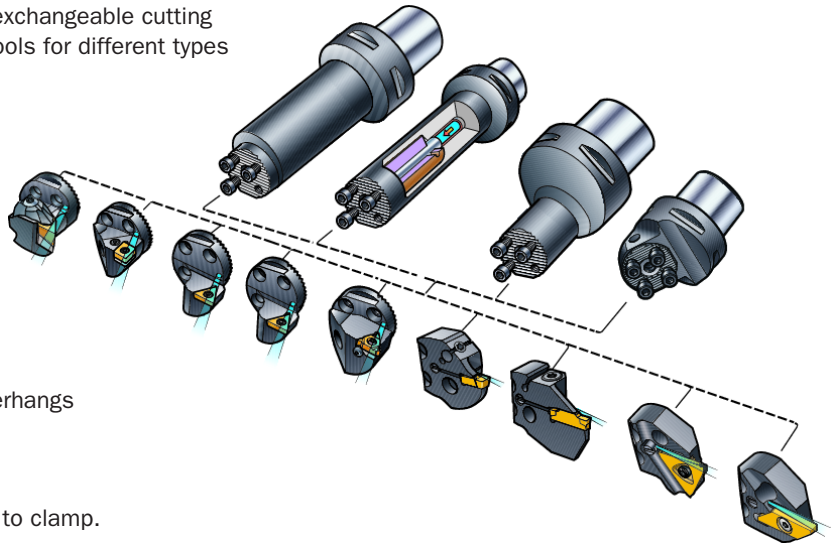
CoroTurn SL is an universal modular system with exchangeable cutting heads, which allow customers to build their own tools for different types of machining applications.

Steel, carbide and dampened Silent Tool boring bars and adaptors are available for various applications and overhangs.

CoroTurn SL boring bars are available from 16 to 40 mm diameters.

CoroTurn quick change boring bars are available from 80 to 250 mm diameters (600 mm as special).

Both couplings offer the possibility to machine overhangs up to 14 x bar diameter.



All Silent Tool boring bars are pre-tuned and ready to clamp.

The CoroTurn SL coupling provides the means for high stability and diameter reduction.

To improve the performance of bars between 50 and 60 mm in diameter, the design has a reduced front coupling down to 40 mm, which provides:

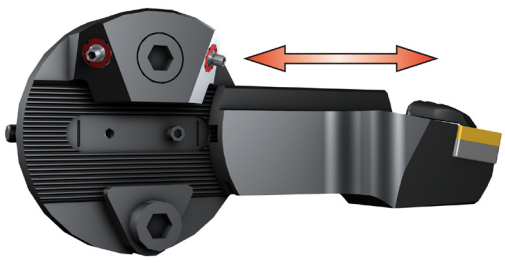
- less vibration
- better chip evacuation
- better cost efficiency thanks to wider range of cutting heads.

CoroTurn SL coupling with exchangeable cutting heads

For large diameter holes (minimum diameter 100 mm), the CoroTurn SL with quick changing function reduces the tool changing time and has a radial adjustable setting for the cutting edge (f_1 dimension).

Adaptors provide a broad product range of 40 mm diameter tools including CoroTurn SL cutting heads and adaptors for shank tool solutions.

Bars from 200 mm can be used with a manual Coromant Capto clamping unit, making it possible to use all types of Coromant Capto units.

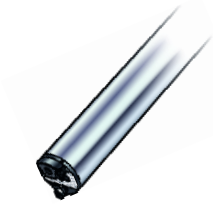
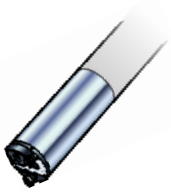


CoroTurn SL quick change coupling with radial adjustments

Boring bars

The assortment consists of:
- Coromant Capto and conventional shank designs
- Steel, carbide and dampened Silent Tools
- All types of bars with through coolant supply.

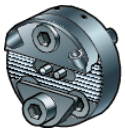
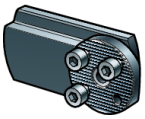
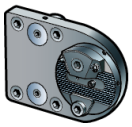
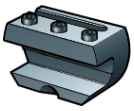
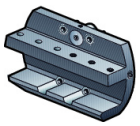
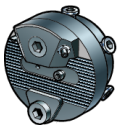
	Coromant Capto® Size C3-C8		Cylindrical with flats	Cylindrical		
	Steel shank	Dampened boring bar	Steel boring bar	Carbide shank boring bar	Dampened boring bar	Dampened carbide boring bar
						
Type		Silent Tools® *)		For EasyFix	Silent Tools® *)	Silent Tools® *)
Coupling size, mm	16-40	16-40	16-40	16-25	16-40	16-40
Bar diameter, mm	16-60	16-60	16-40	16-25	16-60	16-60
Max. overhang, mm	4 x dm_m	Up to 10 x dm_m	4 x dm_m	6 x dm_m	7 to 10 x dm_m	10 to 14 x dm_m

	CoroTurn® SL quick change			
	Dampened boring bar	Dampened boring bar	Dampened boring bar	Dampened carbide reinforced boring bar
				
Type	Silent Tools® *)	Silent Tools® *)	Silent Tools® *)	Silent Tools® *)
Coupling size, mm	80	120-150	200-250	80
Bar diameter, mm	80-100	120-150	200-250	80-100
Max. overhang, mm	7x dm_m	10x dm_m	10 x dm_m	12-14 x dm_m

*) For more information, see page G 100

Adaptors

Exchangeable adaptors make CoroTurn SL an efficient modular system for most types of machining applications.

	Reduction adaptor	Quick change adaptors for cutting heads			Quick change adaptors for shank tools		580 boring bar adaptor
							
Coupling size, mm	50 to 32 50 to 40 60 to 40	32-40	40	80	2020	2525-4040	80
Machine side, mm	50-60	32-40	80	-	80	-	-

CoroPlex™ SL - mini turret

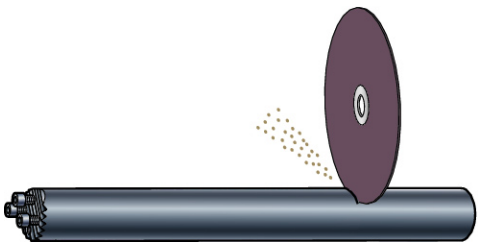
Mounting units used for cutting heads and blades with serrated coupling.

	5° radial mounting	Axial mounting
		
Coupling size, mm	25-32	25-32
Machine side, mm	40	40

Cut off bar length

To modify a standard boring bar to suit an application, the simplest form of adaption is to shorten a standard bar. Minimum overall length, from the serration after shortening, is given in the table below:

Bar diameter dm_m	Design 570-3C Short	Long
16	100	155
20	125	200
25	155	255
32	190	320
40	240	410
50	305	520
60	380	630



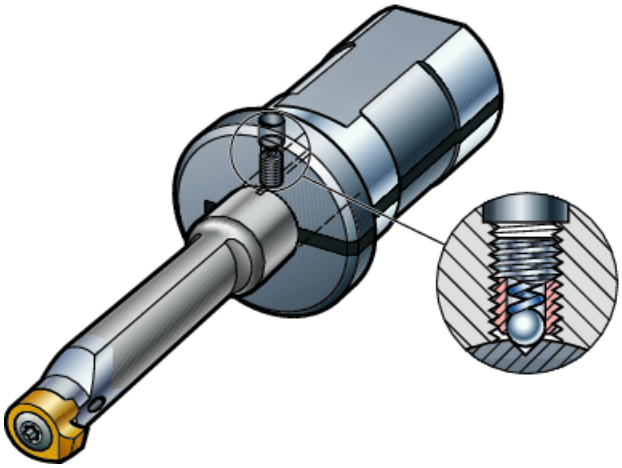
Note: The lengths given above include a 4 x diameter clamping length.

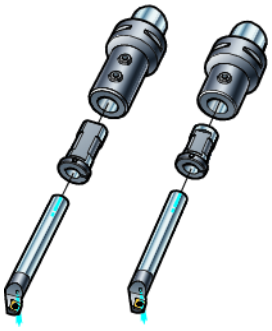
EasyFix

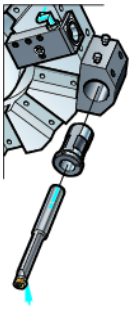
EasyFix provides a fast and simple way to achieve lower vibration and correct indexing of centre height when mounting cylindrical bars into the machine.

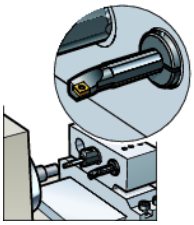
Correct centre height is reached when a spring plunger mounted in the sleeve clicks into a groove in the bar.

The slot in the cylindrical sleeve is filled with a silicon sealant, which allows the existing coolant supply system to be used.







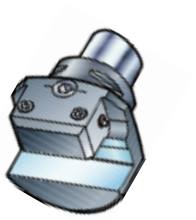


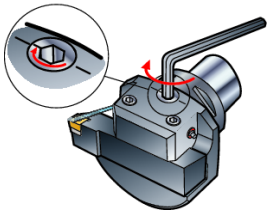
Machine type	Conventional lathe	Coromant Capto®		Turret type lathe	Sliding head machine
EasyFix type	131	132L ISO 9766	132W ISO 9766	132L ISO 9766	132L

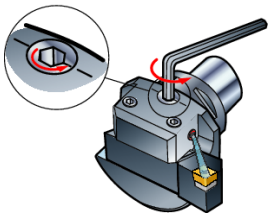
Adaptors for square shank tools

Coromant Capto adaptors for use with different shank tools for general turning, threading, and parting and grooving in multi-task machine.

Available tools can be used. However, this would not be the most stable system and set-up time for tool changing will be high, unless you are using tools from the same tool family.







Radial mounting

Radial mounting adaptor with a valve function to control the coolant direction.

Easy to change coolant direction left/right, handles up to 80 bar coolant pressures.

1. Use a hexagon key to turn the valve.
2. Turn the line on the valve point to the line on the adaptor in the direction the coolant should be directed.

Axial mounting

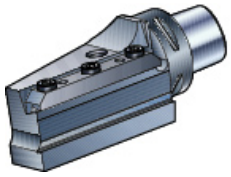
Axial mounting

Angular mounting

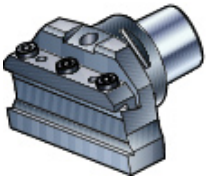
Adaptors for CoroCut® and T-Max Q-Cut®

Universal adaptors for use in parting and grooving machining with CoroCut and T-Max Q-Cut parting blades.

Available tools can be used. However, this would not be the most stable system, and set-up time for tool change will be high, unless you are using tools from the same tool family.



Axial mounting



Radial mounting

Warning!

The adaptors are designed for hand-operated tool set-up and automatic tool change:

- Measure the tool set-up length and program the machine with this value. Make sure that there is no risk of interference between tool and workpiece.
- Make sure that there is no risk of interference in magazine and tool changing cycles.

Adaptor for solid boring bars

Boring bar adaptors are used with round shanks for general turning, parting and grooving, and threading.

Boring bar adaptors for multi-task machines are equipped with a three position switch for through coolant:

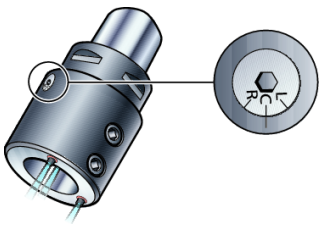
C = Coolant goes straight through the centre

L = Left coolant nozzle will get coolant

R = Right coolant nozzle will get coolant

Always use cylindrical sleeves with boring bars for multi-task machines, dia. from 6 to 32 mm.

Boring bar adaptor



Boring bar adaptor for multi-task machines

Adaptors for rotating tools

Side and face mills

Side and face mill tool holders, with arbor connections, are economical alternatives for milling when the demand for tool run-out is not too high.

Face mill adaptor

Side and face mill adaptor

Article:	dm_t	Max. torque: (Nm)
C3-391.05-16 XXX	16	22 (M8)
C4-391.05-22 XXX	22	45 (M10)
C6-391.05-27 XXX	27	80 (M12)
C8-391.05-32 XXX	32	180 (M16)
C10-391.05-40 XXX	40	80 (M12)
C10-391.05-60 XXX	60	180 (M16)
C3-A391.05-19 XXX	19 (0,75")	25
C4-A391.05-25 XXX	25 (1,00")	65
C5-A391.05-31 XXX	31 (1,25")	120
C6-A391.05-38 XXX	38 (1,50")	220
C8-A391.05-50 XXX	50 (2,00")	120
C10-A391.05-63 XXX	63 (2,50")	120

Weldon

Weldon tool holders are an economical alternative for milling when the demand for tool run-out is not so high.

One holder is used for each shaft diameter.

