Version 5.12
Supersedes 5.11

COROMANT CAPTO®

Spindle clamping set handbook.

SANDVIK Coromant

Content Page.

Enclosure.

SAFETY INSTRUCTIONS

Read this first.

Ensure that all employees who handle these clamping sets are properly trained and are aware of the dangers that may arise if they don't follow the procedures explained in this handbook.

Never make any modifications or alternations to these clamping set assemblies other than those recommended by SANDVIK COROMANT.

Clamping sets that have the force generated from Disc / helical springs or gas-springs should NEVER be disassembled without proper knowledge of the design and function, due to the personal injury that the present force could cause.

Do not overload the Coromant Capto® coupling; be sure to be inside the boundary lines with the tangential cutting force.

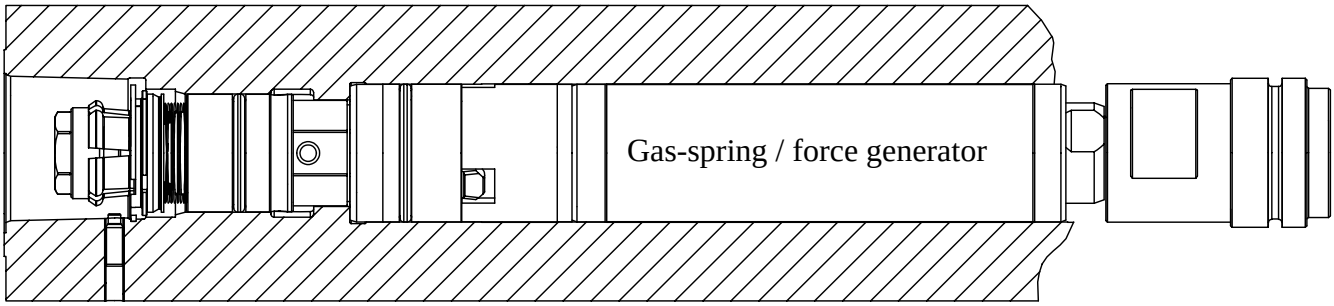
AVOID INJURY. Do not permit assemblies to be misused.

NOTE:

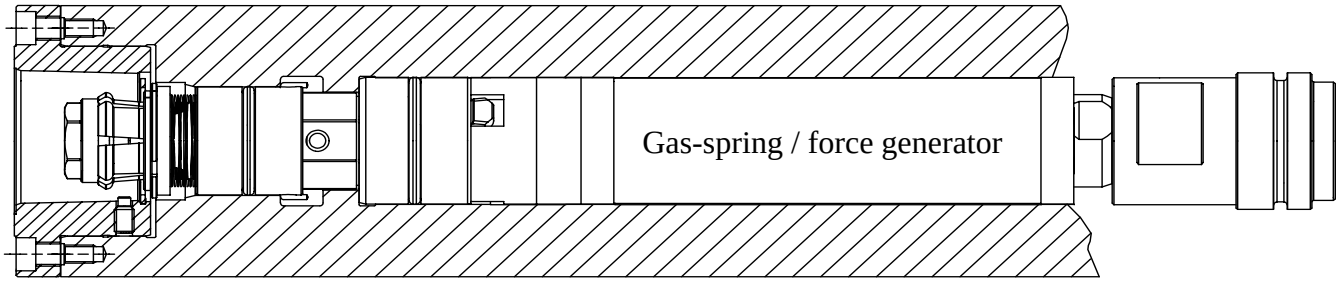
Warranty claims or service requests of Coromant Capto® spindle clamping set shall handles via the Machine Tool Manufacture / Spindle Manufacture to Sandvik Coromant, the builder is responsible for all claims from the end-user.

2. Description.

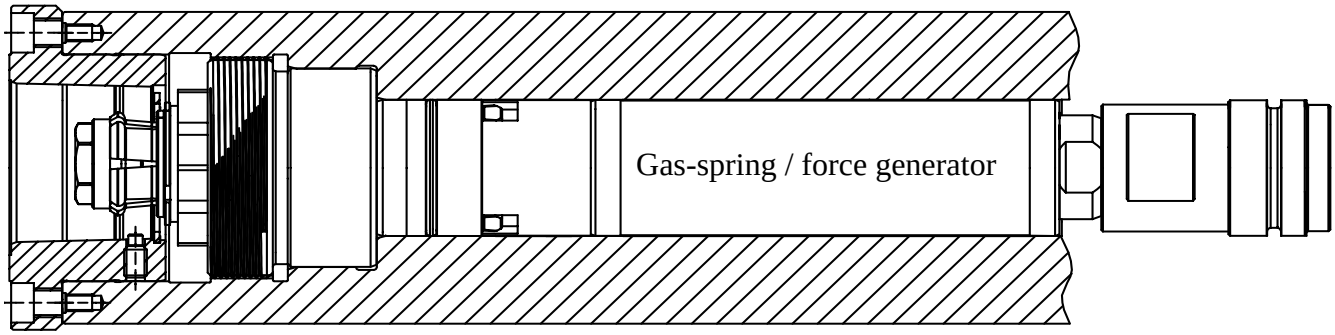
A builder can choose between three different designs of spindleshafts to fit Sandvik Coromant's clamping sets.The sketches shows spindleshafts with gas-spring equppid clamping sets, an option to this is to attach the builders own force generator, e.g. hydraulic, disc-springs etc. to the clamping set.



- **Spindleshafts with an integrated polygon.**



- **Spindleshafts with a polygon sleeve.**



- **Spindleshafts with a polygon sleeve and a spindle sleeve for ex. long spindleshafts that needs to be assembled from the front.**

SANDVIK Coromant Capto® spindle clamping sets are basic assemblies of Coromant Capto® size: C3, C4, C5, C6, C8 and C8X of Sandvik Coromant's modular tooling system program.

Clamping sets with gas-springs, a machine tool builder has to estimate / have knowledge how warm the spindle will be.
90°C should not be exceeded for clamping sets with gas-spring.

This generation of integrated Coromant Capto® spindle clamping sets has been designed to meet Machine Tool Manufactures / Spindle Manufactures demands for shorter spindle-shafts, reliably clamping force with long lifetime. The spindle clamping sets are able to work in a wide range of Rpm's, from low to high-speed applications without changing the properties of the balanced spindle. Coromant's clamping set is delivered as a cartridge that is ready to install into the spindle -shaft. The sets are optimized with a smaller OD and length, together with the gas-spring, all parts are symmetric made, that means the balancing of the assembled spindle is very easy to achieve compared to spindles with e.g. helical / disc springs.

Note. The real limitation regarding rpm's could be machine stability, size and design of the spindle shaft, bearings, tools etc.

Please read the safety instructions carefully. See section 1.

Fig. 1 View of a mounted Coromant Capto® C6 Spindle clamping set with gas spring.

Sandvik Coromant offers four basic options per size of the standard spindle clamping sets, **1.** Spindle clamping sets with a gas spring. **2.** Spindle clamping sets without the gas spring. **3.** Spindle clamping sets with sleeves and gas spring. **4.** Spindle clamping sets with sleeves without gas spring.
It's preferable that the manufacturers produce the spindle-shaft according to the built-in drawings that Sandvik Coromant provides.
See Enclosure: "Built-in instructions" for dimensions.
C8X have a larger contact surface (100mm) and use the same internal parts as C8 (80mm) except for the polygon sleeve.

Spindle clamping sets for spindles with integrated polygon.

The preferable option is a gas spring that actuates the clamping motion and applies the force. Solutions with integrated polygons are optimized in regards of run-outs, length, outside dimension, life-length and dynamic balance. It is delivered as a cartridge and ready to mount into a spindle-shaft. Sandvik Coromant conducts the polygon grinding of the spindle-shaft.

This clamping set comes without a gas spring, it has a threaded fitting at the rear end of the pullbar that a builder can attach there own device that actuates the clamping motion and force. This option will not be optimized in regards of dynamic balance due to lack of a symmetric made gas spring.

SANDVIK Coromant

Spindle clamping set for spindle with a polygon sleeve.

This option comes with a gas-spring clamping package together with a polygon sleeve. With these sets, the builder can produce their own spindle with help of the provided built-in instructions.

This spindle clamping set comes without a gas-spring, it has a threaded fitting at the rear end of the pullbar that the builder can attach their device that actuates the clamping motion and generates the clamping force.

3.Order codes, Clamping sets. x* Coromant Capto size.

(**H**= Drawbar with holding function. **F**= Front mounted clamping set)

Cx*-SP-CS-11:
Spindle clamping set with a gas spring (max 90°C) and a **standard drawbar**.

Cx*-SP-CS-11 H:
Spindle clamping set with a gas spring (max 90°C) and a drawbar with ***(H)* Holding function.**

Cx*-SP-CS-01:
Spindle clamping set with a **standard** drawbar.

Cx*-SP-CS-01 H:
Spindle clamping set with a drawbar with ***(H)* Holding function.**

x* Coromant Capto size.

(**H**= Drawbar with holding function. **F**= Front mounted clamping set)

Cx*-SP-CS-12:

Spindle clamping set with sleeve and gas spring (max 90°C) and a **standard drawbar.**

Cx*-SP-CS-12 H:

Spindle clamping set with a sleeve and a gas spring (max 90°C) and a drawbar with ***(H)*** **Holding function.**

Cx*-SP-CS-02:

Spindle clamping set with a sleeve and a **standard** drawbar.

Cx*-SP-CS-02 H:

Spindle clamping set with a sleeve and a drawbar with ***(H)*** **Holding function.**

Note, option for C8: C8X – SP – CS – 02 / 12 (H / F)

C8X: 100mm face contact of the sleeve.

x* Coromant Capto size.

(**H**= Drawbar with holding function. **F**= Front mounted clamping set)

Cx*-SP-CS-12 F:

(F) **Front** mounted spindle clamping set with a gas spring (max 90°C) and a **standard drawbar**.

Cx*-SP-CS-12 HF:

(F) **Front** mounted spindle clamping set with a gas spring (max 90°C) and a drawbar with ***(H)*** **Holding function.**

Cx*-SP-CS-02 F:

(F) **Front** mounted spindle clamping set with a **standard** drawbar.

Cx*-SP-CS-02 HF:

(F) **Front** mounted spindle clamping set with a drawbar with ***(H)*** **Holding function.**

Note, option for C8: **C8X – SP – CS – 02 / 12 (H / F)**
C8X: 100mm face contact on the sleeve.

4. Installation and system requiements.

All needed inside dimensions and tolerances to fit the clamping set are included in section **Enclosure - built-in instructions.**

All necessary dimensions are stated for the inside contour on these drawings. AB Sandvik Coromant are not responsible for the outside shape of the spindle-shaft, this is decided by the builder.

Coolant Pressure and filter requirement.

Maximum coolant pressue is 80 bar. A filter with maximum 50 micron mesh size shall be used to prevent excessive ware on internal parts.

The clamping set comes as a cartridge ready to assembly into the finished spindle-shaft. Sandvik Coromant offers three options for the manufacturing of the spindle-shaft:

NOTE:
AB Sandvik Coromant is not a spindle manufacture.
If necessary, Coromant will help a builder to produce the spindle-shaft.

- Sandvik Coromant arranges to manufacture the spindle-shaft according to specifications from the customer, the spindle is shipped with a measuring protocol.

Preferred options.

- The builder produces the spindle-shaft according to Coromant's built-in instructions and tolerances. Coromant will provide the builder with soft and hardware if the builder choose to mill the polygon by them self. For grinding, the spindle will be sent to Coromant, which can if chosen assembly the spindle-shaft and ship it back as a complete unit.

- If a builder chose a sleeve solution, the spindle-shaft could be produced in house with help of the Coromant's built-in instructions, the builder only needs to buy the clamping cartridge with a sleeve to finish the spindle-shaft.

Coromant Capto interface system positioning.

Within the Automatic Tool Change (ATC) sequence, the two (2) constituents of the Coromant Capto interface (Clamping unit and cutting unit) should be within the recommended orthogonal and angular tolerances of the interface elements as per Fig. 23A & B. Interface elements positioning out of the recommended tolerances may effect the correct clamping and positioning of the cutting unit.

Information about Gauges and Support tools: see enclosure A

NOTE:
Wrong clamping position of the cutting unit will influence the repeatability precision and the ability of a safe clamping.

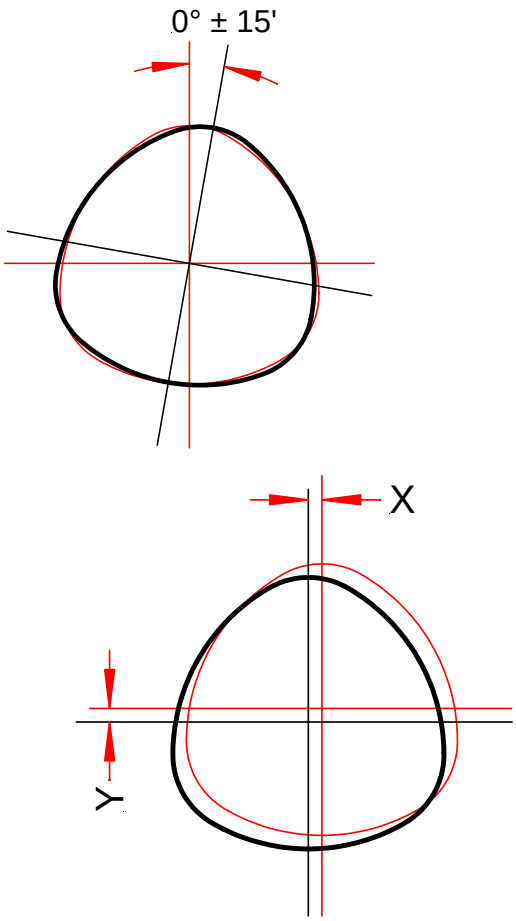
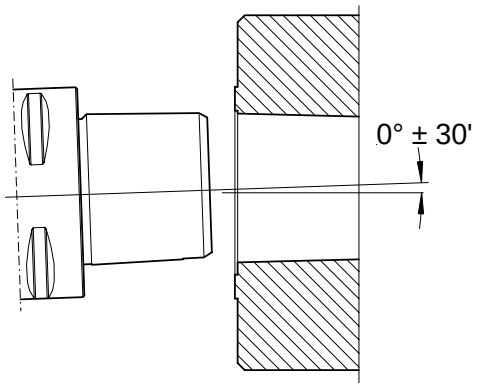


Fig. 23A



Coromant Capto Size	X mm ±	Y mm ±
C3	0,12	0,12
C4	0,15	0,15
C5	0,18	0,18
C6	0,23	0,23
C8 / C8X	0,30	0,30

Measured when tool centerline and spindle are parallel.

Fig. 23B Orthogonal and angular interface tolerance positioning.

5. System specifications. Clamping set with gas spring, max 90ºC.

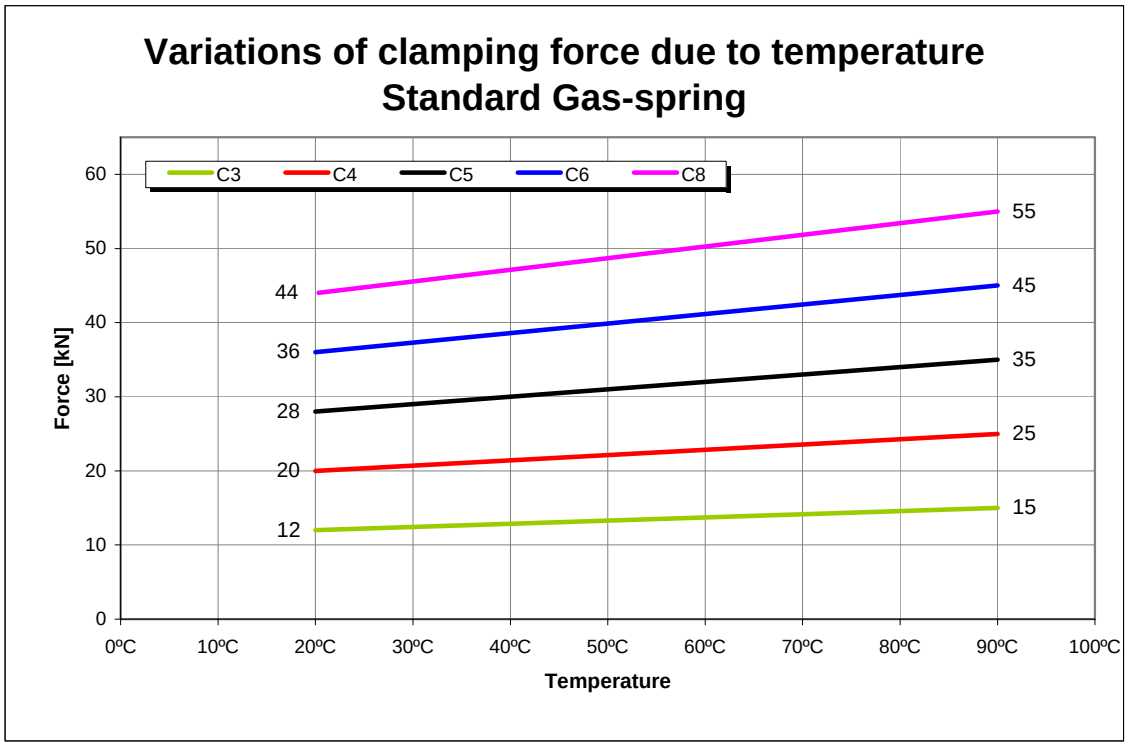
NOTE: This information regarding clamp / unclamping force are only valid for clamping cartridge equipped with a gas-spring.

The maximum temperature for a gas-spring is 90ºC.

Due to temperature of the spindle, the clamping force varies (~ 0,34% / 1ºC) because the gas is expanding inside the gas-spring, therefore it's important to measure the clamping force at a given temperature and compare it with the chart bellow**.**

Clamping force at 20ºC			Ejecting force	
Size	Service limit*	Guideline values	Min	Max
C3	8	12kN	13	18kN
C4	15	20kN	19	25kN
C5	20	28kN	24	31kN
C6	27	36kN	34	42kN
C8 / C8X	33	44kN	45	60kN

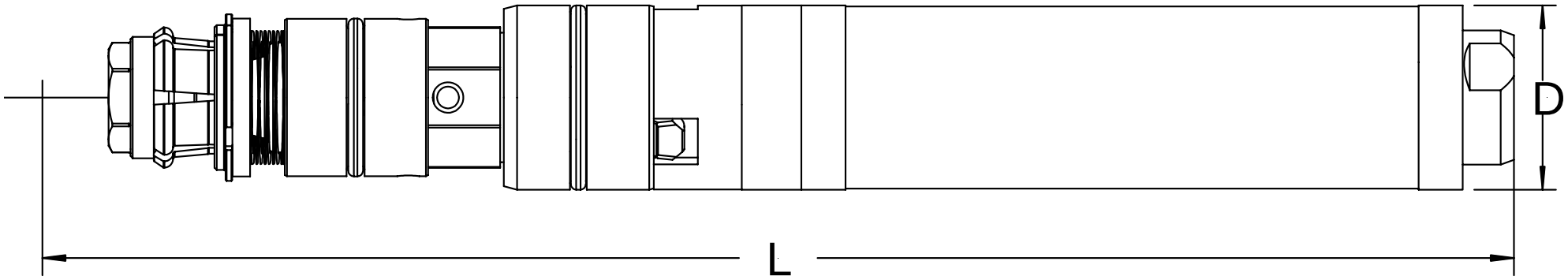
* Only recommended service limit.



Calculation example to check the limit of clamping forces for a C6 at 70º or at various temperatures.
Ex. Spindle temp.70º, [(0,34*50)/100] *27+27 = 31,6kN (Recommended service limit at 70º)
(50 = temp different from 20º to 70º, 27 = Recommended service limit at 20º)

Dimensions for a clamping set equipped with a gas spring. (**Cx-SP-CS-11/12-D1**)
The length dimension is from the polygon face with the spindle clamping set in its rear end position.

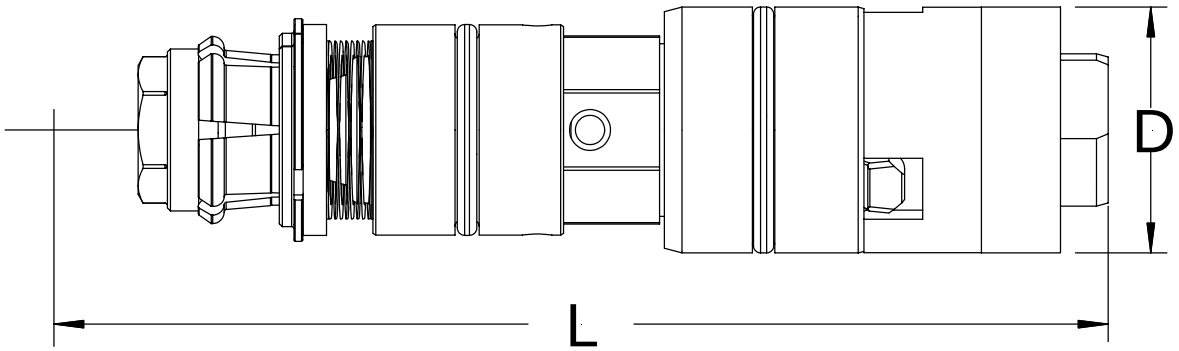
Size	**L**	**D**	**Minimum stroke of the ejecting device.***
C3	233,0 mm	Ø 30 mm	11,4 mm
C4	258,7 mm	Ø 32 mm	11,5 mm
C5	284,4 mm	Ø 36 mm	12,8 mm
C6	337,0 mm	Ø 42 mm	14,4 mm
C8 / C8X	367,2 mm	Ø 48 mm	17,0 mm



* Includes a 0,5mm gap between adapter and ejecting device.

Dimensions for clamping set without a gas spring. (**Cx-SP-CS-01/02-D1**)
The length dimension is from the polygon face with the spindle clamping set in its rear end position.

Size	**L**	**D**	**Clamping force**	**Minimum stroke of the ejecting device.***
C3	116,0 mm	Ø 30 mm	13,0kN ± 15%	11,1 mm
C4	133,2 mm	Ø 32 mm	22,0kN ± 15%	11,2 mm
C5	151,4 mm	Ø 36 mm	30,5kN ± 15%	12,5 mm
C6	183,5 mm	Ø 42 mm	39,0kN± 15%	14,1 mm
C8 / C8X	202,7 mm	Ø 48 mm	48,0kN± 15%	16,7 mm

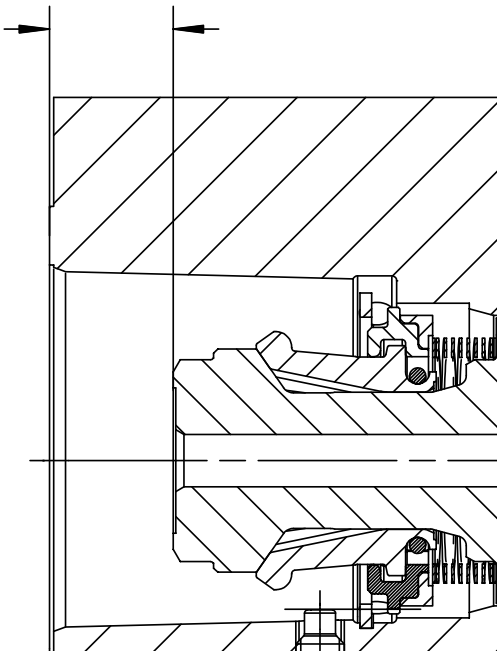


* Includes a 0,5mm gap between the adapter and ejecting device. The distance has to be measured between the rear end of the adapter and the ejecting device.

Drawbar position.

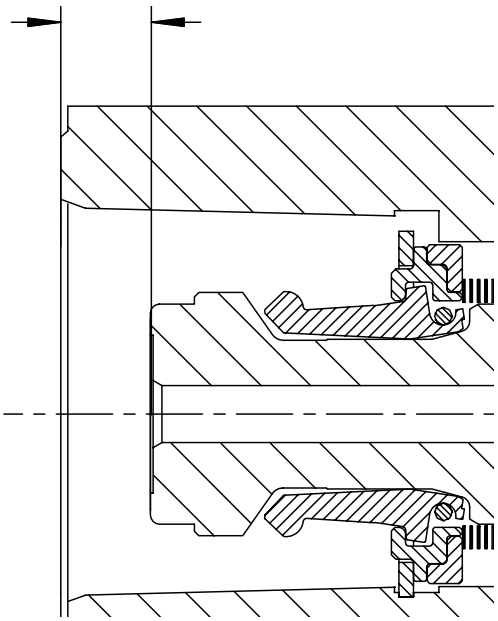
These values have to be held to ensure a proper function of the system.

End Position

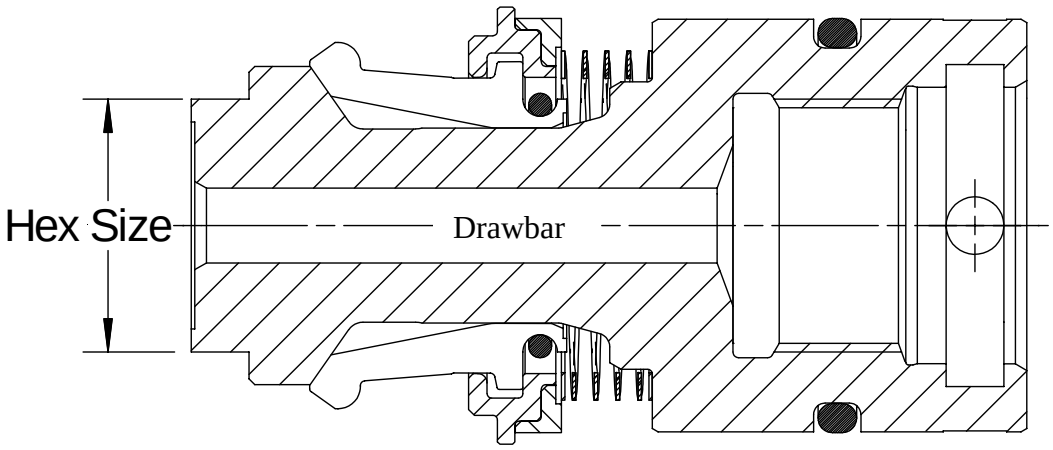


Size	End position Min.
C3	8,5 mm
C4	12,0 mm
C5	13,5 mm
C6	15,8 mm
C8 / C8X	24,8 mm

Ejected Position

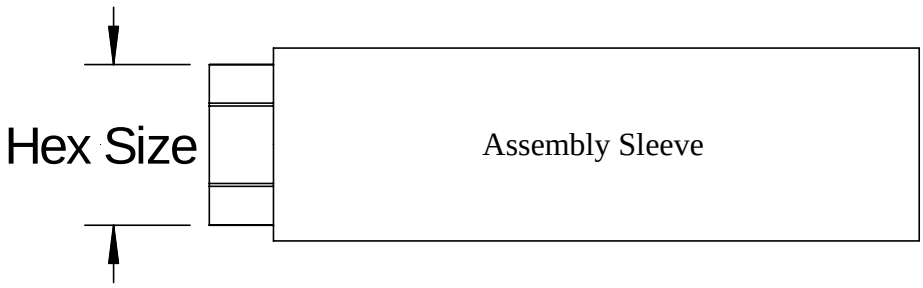


Size	Ejected position
C3	5,3 ± 0,2 mm
C4	8,3 ± 0,2 mm
C5	9,2 ± 0,2 mm
C6	10,2 ± 0,2 mm
C8 / C8X	19,2 ± 0,2 mm



Hex Size, Drawbar.	Tightening torque.
C3: 13mm	C3: 40Nm
C4: 15mm	C4: 70Nm
C5: 18mm	C5: 110Nm
C6: 22mm	C6: 170Nm
C8 / C8X: 24mm	C8 / C8X: 210Nm

NOTE: The torque to loose open the drawbar will exceed the tightening torque.



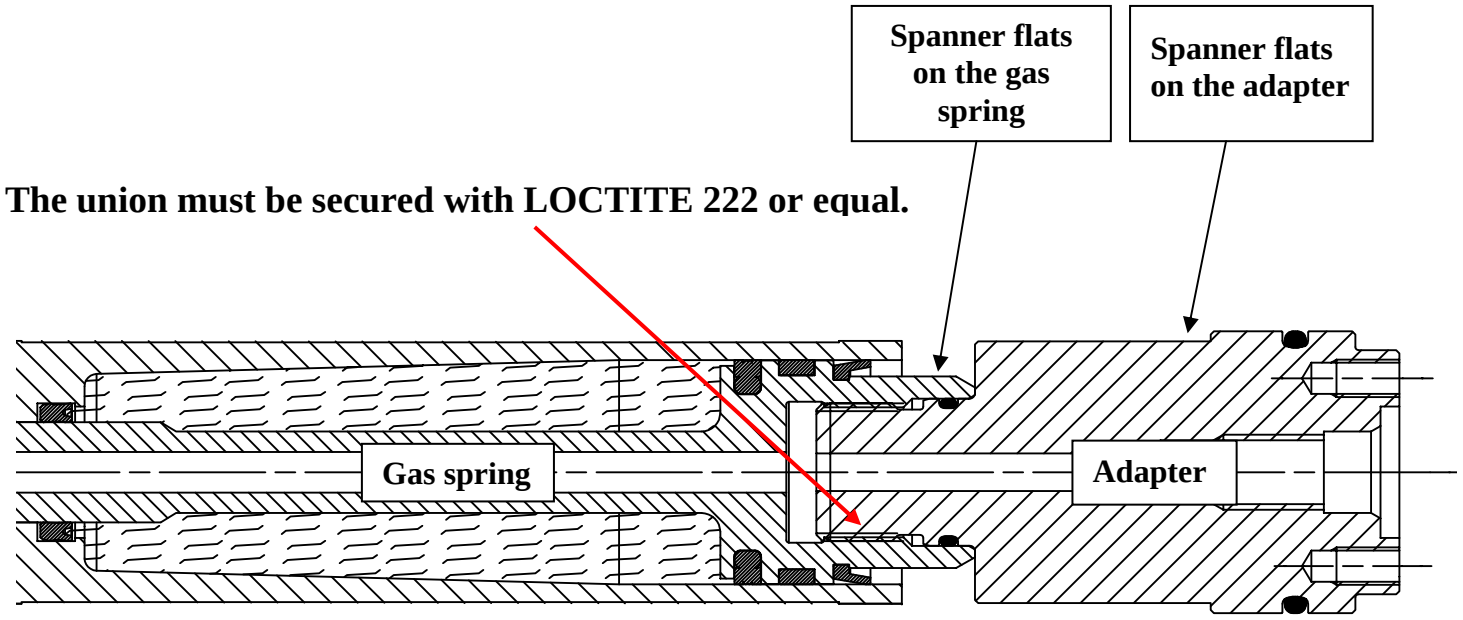
Hex Size, assembly sleeve.	Tightening torque.
C3: 13mm	C3: 10Nm
C4: 15mm	C4: 10Nm
C5: 18mm	C5: 20Nm
C6: 22mm	C6: 25Nm
C8 / C8X: 24mm	C8 / C8X: 25Nm

An adapter* shall always be used between the gas spring and ejecting device, this is needed to be able to fit where the coolant is introduced and where the ejecting device applies its force.
Manufacturers have to meet AB Sandvik Coromant's design requirements regarding tolerances and runouts of the adapter. Length, OD and design of the interface are made according to machine specifications.

Use the flats on the adapter and gas spring when tightening or removing the adapter, it's important to use these flats to prevent any unnecessary stress on other parts inside the cartridge.

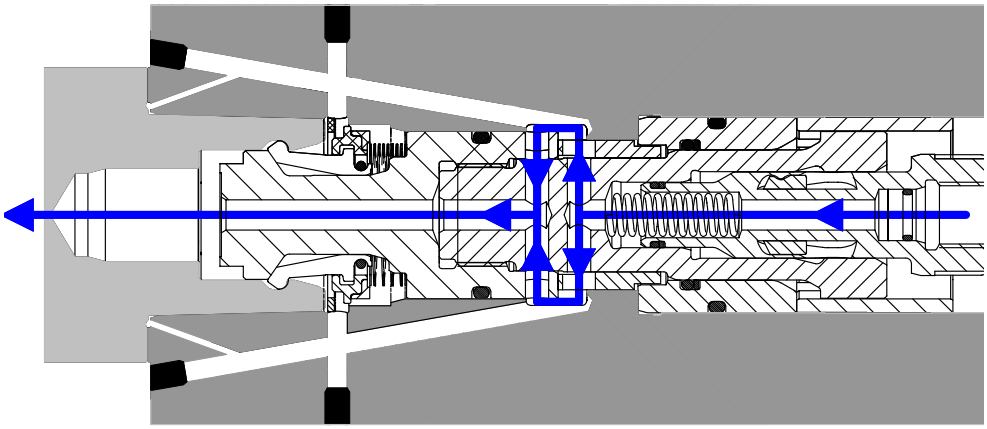
*** The adapter is preferable made by the builder according to Sandvik Coromant's design instructions.**

See **page 75** *for torque and spanner size.*

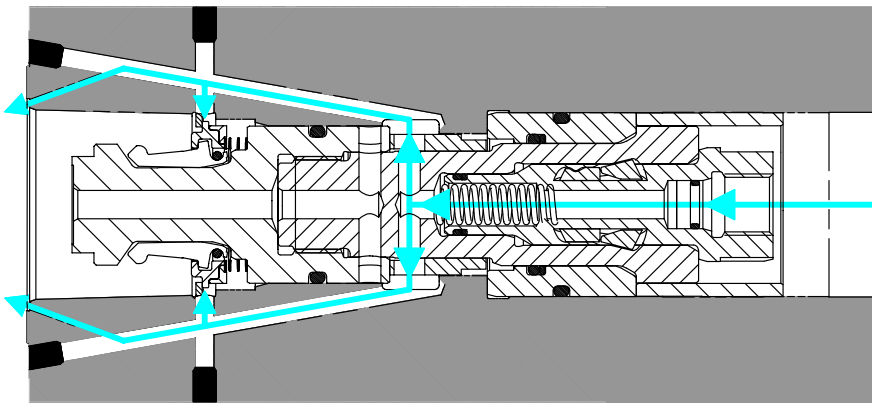


Internal valve for coolant and air blast.

All clamping sets have an internal valve built-in that switches between the coolant and air-blast channels. When the ejecting motion occurs, the internal valve switches position and directs the air into the air-blast channels to clean the interface. When a tool is clamped, the coolant is directed through the tool via the spindle. To be able to uses the standard feature an external valve has to be used that is preferable mounted close to the rear end of the spindle shaft. The external valve has to be timed so that the coolant is active when a tool is clamped and switches to air when the ejecting occur, the air blast shall stay active until the new tool is entered. We recommend having at least two bars air pressure to clean the interface.



The picture shows how the coolant is directed via the valve when a cutting tool is clamped.

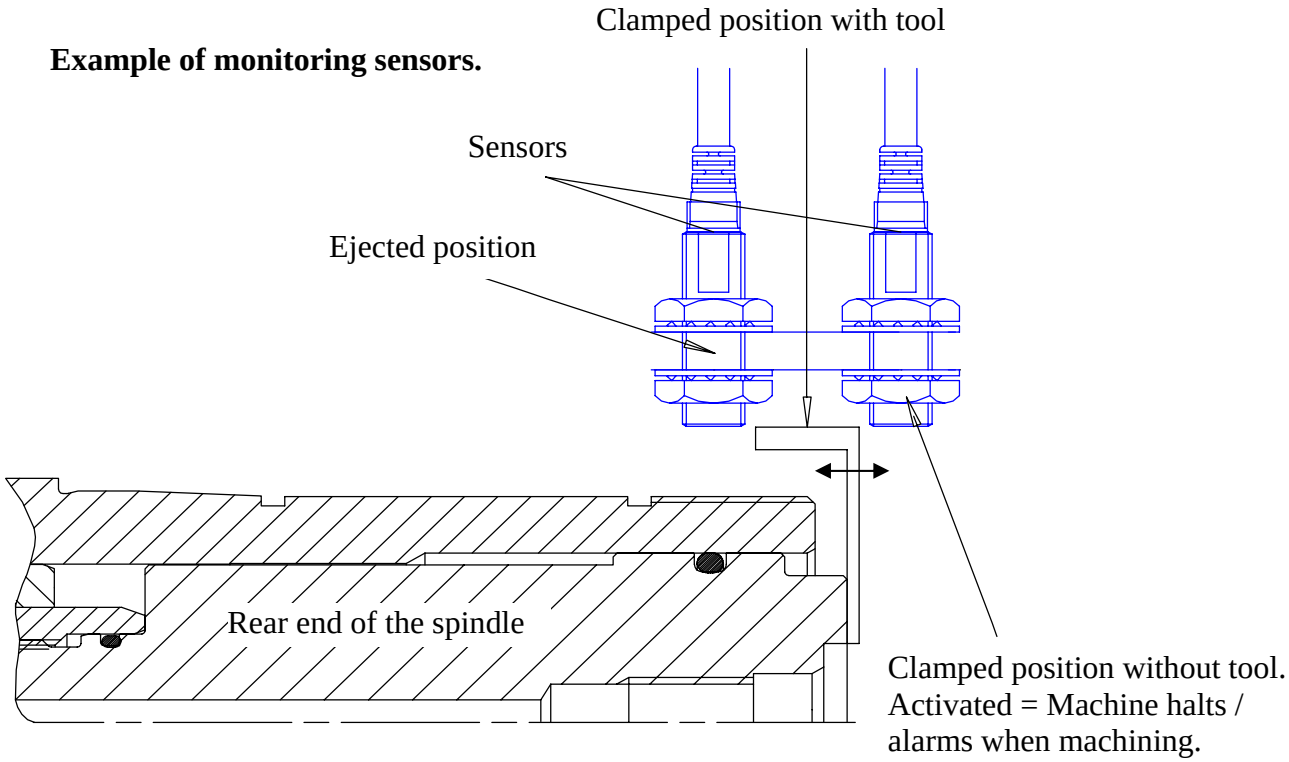


The picture shows how the air-blast is directed via the valve to clean the interface and cutting tool when it’s removed.

Position sensors.

In order to monitor the automatic clamping cycle it's recommended to use at least two sensors, clamped without tool & ejected position. To optimize this, a third sensor could be used to monitor clamped with tool position. This is to avoid any crashes in the machine when machining regardless of tool interface.

Example of monitoring sensors.



Clamping force.

To be able to have proper capacity for the Coromant Capto system we have stated the force under **system specification.**

Coolant filter.

We recommend using filters with a maximum mesh size of 50-micron.

Amplifier ratio.

The built-in amplifier has a ratio of 3,5:1, this has to be considered if a manufacturer will design their own device to generate the clamping force. Example; Actuating device force = clamping force / 3,5.

6. Service.

Coromant Capto® clamping set with a gas spring.

If service is needed on a spindle with a Coromant Capto® clamping set with a gas spring, the whole cartridge should be replaced. The reason is that it's too difficult to determine which item shows too much wear. To ensure proper function, the whole cartridge is replaced.

Replacing the cartridge is very easy and safe compared spindles with disc / helical springs. No special tools are needed to compress the gas spring compared to a spindle with a disc / helical spring. The force in a gas spring is contained inside a cylinder and doesn't expose the service technician for danger.

It's possible to carry out the service inside the machine, if the cartridge could be pushed out backwards through the spindle shaft. To accomplice this, all items in the rear end of the housing has to be removed to have clearance for the cartridge.

NOTE: The curvic coupling can be damaged if it's engaged to lock the spindle when the drawbar is loose open / tightened. We recommend using a **P**olygon **H**olding **T**ool (**PHT**) to hold the spindle in position to prevent it to turn when the drawbar is loose open or is tighteened.

Coromant Capto® clamping set without a gas spring.

The same general rule applies to this set as sets with gas springs. We urge the maintenance crew to take contact with the manufacture of the machine / spindle to get advice how to dismantle the device inside the spindle that generates the force safely. If the force device is not secured proper, personal injury could happen.

Disassembly instructions for spindles with integrated polygons.

Begin with removing the circlip. (Pry and pull to remove it, see fig 11)
To loosen the drawbar the spindle has to be locked, we recommend using a **P**olygon **H**olding **T**ool (**PHT**) to hold the spindle / shaft. After that the drawbar is removed it's important to mount and tighten the ***assembly sleeve** to secure and hold all parts in position when removing the clamping set.
If the spindle is present inside a housing all Items in the rear end e.g. ejecting device has to be removed to be able to push out the clamping set.
NOTE: On size C3, C4 & C5 the positioning pin has to be lowered to take out the drawbar. (See fig. 12). ***To** prevent any damages inside the spindleshaft when dissasembling, an assembly sleeve has to be used, it's also needed to be able to push out the clamping set in a proper way.

A 6 point socket without internal chamfers should be used to prevent slipping when loosen / mounting the drawbar.

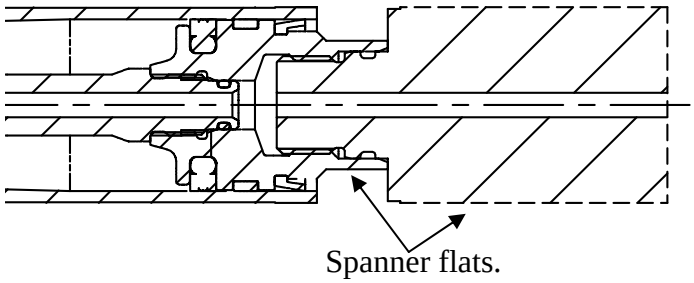
Disassembly instructions for spindles with polygon sleeves.

Begin to loosen the drawbar, we recommend using a **P**olygon **H**olding **T**ool (**PHT**) to hold the spindle shaft. Remove the sleeve (attach a slide hammer to the threaded holes, if needed) then remove the drawbar.
NOTE: C6, C8 / C8X, take away the circlip, the polygon sleeve has enough clearance to remove the drawbar. It's important to mount and tighten the assembly sleeve to secure and hold all parts in position when removing the clamping set.
If the spindle is present inside a housing all Items in the rear end e.g. ejecting device has to be removed to be able to push out the clamping set. (See fig. 13)

Clamping set.

When the clamping set has been pushed out from the spindle shaft it's time to dismount the adapter and mount it to the new clamping set.

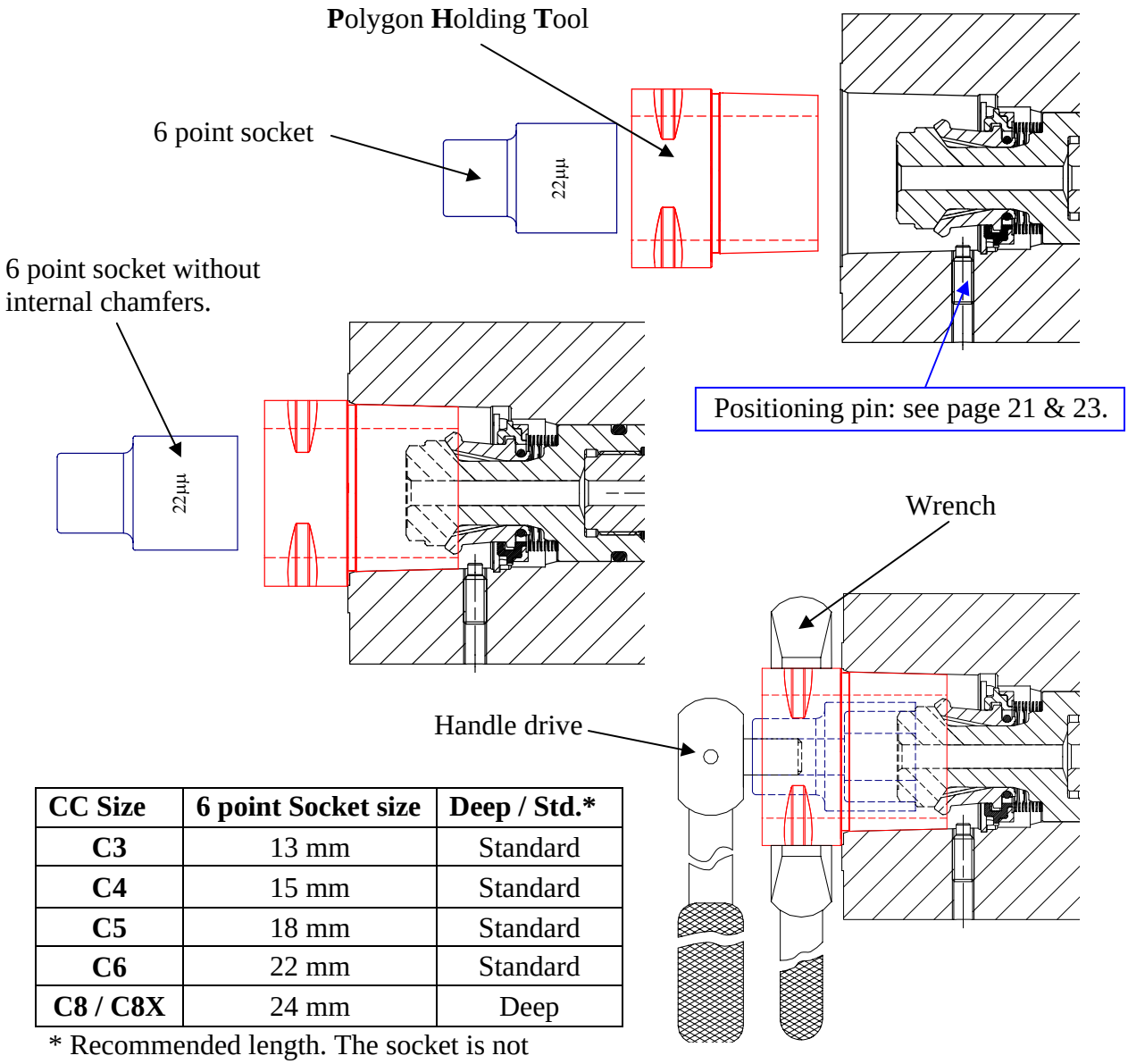
Important, Always take support from the spanner flats that are found on the rear end of the gas spring and the adapter according to the sketch.



Dismantling by using the Polygon Holding Tool

1. Remove the circlip. It's not possible to remove the drawbar if the circlip is present.
2. Insert the **PHT** into the polygon, hold it at the two flats with an wrench.
3. Connect the handle drive with the 6 Point socket to the dra wbar.
4. Loosen the drawbar with the handle drive, hold the spindle in position with help of the **PHT** and the wrench. Remove the drawbar and mount the assembly sleeve.

Assembling is performed in reversed order.



CC Size	6 point Socket size	Deep / Std.*
C3	13 mm	Standard
C4	15 mm	Standard
C5	18 mm	Standard
C6	22 mm	Standard
C8 / C8X	24 mm	Deep

* Recommended length. The socket is not provided by AB Sandvik Coromant.

Dismantle instruction.

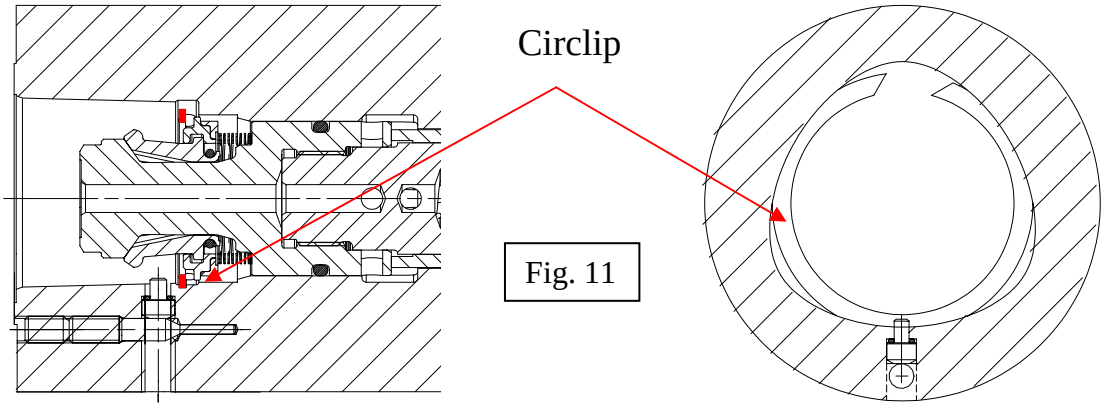


Fig. 11

The circlip exist with all polygons, it has to be removed* to be able to remove the drawbar. *For size C3, C4 and C5 the polygon sleeve have to be removed, if present.

On size C3, C4 & C5 the positioning pin has to be lowered to be able to remove the drawbar or the polygon sleeve have to be removed, if present. Remove the setscrew, unscrew the level screw until the positioning pin retracts according to the sketch.

Fig. 12

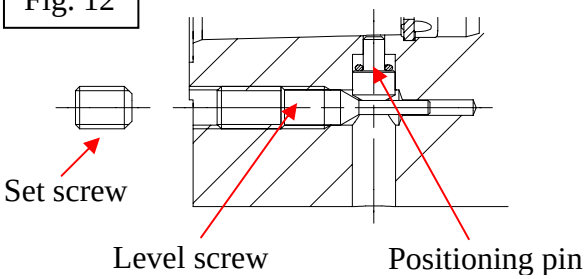
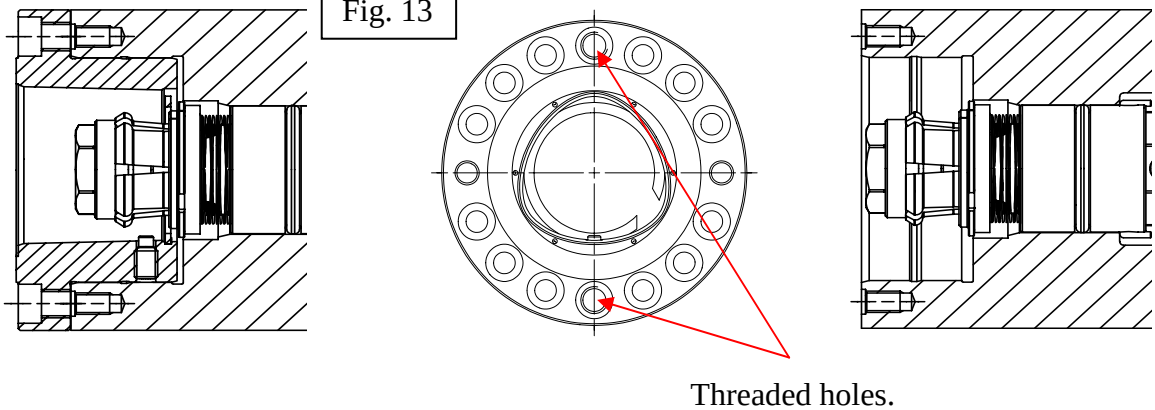
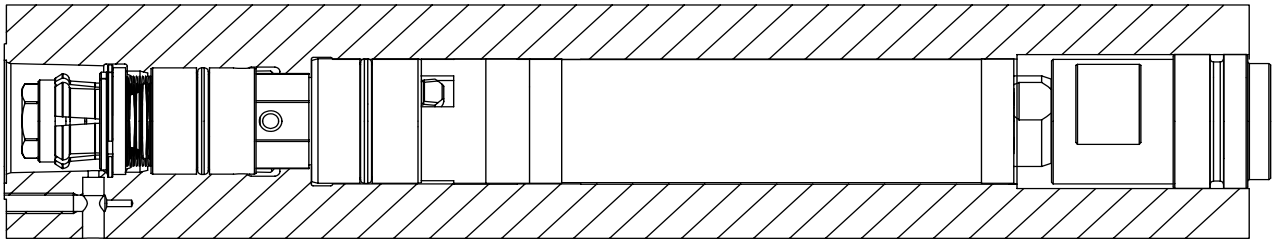


Fig. 13

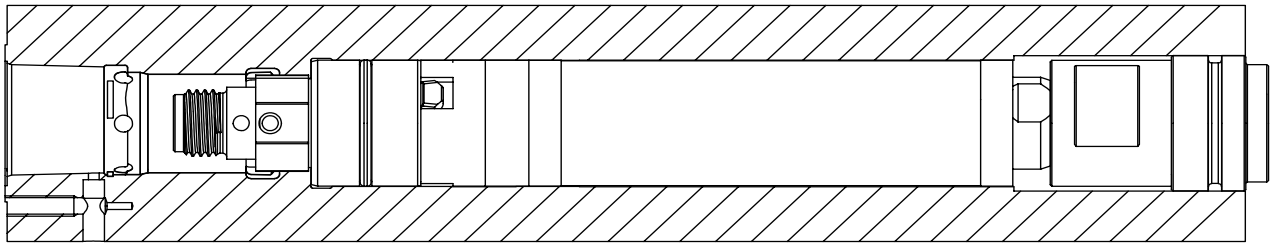


Loosen the drawbar with help of the **P**olygon **H**olding **T**ool**,** then remove the cap screws, attach a slide hammer to the threaded holes and remove the sleeve.

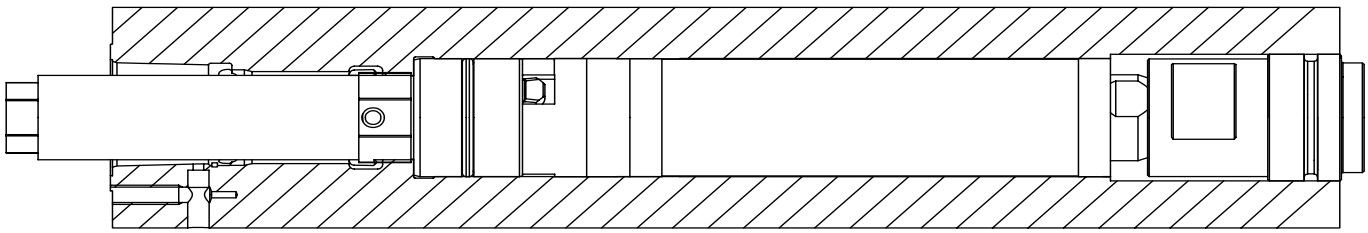
Dismantle instruction.



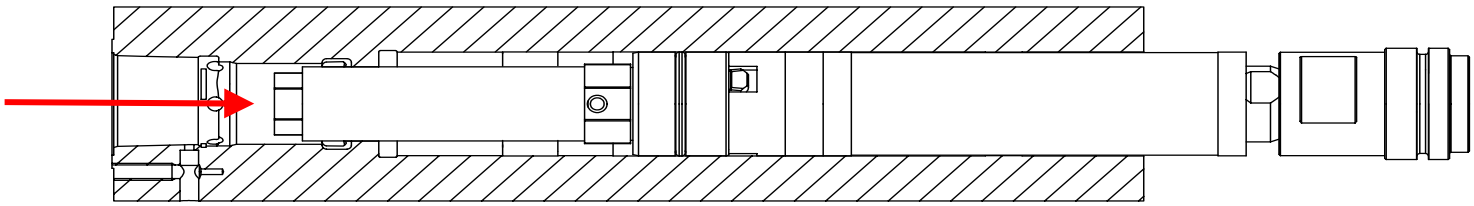
Remove the circlip and loosen the drawbar with help of the **P**olygon **H**olding **T**ool.
(Size C3, C4 and C5: remove the polygon sleeve if present after that the drawbar is loose)



Remove the drawbar. (The positioning pin has to be lowered on size C3, C4 & C5)



Mount the assembly sleeve and tighten to specified torque. (Torque: see **page 18**)



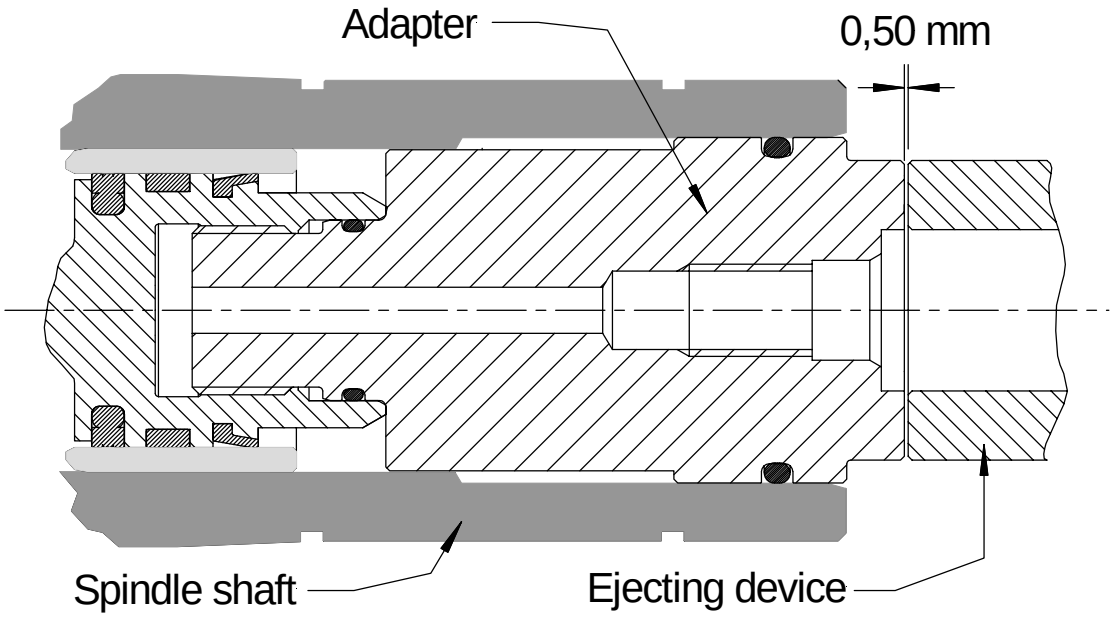
Push out the clamping set. Remove the adapter and mount it on the new clamping set.
(Do not pull out the clamping set from rear end, it can be jammed.)

Assembly, please see: "Assembly instructions".

Ejecting stroke and force.

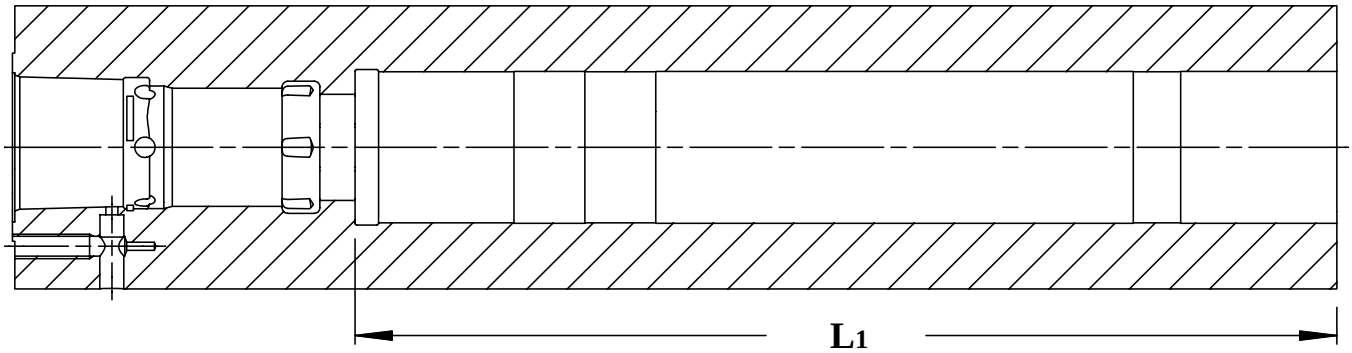
To have the machines tool change cycle work reliable, it's very important to obey our demands regarding stroke of the ejecting device and needed force according to what's stated on the drawing for the Coromant Capto® system. Sandvik Coromant recommends a clearance at least of 0,5mm when the spindle is clamped without tool.

The force of the ejecting device has to be according to the demands stated in the drawing. If the force of the ejecting device is lower than the stated force, it could be impossible to eject the tool out of the spindle.