Weldon shank adaptor

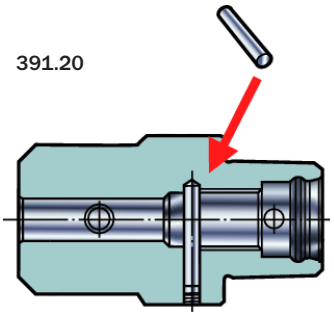
Tightening torque recommendations for Weldon screws

Front clamp:

Weldon size (dia.)	Thread	Recommended torque (Nm)
6	M6	3
8	M8	7
10	M10	10
12 and 14	M12	12
16 and 18	M14	15
20	M16	20
25	M18x2	25
32 and 40	M20x2	45
50	M24x2	60

Permanent stop for new Weldon adaptors

All new adaptors type 391.20 manufactured from January 2002 have a permanent stop built in-to the holder. Stop screws are not required.



Whistle Notch

Whistle notch tool holder is a universal alternative for drilling machining, when the demand for tool run-out is not too high.

One holder is used for each shaft diameter.

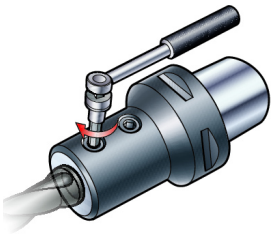
For shanks according to DIN 6535-HE

For Coromant Whistle Notch shank

Drill adaptors for CoroDrill® 880 and Coromant Delta®

Used for cylindrical shanks with flats according to ISO 9766.

One holder is used for each shaft diameter.



Ø	Nm
16	10
20	12
25	20
32	30
40	40
50	45

Drill adaptor

Adjustable holders for CoroDrill® 880

The adjustable holder is used with ISO 9766 shanks and allows manufacture of holes larger than nominal drill hole diameter specification. The working area is +1.4 mm, adjustable in increments of 0.05 mm.

For setting of adjustable holders, see chapter Tool holding drilling, page G 49.

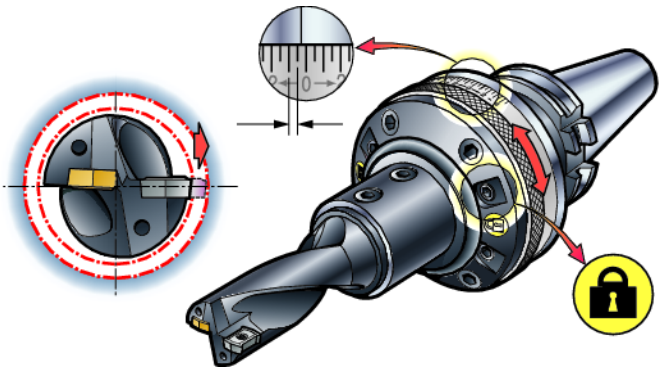
Setting adjustable drill adaptors

Setting is done by turning the scale ring surrounding the holder, indicating a diametrical movement of the tool. Setting of the holder can be made in a pre-setting unit, preferably one equipped with projector and electronic scanning facility. Four locking screws keep the set value in position. Before the setting procedure commences, these screws must be slackened off.

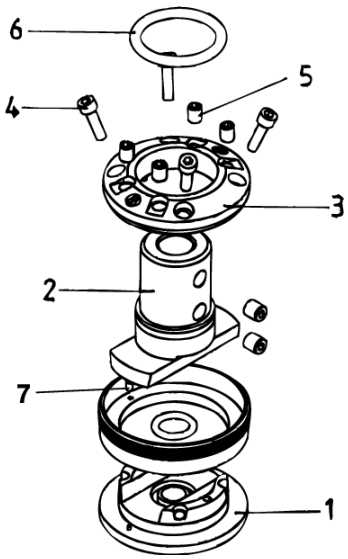
1. Initially the true nominal diameter for each drill has to be measured.

Note: The setting range of the holder exceeds the range for the CoroDrill 880. Therefore check max. range for the actual diameter in the ordering catalogue.

2. Further adjustments after the basic setting can normally be performed outside the pre-setting unit by reference to the scale only. The sleeve should be removed and cleaned when it is not in use for long periods.

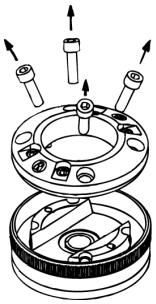


Assembly of adjustable drill holder and slide, size 1 and 2



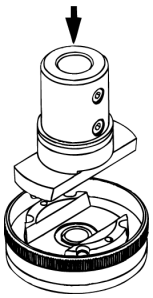
1. Housing
2. Slide
3. Lid
4. Screws
5. Ball end screws
6. O-ring
7. Pin

A



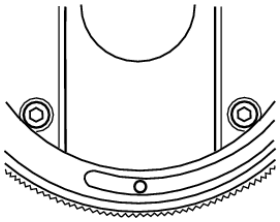
Remove lid by loosening screws. Clean lid, slide and housing, using a lint free cloth. Apply a thin film of light oil on all mating surfaces.

B



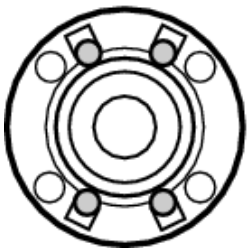
Assemble slide and housing.

C



Make sure pin on slide enters spiral groove in housing.

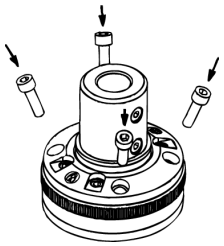
D



Set flats of ball end screws outwards.

Note: Flats must not be outside lid surface.

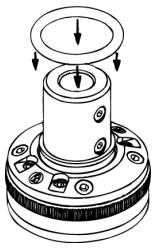
E



Mount lid and tighten screws cross-wise to 10-12 Nm.

Note: These screws must not be loosened when setting diameter.

F



Put protection O-ring on slide and push it down against lid.

Assembly of adjustable drill holder and slide, size 3

1. Remove pre-clamp set. Clean slide (2) and housing (1), using a lint free cloth.

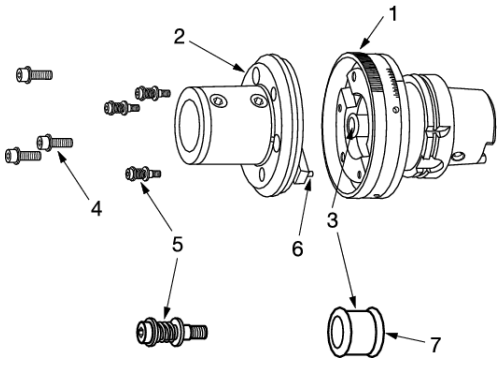
2. Apply a thin film of light oil on all mating surfaces.

3. Assemble slide (2) and housing (1). Make sure pin (6) on slide enters spiral groove in housing and that coolant tube (3) is correctly seated in housing and slide.

4. Tighten screws (4) cross-wise to 10-12 Nm.

5. Mount preclamp set (5), and tighten them lightly.

Note: Pre-clamp sets must not be loosened when setting diameter.



1. Housing
2. Slide
3. Coolant tube
4. Screws
5. Pre-clamp set
6. Pin
7. O-ring

Tap adaptors and holders

The product range for tapping consists of:

- Synchronized tap adaptor, collet type
- Tap adaptor, collet type
- Tap holder with tap adaptor.

Synchronized tap adaptor, collet type

The adaptor can be used with or without through coolant.

Use tapping collets to make the adaptor more flexible to tap diameter.

Synchronized tap adaptor

Note:

For both synchronized adaptors and collet type adaptors:

- Always use a collet that fits tap dimension
- Use a torque wrench to tighten the nut.

For correct collet and torque, see table on page G 55.

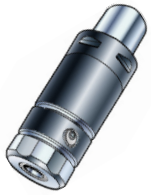
Tap adaptor, collet type

Two types of adaptors:

- Short design (for turning centres)
- Slim design (for machining centres).

Both adaptors are used with external coolant supply. Use tapping collets to make the adaptor more flexible to tap diameter.

Short design for turning centres



Slim design for machining centres

Tap holder with tap adaptor

The tap holder is used with a tap adaptor, either with (SES) or without (SE) friction clutch for torque control.

Style SES has a pre-set safety clutch that will slip when tapping torque exceeds the pre-set value.

The tap holder has through coolant; adaptors can be used with external/internal coolant supply.

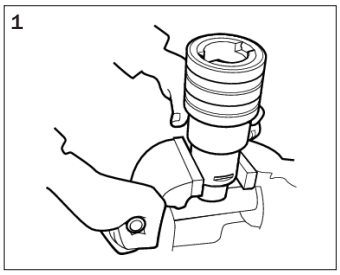
Tap holder

Tap adaptor with friction clutch (SES)

Tap adaptor without friction clutch (SE)

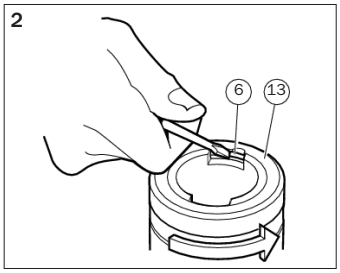
Dismantling of tap adaptor 391.60

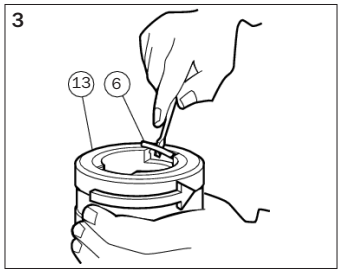
1. Mount the adaptor in a soft-jawed vice.



2. Turn the sleeve (13) until the end of the locking ring (6) is visible. Hold it with a small screwdriver and keep turning the sleeve until the end is positioned 10 mm from the slot in the sleeve.

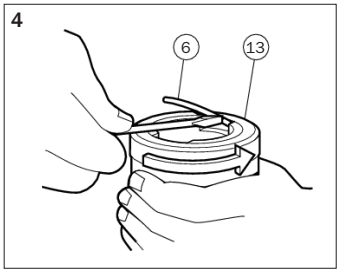
3. Place the screwdriver in the slot in the sleeve and bend out the end of the locking ring (6) while turning the sleeve (13).

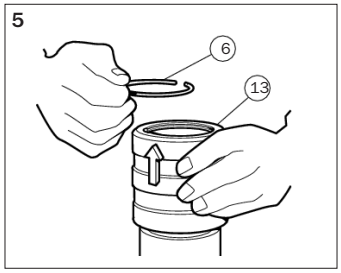




4. Lever the screwdriver against the circlip and keep turning the sleeve until the circlip spirals out.

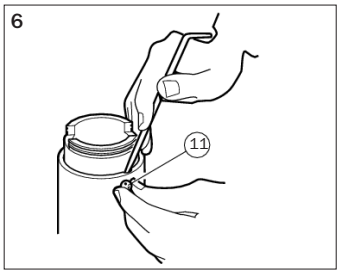
5. Remove the locking ring (6) and the sleeve (13).

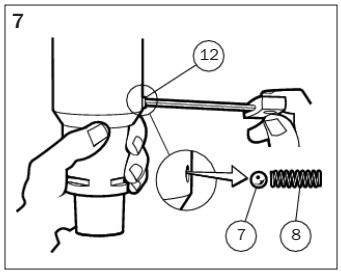




6. Remove the three balls, on sizes 2-3 (11) or the clamp ring, on size 1 (11).

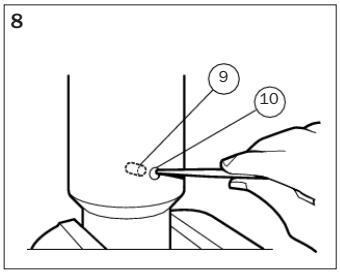
7. Remove screw (12), compression spring (8) and ball (7).

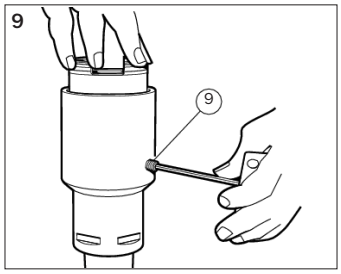




8. Remove the plastic plug (10) for the stop screw (9).

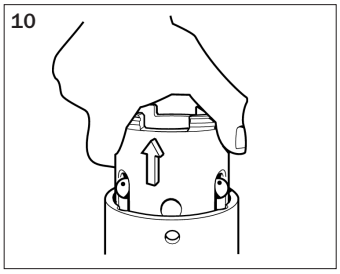
9. Press down on the interior of the adaptor and remove the stop screw (9).