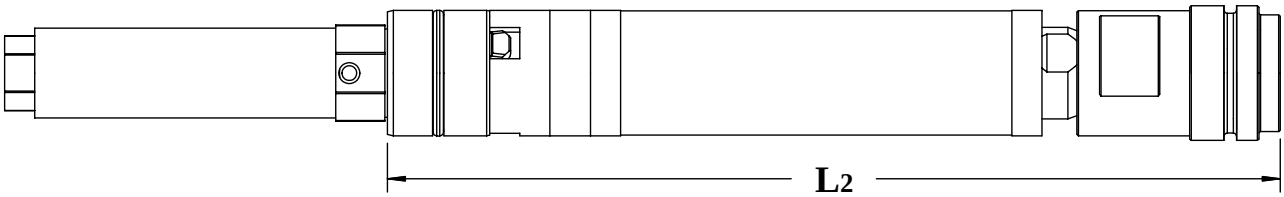


It is of importance in regards of stroke and clearance, for the ejecting device to measure where the end of the adapter / pullbar extension is in relation to the housing / spindle-shaft in order to get a proper function. With the achieved dimension, adjust the ejecting device position in order to get the necessary clearance between the face of the adapter and ejecting device.

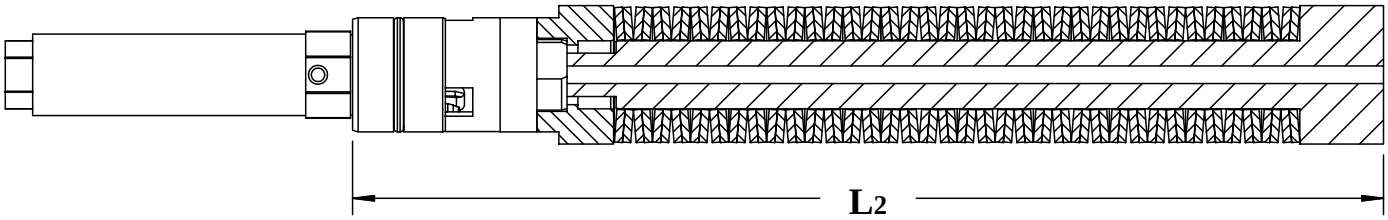
The sketches are a general suggestion how to measure the clamping sets position.



Measure the depth **L_1**.



Measure the dimension **L_2**.



Subtract L_1 from L_2 = X mm.

- X mm + 0,5mm = Piston position of the ejecting device.
- The dimension X, gives also information if the clamping set has reached the correct position inside the spindle-shaft

7. Faulty detection.

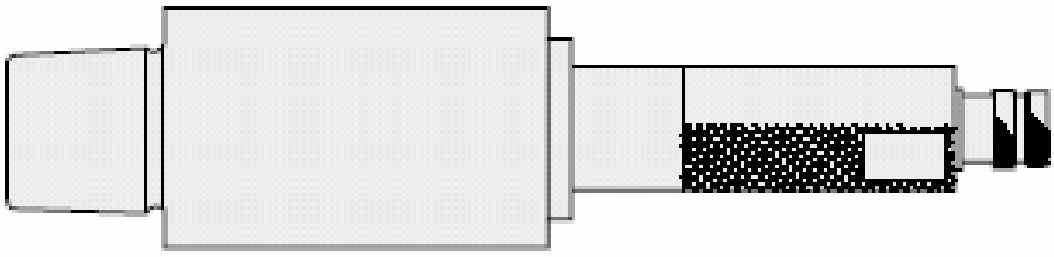
Problem	Cause	Remedy
Broken or damaged segments.	Incorrect clamping. Wave-spring broken. Damage at the locking groove inside the cutting unit.	Adjust the ATC and timing. Replace the wave-spring and segments or replace the clamping drawbar. Replace the cutting unit.
Cutting unit gets loose when machining.	Incorrect clamping.	Adjust the ATC and timing.
Incorrect clamping.	Cutting unit did not have contact with the drawbar face when the clamping occurred. Cutting unit could not enter proper due to air blast pressure. The segments are jammed on the drawbar.	Adjust the ATC and timing. Adjust the timing of the air blast, the blast has to be shut off before the cutting unit get in contact with the drawbar. Clean the area and make sure the segment runs smoothly on the drawbar
Vibrations.	Spindle bearings. Too long overhang of the cutting tool.	Check the runout / backlash. Change to another tool.
Machine alarm. (clamped position)	Incorrect clamping. Limit switches. Clamping force.	Adjust the ATC and timing. Verify function. Verify motion and check the force with a safe control device.

A. Gauges and support tools.

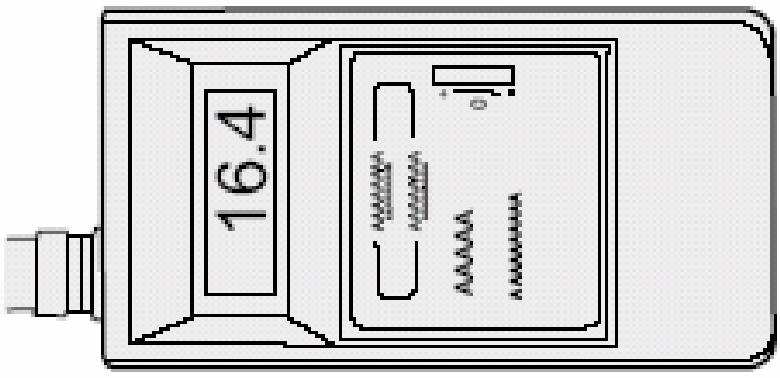
Clamping Force.

The **safe control** is used to measure the clamping force of the spindle clamping set.

Sandvik Coromant offer safe control devices in different sizes via our business partners **Berg GmbH** and **Kelch GmbH**. Please contact your local Sandvik representative for more information.



Test gauge

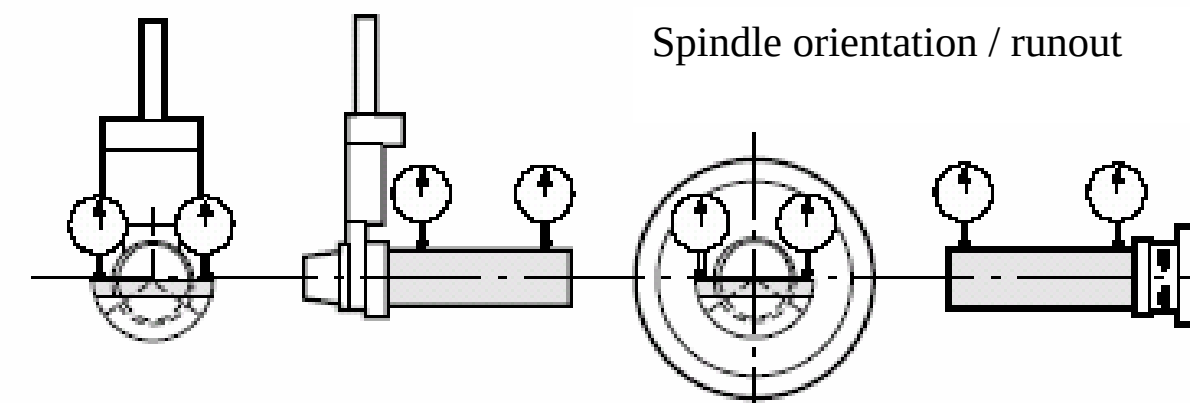


Reading unit

Master setting gauges.

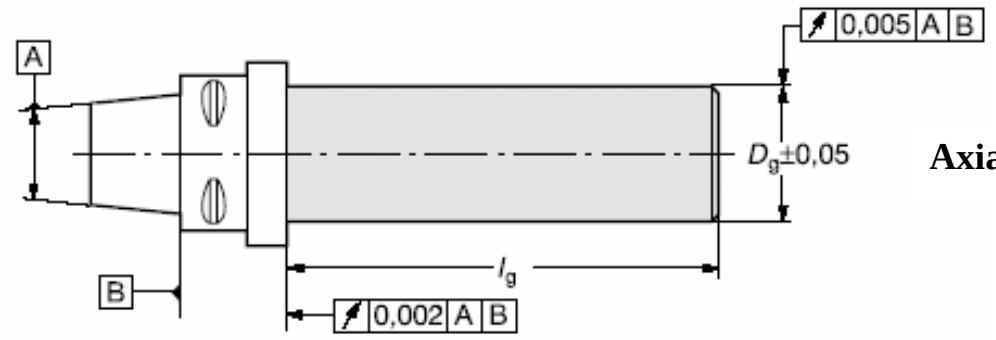
Sandvik Coromant offers a range of axial and center height masters gauges, which are strongly recommended when tuning in various parameters in the machine e.g. gripper / ATC position, spindle orientation and spindle center height.

Gripper / ATC position



Spindle orientation / runout

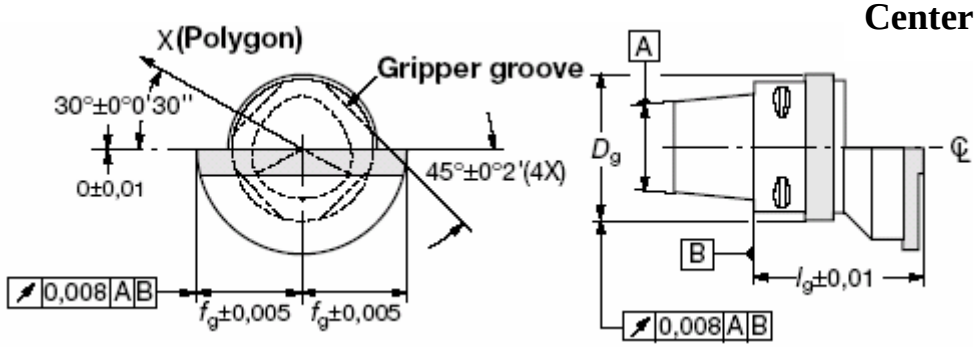
Master setting gauges.



Axial gauge

Size	Ordering code	Dimensions, mm	
		D_g	l_g
C3	C3-MAS-11	25	160
C4	C4-MAS-11	25	160
C5	C5-MAS-11	32	215
C6	C6-MAS-11	40	320
C8	C8-MAS-11	40	320

Center height gauge



Size	Ordering code	Dimensions, mm		
		f_g	l_g	D_g
C3	C3-MAS-01	22	40	34
C4	C4-MAS-01	27	50	42
C5	C5-MAS-01	35	60	52
C6	C6-MAS-01	45	65	65
C8	C8-MAS-01	55	80	82

Coromant Capto Alignment tool.

This tool is used to check the ATC positioning at the magazine and at the clamping unit / spindle. The alignment tool contains four (4) Items, two (2) gauge pins and a divided tool. Handle the alignment tool with care, any presence of dents or nicks will make this tool less reliable to find the correct tool change position.

NOTE:
It's of prime importance to follow this instruction when an ATC is used. Check and adjust the axis to achieve the necessary tolerances as per fig.23B. If this is not achieved the result could be abnormal wear on cutting adapter, Coromant Capto interface, faulty clamping, dropped tools, personnel injury etc.

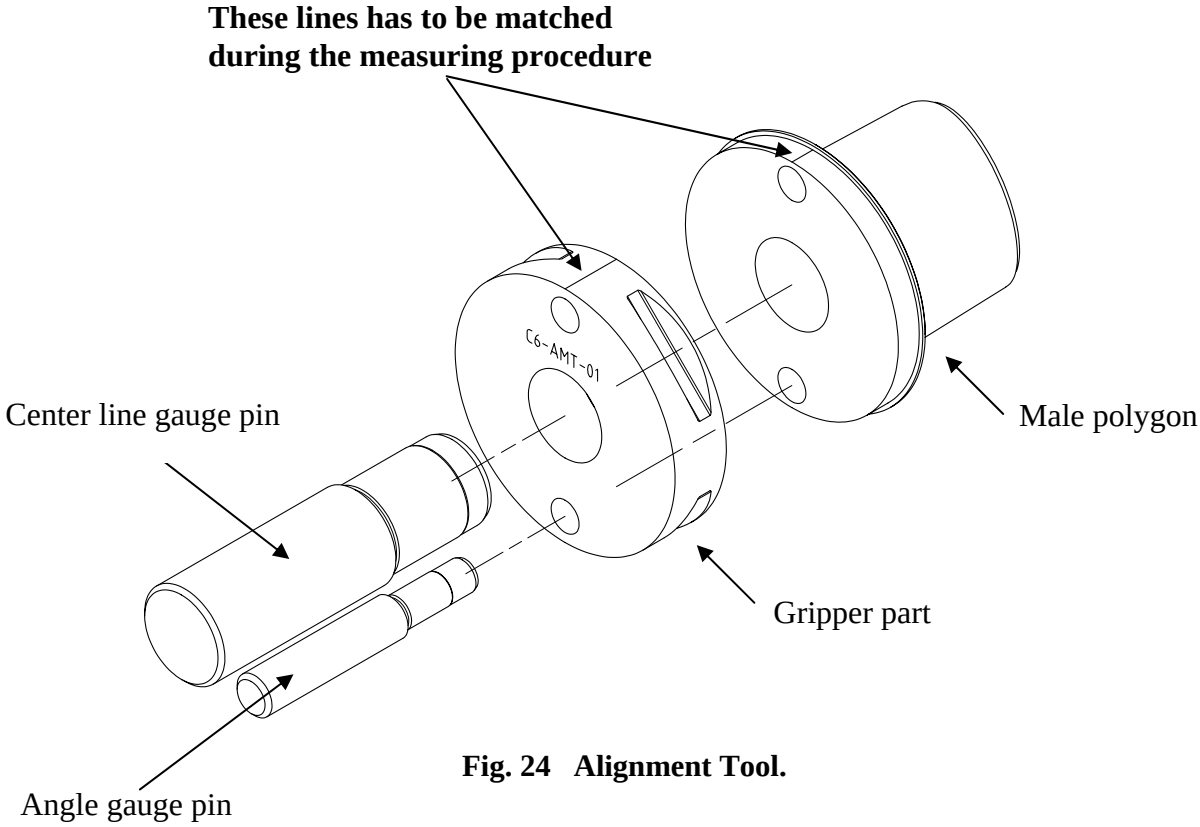


Fig. 24 Alignment Tool.

User Instruction.

Clean the interfaces clamp the part with the male polygon in the clamping unit / spindle. Mount the part with the gripper slots to the ATC, another option is to mount it when the ATC is at the tool change position. Run the machine in steps until the ATC reaches the other part that's clamped to the unit / spindle.
The gauge pins are designed with two diameters; the smaller OD is equal to max out of center / angle tolerance, the larger OD is equal to a perfect centerline / angle.

Begin with the centerline gauge. Push it into the hole, if it's possible to have the larger OD through both parts it's perfect aligned. The centerline gauge pin has to be fully inserted when the Angle gauge pin is inserted to be able to check the angle, adjust the angular misalignment of the ATC / Spindle until the angle gauge pin fits.

The Alignment Tool makes it possible to see which axis that needs to be tuned in to get a proper tool change cycle.

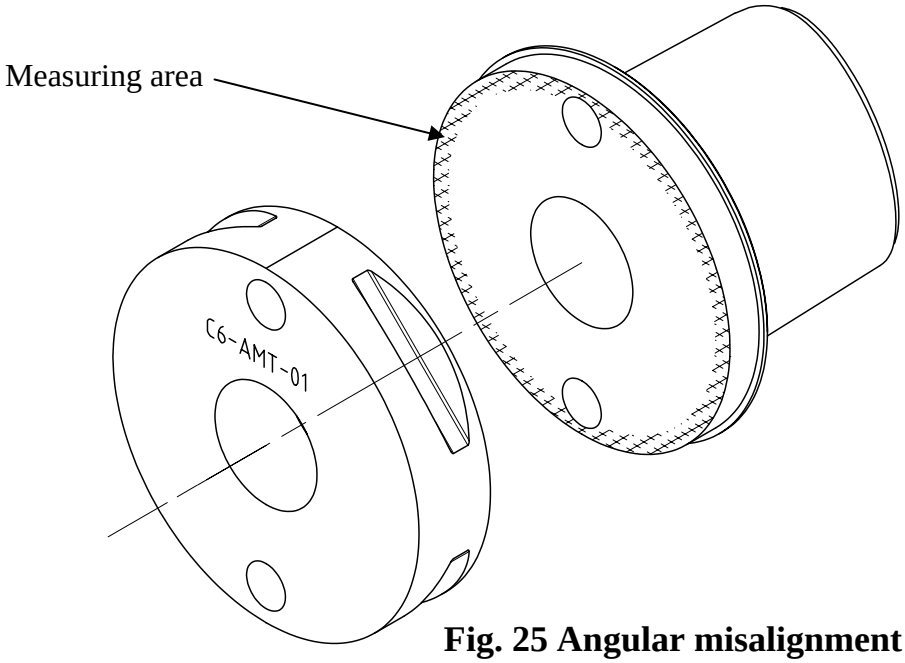


Fig. 25 Angular misalignment measuring area.

To be able to check the angular misalignment between a cutting adapter and the Coromant Capto interface when the ATC is loading, it's needed to use a Alignment Tool. Have the male polygon clamped into to the unit / spindle, run the machine in steps until the ATC is in loading position with the gripper part. Insert a feeler gauge all around the marked area and measure the max difference between the surfaces. The measured difference has to be according to the diagram bellow, to be within the maximum allowed angular misalignment as per **fig.23A**. Adjust the ATC and OR the spindle if necessary to get the misalignment within the tolerances.

Coromant Capto Size	Max. difference mm	Alignment Tool Order code
C3	0.28	C3 – AMT – 01
C4	0.35	C4 – AMT – 01
C5	0.44	C5 – AMT – 01
C6	0.55	C6 – AMT – 01
C8	0.70	C8 – AMT – 01
C8	0.87	C8X – AMT – 01

Balancing tool.

A machine tool spindle shall never be run without a tool attached to the interface, this is to avoid misalignment of segments and the holder due to centrifugal forces.

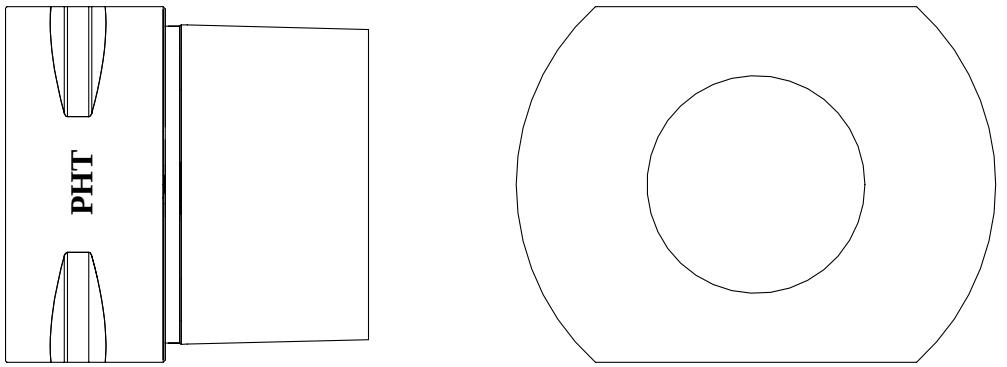
The balancing tool is balanced to **G2,5 at 15000 Rpm.**

Size	Balancing tool, order code
C3	C3 – BAT – 01
C4	C4 – BAT – 01
C5	C5 – BAT – 01
C6	C6 – BAT – 01
C8 / C8X	C8 – BAT – 01

Polygon Holding Tool.

This tool makes it possible to hold the spindle-shaft when it's assembled or serviced. We recommend using this tool when making service or assembly when the drawbar is loosen or tightened to specific torque.

NOTE:
If a curvic coupling is present and used to prevent the spindle to turn the curvic coupling could be damaged due to high tighten / release torque.



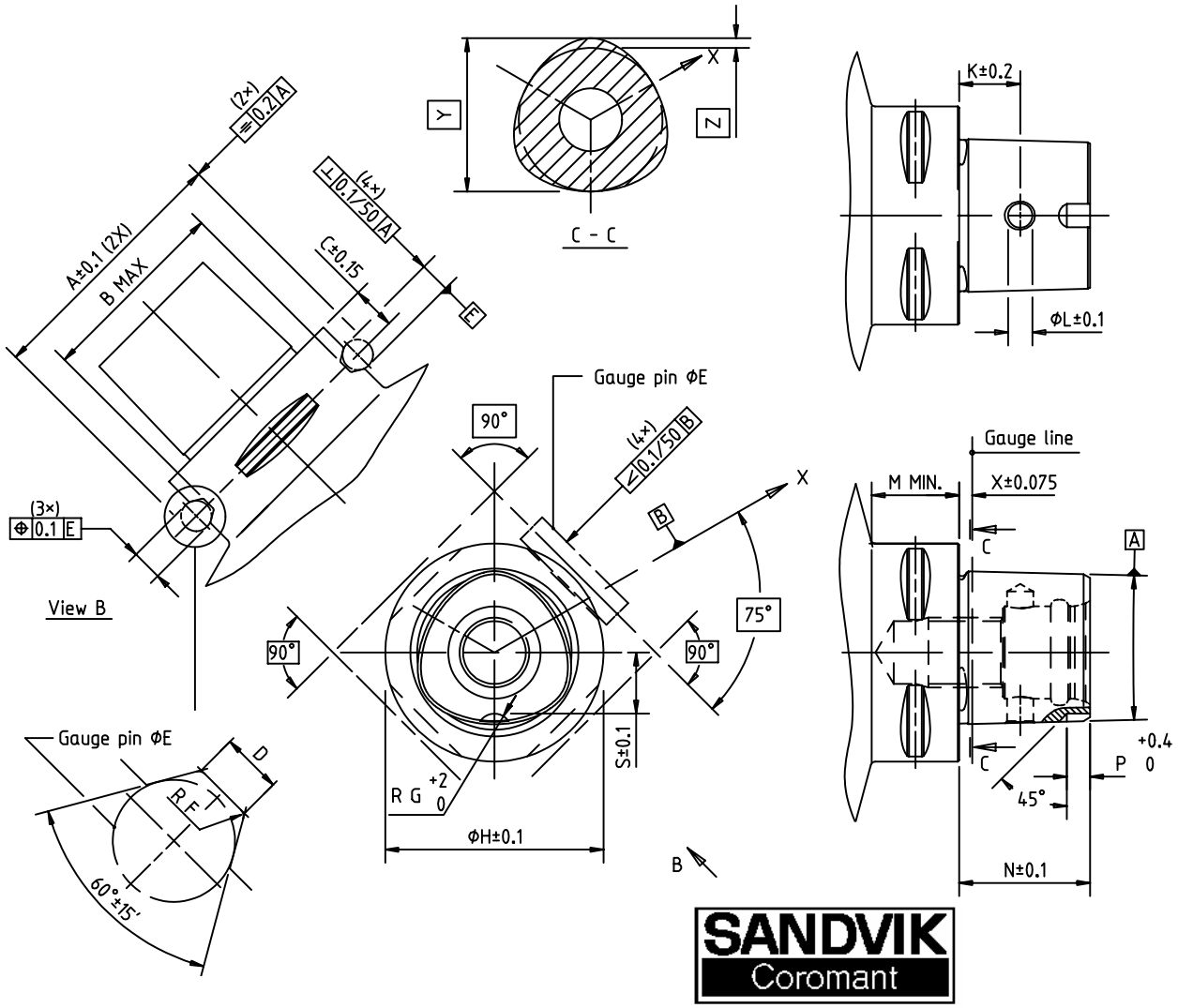
Remove the internal chamfers.

A 6 point socket without internal chamfers should be used to prevent slipping when tighten or loosen the drawbar. The socket is not provided by AB Sandvik Coromant.

Size	Polygon Holding Tool, order code
C3	C3 – PHT – 01
C4	C4 – PHT – 01
C5	C5 – PHT – 01
C6	C6 – PHT – 01
C8 / C8X	C8 – PHT – 01

SANDVIK Coromant

B. Gripper grooves dimensions and position drawing.



Dim. \ Size	C3	C4	C5	C6	C8	C8X
A	39	46	59.3	70.7	86	110
B	28.3	35.3	44.4	55.8	71.1	88.7
C	6	8	10	12	12	16
D	2.5	2.5	3.5	3.5	3.5	5
E	5	5	7	7	7	10
F	0.3	0.3	0.5	0.5	0.5	0.5
G	3	3	4	5	6	6
H	32	40	50	63	80	100
K	8	11.5	14	15.5	25	25
L	3.6	4.6	6.1	8.1	9.1	9.1
M	15	20	20	22	30	32
N	19	24	30	38	48	48
P	3.2	4	5.3	6.2	8	8
S	9	11	14	18	22.2	22.2
X	2.5	2.5	3	3	3	3
Y	22	28	35	44	55	55
Z	1.4	1.8	2.24	2.8	4	4

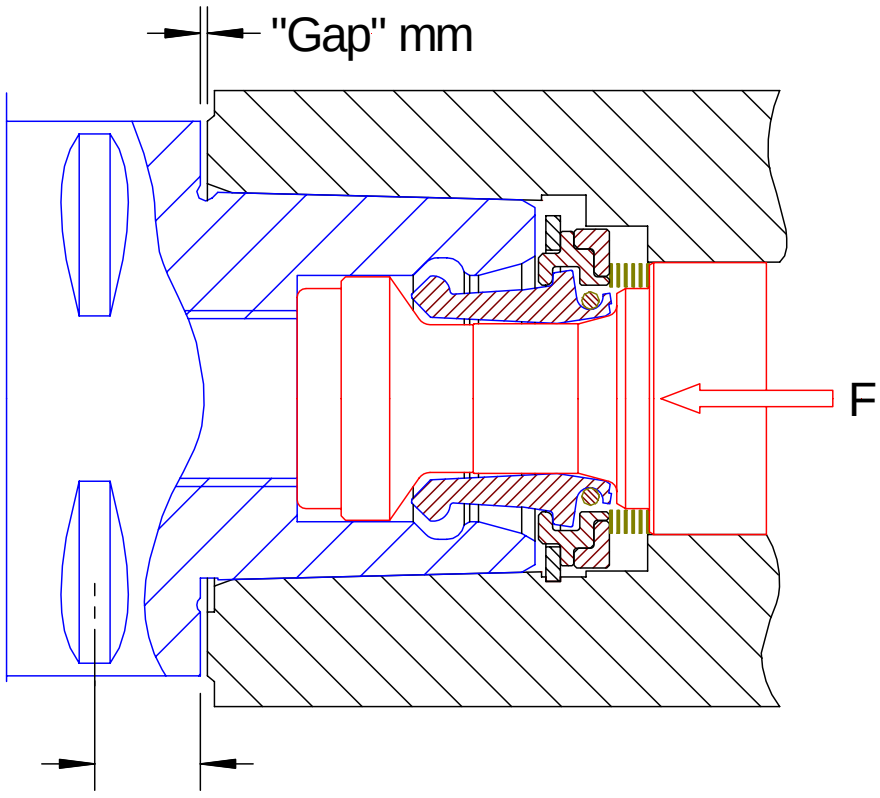
ATC, tool change position.

We suggest that in order to get an optimal position for the ATC arm the gap between spindle face and the face of the cutting head have to be considered to get smallest bending as possible of the ATC arm. When a cutting head is ejected, the gap will be 0,7 to 0,8mm depending on size. We recommend adjusting the ATC arm according to the example.

Example, dimension according to gripper drw: C6 = 12 ± 0,15mm, Gap = 0,8mm. The centerline of ATC arms should be adjusted to 12,4mm (12,0mm + 0,4mm) measured from the spindle face to get the smallest bending effect.

Nominal gap of the sizes is according to these values with a standard drawbar.

C3 = 0,7mm. C4 = 0,7mm. C5 = 0,7mm. C6 = 0,8mm. C8 / C8X = 0,8mm.

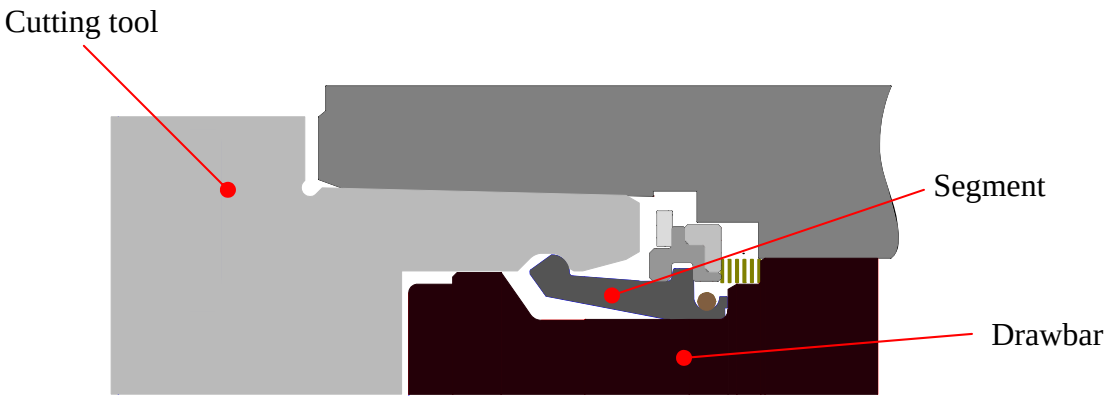


Drawbar option.

All standard clamping sets that are offered from AB Sandvik Coromant could be equipped with a drawbar that has a built in holding mechanism. With a holding function, the tool is hold in position until the ATC grabs and removes it.
The holding force is according to the stated information below.

A machine builder has to consider that the force to remove the cutting head from the interface with an ATC will increase compared to the standard drawbar.

Drawbar with holding mechanism



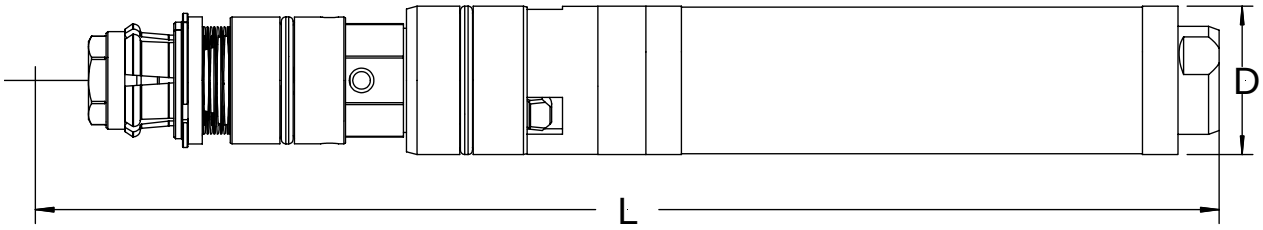
Drawbars with holding mechanism have spring-loaded segments that hold the cutting tool in position until it's changed by ex. the ATC.

Size	Holding force N
C4	**~ 70 N***
C5	**~ 130 N***
C6	**~ 200 N***
C8 / C8X	**~ 220 N***

* The holding resistances are approximately due to tolerances.

C. Built-in drawings.

Sandvik Coromant offers two optimized options with the gas spring and two options where the manufacturer can choose their own device to generate the clamping force. All together, it's four main options per size of the Coromant Capto® Spindle clamping set.
C8X have a larger contact surface (100mm) and use the same internal parts as C8 (80mm) except for the polygon sleeve.



Please visit the web site below to download the latest version of the handbook and built-in drawings for Sandvik Coromant's Spindle Clamping sets.

http://www.coromant.sandvik.com/toolholding

Section: Coromant Capto ⇒ Coromant Capto integrated in spindles

The drawings that can be downloaded from this site can be updated without notice, due to this a spindle manufacturer / machine tool builder has always to verify that the latest drawing version is used.

D. Assembly instructions.

Cx-SP-CS-11
(For Integrated polygons with a gas-spring)

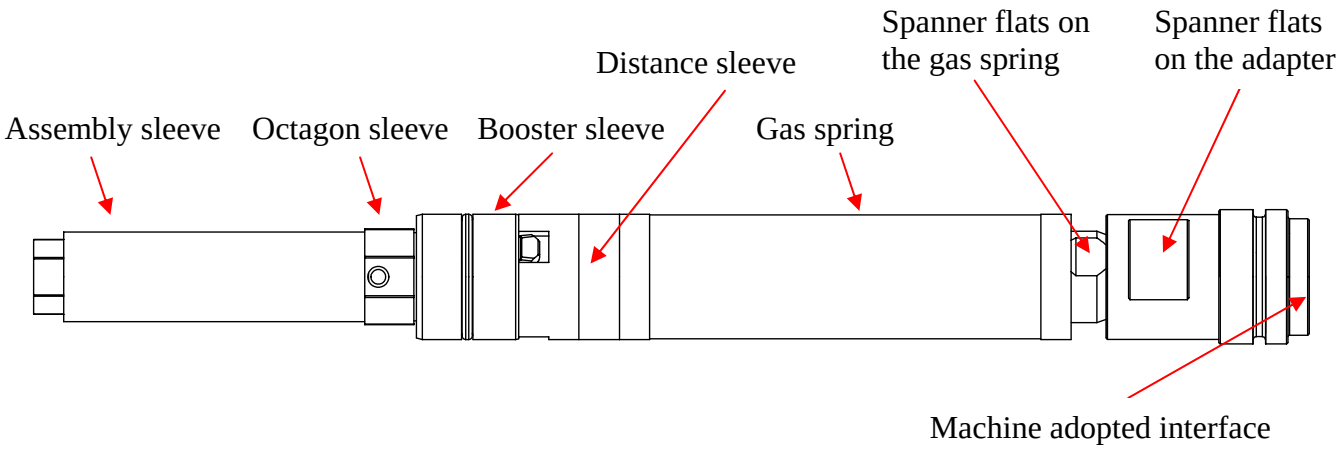
To fit the clamping set (Cx-SP-CS-11) all dimensions and tolerances have to been followed according to drawing: Cx_SP_CS_01_D2. The clamping set comes with an assembly sleeve attached that holds all parts in position instead of the drawbar, the assembly sleeve is needed when it's inserted into the spindle-shaft.

An adapter with a machine-adopted interface is needed, this is where the ejecting force is applied and coolant / air is introduced. The adapter is made by the MTM or the spindle manufacture according to our interface drawing.

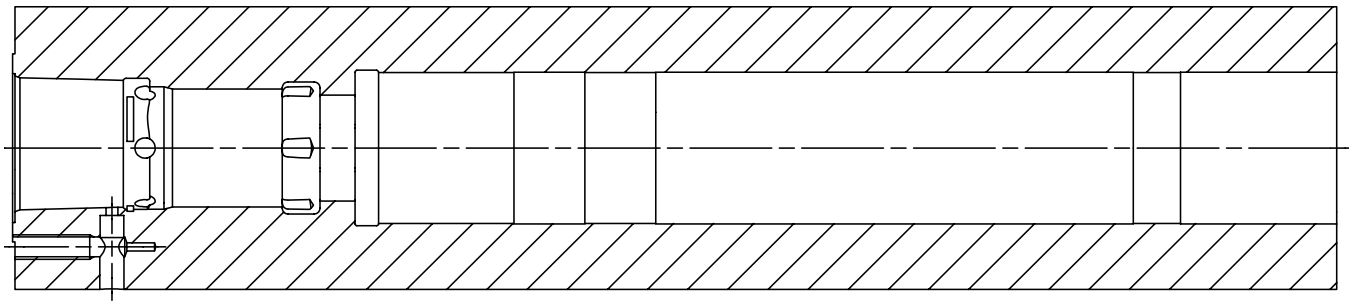
Apply Loctite 222 or equal on the adapter, take support from the spanner flats on the adapter and gas spring, tightening to specified torque. Apply grease on o-rings and on the outside surface of the clamping set.

Before the clamping set is inserted into the spindle-shaft, it's important to verify that no contamination's or burrs are present inside the bore that will effect the clamping sets position inside the spindle-shaft.

Cx-SP-CS-11



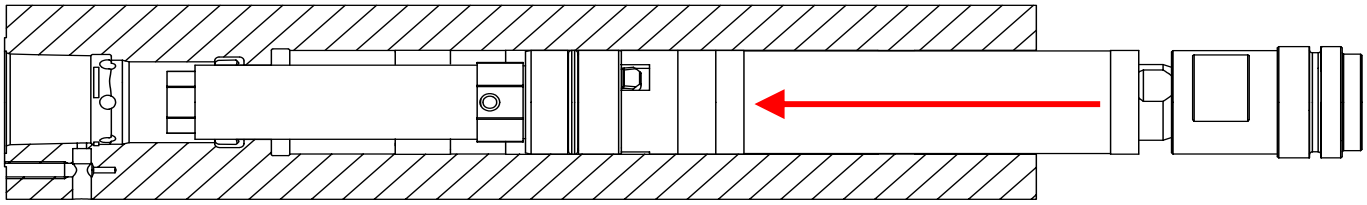
Examine the bore inside the spindle-shaft carefully, make sure that no burrs, dents nicks are present.



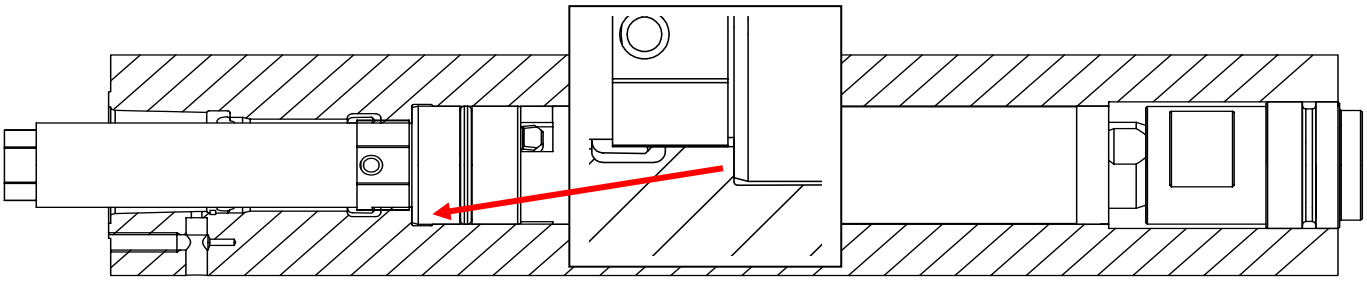
Machined areas have to be de-burred, all sharp edges should be chamfered to prevent misalignment of the clamping set and damaging to the o-rings.

IMPORTANT: DEBURR and CHAMFER both sides of the octagonal hole.

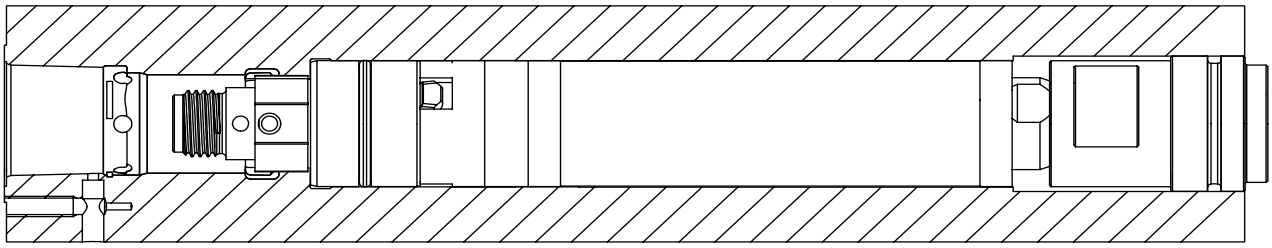
Cx-SP-CS-11



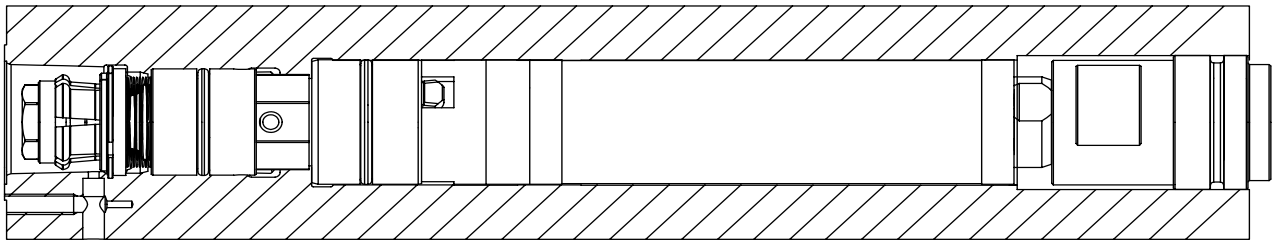
Insert the clamping set from the rear end of the spindle, align the octagon sleeve to match the octagon socket inside the spindle-shaft.



Make sure that the clamping set has reached the correct position according to the fig.



Remove the assembly sleeve.



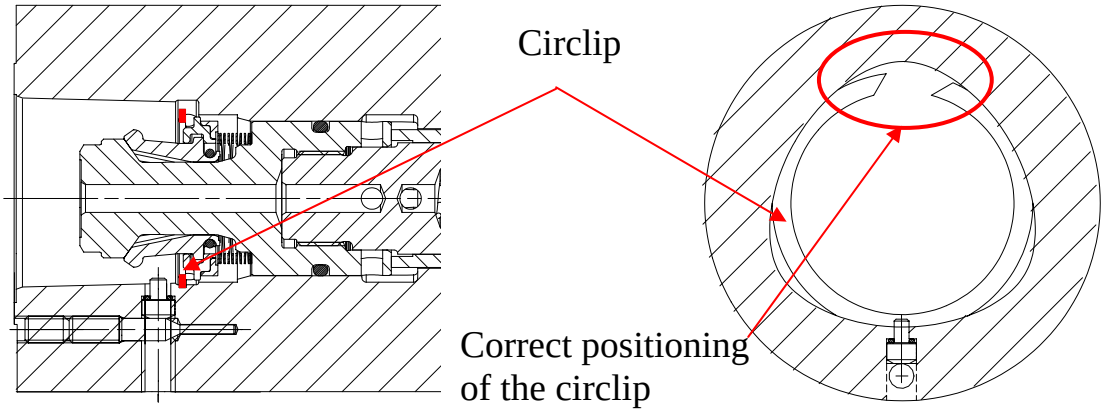
Apply Loctite 222 or equal on the thread of the drawbar, tighten to specified torque.
Use a socket without internal chamfers to prevent slipping when tightening the drawbar, hold the spindle-shaft with help of the **P**olygon **H**olding **T**ool.

Cx-SP-CS-11

CIRCLIP

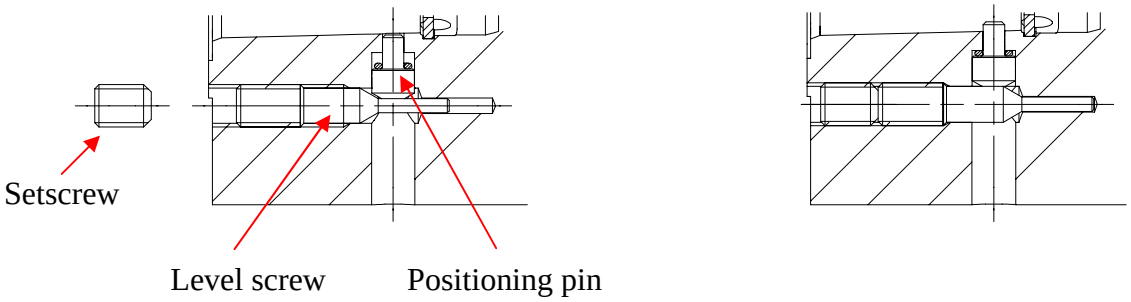
Without a circlip it's impossible to remove a cutting tool after it's inserted.

Take the circlip and mount it into the groove at the bottom of the polygon, place the open ends in one of the positions where the circlip do not have any support from the polygon.



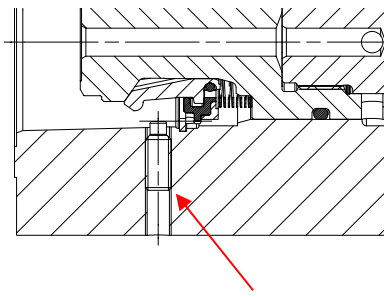
Size C3, C4 and C5.

Push in the positioning pin together with the o-ring until it reaches its seat. Mount and tighten the level screw. Apply Loctite 222 or equal on the thread of the setscrew to secure the package.



Size C6 and C8 / C8X.

Insert a tool lightly into the polygon. Apply Loctite 222 or equal on the thread of positioning screw. Tighten the positioning screw until it reaches the tool, back it off 90deg.



Assembly instructions.

C3-SP-CS-11
(For Integrated polygon with a gas-spring)

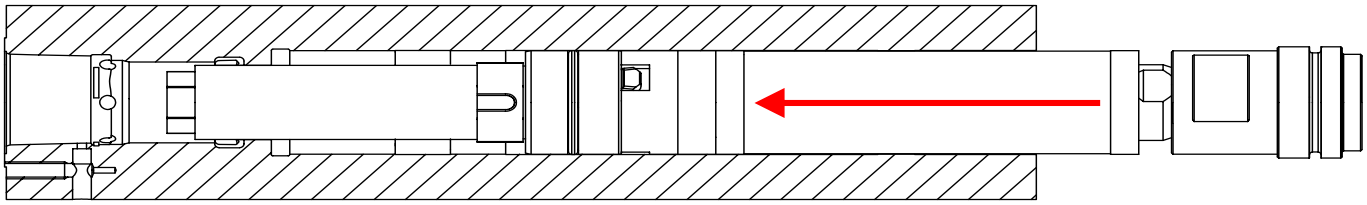
To fit the clamping set (C**3**-SP-CS-11) all dimensions and tolerances have to been followed according to drawing: C**3**_SP_CS_01_D2. The clamping set comes with an assembly sleeve attached that holds all parts in position instead of the drawbar, the assembly sleeve is needed when it's inserted into the spindle-shaft.

An adapter with a machine-adopted interface is needed, this is where the ejecting force is applied and coolant / air is introduced. The adapter is made by the MTM or the spindle manufacture according to our interface drawing.

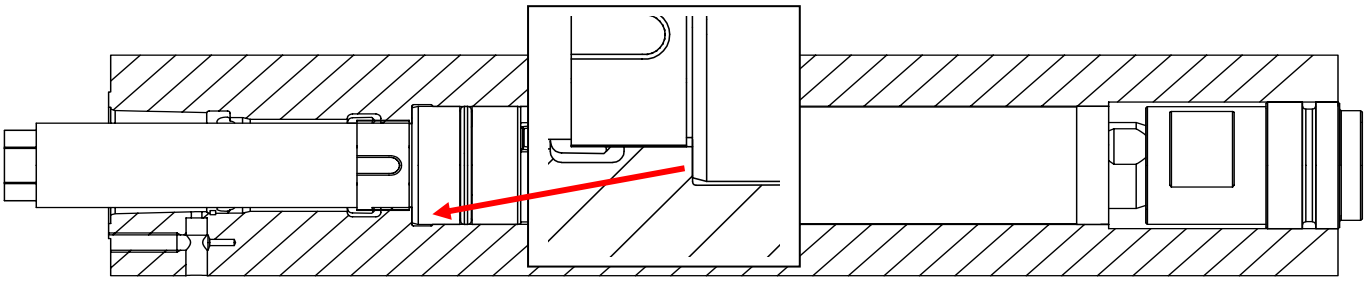
Apply Loctite 222 or equal on the adapter, take support from the spanner flats on the adapter and gas spring, tightening to specified torque. Apply grease on o-rings and on the outside surface of the clamping set.

Before the clamping set is inserted into the spindle-shaft, it's important to verify that no contamination's or burrs are present inside the bore that will effect the clamping sets position inside the spindle-shaft

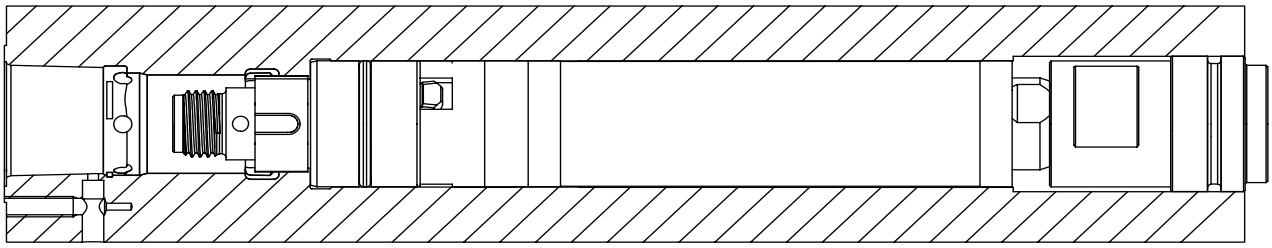
C3-SP-CS-11



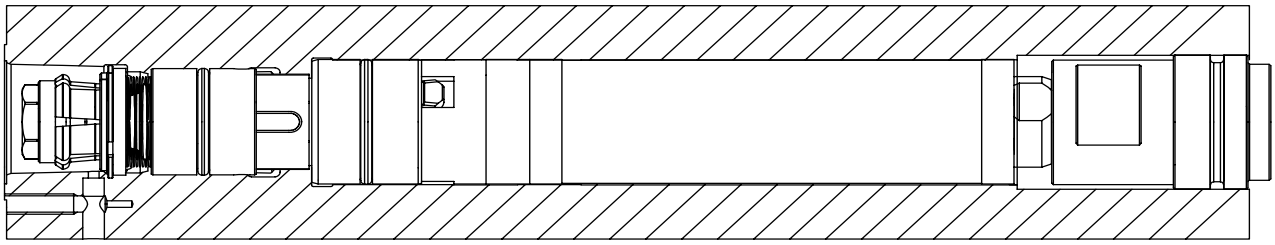
Insert the clamping set from the rear end of the spindle. Align the two grooves to match the two pins inside the spindle-shaft. See sketch next page.



Make sure that the clamping set has reached the correct position according to the fig.

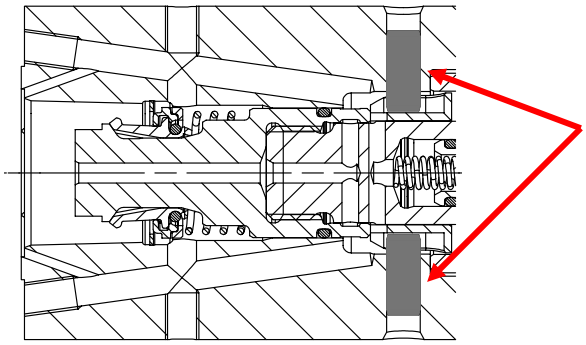


Remove the assembly sleeve.



Apply Loctite 222 or equal on the thread of the drawbar, tighten to specified torque.
Use a socket without internal chamfers to prevent slipping when tightening the drawbar, hold the spindle-shaft with help of the **P**olygon **H**olding **T**ool.

C3-SP-CS-11

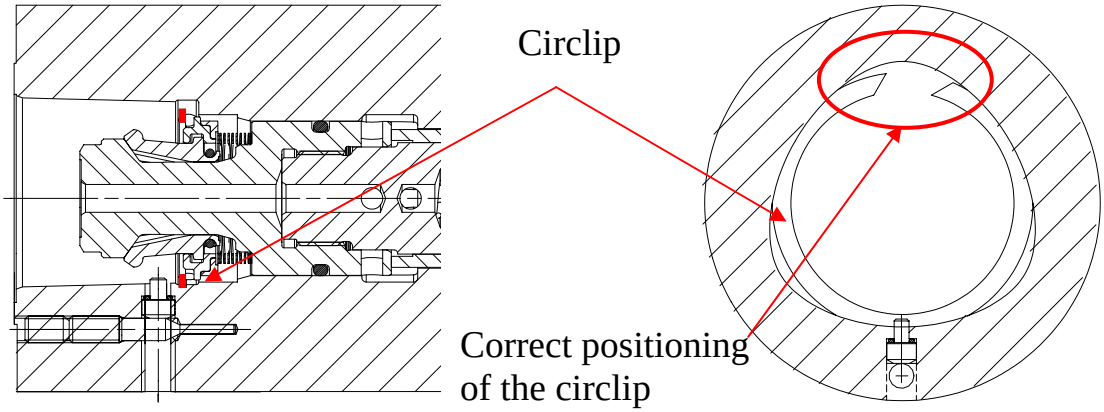


Pin position and dimension according to built-in instruction. **C3_SP_CS_01_D2**

CIRCLIP

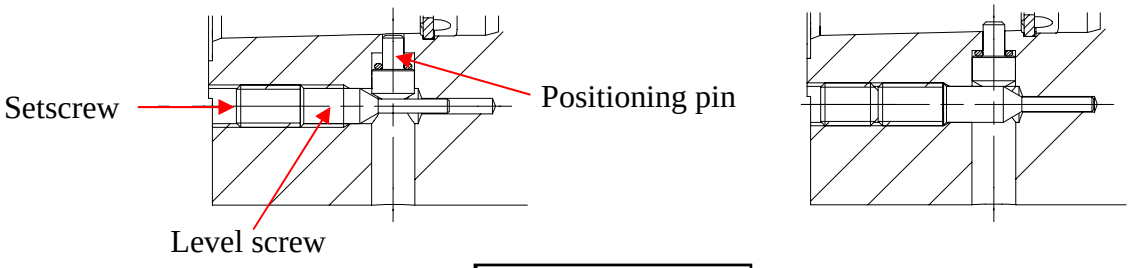
Without a circlip it's impossible to remove a cutting tool after it's inserted.

Take the circlip and mount it into the groove at the bottom of the polygon, place the open ends in one of the positions where the circlip do not have any support from the polygon.



Size C3.

Push in the positioning pin together with the o-ring until it reaches its seat. Mount and tighten the level screw. Apply Loctite 222 or equal on the thread of the setscrew to secure the package.



Assembly instructions.

Cx-SP-CS-12
(For sleeve polygons with a gas-spring)

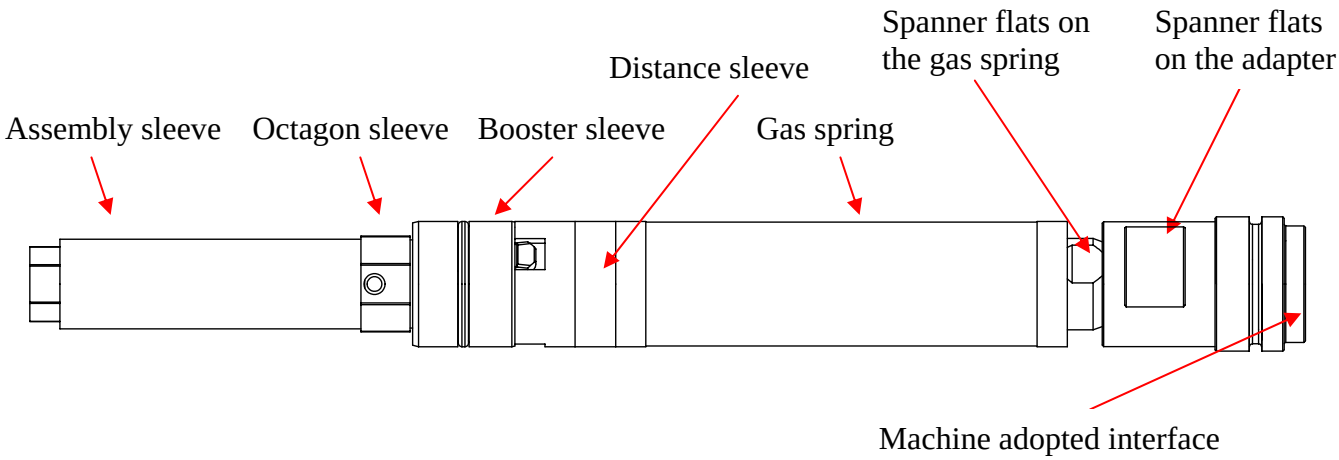
To fit the clamping set (Cx-SP-CS-12) all dimensions and tolerances have to been followed according to drawing: Cx_SP_CS_02_D2. The clamping set comes with an assembly sleeve attached that holds all parts in position instead of the drawbar, the assembly sleeve is needed when it's inserted into the spindle-shaft.

An adapter with a machine-adopted interface is needed, this is where the ejecting force is applied and coolant / air is introduced. The adapter is made by the MTM or the spindle manufacture according to our interface drawing.

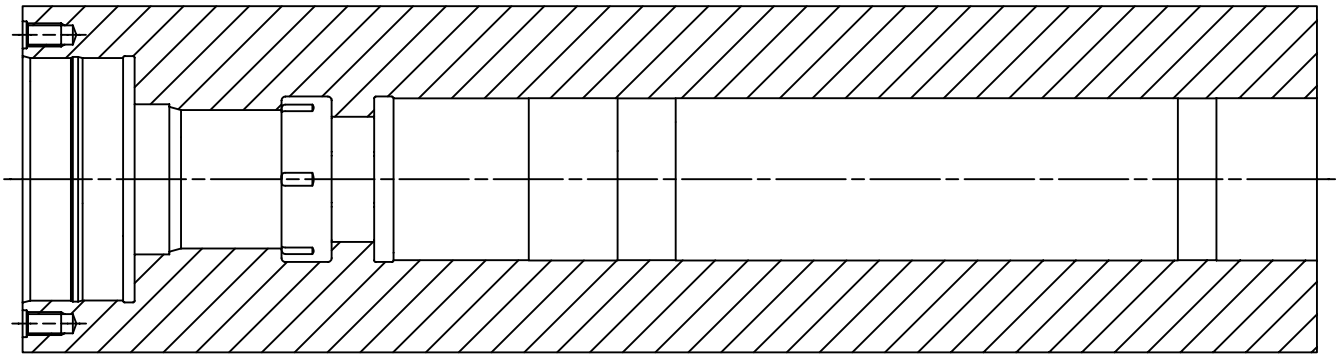
Apply Loctite 222 or equal on the adapter, take support from the spanner flats on the adapter and gas spring, tightening to specified torque. Apply grease on o-rings and on the outside surface of the clamping set.

Before the clamping set is inserted into the spindle-shaft, it's important to verify that no contamination's or burrs are present inside the bore that will effect the clamping sets position inside the spindle-shaft.

Cx-SP-CS-12



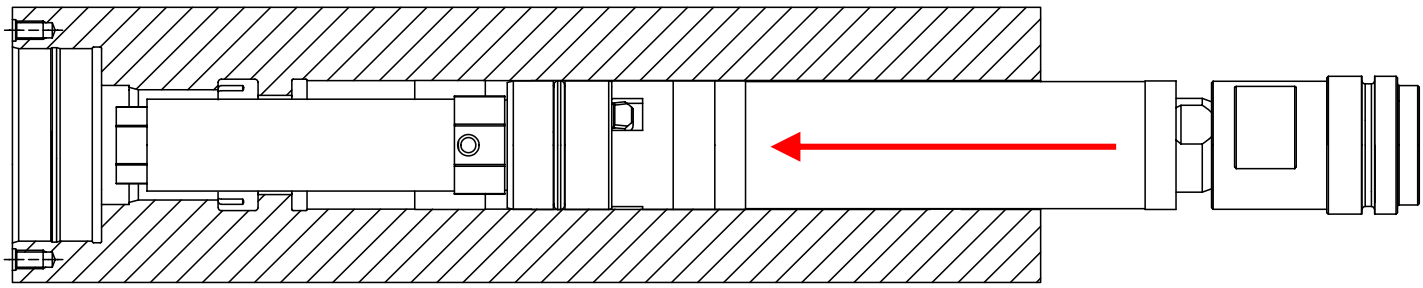
Examine the bore inside the spindle-shaft carefully, make sure that no burrs, dents nicks are present.