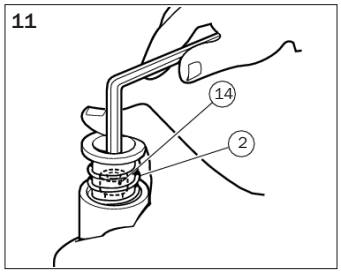




10. Pull out the inner assembly.

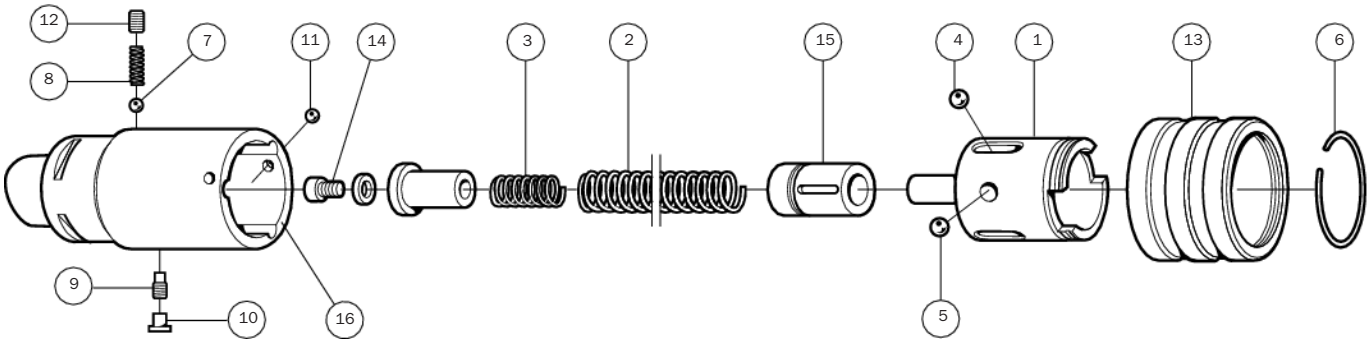
11. In order to replace the compression springs (2 and 3), remove the screw (14). It is important to press down the rear part of the adaptor before completely loosening the screw.



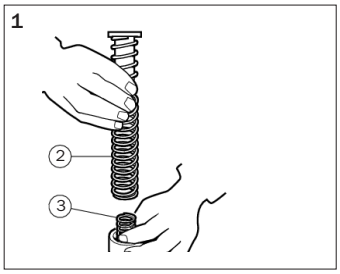


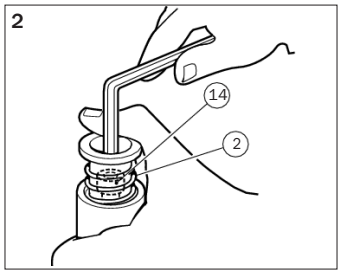
Note:
Compress the springs while removing screw (14), otherwise the compression spring will jump out and possibly cause an injury.

Assembly of tap adaptor 391.60



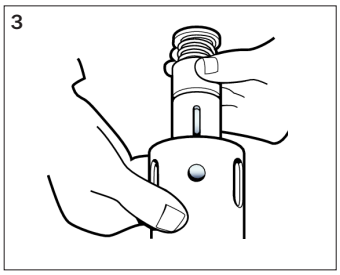
1. Mount the compression springs into bush (15). First place the small spring (3) into the bush, then position the large spring (2) over the small spring.
2. Compress the springs and fasten the screw (14).

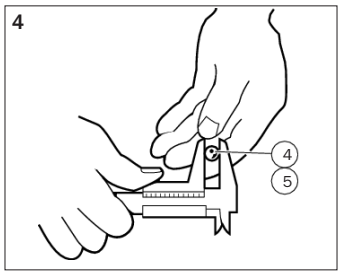




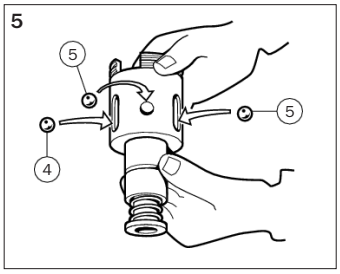
3. Align the slot for the stop screw (9) against the centre line of the hole for the ball (5).
4. Identify and locate 3 smaller balls (4) and balls (5).

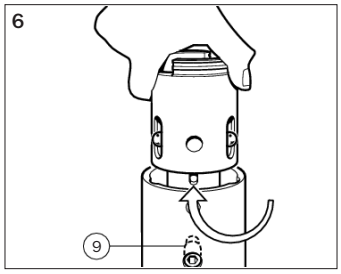
Note: See chart for the ball sizes at the bottom of page G 98.





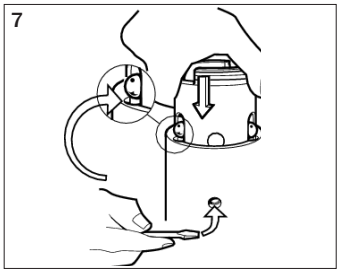
5. Place grease in the holes/slots of barrel (1) to retain balls.
6. Align balls (4) with slots in adaptor body, with the stop screw-slot facing the stop screw-hole in the adaptor body (16), and insert the inner assembly.

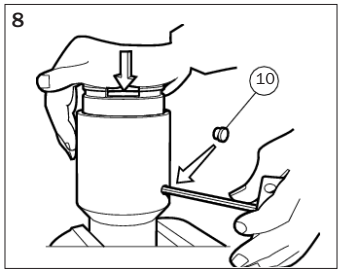




7. Press down and check that the slot for the stop screw is visible through the screw hole.

   Adjust if necessary.
8. Press the barrel halfway down and tighten the stop screw. Loosen the screw 1/4 turn and mount the plastic plug (10).

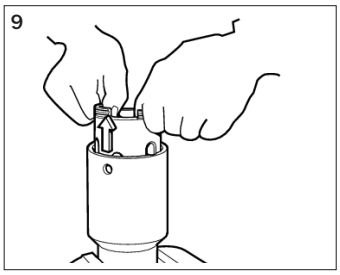


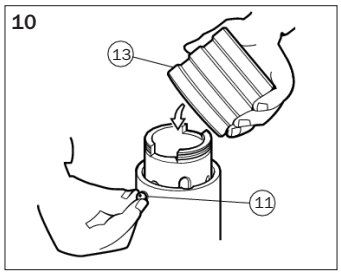


Assembly of tap adaptor 391.60

9. Check for correct location by pulling on the inner assembly.

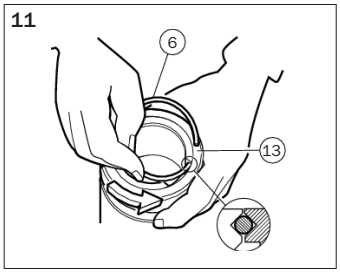
10. Mount the balls, or clamp ring, (11) and slide the sleeve (13) into position.

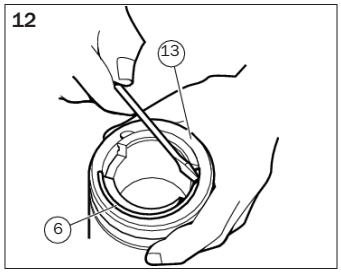




11. Align the circlip grooves of the sleeve and inner assembly. Place the circlip into the grooves (make sure the ends are free from burrs). Turn the sleeves (13) while pushing the circlip down to make it enter.

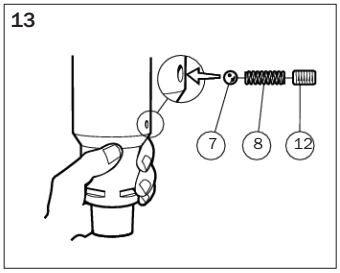
12. Press the circlip (6) with a screwdriver against the groove in the sleeve and continue turning the sleeve until the circlip is in place.

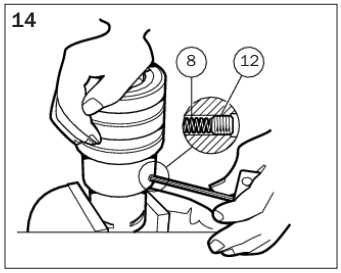




13. Assemble the initial compression device. First insert the ball (7), then compression spring (8) and finally fasten the screw (12).

14. Adjust initial pressure by compressing the spring (8) with screw (12). Check the pressure by pressing down on the adaptor.





Maintenance

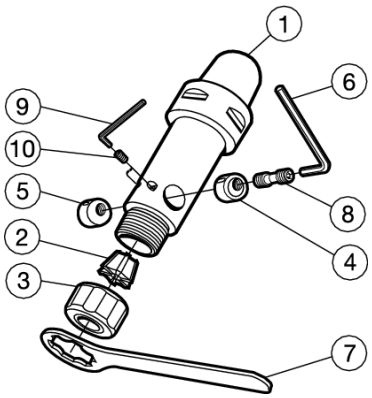
Tap adaptors should be inspected regularly for damage. At that time, they should be cleaned and lubricated.

Special checks should be made for cracks or scoring in the housing, and for damage to the screw.

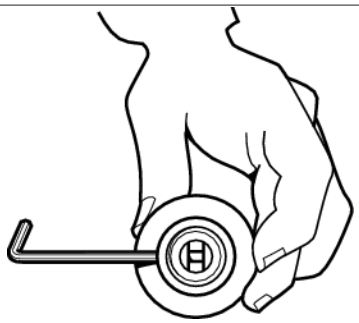
Ball size information

Adaptor size	Ball diameter, mm	
	Part No. 4	Part No. 5
1	5.0	5.2
2	6.5	6.5
3	8.0	9.0

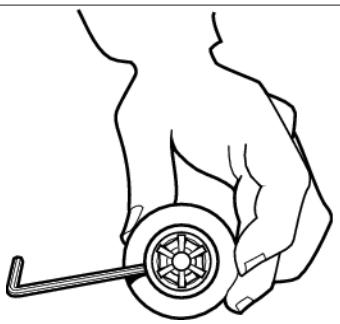
Assembly instructions for collet tap adaptors



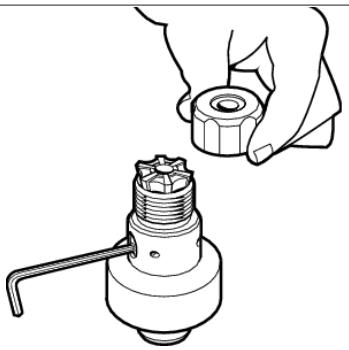
1. Adaptor
2. Collet
3. Collet nut
4. Jaws
5. Jaws
6. Key
7. Spanner for locking nut
8. Adjusting screw
9. Key
10. Socket screw



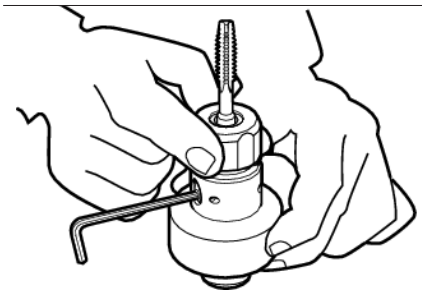
Open jaws (4) (5) to accept square tap shank.



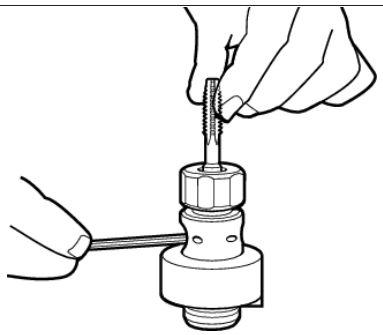
Fit collet (2) into adaptor (1).



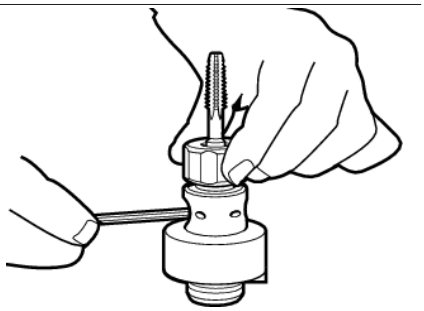
Fit collet nut.



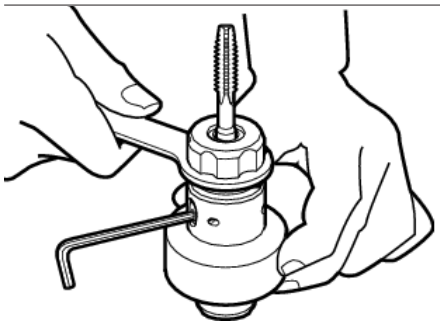
Place tap into collet. Tighten nut sufficiently to turn tap.



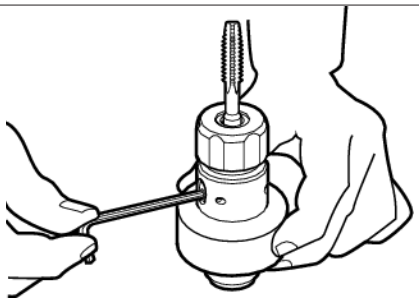
Turn tap to the right position and grip the tap shank square using the jaws (4) and (5).



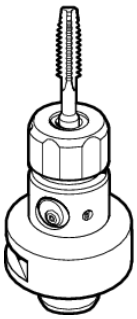
Open jaws slightly to minimize danger of tilting tap.



Secure tap by tightening collet nut.



Slightly tighten jaws to take up any play.



Assembly completed.

Dampened adaptors

Tools with long overhangs are becoming increasingly more common, especially on machining centres.

Vibration, a feature of long overhangs, can be reduced by using dampened adaptors (tuned dampened bar or Silent Tool).