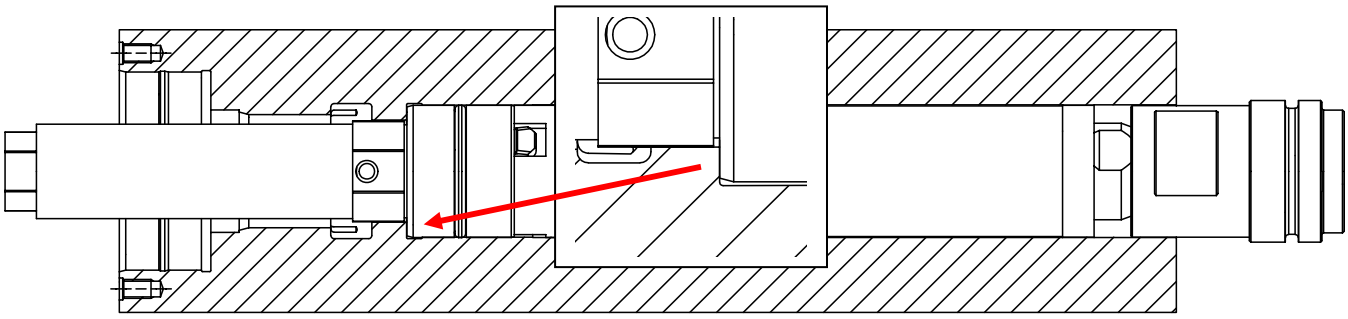
Machined areas have to be de-burred, all sharp edges should be chamfered to prevent misalignment of the clamping set and damaging to the o-rings.

IMPORTANT: DEBURR and CHAMFER both sides of the octagonal hole.

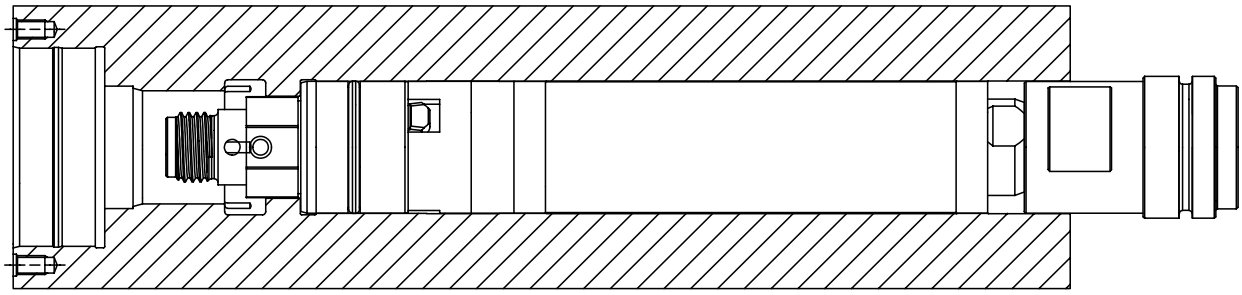
Cx-SP-CS-12



Insert the clamping set from the rear end of the spindle, align the octagon sleeve to match the octagon socket inside the spindle-shaft.

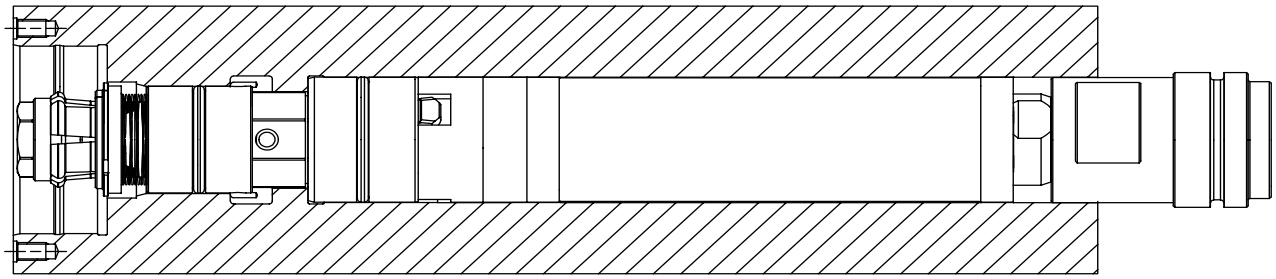


Make sure that the clamping set has reached the correct position according to the fig.

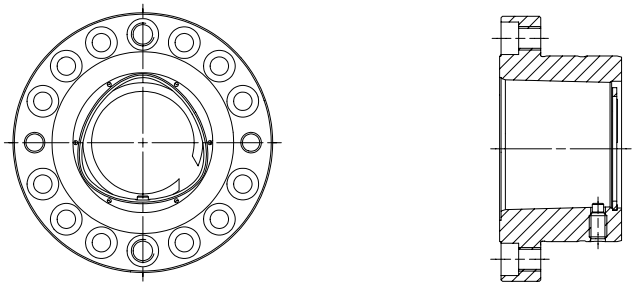


Remove the assembly sleeve.

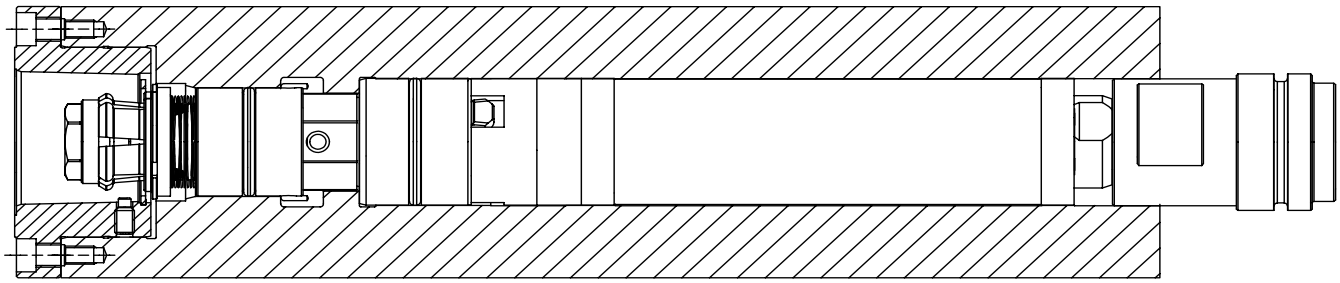
Cx-SP-CS-12



Apply Loctite 222 or equal on the thread of the drawbar, tighten the drawbar by hand.



The polygon sleeve comes complete with circlip and positioning screw and is ready to mount into the spindle shaft.



Apply a thin layer of oil on the polygon sleeve. Mount and adjust the polygon sleeve so it fits the corresponding dowel pinholes, tighten the cap screws to specified torque according to the drawing in a crisscross pattern to get an even pressure. Use a socket without internal chamfers to prevent slipping when tightening the drawbar to the specific torque, hold the spindle-shaft with help of the **P**olygon **H**olding **T**ool.

Assembly instructions.

Cx-SP-CS-12F
(For sleeve polygons with **F**ront mounted clamping set with a gas spring)

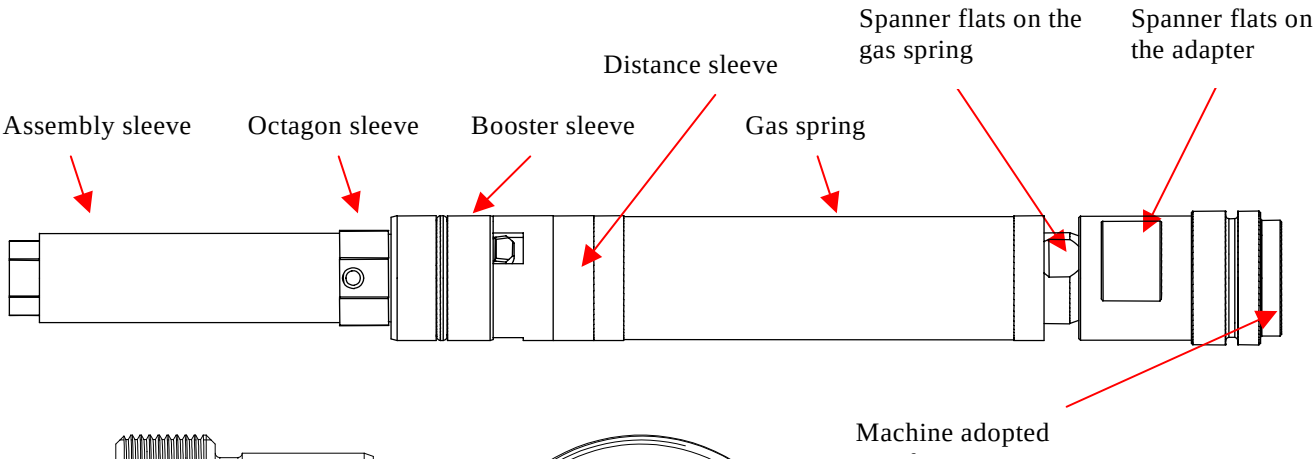
To fit the clamping set (Cx-SP-CS-12F) all dimensions and tolerances have to been followed according to drawing: Cx_SP_CS_02F_D2. The clamping set comes with an assembly sleeve attached that holds all parts in position instead of the drawbar, the assembly sleeve is needed when it's inserted into the spindle-shaft.

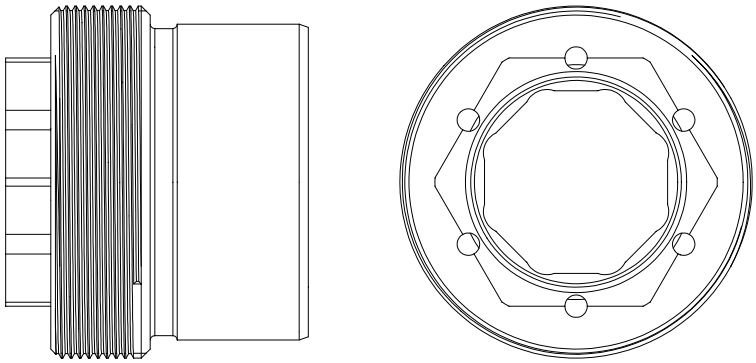
An adapter with a machine-adopted interface is needed, this is where the ejecting force is applied and coolant / air is introduced. The adapter is made by the MTM or the spindle manufacture according to our interface drawing.

Apply Loctite 222 or equal on the adapter, take support from the spanner flats on the adapter and gas spring, tightening to specified torque. Apply grease on o-rings and on the outside surface of the clamping set.

Before the clamping set is inserted into the spindle-shaft, it's important to verify that no contamination's or burrs are present inside the bore that will effect the clamping sets position inside the spindle-shaft.

Cx-SP-CS-12F

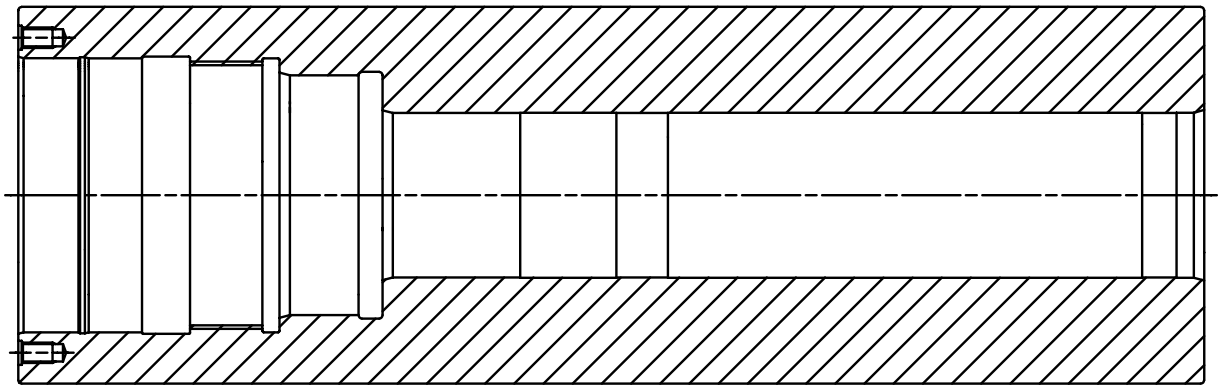




Spindle sleeve

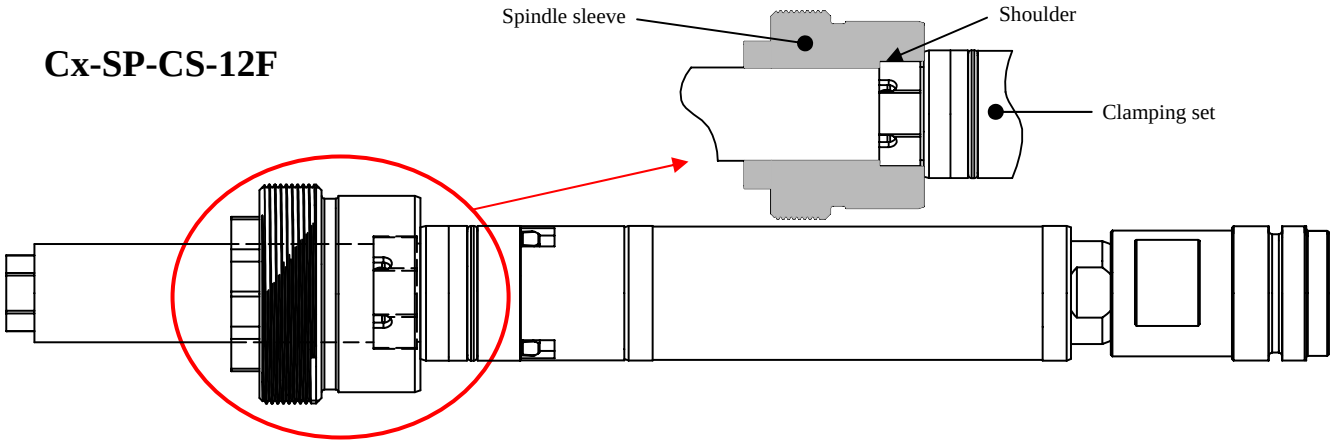
C4	120Nm Hex Size 28
C5	190Nm Hex Size 36
C6	300Nm Hex Size 46
C8 / C8X	360Nm Hex Size 55

Examine the bore inside the spindle-shaft carefully, make sure that no burrs, dents nicks are present.

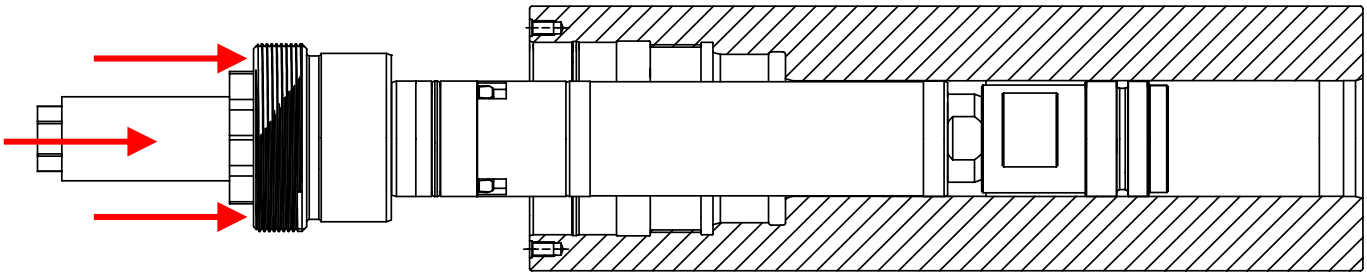


Machined areas have to be de-burred, all sharp edges should be chamfered to prevent misalignment of the clamping set and damaging to the o-rings.

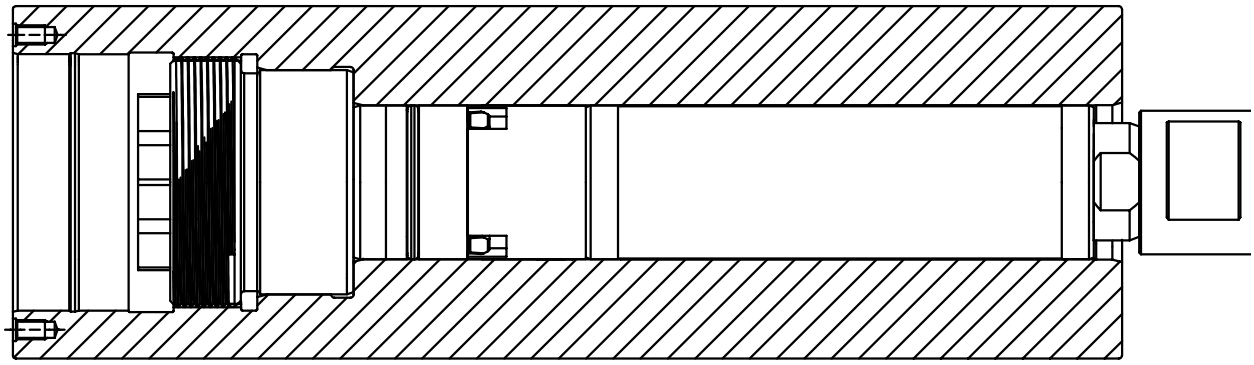
Cx-SP-CS-12F



Loosen the assembly sleeve so it can be removed by hand. The spindle sleeve has an internal octagonal socket with a shoulder that have the same function as in a spindle shaft with an integrated octagonal socket that gives the positioning for the clamping set.

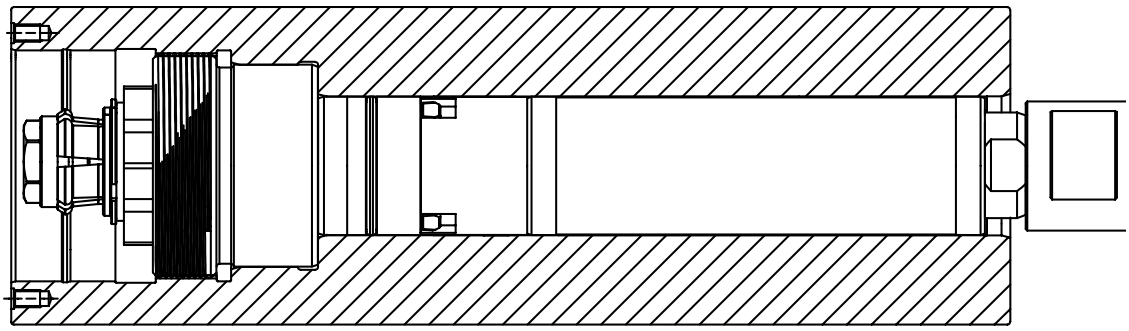


Insert the clamping set together with the spindle sleeve from the front of the spindle according to the sketch, push it in until the spindle sleeve reach the thread in the spindle shaft. Tighten the spindle sleeve by HAND with help of the assembly sleeve until it reaches its position.

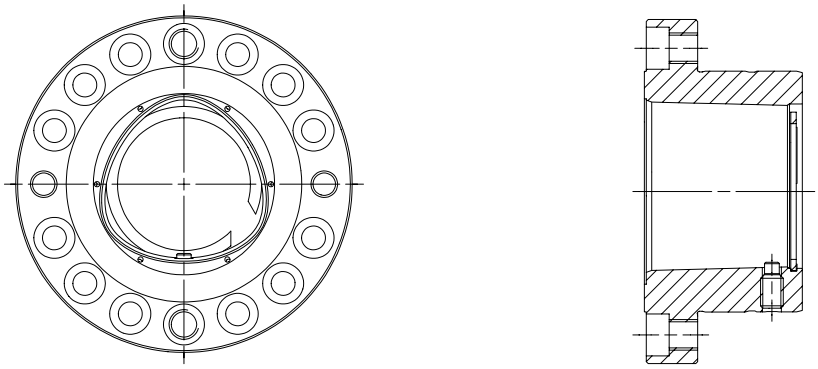


Remove the assembly sleeve, tighten the spindle sleeve to specified torque with a socket.

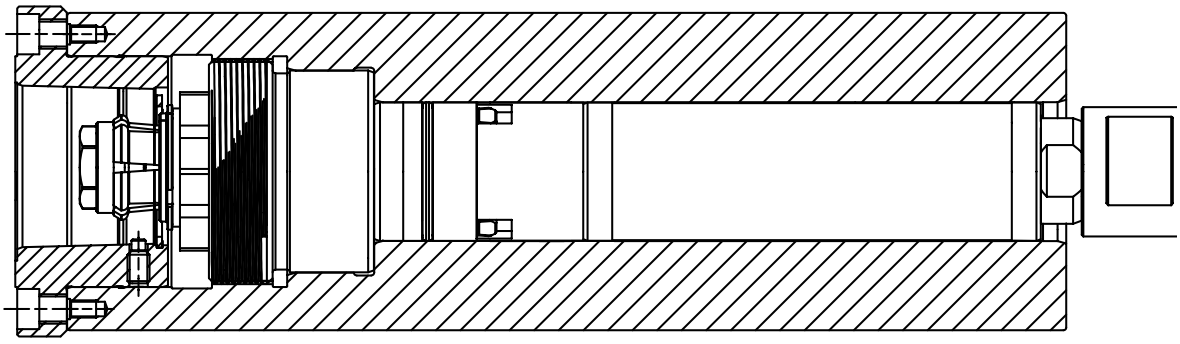
Cx-SP-CS-12F



Apply Loctite 222 or equal on the thread of the drawbar, tighten the drawbar by hand.



The polygon sleeve comes complete with circlip and positioning screw and is ready to mount into the spindle shaft.



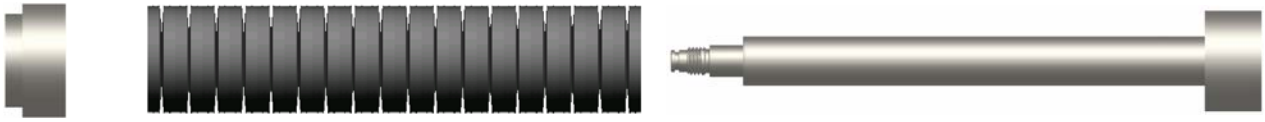
Apply a thin layer of oil on the polygon sleeve. Mount and adjust the polygon sleeve so it fits the corresponding dowel pinholes, tighten the cap screws to specified torque according to the drawing in a crisscross pattern to get an even pressure. Use a socket without internal chamfers to prevent slipping when tightening the drawbar to the specific torque, hold the spindle-shaft with help of the **P**olygon **H**olding **T**ool.

Assembly instructions.

Cx-SP-CS-01
(For Integrated polygons without a gas-spring)

To fit the clamping set (Cx-SP-CS-01) all dimensions and tolerances have to been followed according to drawing: Cx_SP_CS_01_D2. The clamping set comes with an assembly sleeve attached that holds all parts in position instead of the drawbar, the assembly sleeve is needed when it's inserted into the spindle-shaft.

A pullbar extension that has a machine and amplifier adopted interface together with a spring package / device is needed to generate the force for this option. The force device and pullbar extension is made by the MTM or the spindle-manufactures according to our recommendations regarding the force and the amplifier connection drawing.

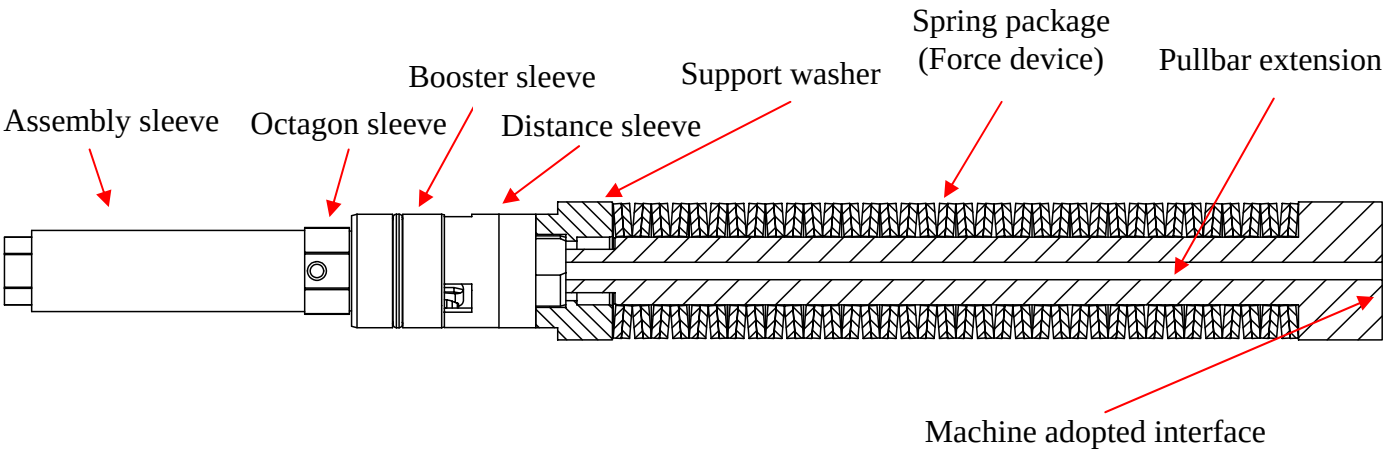


Support washer Spring package / Force device Pullbar extension

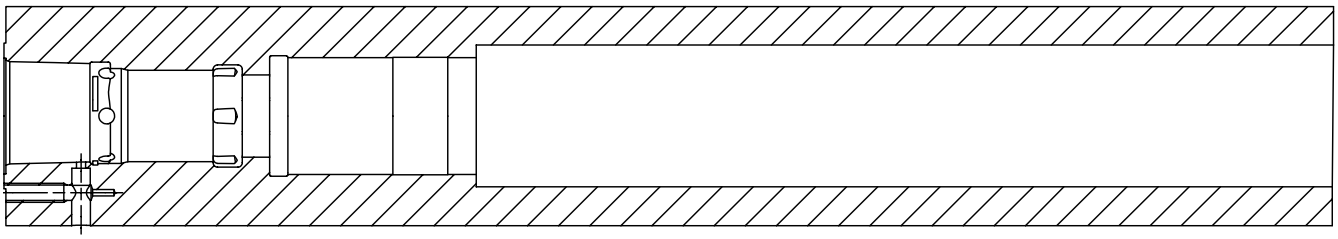
These Items are the machine tool / spindle manufactures responsibility to produce. The provided built-in instruction gives information how the washer and pullbar extension connection should be made. Due to the complexity of the characteristic of disc / helical spring the MTM need to calculate lifetime and stroke with help from a spring manufacturer. If the advises isn't followed the result will be a short lifetime due to overloading of the spring package. This is the reason why AB Sandvik Coromant can't give any recommendations for disc or helical springs.

Before the clamping set is inserted into the spindle-shaft, it's important to verify that no contamination's or burrs are present inside the bore that will effect the clamping sets position inside the spindle-shaft.

Cx-SP-CS-01



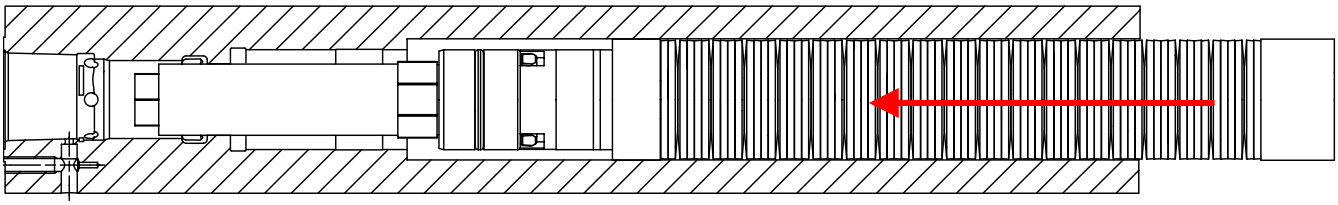
Examine the bore inside the spindle-shaft carefully, make sure that no burrs, dents nicks are present.



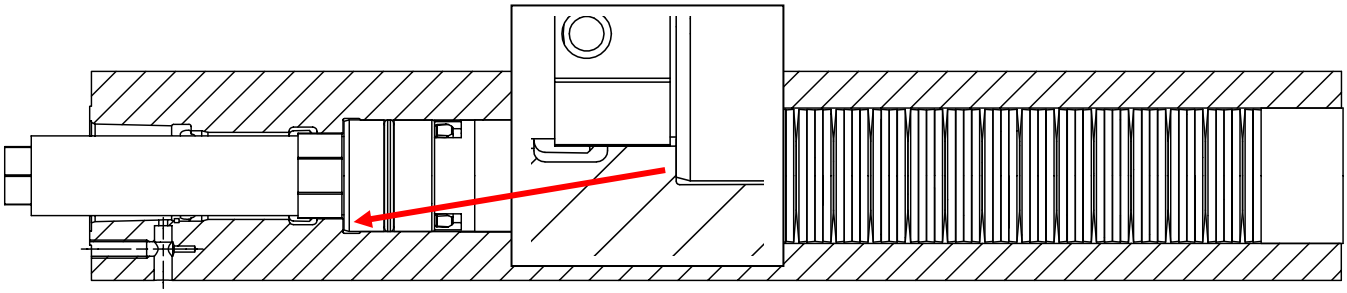
Machined areas have to be de-burred, all sharp edges should be chamfered to prevent misalignment of the clamping set and damaging to the o-rings.

IMPORTANT: DEBURR and CHAMFER both sides of the octagonal hole.

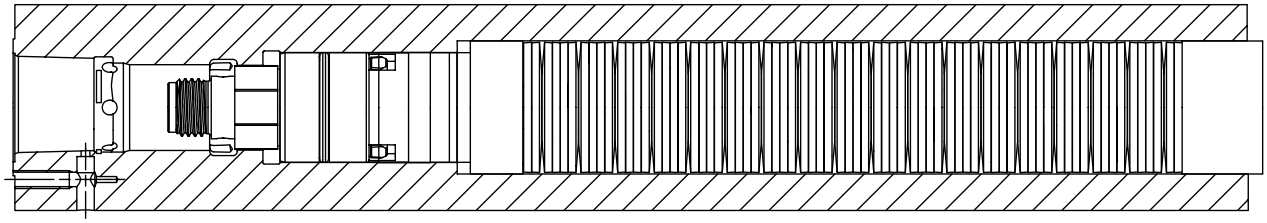
Cx-SP-CS-01



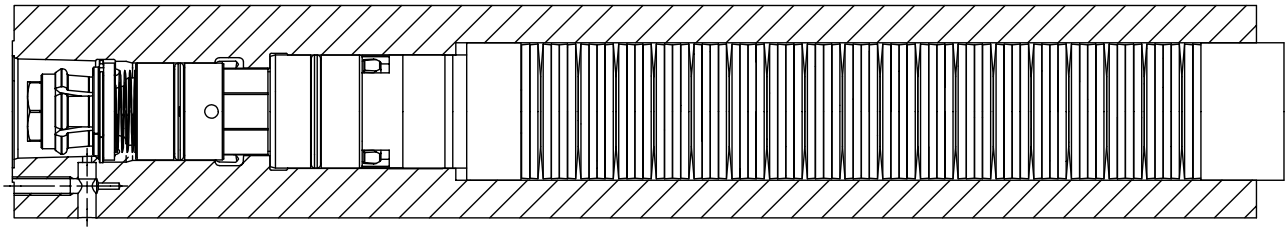
Insert the clamping set from the rear end of the spindle, align the octagon sleeve to match the octagon socket inside the spindle-shaft.



Make sure that the clamping set has reached the correct position according to the fig.



Remove the assembly sleeve.



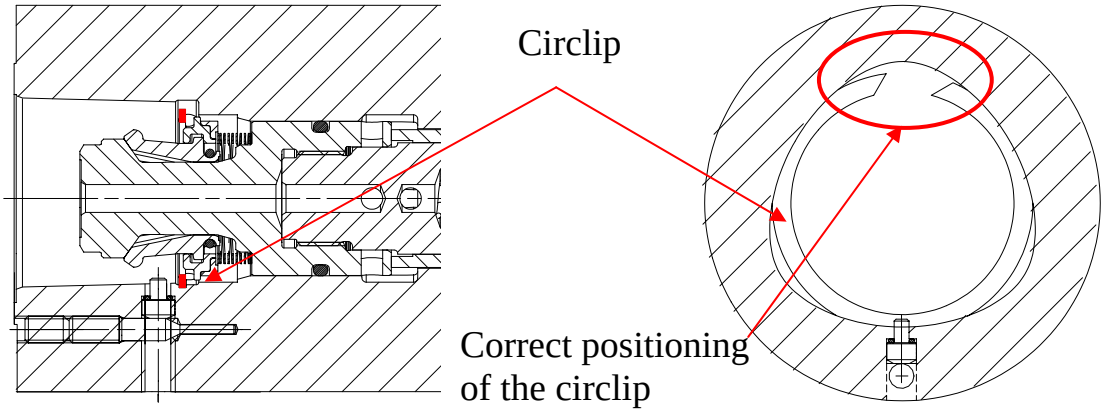
Apply Loctite 222 or equal on the thread of the drawbar, tighten to specified torque.
Use a socket without internal chamfers to prevent slipping when tightening the drawbar, hold the spindleshaft with help of the **P**olygon **H**olding **T**ool.

Cx-SP-CS-01

CIRCLIP

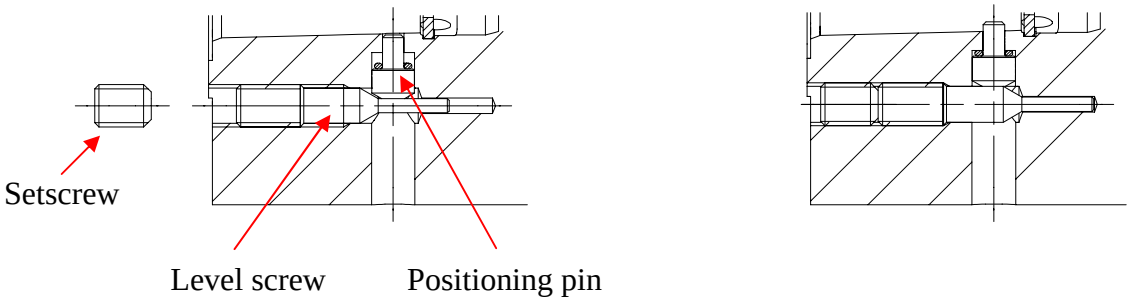
Without a circlip it's impossible to remove a cutting tool after it's inserted.

Take the circlip and mount it into the groove at the bottom of the polygon, place the open ends in one of the positions where the circlip do not have any support from the polygon.



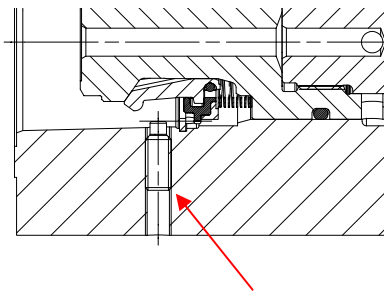
Size C3, C4 and C5.

Push in the positioning pin together with the o-ring until it reaches its seat. Mount and tighten the level screw. Apply Loctite 222 or equal on the thread of the setscrew to secure the package.



Size C6 and C8 / C8X.

Insert a tool lightly into the polygon. Apply Loctite 222 or equal on the thread of positioning screw. Tighten the positioning screw until it reaches the tool, back it off 90deg.

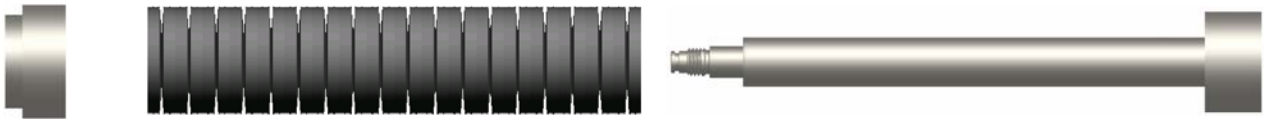


Assembly instructions.

Cx-SP-CS-02
(For polygon sleeves
without a gas-spring)

To fit the clamping set (Cx-SP-CS-02) all dimensions and tolerances have to been followed according to drawing: Cx_SP_CS_02_D2. The clamping set comes with an assembly sleeve attached that holds all parts in position instead of the drawbar, the assembly sleeve is needed when it's inserted into the spindle-shaft.

A pullbar extension that has a machine and amplifier adopted interface together with a spring package / device is needed to generate the force for this option. The force device and pullbar extension is made by the MTM or the spindle-manufactures according to our recommendations regarding the force and the amplifier connection drawing.

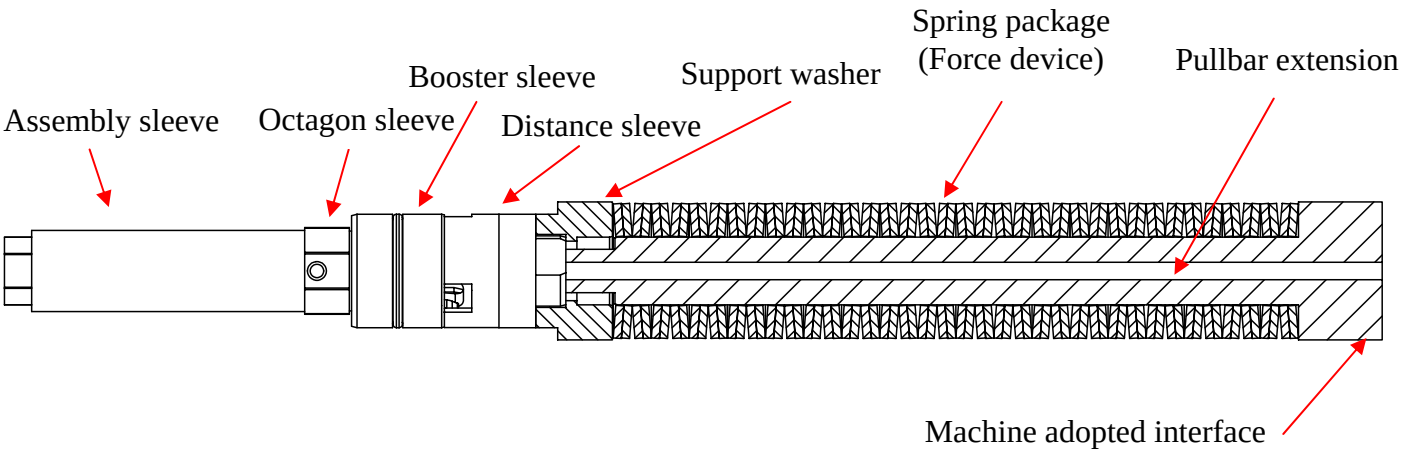


Support washer Spring package / Force device Pullbar extension

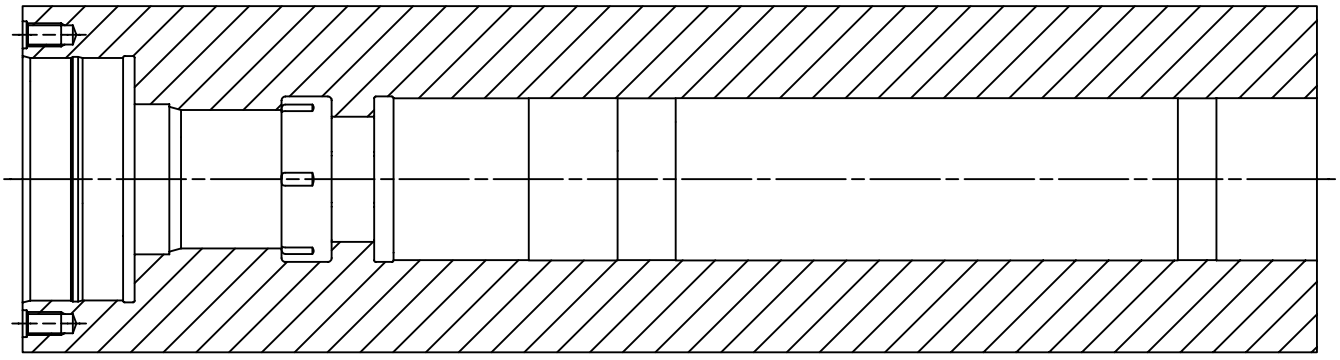
These Items are the machine tool / spindle manufactures responsibility to produce. The provided built-in instruction gives information how the washer and pullbar extension connection should be made. Due to the complexity of the characteristic of disc / helical spring the MTM need to calculate lifetime and stroke with help from a spring manufacturer. If the advises isn't followed the result will be a short lifetime due to overloading of the spring package. This is the reason why AB Sandvik Coromant can't give any recommendations for disc or helical springs.

Before the clamping set is inserted into the spindle-shaft, it's important to verify that no contamination's or burrs are present inside the bore that will effect the clamping sets position inside the spindle-shaft.

Cx-SP-CS-02



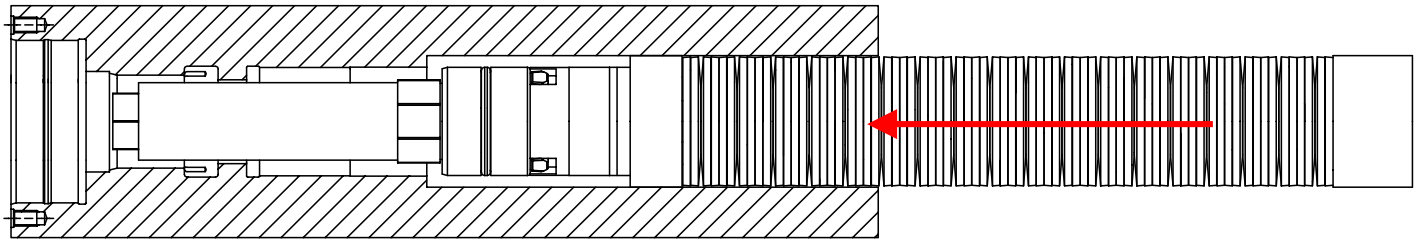
Examine the bore inside the spindle-shaft carefully, make sure that no burrs, dents nicks are present.



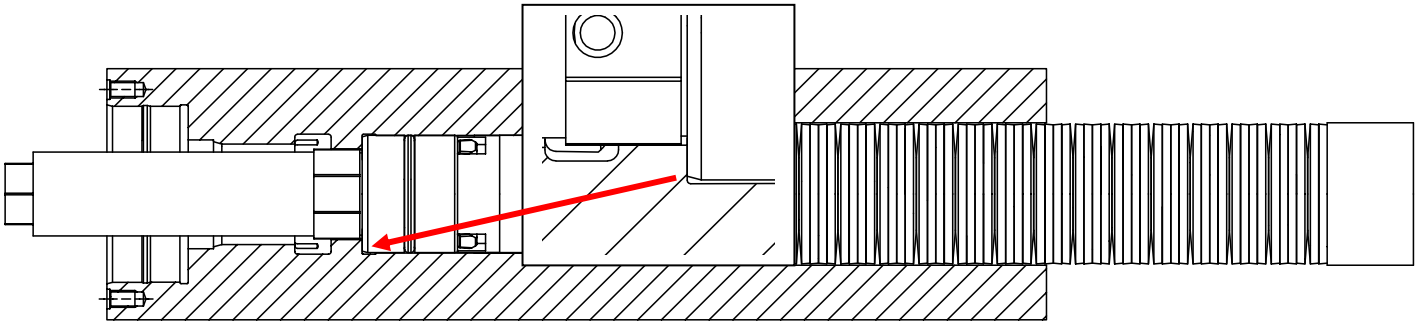
Machined areas have to be de-burred, all sharp edges should be chamfered to prevent misalignment of the clamping set and damaging to the o-rings.

IMPORTANT: DEBURR and CHAMFER both sides of the octagonal hole.

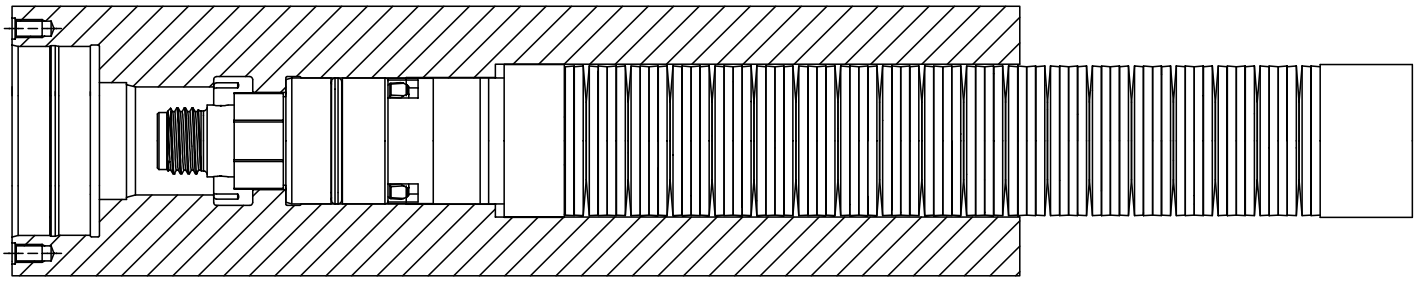
Cx-SP-CS-02



Insert the clamping set from the rear end of the spindle, align the octagon sleeve to match the octagon socket inside the spindle-shaft.

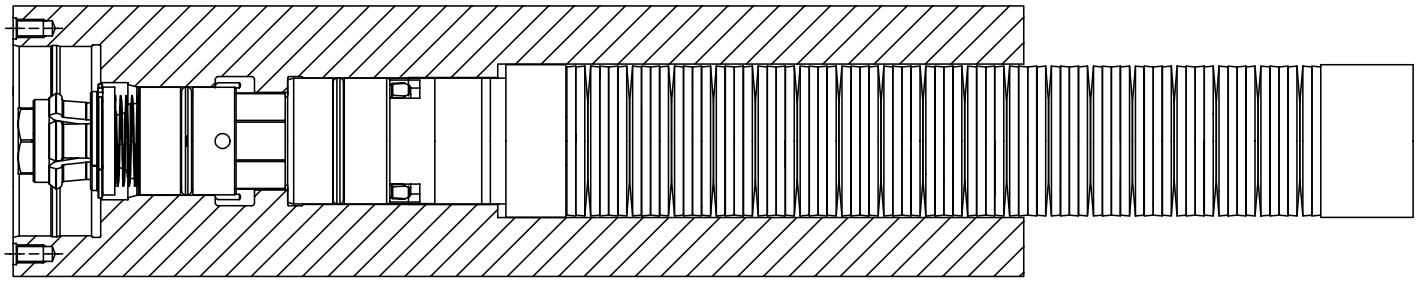


Make sure that the clamping set has reached the correct position according to the fig.

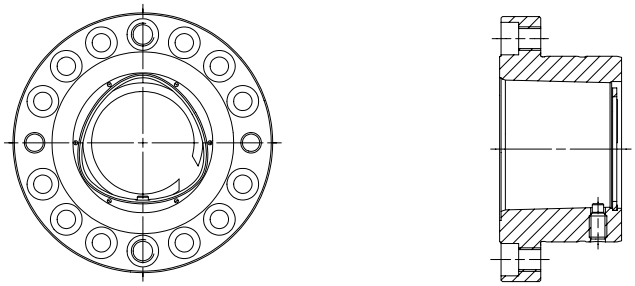


Remove the assembly sleeve.

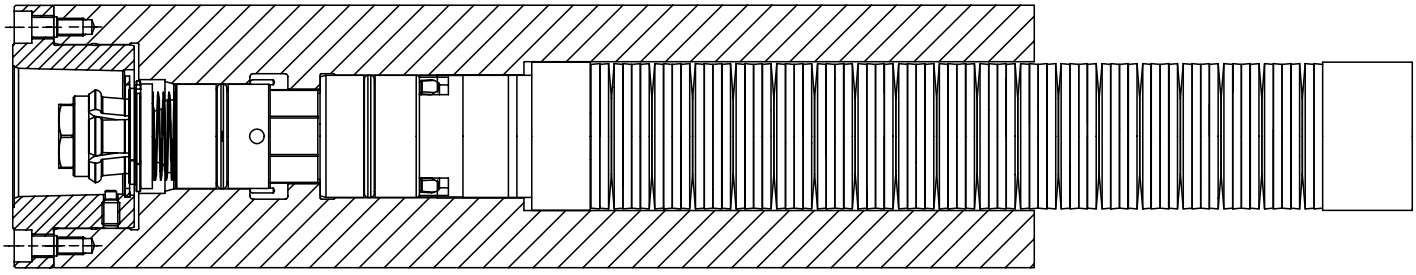
Cx-SP-CS-02



Apply Loctite 222 or equal on the thread of the drawbar, tighten the drawbar by hand.



The polygon sleeve comes complete with circlip and positioning screw and is ready to mount into the spindle shaft.



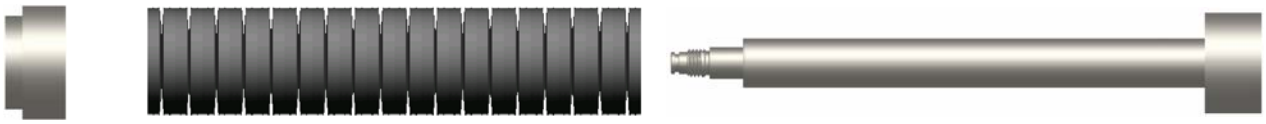
Apply a thin layer of oil on the polygon sleeve. Mount and adjust the polygon sleeve so it fits the corresponding dowel pinholes, tighten the cap screws to specified torque according to the drawing in a crisscross pattern to get an even pressure. Use a socket without internal chamfers to prevent slipping when tightening the drawbar to the specific torque, hold the spindleshaft with help of the **P**olygon **H**olding **T**ool.

Assembly instructions.
Cx-SP-CS-02F
(With sleeve polygons and **F**ront mounted clamping set without a gas spring)

To fit the clamping set (Cx-SP-CS-02F) all dimensions* and tolerances have to been followed according to drawing: Cx_SP_CS_02F_D2. The clamping set comes with an assembly sleeve attached that holds all parts in position instead of the drawbar, the assembly sleeve is needed when it's inserted into the spindle-shaft.

* If the OD of the spring package is bigger then the OD of the booster sleeve, a bushing has to be made. The drawing has to be modified to accept the bushing.
See page 65

A pullbar extension that has a machine and amplifier adopted interface together with a spring package / device is needed to generate the force for this option. The force device and pullbar extension is made by the MTM or the spindle-manufactures according to our recommendations regarding the force and the amplifier connection drawing.

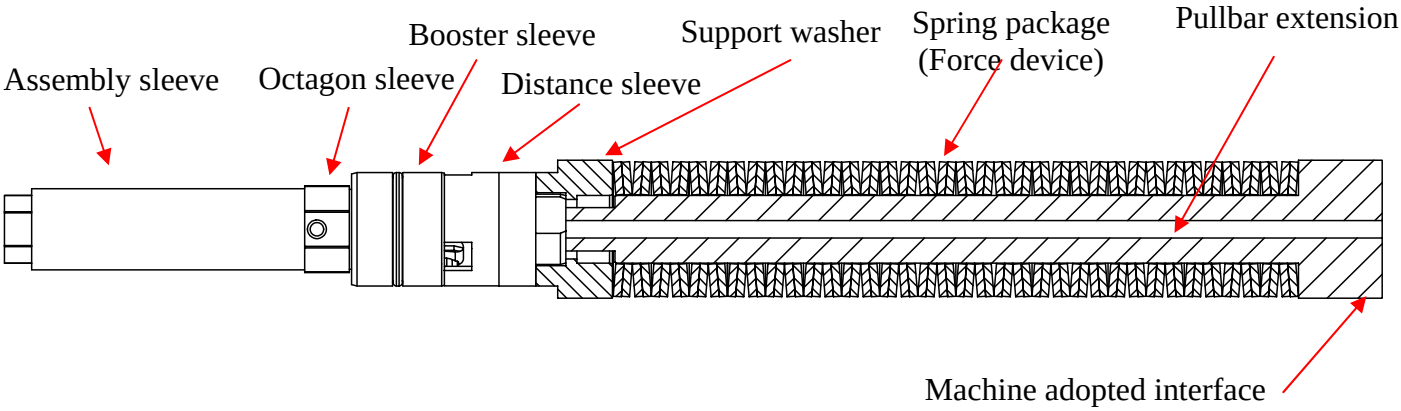


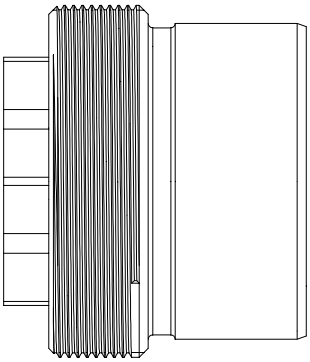
Support washer Spring package / Force device Pullbar extension

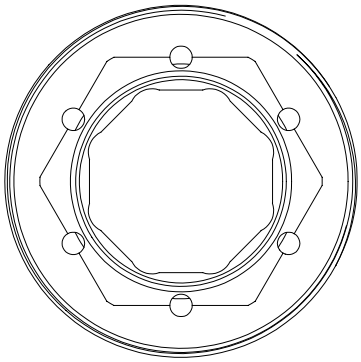
These Items are the machine tool / spindle manufactures responsibility to produce. The provided built-in instruction gives information how the washer and pullbar extension connection should be made. Due to the complexity of the characteristic of disc / helical spring the MTM need to calculate lifetime and stroke with help from a spring manufacturer. If the advises isn't followed the result will be a short lifetime due to overloading of the spring package. This is the reason why AB Sandvik Coromant can't give any recommendations for disc or helical springs.

Before the clamping set is inserted into the spindle-shaft, it's important to verify that no contamination's or burrs are present inside the bore that will effect the clamping sets position inside the spindle-shaft.

Cx-SP-CS-02F



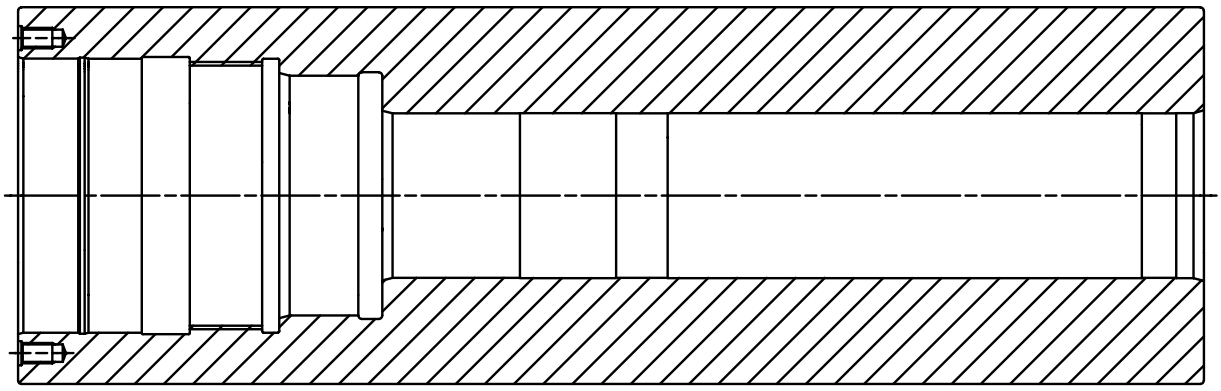




Spindle sleeve

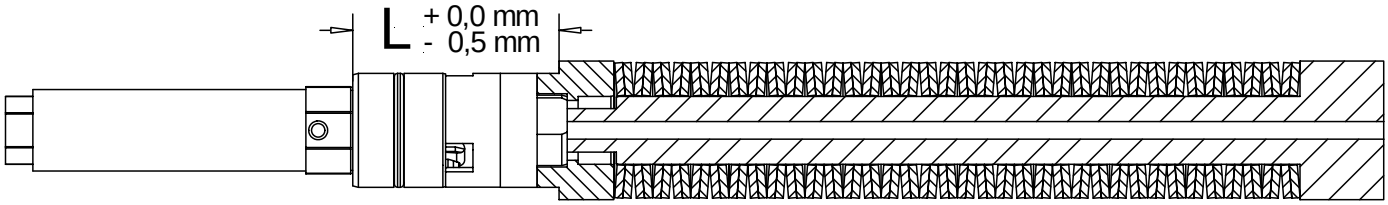
Size	Torque	Hex size
C4	120Nm	28mm
C5	190Nm	36mm
C6	300Nm	46mm
C8 / C8X	360Nm	55mm

Examine the bore inside the spindle-shaft carefully, make sure that no burrs, dents nicks are present.

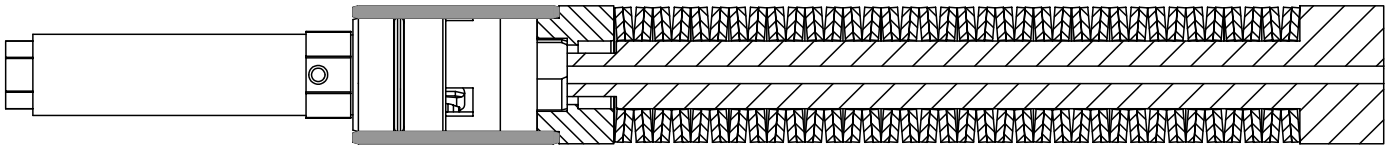


Machined areas have to be de-burred, all sharp edges should be chamfered to prevent misalignment of the clamping set and damaging to the o-rings.

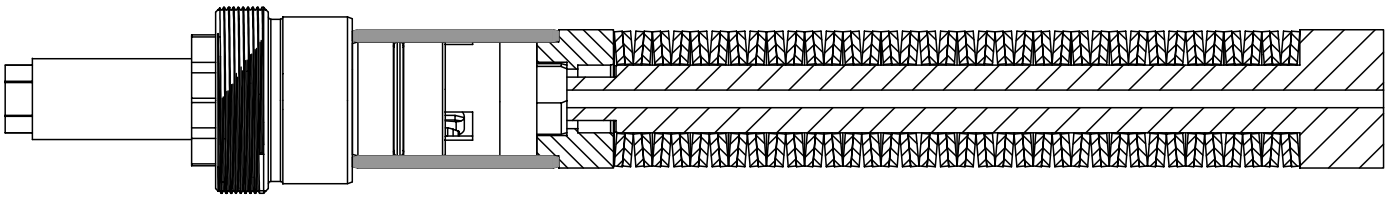
Cx-SP-CS-02F



A bushing has to be made to fill the space between the clamping set and the spindle shaft. ID and OD shall have H7 / h7 tolerance, the length has to be measured and made according to dimension: L. **Note;** OD of the bushing has to be smaller than the smallest OD of the retaining sleeve.
If a bushing is used, the spindle shaft has to be designed to cope with the bushing.

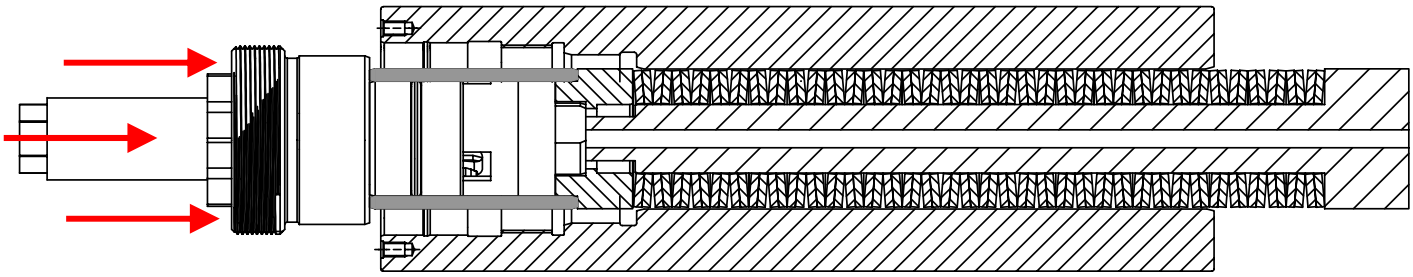


Assembly the bushing on the clamping set according to the sketch.