First choice should always be the Coromant Capto coupling, which offers excellent repeatability and the best stability characteristics on the market.

The main parts of a tuned boring bar are:

A: heavy tuning body

B: rubber bushes

C: special oily liquid.

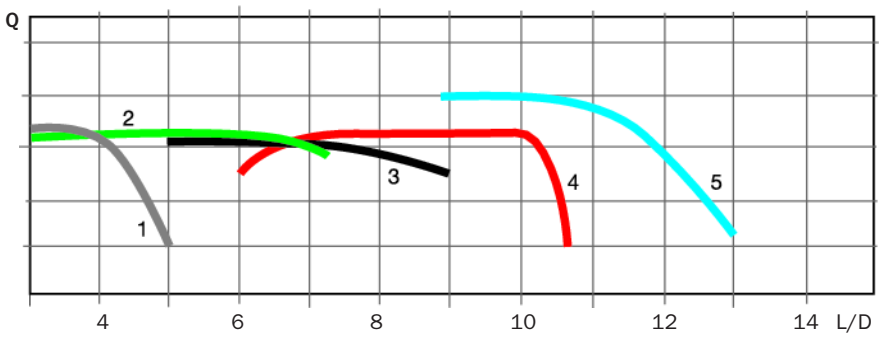
How it works

A dampened adaptor's primary function is to minimize vibrations due to a heavy tuning body suspended in two rubber bushes. The tuning body is surrounded by a special oily liquid. If vibrations arise during machining, the tuning system will immediately come into force, and the kinetic energy of the bar will be absorbed in the tuning system.

Dampened bars for long overhangs

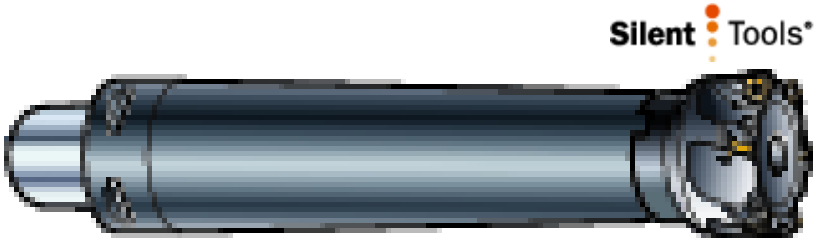
With overhangs more than 4 times tool diameter, vibration tendencies can become more apparent.

With the use of dampened adaptors, overhangs of up to 13 times the diameter of the bar can be employed with good results, as illustrated below.



Q = metal removal rate (cm³/min.)

1. Solid steel bar
2. Carbide alloy bar
3. Short dampened bar
4. Long dampened bar
5. Extra long, dampened bar



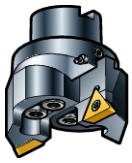
Maximum recommended overhang for dampened bars is 7 x dm_m for short design and 10 x dm_m for long design.

Dampened adaptors for boring

The product range for boring consists of the Coromant Capto adaptor with arbor coupling for Duobore tools for twin edge boring, step boring and single edge boring.

Coupling size	Arbor size (mm)	Length (mm)
C8	27	320
C8	32	320

Dampened milling adaptor with arbor coupling



Duobore with arbor coupling

Dampened adaptors for milling

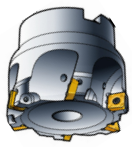
The product range for milling consists of the Coromant Capto coupling with:

- Arbor coupling
- Threaded coupling

Arbor couplings for CoroMill face mill cutters and square shoulder face mills.

Coupling size	Arbor size (mm)	Length (mm)
C5	22	220
C6	22	260
C8	27	320
C8	32	320

Dampened milling adaptor with arbor coupling



CoroMill 490 with arbor coupling

Threaded couplings for CoroMill screw type cutters and a variety of shanks for demanding die and mould making.

Coupling size	Coupling	Length (mm)
C4	M10	175
C5	M12	186
C5	M16	279
C6	M16	279

Dampened milling adaptor with threaded coupling

CoroMill 390

CoroMill 300

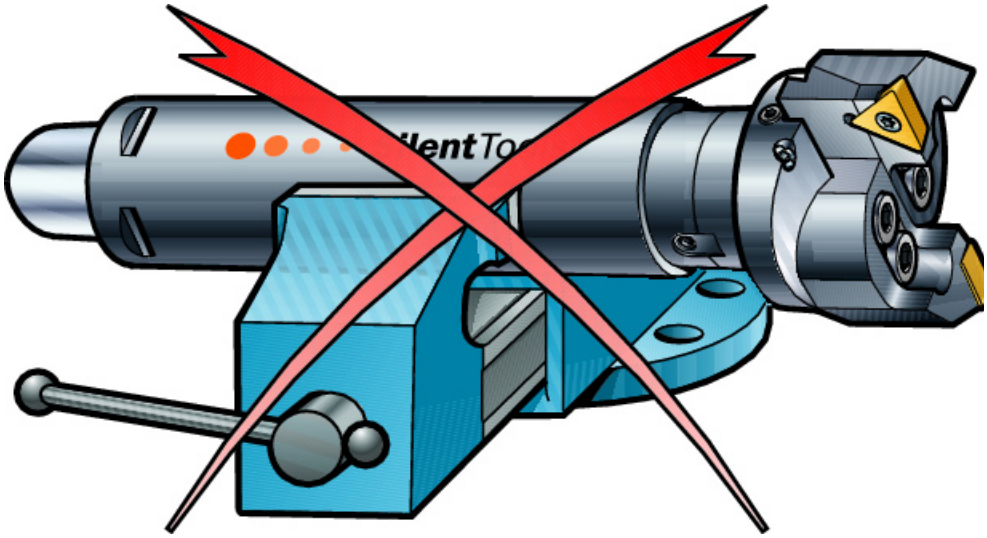
Dampened boring bar for turning

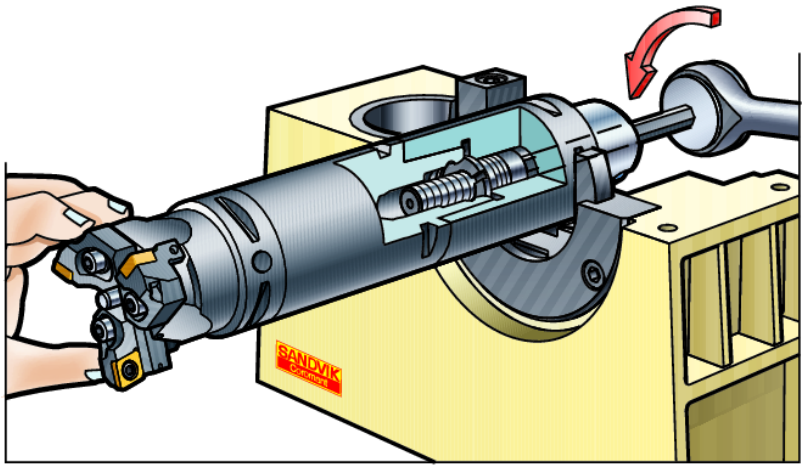
See CoroTurn SL programme, page G 86.

Assembling dampened tools

When using dampened adaptors in assemblies, care should be taken to hold the adaptors correctly, in order to ensure that they are not damaged.

The adaptors are easily deformed due to the thin wall thickness.



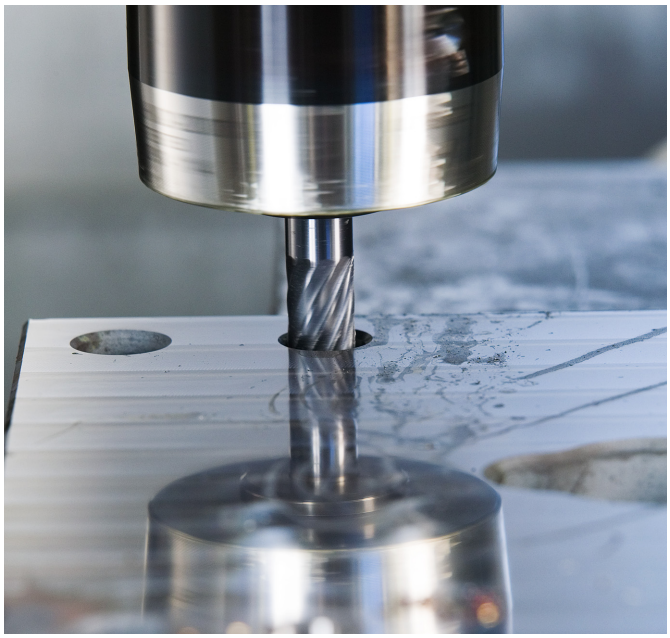


Use adapted fixtures when mounting tools and adaptor.

CoroGrip® chucks

The CoroGrip hydro-mechanical, precision chuck programme provides all-round tool chucks for milling and drilling, from roughing to finishing operations. The tool shanks can be clamped in a range from 6 to 32 mm in diameter, with slitted collet options down to 3 mm. All types of shanks can be clamped, and the chucks are available for most tool holding systems. CoroGrip chucks also provide a large amount of application flexibility due to their availability of normal (HMD) and short (HMS) versions, as well as a long, slender plain parallel shank version. The clamping function is actuated by hydraulic pressure acting on a wedge-type, mechanical tool grip method.

Each chuck is individually balanced to G2.5 for speed, and an individual measuring report is enclosed.



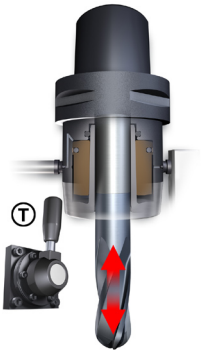
CoroGrip® provides a secure grip in all applications – from finishing to roughing

Extremely high torque transmission capability prevents the tool from slipping. This also applies to roughing operations and, as the mechanism is self-locking, no hydraulic pressure is retained in the mechanism during machining. The clamping force remains constant during the entire operation and over long term use.

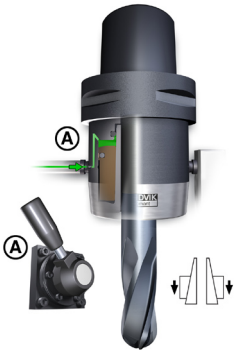
The CoroGrip chucks are manufactured with close tolerances, resulting in a maximum run-out at the cutting edge of only 0.002 - 0.006 mm - measured at a length of three times the tool diameter. The run-out is maintained constantly throughout its extensive operation, enhancing tool-life and component quality.

All types of cutting tools with cylindrical, Whistle Notch or Weldon shanks are retained securely in the CoroGrip chuck. Shanks can be clamped directly into the holder with or without collets for cylindrical, Whistle Notch and Weldon.

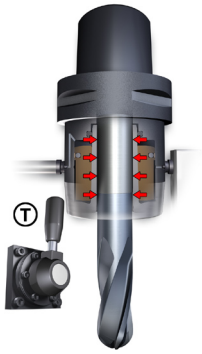
The clamping forces of CoroGrip chucks are extremely high with precision values at the same level. The CoroGrip chuck is also less dependent upon the tool-shank tolerances, with shank tolerances of h7 being clamped satisfactorily.



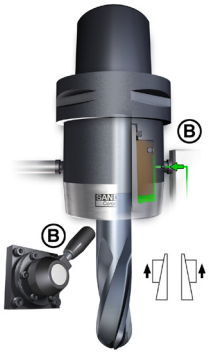
Valve handle in position T for inserting and releasing the tool.



Pump and valve handles in position A for clamping.



Valve handle in position T after clamping the tool.

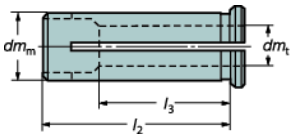


Pump and valve in position B for releasing.

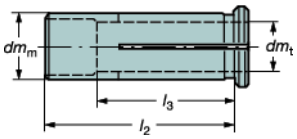
Cylindrical collets

The CoroGrip chucks can be used with a cylindrical collet. The collets are available in slitted and sealed variants and must be ordered separately.

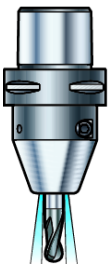
Slitted 393.CG



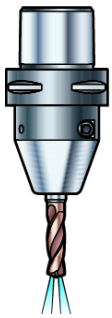
Sealed 393.CGS



Slitted 393.CG



Sealed 393.CGS



Easy handling

Tool change can take place in less than 20 seconds. The high clamping force required for the CoroGrip system is generated by an external hydraulic pump. This provides a pressure of 500 bar for operating the clamping and up to 800 bar for the releasing mechanism. As the mechanism is self-locking, no hydraulic pressure is retained during machining.

Two different hydraulic pumps are available for changing tools in the CoroGrip holder - a manual hand pump and a pneumatic motor driven pump. The latter uses the regular pneumatic air available in the machine shop (min. 6 bar required). By using either of these pumps, the tool change is ergonomically and easily performed in less than 20 seconds - and the same gripping force is always applied to the tool shank.

Extended reach

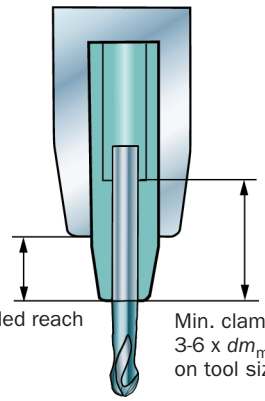
The CoroGrip pencil collet allows an extended reach for long overhangs, such as in die and mould applications. Available in a 20 mm outer diameter, the collet can accept four different sizes of tool shank: 6, 8, 10 and 12 mm.

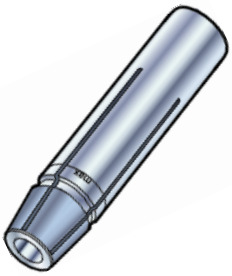
Using the CoroGrip pencil collet offer a three-fold advantage:

- Machining in cavities and pockets with improved productivity
- No compromise in stability with improved bending stiffness
- Improved tool-life.

A laser marking on the collet indicates the maximum recommended protrusion for undiminished clamping force. This positioning should never be exceeded.

CoroGrip® pencil collet





Adjustment to a predefined length

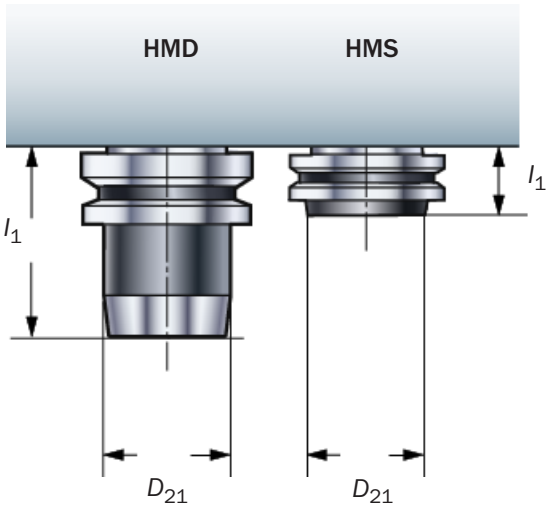
Clamping of a tool to a certain length is an easy operation. Place the tool in the holder and use an optical reader. The tool length can be set within +/- 5 microns, depending on the accuracy of the optical reading and on the movement of the CoroGrip plunger.

Bending stiffness

Sandvik Coromant continually improves its products. The most recent CoroGrip chuck version is characterised by high reliability and accuracy, with run-outs of a few microns. A larger axial face support and chuck diameter provides bending stiffness, which has been increased ten-fold. The bending stiffness is especially important in preventing tools from climbing out of the chuck during machining. The tool clamping and releasing functions are simple, requiring only a pump handle and the operation of a valve-handle.

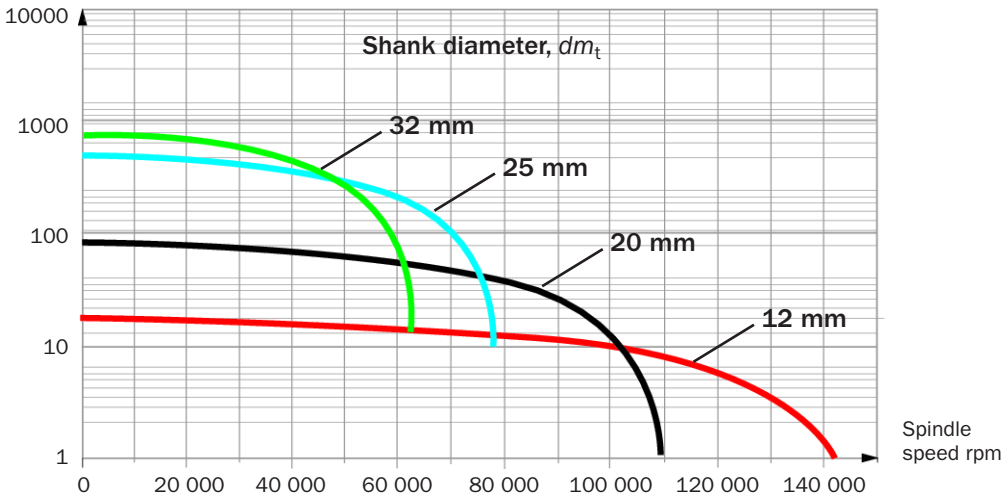
On the HMD chucks, the chuck overhang is smaller in comparison to many other solutions, while on the HMS chucks, the overhang has been kept to an absolute minimum. The distance is shorter from spindle bearings to chuck-face, with increased stiffness and resistance to side forces. This enables longer tool extensions and higher cutting data can be considered.

The use of collets in CoroGrip chucks influences the level of torque transmission possible. In the example, a cutting tool with a shank diameter of 12 mm is clamped directly in the chuck, and alternatively in a 20 mm chuck with a reduction collet to 12 mm. The torque transmission is improved with the collet clamping. However, the use of collets will add a couple of microns to the run-out of the chuck.



CoroGrip® torque transmission by spindle speed

(Tool shank tolerance h6)



Capacity values for CoroGrip® chucks

Recommended maximum spindle speeds are specified for each chuck type and size. The high clamping forces in combination with the precision and balancing enable high speed machining.

Minimum torque transmission is required for machining.

Capacity values for CoroGrip® chucks

Recommended maximum spindle speeds are specified for each chuck type and size. The high clamping forces in combination with the precision and balancing enable high speed machining.

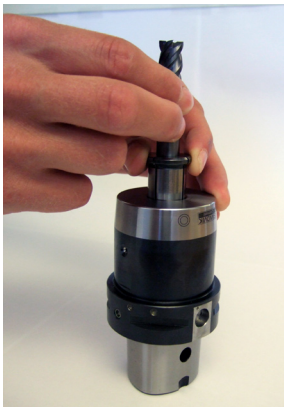
Minimum torque transmission required for machining

Material : low-alloy steel (CMC02.2)
Operation : full slot milling
Tool : CoroMill 390 indexable endmill
Torque values in Nm

	Diameter: mm									
	12	12	16	16	20	20	25	25	32	32
	Rough	Light	Rough	Light	Rough	Light	Rough	Light	Rough	Light
f_z (mm/r)	0.2	0.15	0.2	0.15	0.2	0.15	0.35	0.15	0.35	0.15
a_p (mm)	10	10	10	10	10	10	15.7	15.7	15.7	15.7
Z=1	13	10	x	x	x	x	x	x	x	x
Z=2	x	x	34	27	43	34	127	67	163	86
Z=3	x	x	x	x	64	52	191	101	244	129

Tool: CoroMill Plura solid carbide

	Diameter: mm / a_p			
	12/12	16 / 16	20 / 20	25 / 25
Z	f_z / Nm			
2	0.035 / 6.1	0.058 / 17	0.083 / 34	-
3	0.072 / 5.5	0.046 / 20	0.061 / 40	-
4	0.033 / 12	0.053 / 31	0.070 / 65	0.054 / 75



For rough machining and/or using demanding cutting data, it is recommended that you use a larger chuck, which will allow the use of a collet. The larger chuck will improve stability and the use of a collet considerably increases the clamping power on the tool shank. The clamping power of the chuck is applied on a larger area than the inner diameter of the collet, which provides an increase per area-unit on the shank of the tool.

Operation : drilling
Tool : CoroDrill Delta C solid carbide drill

	Diameter: mm						
	6	8	10	12	16	20	
f_n (mm/r)	0.25	0.38	0.38	0.44	0.5	0.5	
Nm	4.1	10	16	25	50	78	Normal torque
Nm	8.2	20	32	50	100	156	Peak torque at chipjamming

Torque at direct clamping in chuck

Bore Ø mm	500 bar
6	13
12	60
16	155
20	365
25	670
32	1220

Torque increase with reduction sleeve

Bore Ø mm	Bore with reduction sleeves Ø mm				
	12	16	20	25	32
	Nm				
12	60	-	- -	-	
16	94	155	- -	-	
20	195	260	365	-	-
25	273	373	473	670	-
32	290	387	471	681	1220

Minimum torque transmission (Nm) at different tool clamping lengths

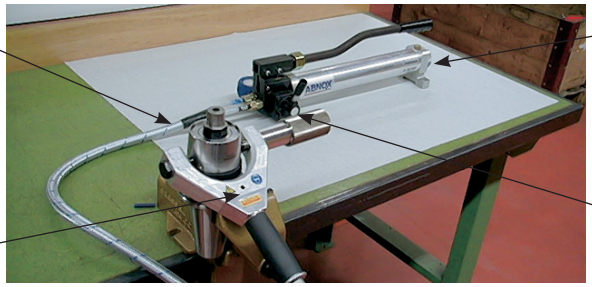
Bore Ø mm	Clamping length X number of diameter					*) Min. length
	1.00	1.25	1.50	1.75	2.00	
6	3	4	5	7	8	18
12	28	38	48	58	60	21.5
16	74	100	126	152	155	28.5
20	170	231	292	353	365	36
25	322	433	545	657	670	44.5
32	610	813	1017	1220	1220	56

*) Min. length = recommended min. clamping length

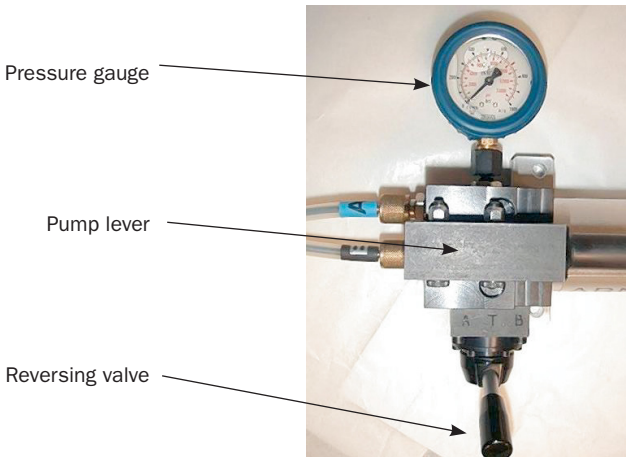
Hand pump – system installation

All rules and regulations valid for the system stand must be observed and respected. The floor space dimensions must be checked before the system is installed in order to ensure the operation, for the personnel as well as for the system. The high pressure hand pump must be assembled so that a safe and durable operation is guaranteed. All exposed parts and hoses must be assembled in such a fashion that there is no risk of injury. Only specially trained personnel are allowed to assemble, commission and store the system.

The system should be placed and operated on a horizontal floor/bace. The system has been built to be used in rooms which are not exposed to the effects of weather. Storing the system in an aggressive and excessively moist environment or out doors can lead to corrosion or other forms of damage for which we cannot accept any liability.



Elements of operation – hand pump

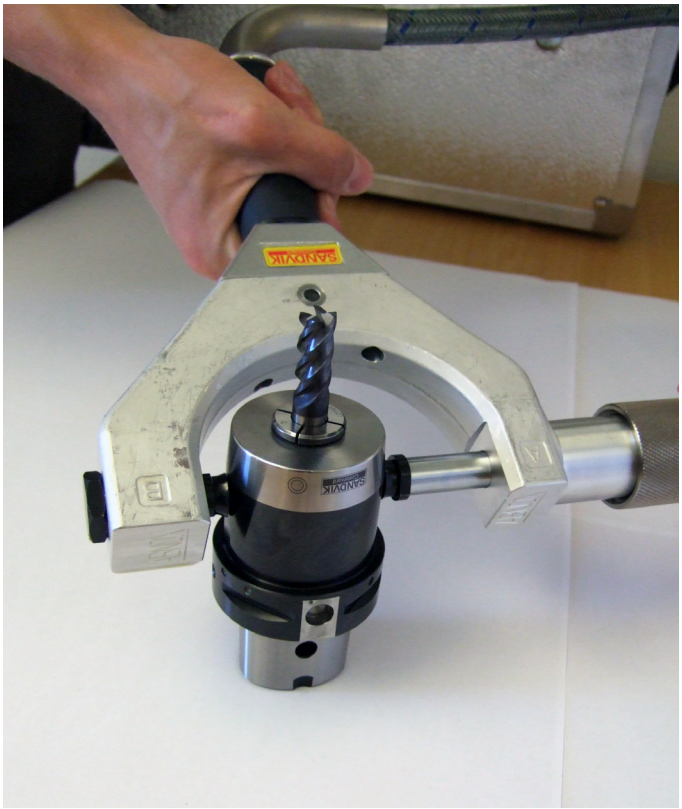


Clamping a tool (unclamping)

- The handle has to be positioned so that the marked connections A and B match the marks on the precision power chuck.
- Use the sleeve to hand tighten the handle. The nozzles are pushed automatically onto the chuck by hydraulic pressure.
- Insert the tool into the chuck.
- Set the reversing valve to position A. (Unclamping position B).
- Use the high pressure hand pump until the hydraulic pressure of 500 bar is reached. (Unclamping position B reaches 800 bar).
- Set the reversing valve to position T. The hydraulic pressure now descends to zero bar.
- Remove the handle from the chuck.
- The chuck is now ready to be implemented into the tooling machine.