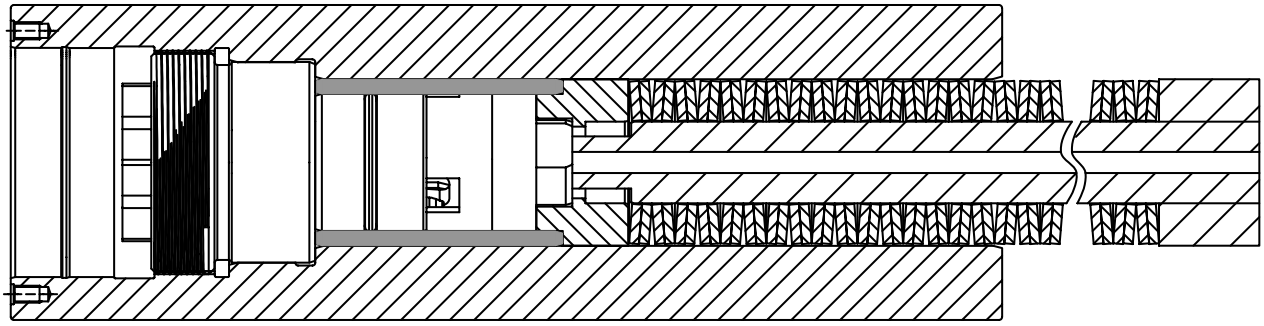


Loosen the assembly sleeve so it can be removed by hand, attach the spindle sleeve to the clamping set

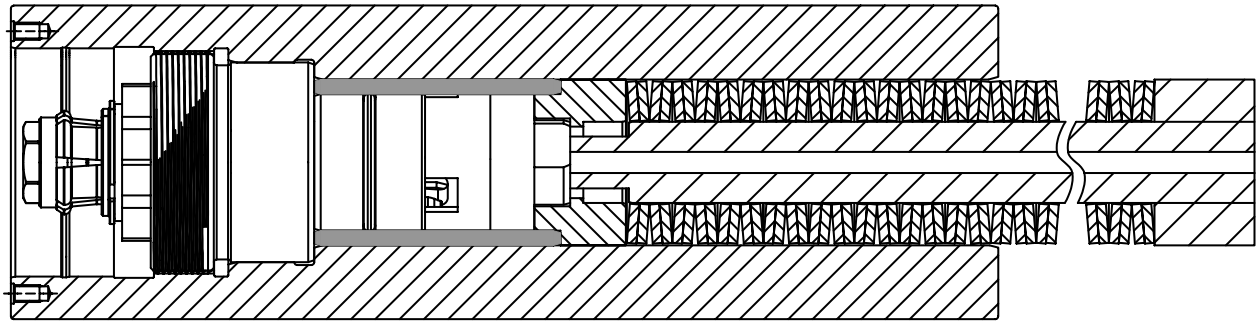
Cx-SP-CS-02F



Insert the clamping set together with the spindle sleeve from the front of the spindle according to the sketch, push it in until the spindle sleeve reach the thread in the spindle shaft. Tighten the spindle sleeve by HAND with help of the assembly sleeve until it reaches its position.

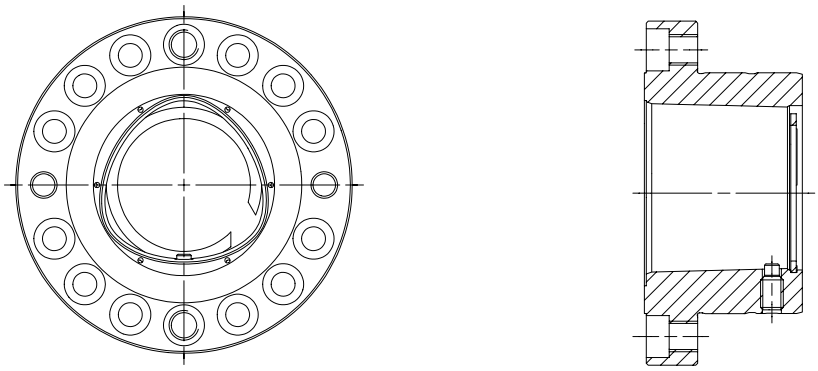


Remove the assembly sleeve, tighten the spindle sleeve to specified torque with a socket.

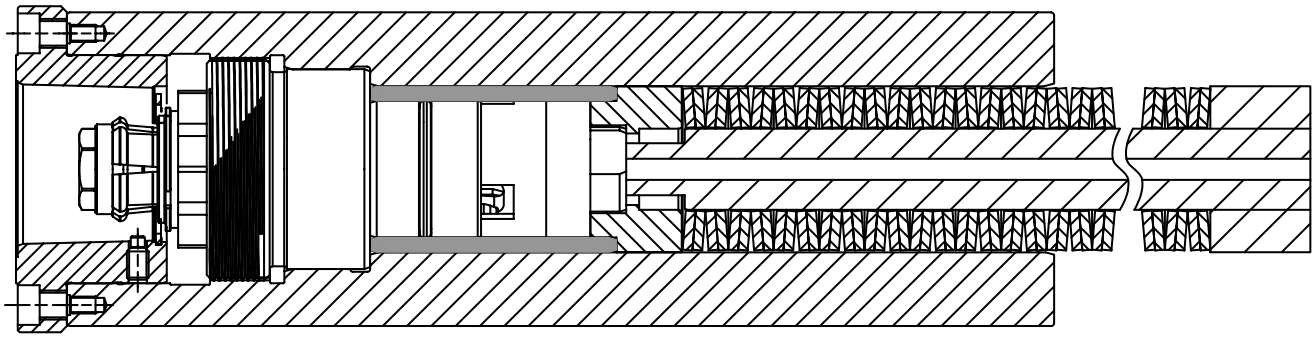


Apply Loctite 222 or equal on the thread of the drawbar, tighten the drawbar by hand.

Cx-SP-CS-02F



The polygon sleeve comes complete with circlip and positioning screw and is ready to mount into the spindle shaft.



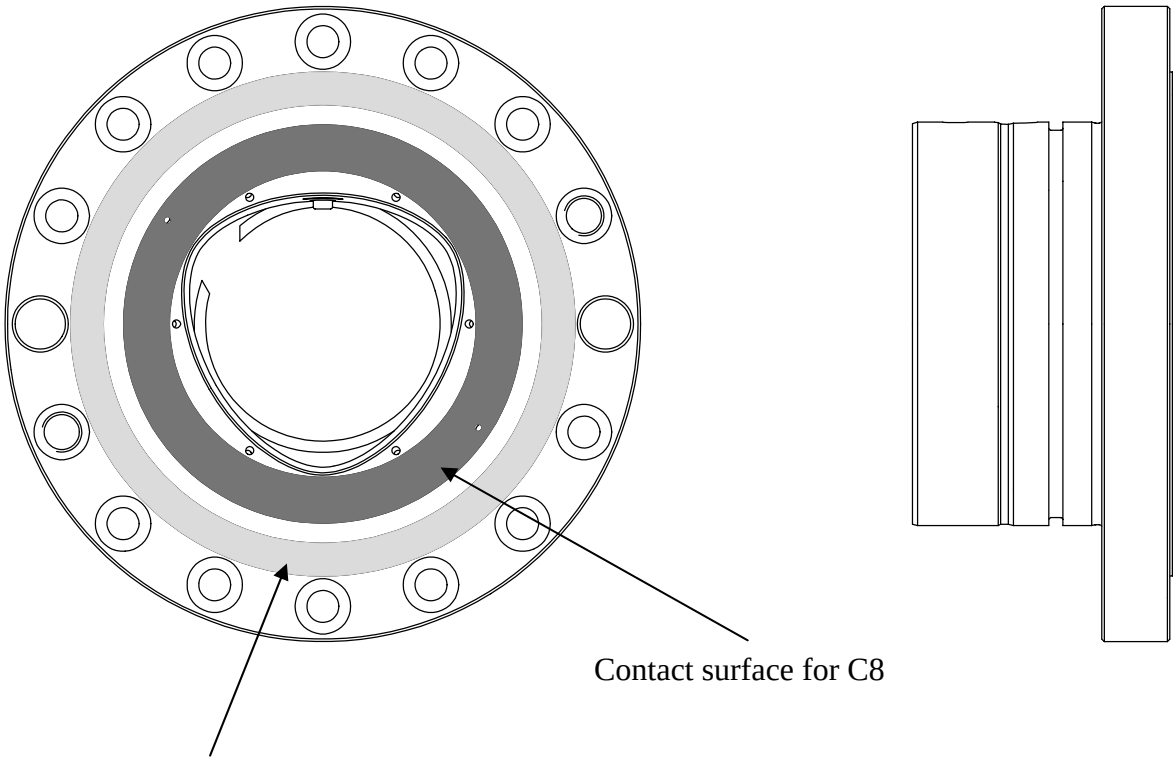
Apply a thin layer of oil on the polygon sleeve. Mount and adjust the polygon sleeve so it fits the corresponding dowel pinholes, tighten the cap screws to specified torque according to the drawing in a crisscross pattern to get an even pressure. Use a socket without internal chamfers to prevent slipping when tightening the drawbar to the specific torque, hold the spindle shaft with help of the **P**olygon **H**olding **T**ool.

C8X Polygon sleeve.

A C8X polygon sleeve has a larger contact surface for the cutting tool / adapter compared with a standard C8 polygon sleeve. The contact surface diameter is 100mm for a C8X compared to 80mm for a standard C8 polygon sleeve.

C8X polygon sleeves are compatible with all standard C8 tools and adapters.

To fit a C8X polygon sleeve into a spindle shaft, all dimensions and tolerances have to be according to built-in drawing: C8X_SP_CS_02 / F _D2 .



Assembly instruction for C8X – SP – CS – 02 / 12 *(H / F)* is the same as:

Cx–SP–CS–02 / -02H / -02F / -02HF
Cx–SP–CS–12 / -12H / -12F / -12HF

This instruction is only valid for clamping set: Cx-SP-CS-01 and **02**, It's only a proposal how a spring package could be preloaded and mounted to a clamping set in a safe way for the assembly personnel.

Force and Stroke.
The spring package or the device that generates the force shall be designed to generate the stated force and stroke as described in the chapter "System specifications" (**Cx-SP-CS-01 / 02**) to achieve a proper function for the Coromant Capto system.

To be able to eject a cutting tool, the travel of the pullbar and spring package has to meet the following **minimum** stroke:

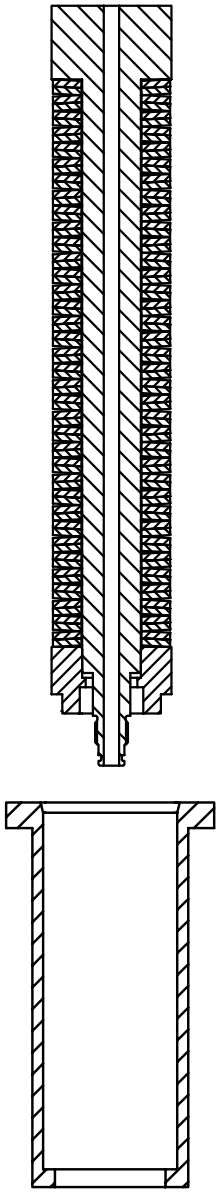
C3 – 10,3 mm (Ejecting device stroke: 11,1mm*)
C4 – 10,4 mm (Ejecting device stroke: 11,2mm*)
C5 – 11,7 mm (Ejecting device stroke: 12,5mm*)
C6 – 13,3 mm (Ejecting device stroke: 14,1mm*)
C8 / C8X – 15,9 mm (Ejecting device stroke: 16,7mm*)

* The stroke includes a clearance of 0,5mm and manufacturing tolerances of 0,3mm.

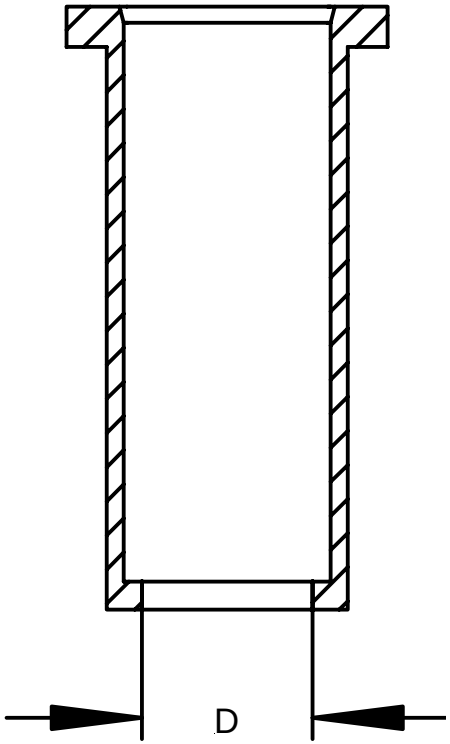
Ejecting device.
A clearance of at least 0,5mm is recommended between the surface of pullbar extension and ejecting device when it's clamped without tool. The ejecting device shall be designed to apply enough with force to compress the spring(s) and eject the clamped and preloaded cutting tool. The needed ejecting force should be calculated as:

C3: Spring(s) + 7kN (cutting tool) = Ejecting force
C4: Spring(s) + 10kN (cutting tool) = Ejecting force
C5: Spring(s) + 12kN (cutting tool) = Ejecting force
C6: Spring(s) + 18kN (cutting tool) = Ejecting force
C8 / C8X: Spring(s) + 25kN (cutting tool) = Ejecting force

As the pullbar extension and spring package is the concern for the machine tool manufacture / spindle producer, AB Sandvik Coromant can not provide any dimensions for the support tools that are needed to pre-load the spring. These tools have to be designed to fit the pullbar extension and the used spring(s).

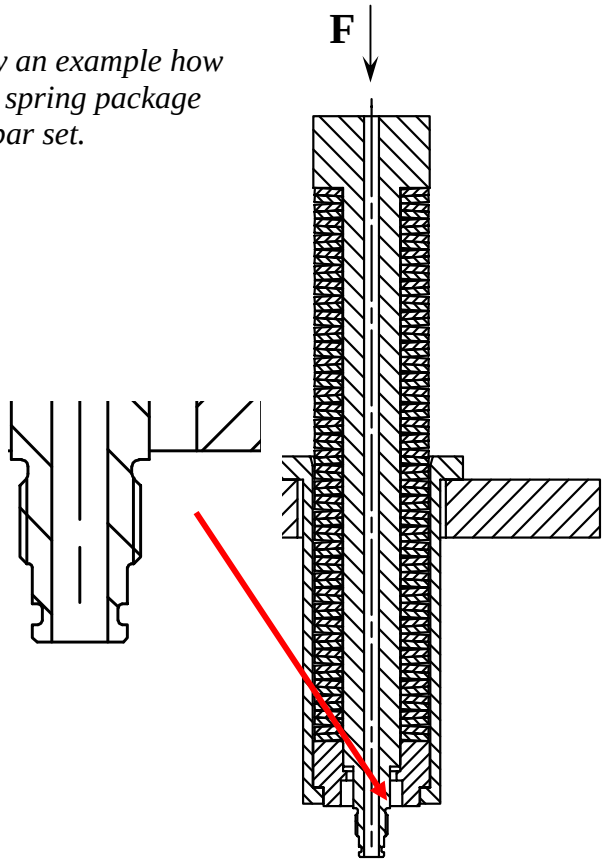


The support tool is made by the MTM / spindle manufacture.

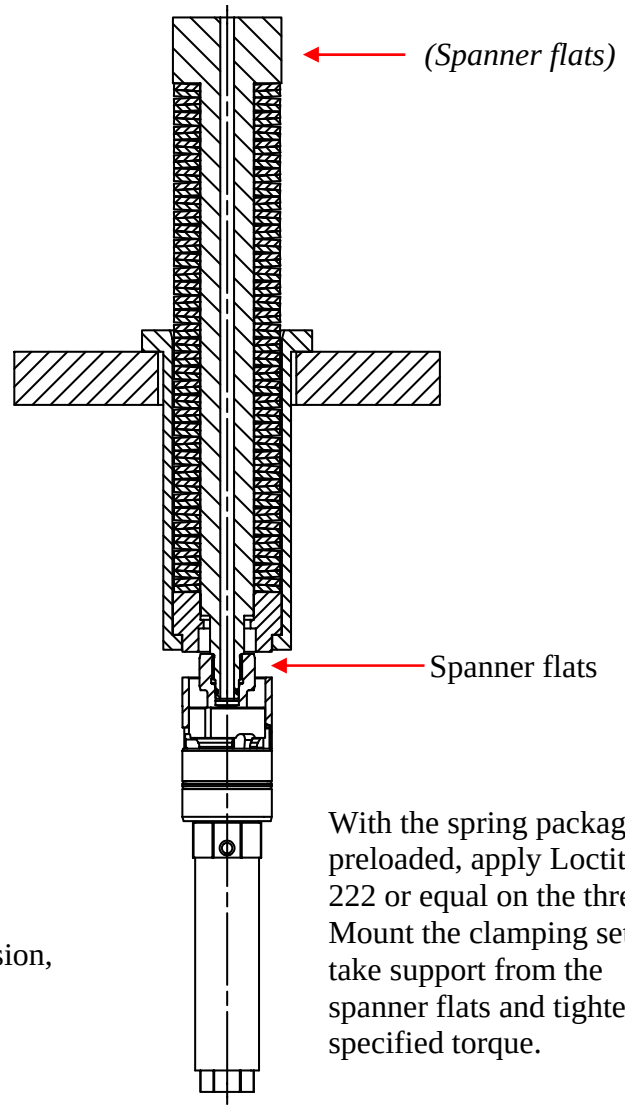


To be able to remove the clamping set from the support tool, diameter ”D” has to be ~ 0,1mm larger than the clamping sets diameter.

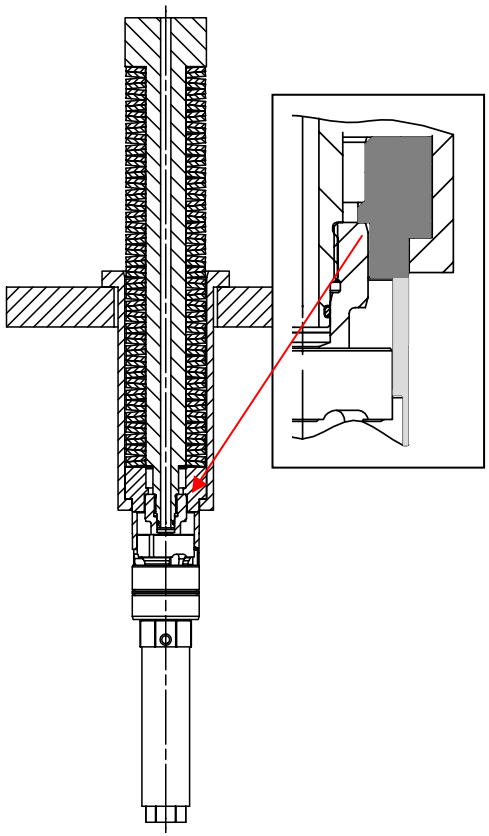
This is only an example how to mount a spring package to the pullbar set.



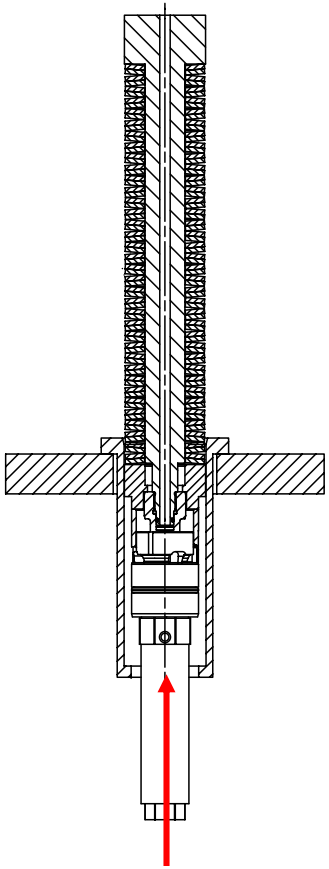
Place the spring package into the support tool. Apply pressure at the end of the pullbar extension, stop when the whole thread is visible, see fig.



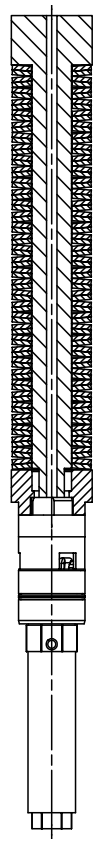
With the spring package preloaded, apply Loctite 222 or equal on the thread. Mount the clamping set, take support from the spanner flats and tighten to specified torque.



Release the pressure on the spring package, the package is preloaded and secured when the clamping set has reached support washer. See fig.

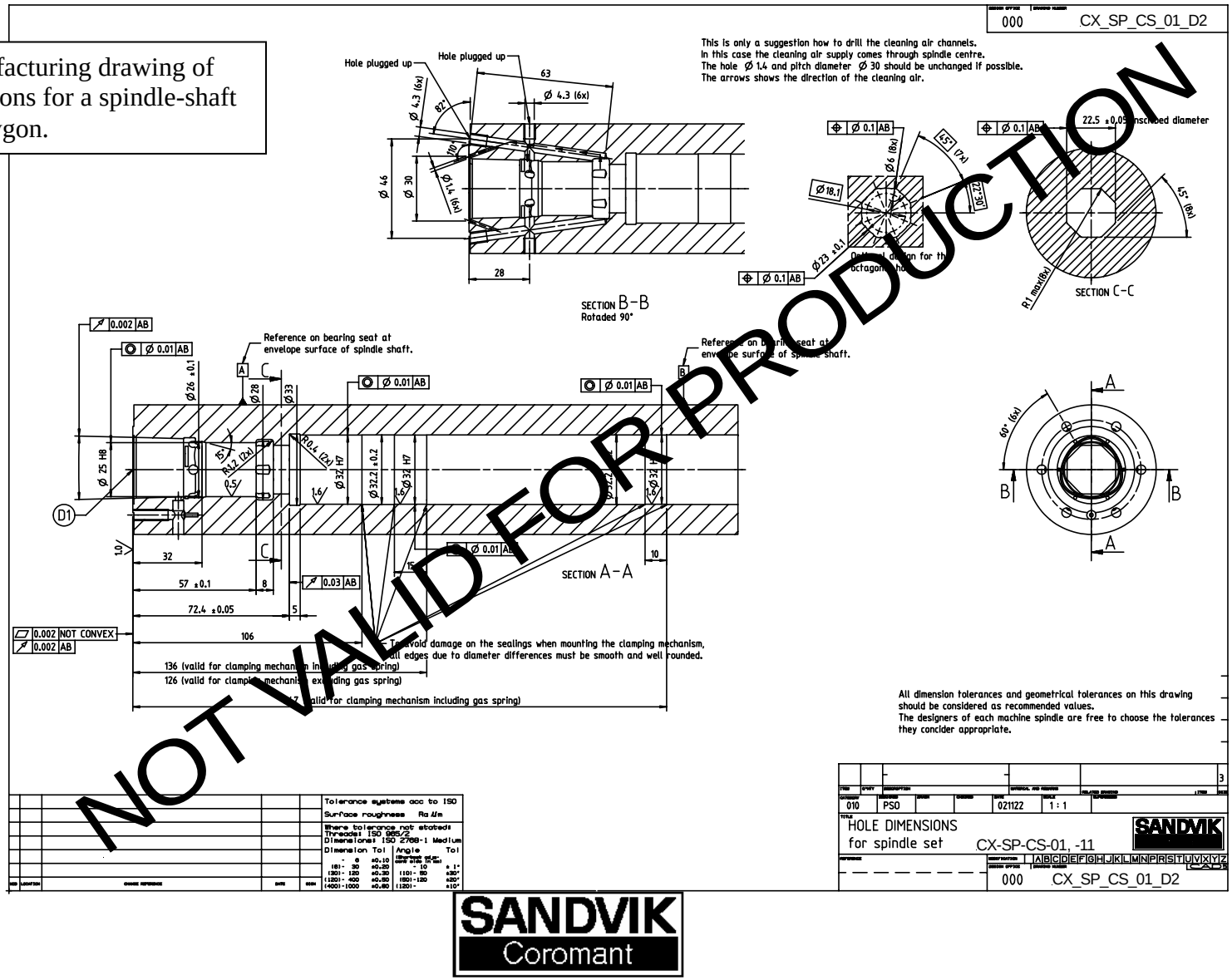


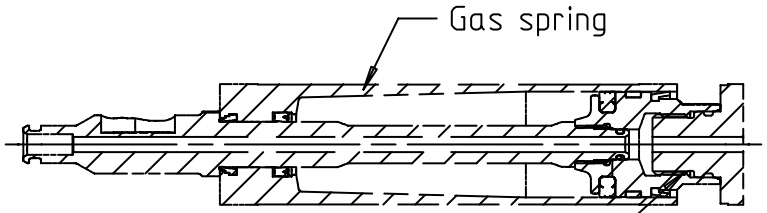
Remove the clamping set from the support tool.



The clamping set is now ready to assembly into the spindle shaft. See previous chapter, “built- in instructions”.

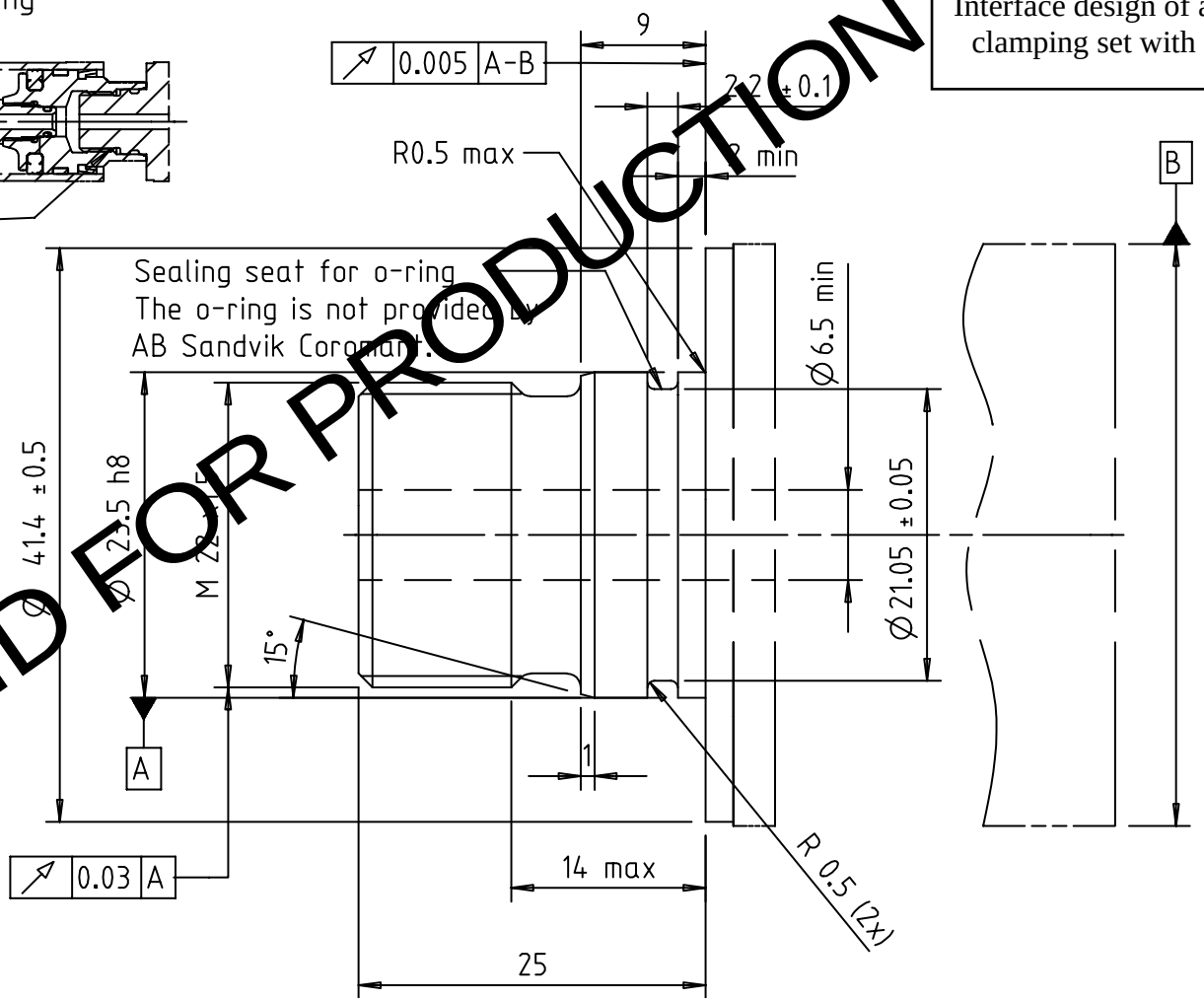
Example of a manufacturing drawing of the internal dimensions for a spindle-shaft with integrated polygon.





NOTE:
Use torque according to recommendation and apply Loctite 222 or similar to secure the union.