If problems occur – hand pump

Fault	Possible causes	Solution
High pressure hand pump has very little or no pressure	Oil level too low	Top up until the oil level window shows half full. Use hydraulic oil type SAE 80 W.
	Leakage	Check, and if necessary, change hoses and fittings
	Soiled oil	Clean tank, refill with new, filtered oil, and release air
	Incorrect position of reversing valve	Reset valve to position A or B
Tool can not be clamped	Incorrect position of reversing valve	Set valve to position A
	Incorrect mounting of the handle onto the power chuck	Marks of the handle must be identical with the ones on the chuck
	Check if valve of power chuck is broken	Check power chuck
Tool can not be unclamped	Incorrect position of reversing valve	Set valve to position B
	Incorrect mounting of the handle onto the power chuck	Marks of the handle must be identical with the ones on the chuck
	Check if valve on power chuck is broken	Check power chuck



Do’s and don’ts – CoroGrip® pumps

Do's

Work in accordance with the operating manual

Follow the short user guide for hand pump	Start up/Operating instructions
Follow the short user guide for bench-pump	Start up/Operating instructions

Don’ts

- Don't a the handle onto connector A + B in correctly. Always screw the handle completely onto connector A + B.
  (The connectors have a valve inside which opens only if the connection is 100% perfect).
- Don’t damage the nozzles or the inlet shape when assembling the handle on the chuck!
- Don’t mix up connectors A with B, as this will result in a clamping pressure of 800 bar, which is too high.
- Don’t pump too fast with the hand-operated pump when nearing the maximum clamping pressure!
  The pressure relief valve works with a tight tolerance when working at lower speed (no peaks!).
- Don’t work with dirty oil!
- Don’t store the handle in a dirty place, or where the nozzles could get damaged!
- Don’t bend the hoses to excess: the handles have special high pressure hoses which are still flexible at 800 bar, even with the protection safety hose.
- Don’t kink the hose! The hose will break when kinked.
- Don’t leave the pump under pressure! Always release the pressure by switching the reversing valve to T (neutral position) after clamping and unclamping.
- Don’t take the handle off the chuck before you have released the pressure!
- Don’t use a handle which is missing its cup protection!
- Don’t forget: The maximum recommended clamping pressure is 500 bar.

Bench pump – system installation

All installation and operating instructions for the system stand must be adhered to. The floor space dimensions must be observed before the system is installed, in order to ensure complete safety for both personnel and the system itself.

The high-pressure pump must be assembled in a way that a safe and durable operation is guaranteed. All exposed parts and hoses have to be assembled in such a fashion that there is no risk of injury. Only specially trained personnel are allowed to assemble, commission and store the system.

To operate the system, it must be positioned on a flat and horizontal surface. The system must also be used in conditions which are not exposed to effects of weather.

Storing the system in an aggressive and excessively moist environment or out doors can lead to corrosion or other forms of damage, for which we cannot except responsibility.

Note: More information is available in the Operating Manual and Short Users Guide.

Elements of operating – bench pump

Unclamping

Regulation of pneumatic pressure control valve to adjust the unclamping pressure of 800 bar.

Pull the regulation knob to change the pressure

➦ increase pressure

➥ reduce pressure

Clamping

Regulation of the pneumatic pressure control valve to adjust the clamping pressure of 500 bar.

Pull the regulation knob to change the pressure

➦ increase pressure

➥ reduce pressure

Clamping a tool (unclamping)

- The handle has to be positioned in a way that the marked connections A and B match the marks on the precision power chuck.
- Use the sleeve (handle screw) to hand tighten the handle onto the power precision chuck. The nozzles are pushed automatically onto the chuck (hydraulic pressure).
- Insert the tool into the chuck.
- Switch the reversing valve to A (unclamping position B). The pneumatic high-pressure pump starts automatically and pumps until the defined clamping pressure of 500 bar (unclamping 800 bar) on the power precision chuck has been reached.
- Switch the reversing valve to position T. The hydraulic pressure now descends to 0 bar.
- Press the push button for the vacuum function for a duration of about 10 seconds to produce a vacuum in the high pressure hoses.
- Take the handle off the chuck.
- The tool is now ready to be put into the machine tool.

Note: More information is provided in the Operating Manual and Short Users Guide.

If problems occur – bench pump

Fault	Possible causes	Solution
Pump does not start	No air pressure	Control air pressure supply
	Safety coupling is not properly connected	Connect safety coupling properly
	Contaminated maintenance unit	Clean or exchange filter
High pressure pump produces little or no pressure	Pressure control valve: clamping misadjusted	Adjust the pressure control valve to 3.5 bar (rising) to achieve 500 bar hydraulic pressure
	Pressure control valve: unclamping misadjusted	Adjust the pressure control valve to 5.6 bar (rising) to achieve 800 bar hydraulic pressure
	Oil level too low (hydraulic)	Top up oil up to max. level
	Contaminated maintenance unit	Clean or exchange filter
	Leakage	Check hoses and fittings, replace if necessary
	Soiled oil	Clean tank, refill with new, filtered oil and release the air
	Dirty oil filter	Clean oil filter
	Not enough air pressure	Check air pressure net
	Incorrect position of reversing valve	Reset valve to position A or B
High pressure pump doesn't stop	Pneumatic tripping valve (assembled on reversing valve) is clamped	Check pneumatic tripping valve
Tool cannot be clamped	Incorrect position of reversing valve	Set valve to position A
	Incorrect mounting of the handle onto the power chuck	Marks of the handle must be identical with the ones on the chuck
Tool cannot be unclamped	Damaged precision power chuck	Check power chuck
	Incorrect position of reversing valve	Set valve to position B
	Incorrect mounting of the handle onto the power chuck	Marks of the handle must be identical with the ones on the chuck

CoroGrip® chuck handling hints

- Before inserting the tool shank, always make sure that the shank is undamaged, holds the correct dimensions and is clean – especially the bore of the chuck.

- If possible, insert the tool-shank all the way. The transmittable torque will be reduced in relation to the reduction of insertion.

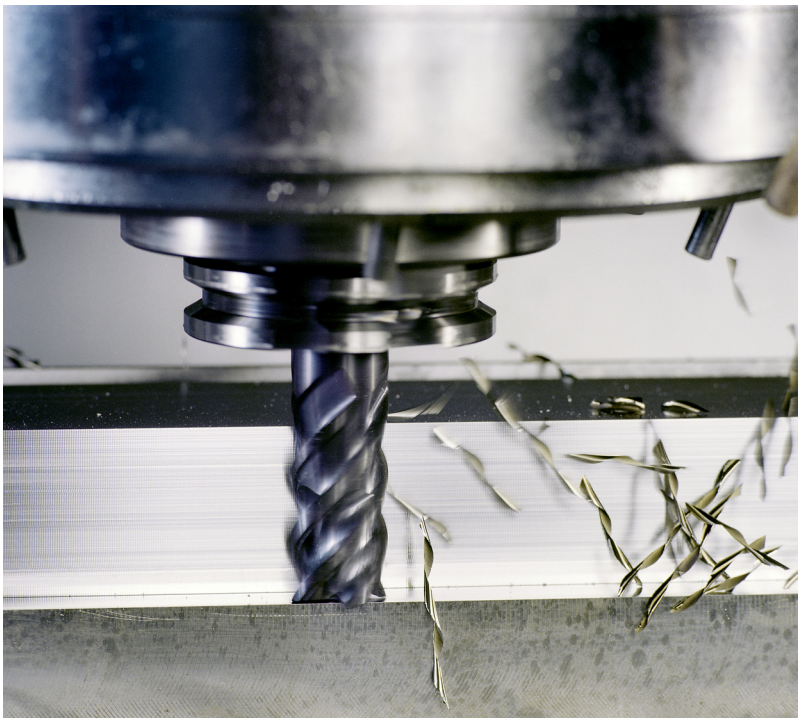
- When storing the chuck, protect it against corrosion by spraying it with oil.

- Never use excessive force when trying to insert a toolshank into the chuck.

- These chucks are precision tool holders and should be handled with care.

- The chucks should never be heated to temperatures above 75 degrees C (167 degrees F). (This ensures that the seals are not damaged).

- Do not exceed 500 bars in clamping pressure in the CoroGrip chuck: this can result in chuck jamming. If more clamping pressure is needed, consider using a larger chuck with reduction sleeves.

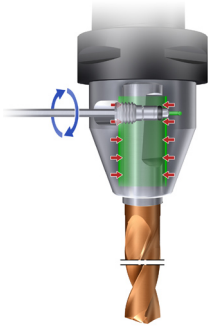


HydroGrip® chucks

The HydroGrip chuck can exceed the clamping force of a conventional chuck by up to three times. This means that the chuck can handle most drilling operations and also light to medium profile milling.

Compared to collet chucks and Weldon and Whistle Notch adaptors, where run-out values are measured in hundredths of a mm, the HydroGrip chucks provide run-out values that are measured in microns.

Each chuck is individually balanced to G2.5 for speed. An individual measuring report is enclosed for each chuck.



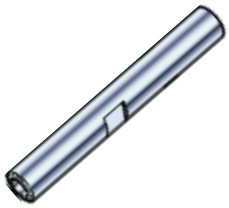
High precision chucks

The HydroGrip precision chucks offer the best precision in combination with the highest stability.

The range of Heavy Duty (HD), short, slender and pencil chucks provides the best choice for most ordinary milling and drilling operations.

A cylindrical shank is also available as an insert to all holding chucks.

Short version



Cylindrical shank

A shorter, more slender HydroGrip chuck is also available, which offers increased accessibility in drilling and light milling operations.

Function and ease of clamping remain the same as for other HydroGrip assortments.

HydroGrip® HD

Slender version

The HydroGrip pencil chuck provides a combination of reach and stability for narrow space operations, often found in die and mould cavity machining, but also when tools have to extend past and close to a shoulder in many other applications. Individual balancing provides very high quality machining results.

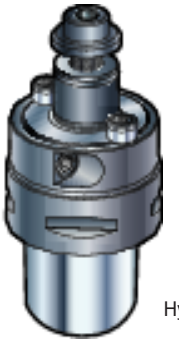
The range of short, medium and long reach pencil chucks provides the best choice for applications, depending upon reach demands, but there are also different limitations on the maximum spindle speed capability.

HydroGrip pencil chucks represent a tool holder, developed to extend into and past component or fixture obstacles. Many complex components, or those with cavities, require long reach tooling to perform narrow space operations. One of the main features is the ability to adjust the length, and thereby the tool overhang. For best clamping unit results, use h6 shanks.

Short, medium and long pencil chucks.

HydroGrip® face mill holder

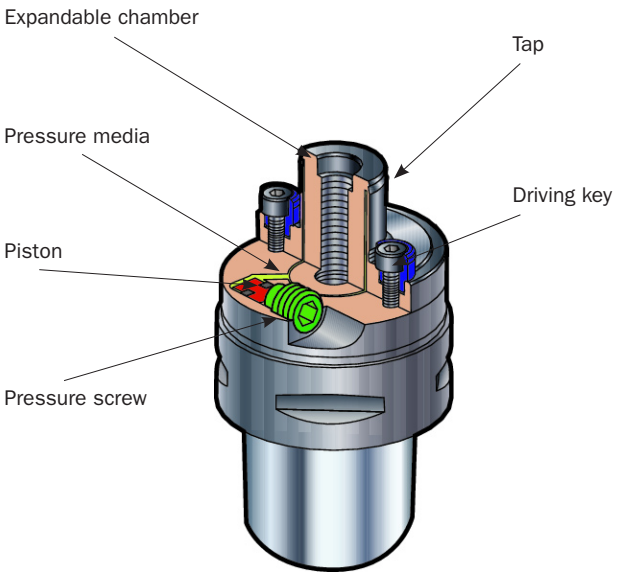
The HydroGrip face mill holder is a perfect partner for face mills where high surface finishing is needed, and where minimal radial run-out ensures an even tooth load and wear pattern. This, in turn, ensures an improved tool life and surface finish in high demanding, shoulder face milling operations.

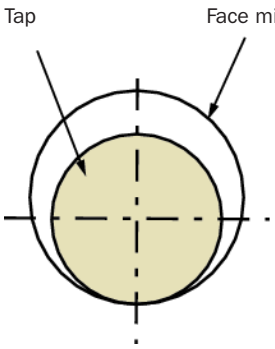


HydroGrip face mill holder

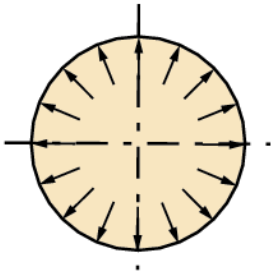
The hydraulic expanding arbor provides precise, concentric location to eliminate radial run-out.

Each chuck is individually balanced to G2.5 for speed. An individual measuring report is enclosed for each chuck. See individual balanced tool chucks for high speed machining on page G 15.



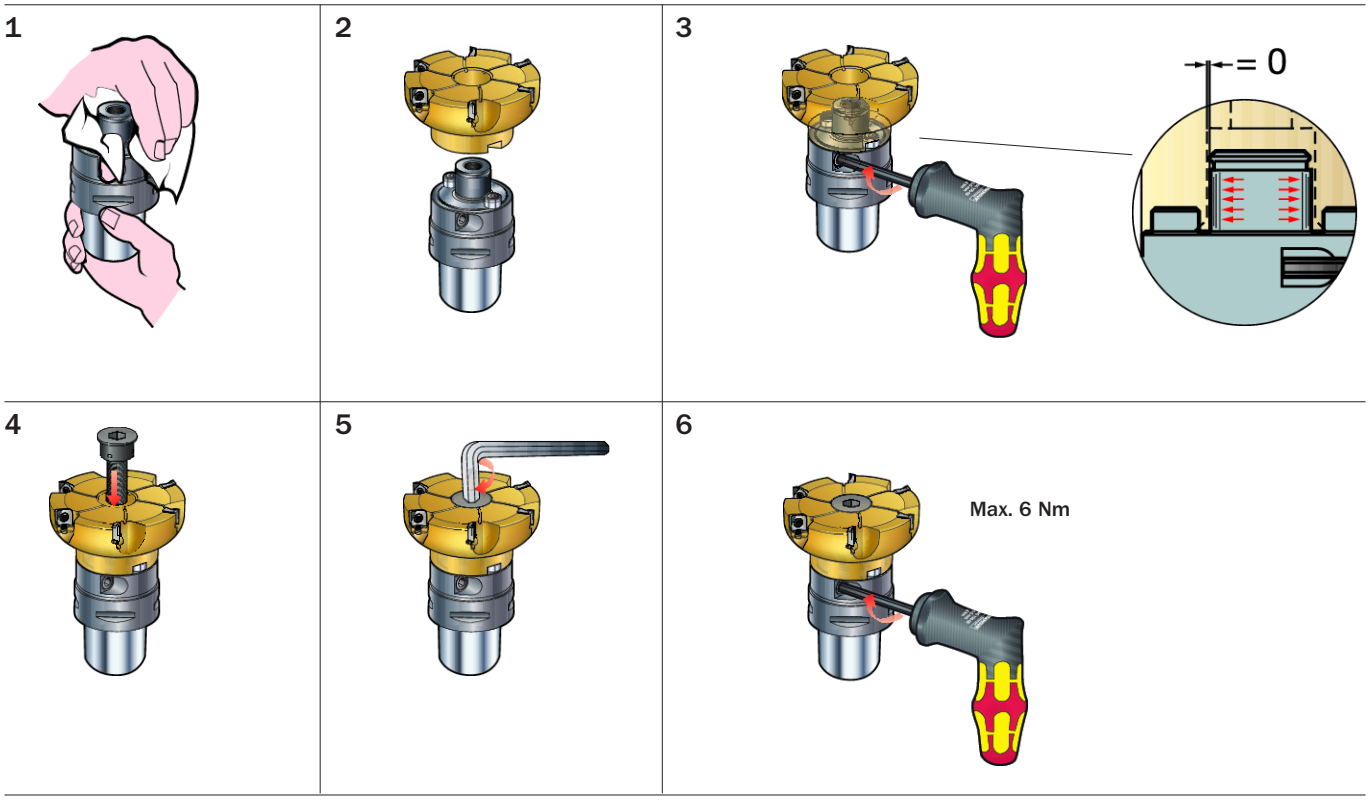


Conventional competitor's tool holder



HydroGrip face mill holder

HydroGrip® face mill holder – mounting the cutting head



1. Make sure that the arbor coupling is free of dirt and burrs.

2. Loosen the pressure screw.

3. Attach the cutting head to the adaptor.

4. Attach the socket head cap screw.

5. Tighten the socket head cap screw.

6. Tighten the pressure screw with a torque wrench (max. 6 Nm).

How to clamp

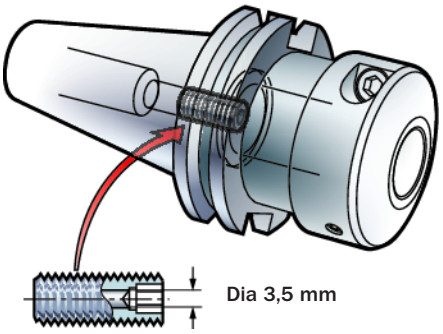
A torque wrench should be used to ensure the correct clamping force is applied.

HydroGrip® 6 Nm

HydroGrip® HD 10 Nm

Axial tool stop

An axial tool stop can be provided where the hole through the taper is threaded in the front end. An M8 screw can be inserted into this hole to act as a tool stop. When cutting fluid is required through the flange, the screw will act as a spindle seal. If cutting fluid is required through the spindle, a 3.5 mm diameter hole should be drilled through the screw.



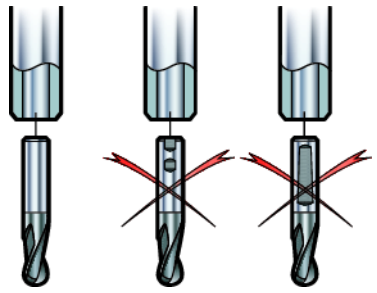
Clamping of any type of tool shank

High clamping forces in tool holding determine how securely the cutting tool is held and the torque transmission during machining. As cutting forces act on the tool, the tool will tend to slip in the holder. The capability of the tool holder can then be related to how tightly the tool-shank is clamped.

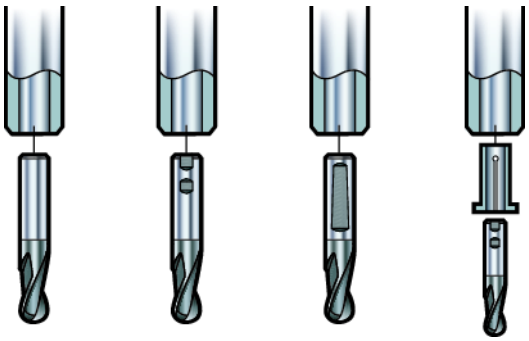
The HydroGrip can exceed the clamping force of a conventional chuck by up to three times. This mean that the HydroGrip product range can clamp any type of tool shank up to h7 tolerance.

Note: It is not possible to clamp a HydroGrip 6 mm diameter chuck.

- without any tool
- with Weldon or Whistle Notch holders.



dm_m **6 mm**

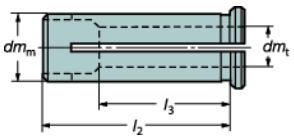


dm_m **12-32 mm**

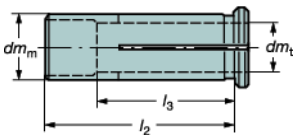
All HydroGrip chucks, except the face mill holder, can be used with a cylindrical collet. The collet is available in slitted and sealed variants and must be ordered separately.

Always use a collet that fits the tool.

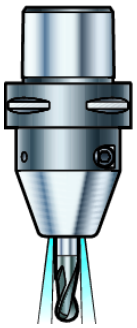
Slitted 393.CG



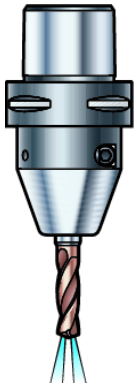
Sealed 393.CGS



Slitted 393.CG



Sealed 393.CGS



Capacity values for HydroGrip® chucks

Recommended maximum spindle speeds are specified for each chuck type and size. The high clamping forces in combination with the precision and balancing provide the ability for high speed machining.

Minimum torque transmission required for machining

Material : low-alloy steel (CMC 02.2)
Operation : full slot milling
Tool : CoroMill 390 indexable endmill
Torque values in Nm

	Diameter: mm									
	12	12	16	16	20	20	25	25	32	32
	Rough	Light	Rough	Light	Rough	Light	Rough	Light	Rough	Light
f_z (mm/r)	0.2	0.15	0.2	0.15	0.2	0.15	0.35	0.15	0.35	0.15
a_p (mm)	10	10	10	10	10	10	15.7	15.7	15.7	15.7
Z=1	13	10	x	x	x	x	x	x	x	x
Z=2	x	x	34	27	43	34	127	67	163	86
Z=3	x	x	x	x	64	52	191	101	244	129

Tool: CoroMill Plura solid carbide

	Diameter: mm / a_p			
	12/12	16 / 16	20 / 20	25 / 25
Z	f_z / Nm			
2	0.035 / 6.1	0.058 / 17	0.083 / 34	-
3	0.072 / 5.5	0.046 / 20	0.061 / 40	-
4	0.033 / 12	0.053 / 31	0.070 / 65	0.054 / 75

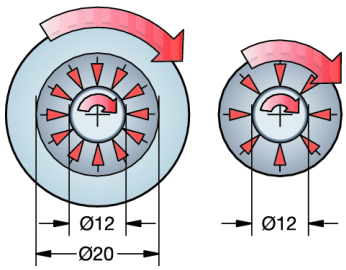
Operation : drilling
Tool : CoroDrill Delta C solid carbide drill

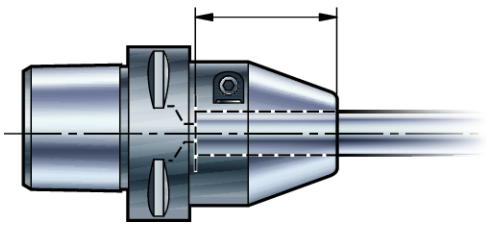
	Diameter: mm						
	6	8	10	12	16	20	
f_n(mm/r)	0.25	0.38	0.38	0.44	0.5	0.5	
Nm	4.1	10	16	25	50	78	Normal torque
Nm	8.2	20	32	50	100	156	Peak torque at chip jamming

Torque at direct clamping in chuck

Bore Ø mm	Torque Nm	
12	60	
20	260	400 *)
25	480	700 *)
32	820	1300 *)

*) HydroGrip HD





Torque increase with reduction sleeve

Bore Ø mm	Bore with reduction sleeves Ø mm			
	12	20	25	32
	Nm			
12	60	-	-	-
20	95	260	-	-
25	140	235	480	-
32	190	350	520	820

Minimum torque transmission (Nm) at different tool clamping lengths

Bore Ø mm	Clamping length X number of diameter					*) Min. length
	1.00	1.50	2.00	2.50	3.00	
12	5	15	25	40	60	35
20	45	100	175	260	260	46.5
25	110	235	440	480	480	50.5
32	260	585	820	820	820	53.5

*) Min. length = recommended min. clamping length.

HydroGrip® chuck handling hints

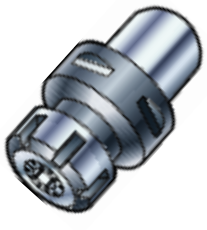
- Before inserting the tool shank, always make sure that the shank is undamaged, that it holds the correct dimensions, and is clean – especially the bore of the chuck.
- If possible, insert the tool-shank all the way. The transmittable torque will be reduced in relation to the reduction of insertion.
- When storing the chuck, protect it against corrosion by spraying it with oil.
- Never use excessive force when trying to insert a toolshank into the chuck.
- These chucks are precision tool holders and should be handled with care.
- On the HydroGrip chuck, tighten the pressurizing screw to the stop by using the recommended wrench.
- Keep the HydroGrip chuck in vertical position and turn the cutter slightly when tightening the pressurizing screw. (This will achieve the very best accuracy).
- If a correctly-dimensioned tool shank is not clamped in the chuck when the bottom position is very close on the clamping screw - less than a turn - the chuck is in need of service.
- Never use the HydroGrip chuck in an environment where temperatures exceed 50 degrees C (120 degrees F). (This may increase the internal pressure of the chuck and affect it negatively).
- Never remove the pressurizing screw on the HydroGrip chuck. Untightening by a few turns is enough to release the tool.
- Never turn the small (M6) air-release screw on the HydroGrip chuck as this will make the chuck unworkable.

Collet chuck

The collet chuck is used for universal drilling and milling, and is available in standard, short and long lengths.

Shanks of different tolerances can be clamped.

For better accessibility in narrow machining, use a collet chuck extension.



Collet chuck adaptor

Collet chuck extension

Due to different collet sizes, the tool holder is more adaptable to shank diameter.
Always use a collet that fits tool diameter.
Use a torque wrench to tighten the nut.