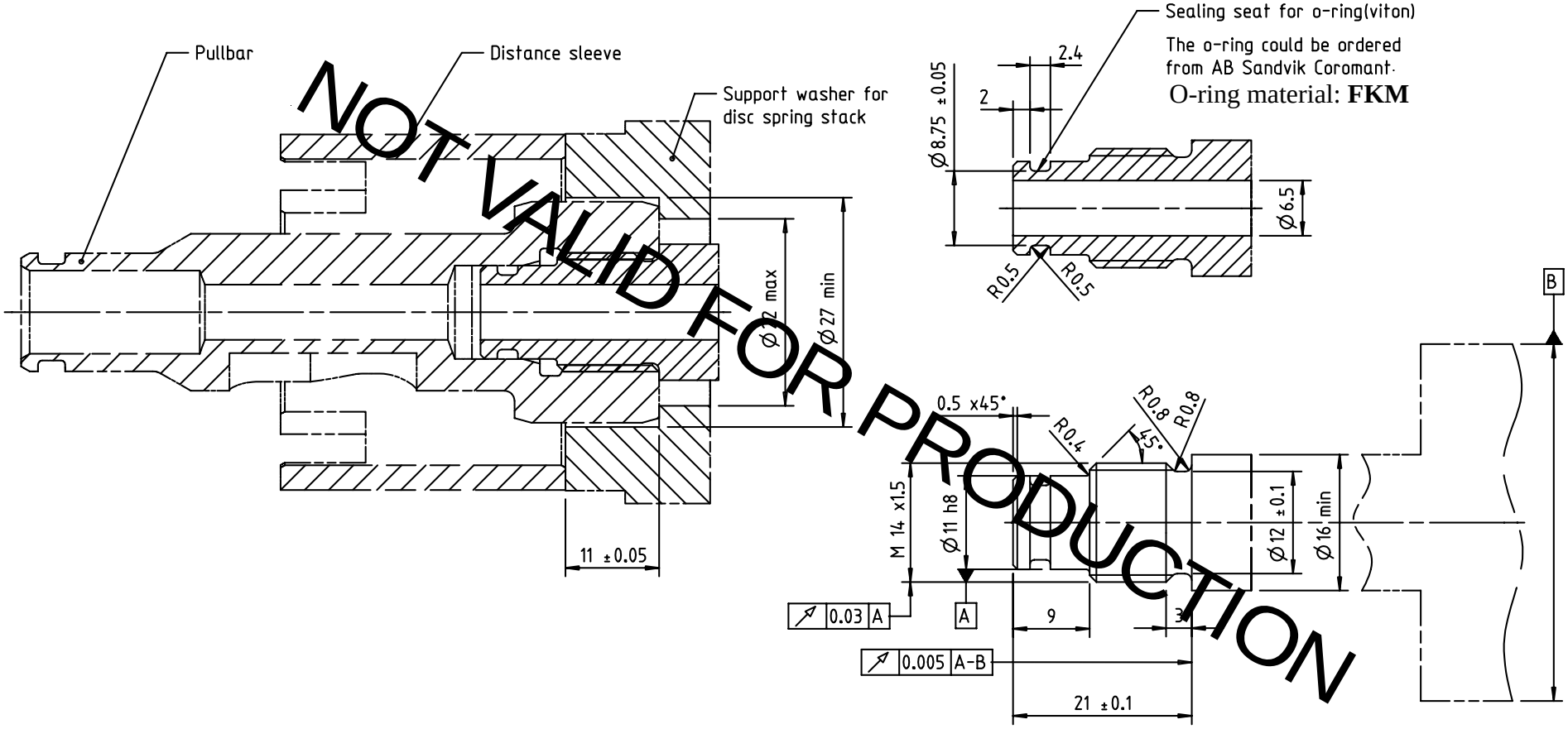
O-ring material: **FKM**



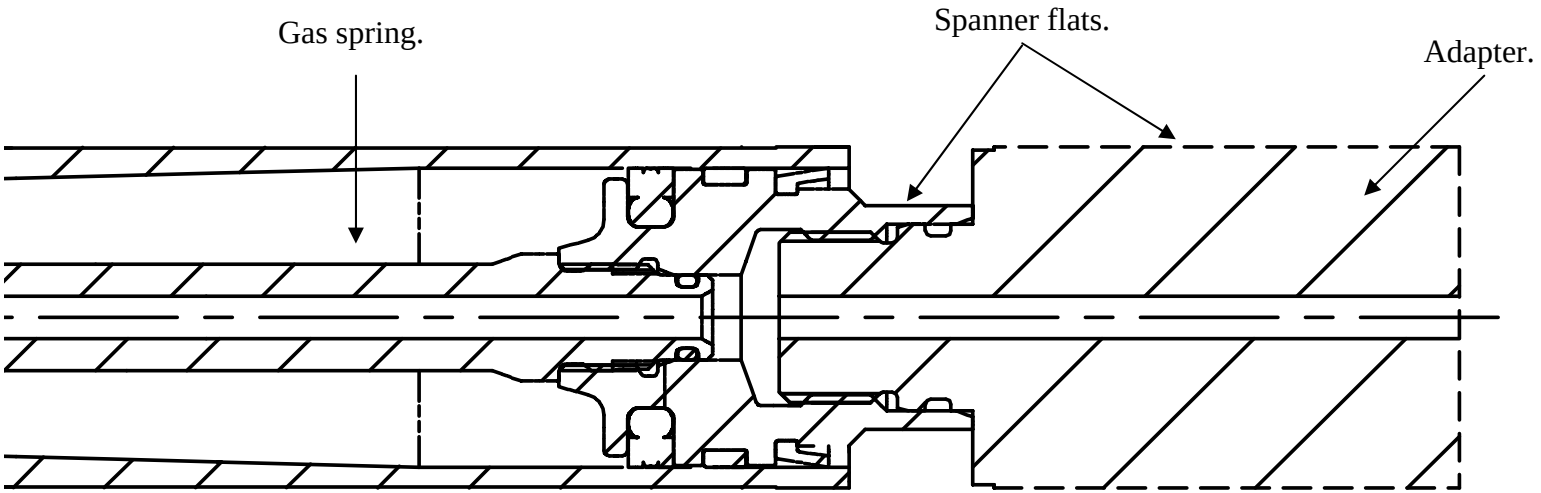
Interface design of an adapter to a clamping set with a gas-spring.

SANDVIK Coromant

Design of the pullbar extension to a clamping set without a gas-spring.



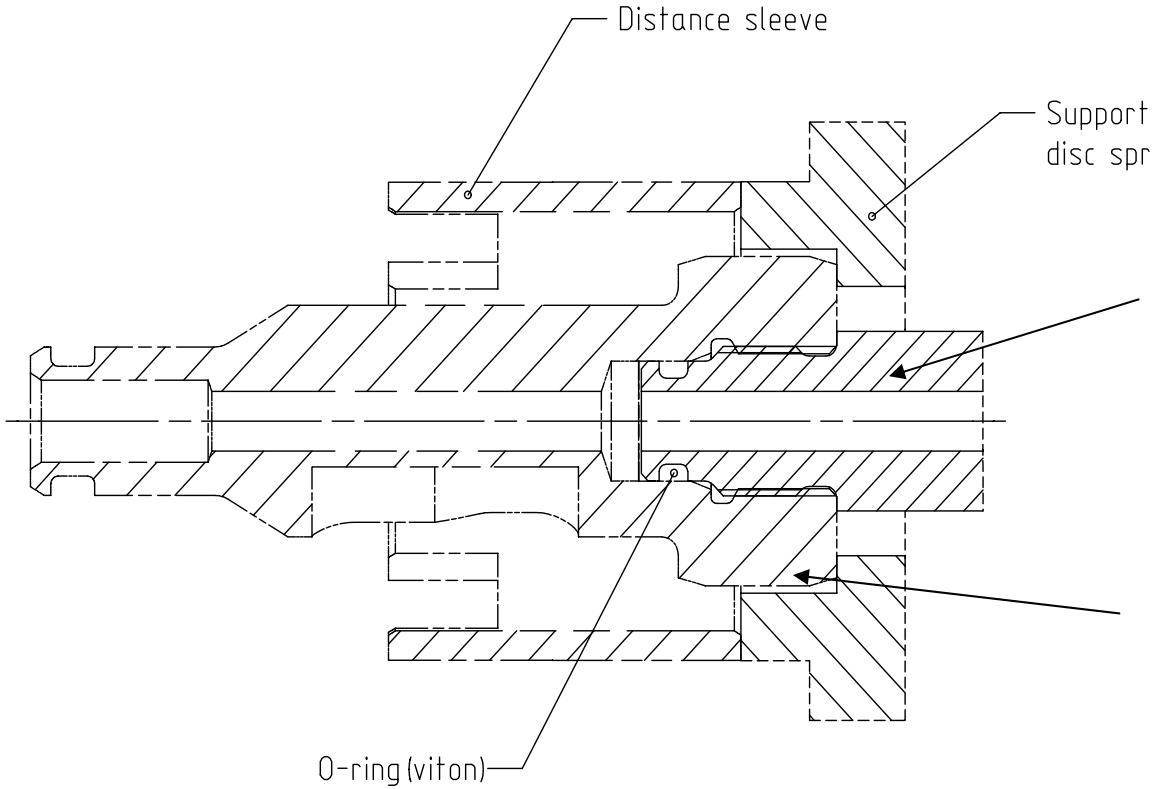
SANDVIK Coromant



Torque for the adapter. **Important: use the spanner flats when tightening or loosening the adapter.**

	Spanner size (Gas spring)
C3: 10Nm max.	**C3: 19mm**
C4: 17Nm max.	**C4: 21mm**
C5: 35Nm max.	**C5: 24mm**
C6: 40Nm max.	**C6: 27mm**
C8 / C8X: 60Nm max.	**C8 / C8X: 32mm**

Use Loctite 222 or equal to secure the union.



Torque for the pullbar extension

C3: 20Nm
C4: 25Nm
C5: 40Nm
C6: 60Nm
C8 / C8X: 90Nm

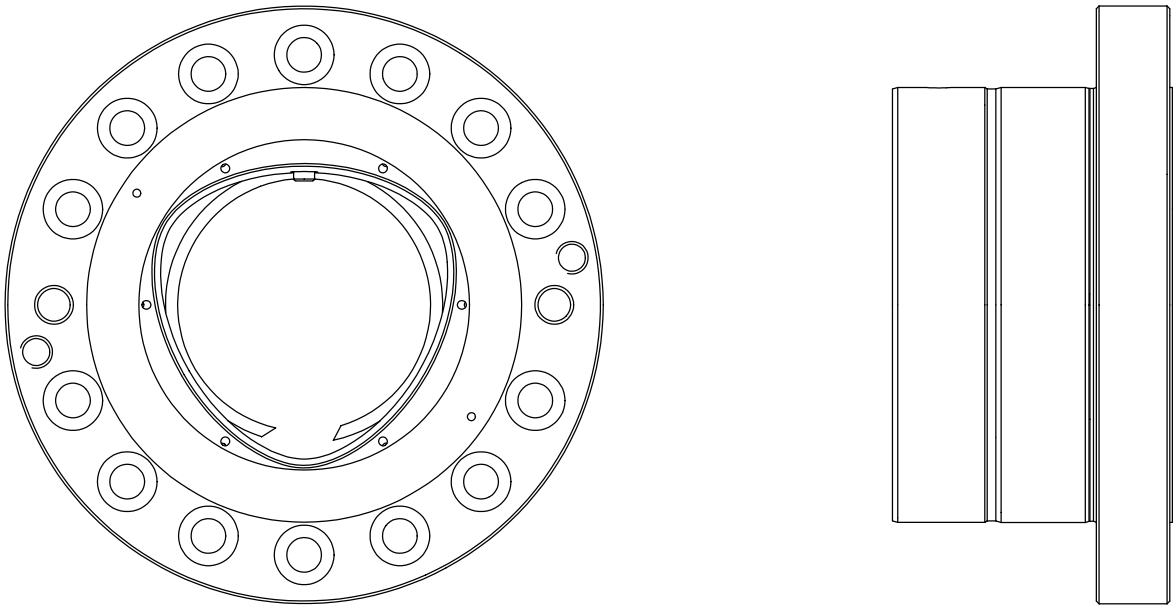
IMPORTANT:
Take support from the spanner flats of the pullbar when tightening.

Spanner size (Pullbar)

C3: 17mm
C4: 19mm
C5: 19mm
C6: 21mm
C8 / C8X: 24mm

E. Spare Parts.

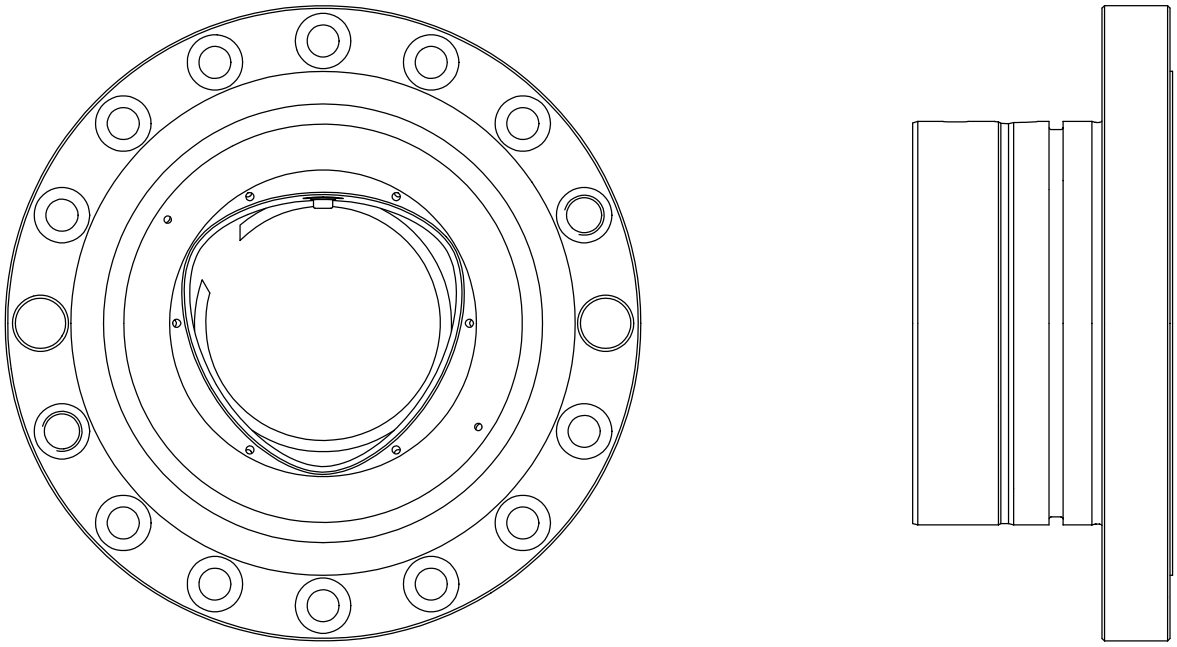
Polygon Sleeve.



Size	Order code
C3	5252 022 – 19
C4	5252 022 – 15
C5	5252 022 – 16
C6	5252 022 – 17
C8	5252 022 – 18

All necessary screws and cylindrical pins are enclosed in the package.

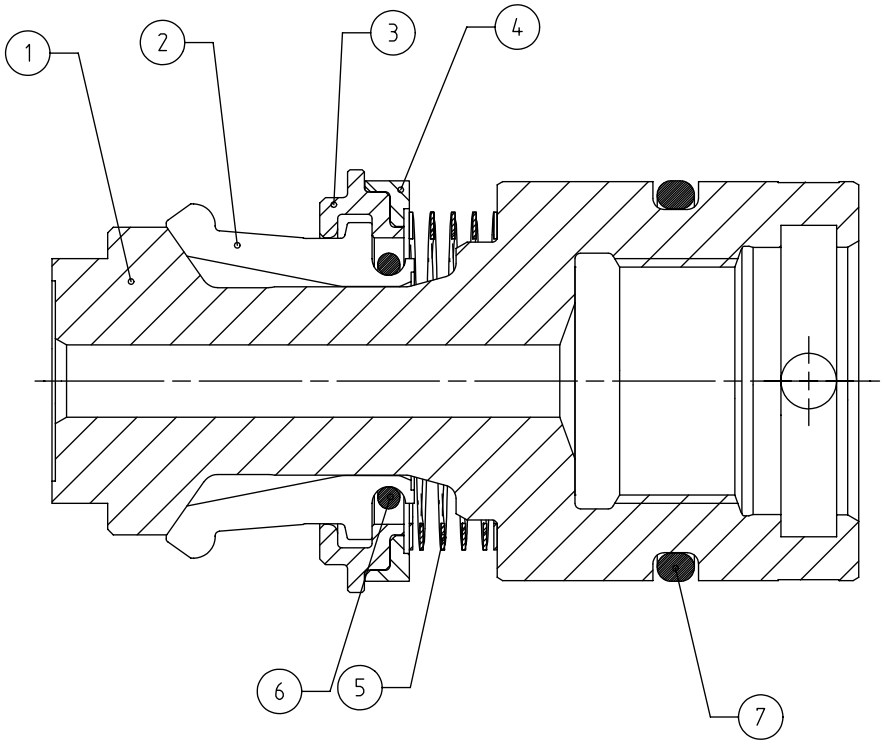
C8X Polygon Sleeve.



Size	Order code
C8X	5252 022 – 20

All necessary screws and cylindrical pins are enclosed in the package.

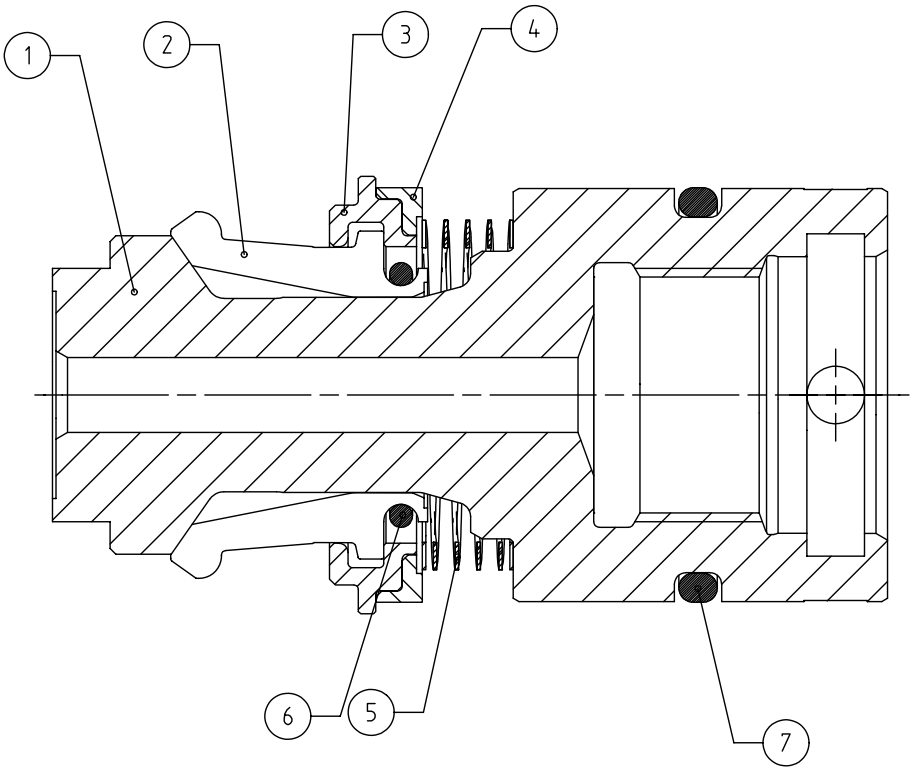
Clamping drawbar (Standard).



Pos.	1	2	3	4
SIZE	***Clamping drawbar**	**Set of segments**	**Holder**	**Ring**
C3	5461 135-181	5549 120-08	5546 002-01	5541 028-01
C4	5461 135-141	5549 120-06	5546 002-02	5546 004-04
C5	5461 135-151	5549 120-07	5546 002-03	5546 004-05
C6	5461 135-111	5549 120-04	5546 005-01	5546 004-06
C8 / C8X	5461 135-161	5549 120-05	5546 005-04	5546 004-02
Pos.	**5**	**6**	**7**	**5**
SIZE	**Flat wire spring**	**O – Ring**	**O –Ring**	**Comp. spring**
C3	N/A	5641 005-01	5641 005-66	5561 001-93
C4	5561 015-08	5641 005-05	5641 005-54	N/A
C5	5561 015-01	5641 005-06	5641 005-22	N/A
C6	5561 015-01	5641 005-04	5641 005-51	N/A
C8 / C8X	5561 015-07	5641 005-07	5641 005-24	N/A

* Complete clamping drawbar. (Includes pos. 2 – 7)

Clamping drawbar (with holding function).

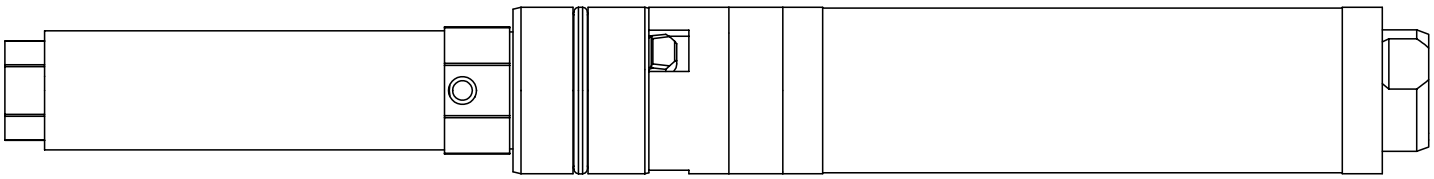


Pos.	1	2	3	4
SIZE	***Clamping drawbar**	**Set of segments**	**Holder**	**Ring**
C3	N/A	N/A	N/A	N/A
C4	5461 135-211	5549 120-06	5546 005-05	5546 004-04
C5	5461 135-221	5549 120-07	5546 005-06	5546 004-05
C6	5461 135-171	5549 120-04	5546 005-03	5546 004-01
C8 / C8X	5461 135-231	5549 120-05	5546 005-07	5546 004-02
Pos.	**5**	**6**	**7**	**5**
SIZE	**Flat wire spring**	**Tension spring**	**O –Ring**	**Comp. Spring**
C3	N/A	N/A	N/A	N/A
C4	5561 015-08	5561 025-02	5641 005-54	N/A
C5	5561 015-01	5641 025-03	5641 005-22	N/A
C6	5561 015-01	5641 025-01	5641 005-51	N/A
C8 / C8X	5561 015-07	5641 025-04	5641 005-24	N/A

* Complete clamping drawbar. (Includes pos. 2 – 7)

Gas spring set.

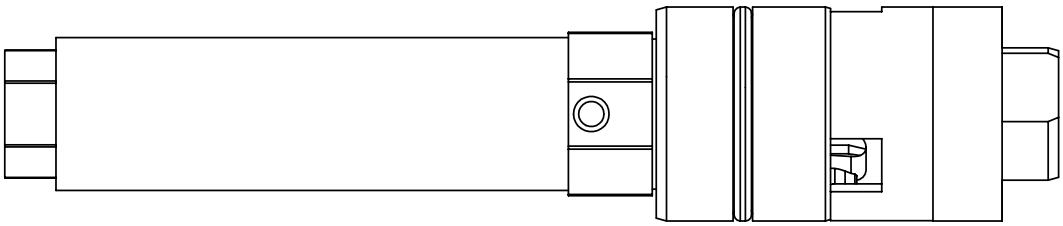
Drawbar is not included.



SIZE	Gas spring set
C3	5564 001-091
C4	5564 001-051
C5	5564 001-061
C6	5564 001-071
C8 / C8X	5564 001-081

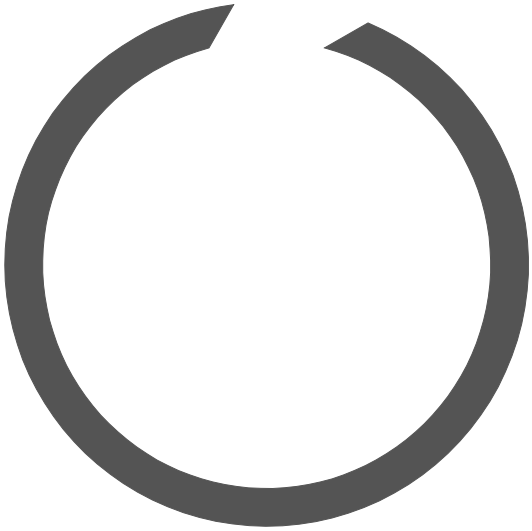
Pullbar set.

Drawbar is not included.



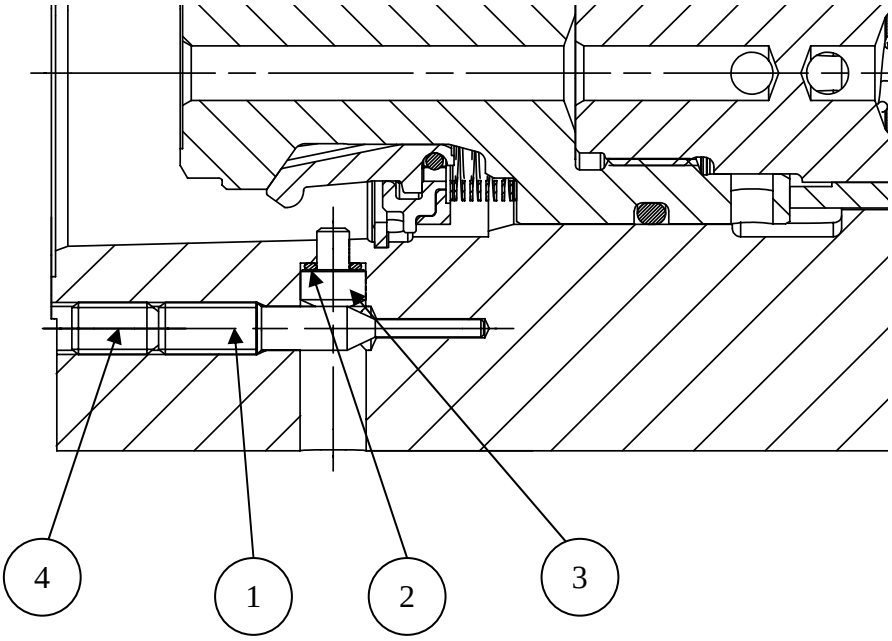
SIZE	Pullbar set
C3	N/A
C4	5461 130-481
C5	5461 130-491
C6	5461 130-431
C8 / C8X	5461 130-501

Circlip.



Size	Order code
C3	5545 042 – 01
C4	3421 105 – 026
C5	3421 105 – 032
C6	3421 105 – 040
C8 / C8X	3421 105 – 050

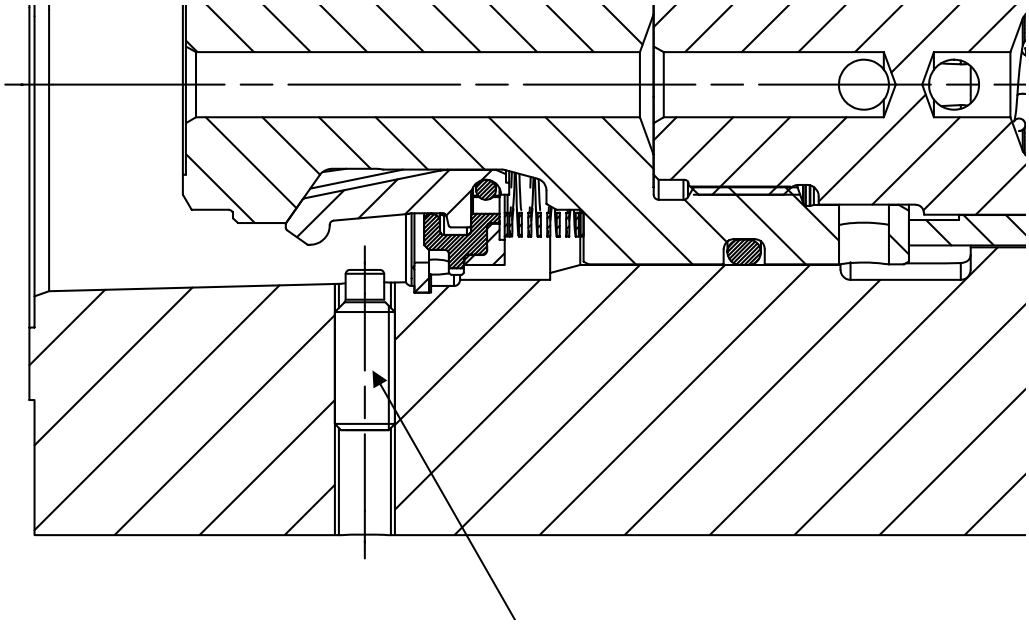
Positioning Pin. *(C3, C4 and C5)*



Order codes

Pos.	1	2	3	4
Size	**Level screw**	**O – Ring**	**Positioning Pin**	**Set screw**
C3	5514 036 – 02	5641 005 – 64	5552 010 – 05	3214 010 – 303
C4	5514 036 – 02	5641 005 – 64	5552 010 – 03	3214 010 – 306
C5	5514 036 – 03	5641 005 – 63	5552 010 – 04	3214 010 – 356

Positioning Screw. *(C6, C8 and C8X)*

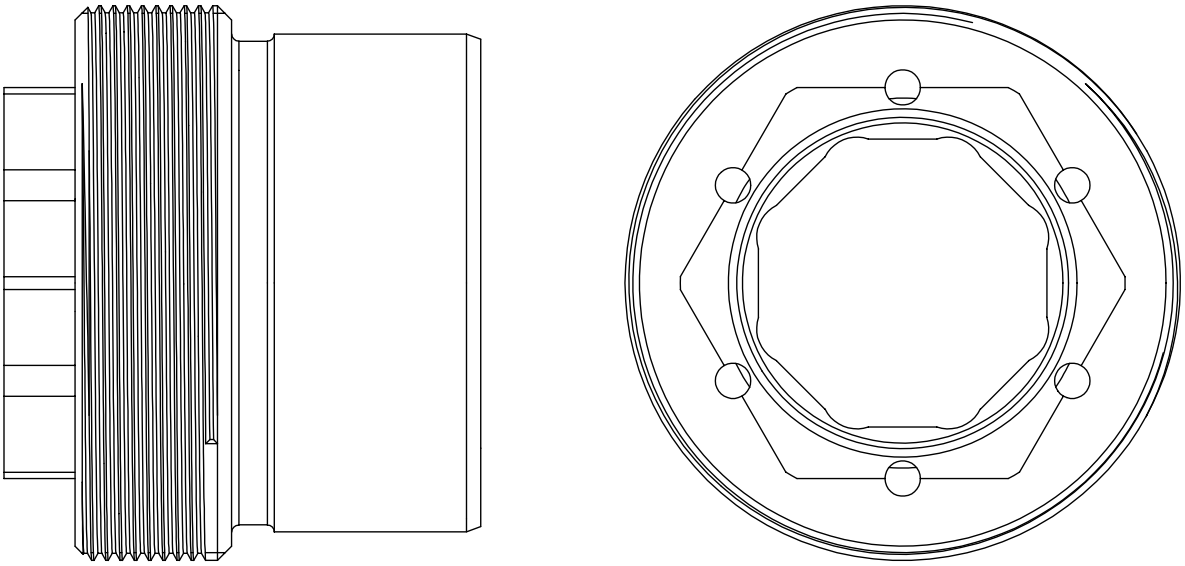


Positioning screw

Order codes

Size	Positioning screw
C6	3214 020-359
C8 / C8X	3214 020-359

Spindle sleeve.



Size	Spindle sleeve, Order code
C4	5549 136 – 04
C5	5549 136 – 05
C6	5549 136 – 02
C8 / C8X	5549 136 – 03

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