Recommended tightening torque values for ER Collet Nuts

Clamping unit	Collet size	ER Counterbore				ER Throughbore				ER Tapping	
		Ø mm	Ø inch	Torque	Torque	Ø mm	Ø inch	Torque	Torque	Torque	Torque
5533 050-07	ER11	Ø1.0-2.5	.039 -.098	7 ft-lbs	9 Nm	Ø3.0-5.0	.118 - .197	18 ft-lbs	24Nm	12 ft-lbs	16Nm
5533 050-06 5533 051-01	ER16	Ø1.0 Ø1.5-3.5 Ø4.0-4.5	.039 .059 -.138 .157- 177	5 ft-lbs 16 ft-lbs 32 ft-lbs	8 Nm 22 Nm 43 Nm	Ø5.0-10.0	.197 -.394	40 ft-lbs	54Nm	32 ft-lbs	43Nm
5533 050-08 5533 051-02	ER20	Ø1.0 Ø1.5-6.5	.039 .59 - .256	12 ft-lbs 24 ft-lbs	16 Nm 32 Nm	Ø7.0-13.0	.276 -.512	60 ft-lbs	80Nm	24 ft-lbs	32Nm
5533 050-02 5533 051-03	ER25	Ø1.0-3.5 Ø4.0-4.5 Ø5.0-7.5	.039 - .138 .157 - .177 .196 - 295"	16 ft-lbs 40 ft-lbs 60 ft-lbs	21 Nm 54 Nm 81 Nm	Ø8.0-16.0	.315 - .630	80 ft-lbs	108Nm	80 ft-lbs	108Nm
5533 050-03 5533 051-04	ER32	Ø2.0 2.5 Ø3.0-7.5	.078 - .098 .118 -.291	16 ft-lbs 100 ft-lbs	22 Nm 135 Nm	Ø8.0-20.0	.315 - .787	100 ft-lbs	135Nm	100 ft-lbs	135Nm
5533 050-04 5533 051-05	ER40	Ø3.0-8.5	.118 -.335	125 ft-lbs	170 Nm	Ø9.0-26.0	.354 - 1.023	125 ft-lbs	170Nm	125 ft-lbs	170Nm
5533 050-05	ER50	Ø6.0-10.0	.236 - .394	175 ft-lbs	237Nm	Ø12.0-34.0	.472 - 1.338	175 ft-lbs	237Nm	—	—
	ER8	Ø1.0-1.25 Ø2.0-2.5	.039 -.049 .079 -.098	1 ft-lbs 3 ft-lbs	1.4 Nm 4 Nm	Ø3.0-5.0	.118 - .197	4 ft-lbs	5Nm	—	—
5533-065-02	ER11	Ø1.0-2.5	.039 -.098	6 ft-lbs	8Nm	Ø3.0-5.0	.118 - .197	12 ft-lbs	16Nm	9 ft-lbs	12Nm
5533 065-03	ER16	Ø1.0 Ø1.5-3.5 Ø4.0-4.5	.039 .059 -.138 .157- 177	6 ft-lbs 14 ft-lbs 18 ft-lbs	8 Nm 19 Nm 24 Nm	Ø5.0-10.0	.197 -.394	18 ft-lbs	24Nm	18 ft-lbs	24Nm
5533 065-01	ER20	Ø1.0 Ø1.5-6.5	.039 .59 - .256	12 ft-lbs 21 ft-lbs	16 Nm 28 Nm	Ø7.0-13.0	.276 - .512	21 ft-lbs	28Nm	21 ft-lbs	28Nm
	ER25	Ø1.0-3.5 Ø4.0-7.5	.039 - .138 .157 - .295	17 ft-lbs 24 ft-lbs	23 Nm 33 Nm	Ø8.0-16.0	. 315 - .630	24 ft-lbs	33Nm	24 ft-lbs	33Nm

Sealing discs for through-coolant nuts

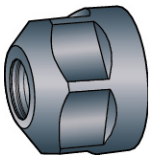
The collet chuck can be used with a coolant supply. Replace the nut with a through-coolant nut:

Assembly:

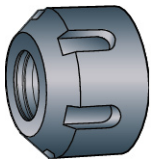
1. Locate the smallest outside diameter on the disc.
2. Insert the small diameter into the centre of the coolant nut and apply even pressure until the disc is properly seated in the nut.

Removal:

1. Simply press on the outside of the disc evenly until it snaps out.



Size 16 and 20



Size 25, 32 and 40

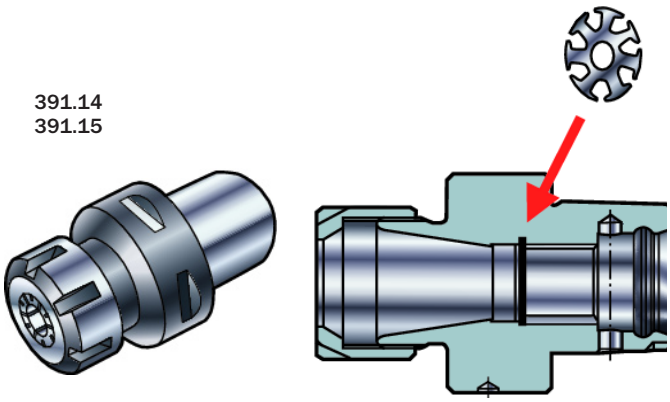
ER collet nuts for through-coolant

ER collet sealing disc

Permanent stop for new collet chucks

All new adaptors, type 391.14 and 391.15 manufactured starting in January 2002, have a permanent stop built in to the holder. Stop screws are not required.

391.14
391.15



For collet chucks 391.14 and 391.15, a special washer is permanently assembled in the holder.

Shrink fit adaptor

Shrink fit adaptor can be used for all drilling and milling operations. Adaptors are available for shank diameters from 6 to 32 mm with coupling sizes C4, C5 and C6.

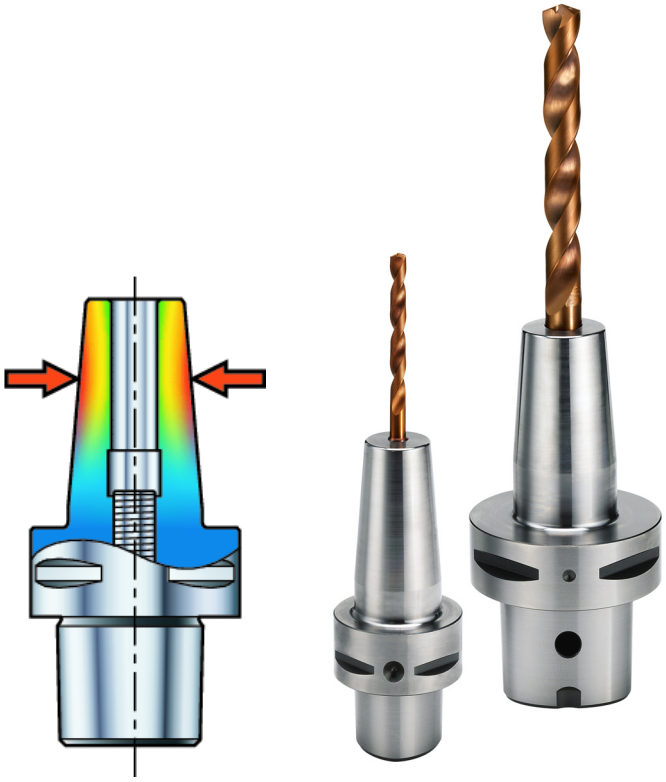
Note: An adaptor fits only one tool shaft diameter and tolerance on the shank diameter must be h6 or closer.

The shrink fit adaptor depends on heat to expand. When cooled, the adaptor contracts to grip around the tool shank.

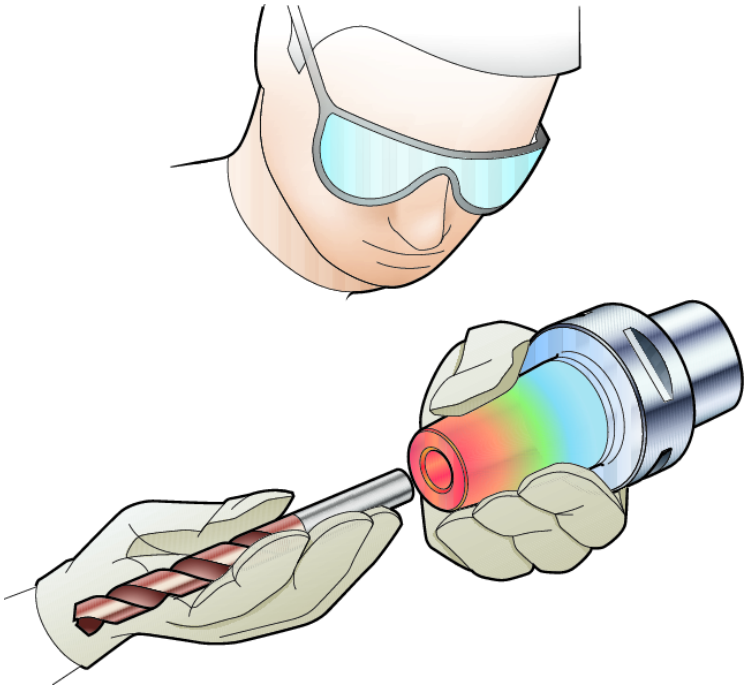
Mounted shrink fit adaptors do not need collets.

Keep away from dirt and burrs

The cylindrical tool shank should be kept free from dirt and burrs before mounting into the adaptor to maintain a secure grip and precision.



Shrink fit adaptor

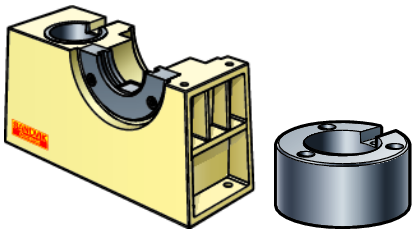


Drill chuck

An alternative for drilling machining when the demand for tool run-out is not too high. The chuck is versatile, fitting a wide diameter range without requiring a collet.

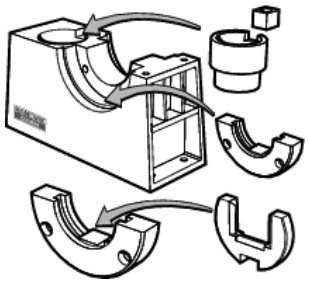
Assembly fixtures for modular tools

Use the assembly fixtures for mounting and dismounting modular tools.

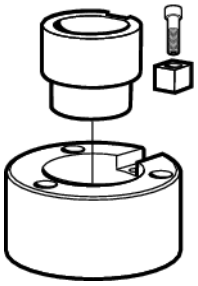


Fixture body

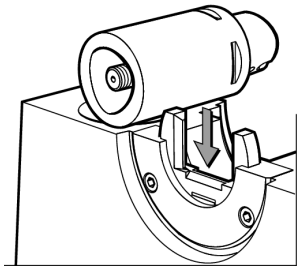
Use the assembly fixtures for mounting and dismounting modular tools.



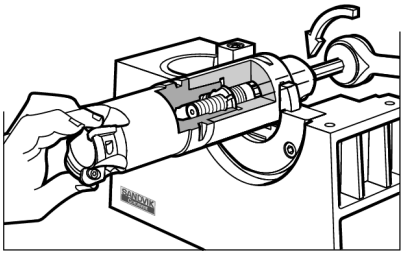
1. Choose flange, collar and sleeve to suit the tool to be assembled.



2. Choose sleeve to suit the coupling. The fixture should be fastened to a bench with three socket head screws.



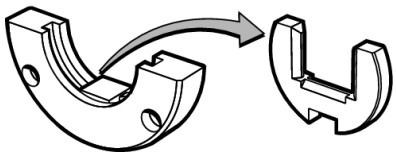
3. Place the adaptor/extension in the fixture. Locate the gripper grooves in the collar.



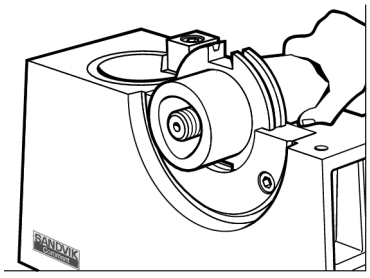
4. Tighten the screw with a torque wrench and extension key to recommended value.

Recommended values for Coromant Capto® coupling:

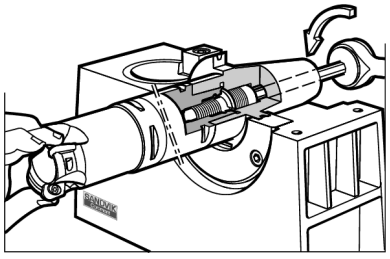
C3	45 Nm
C4	55 Nm
C5	95 Nm
C6	170 Nm
C8	170 Nm
C10	380 Nm



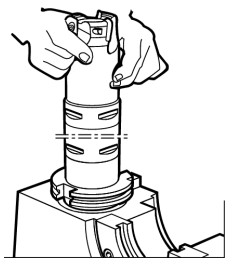
5. Remove the collar from the flange.



6. Place the basic holder in the flange. Locate the drive slot over the key in the flange.



7. Tighten the screw with torque a wrench and extension key to recommended value.



8. Put the tool assembly in the sleeve for mounting inserts or setting diameter.