

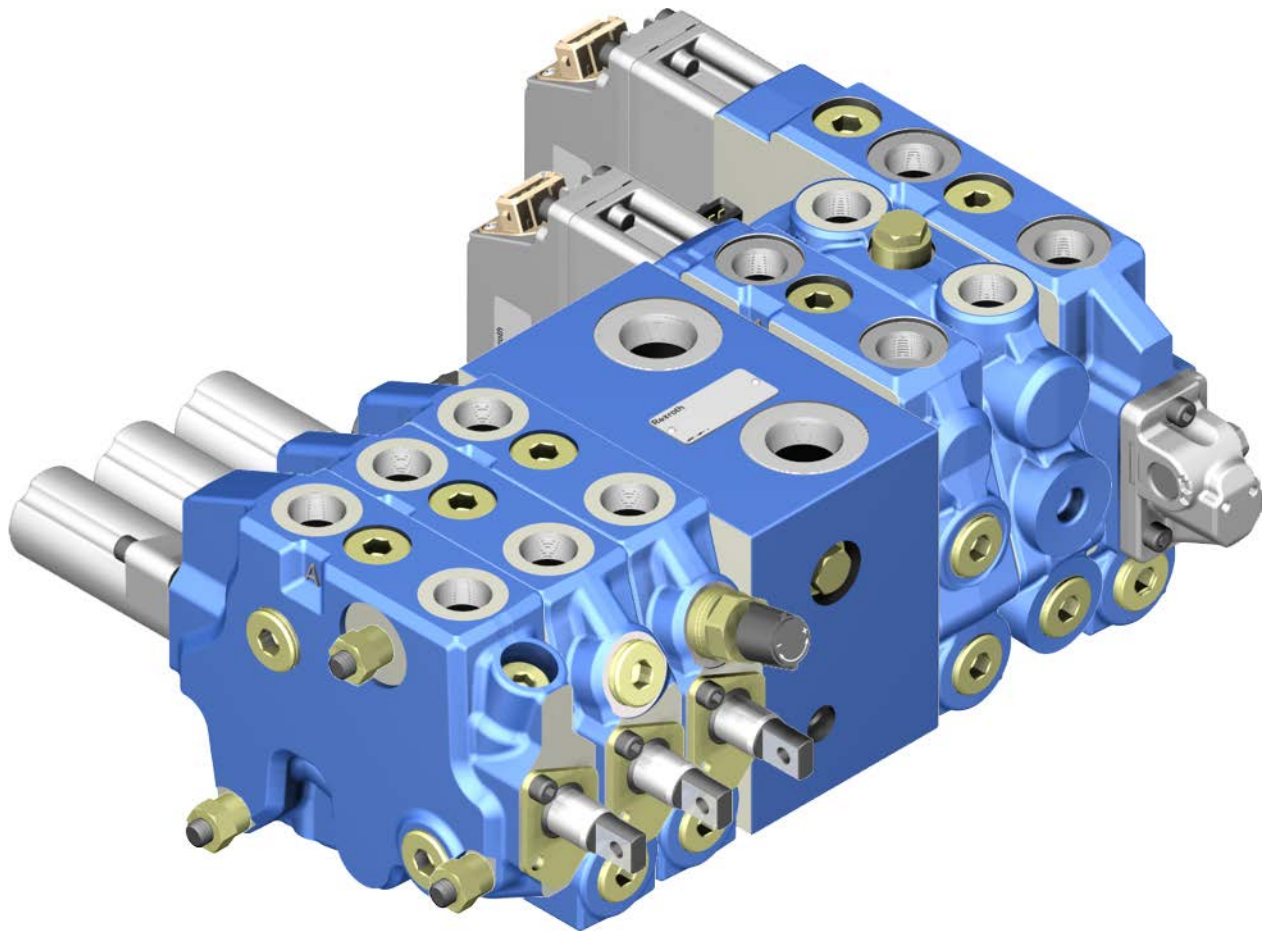
# Load-sensing control block in sandwich plate design SB24/34

Control block assembly – Control blocks with central connecting plate

11-R

**Assembly Instructions**  
**RE 66170-11-R/2019-05-07**

English



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The cover shows an example application. The product delivered may differ from the image on the cover.

The original repair manual was created in the German language.

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# 1 About this documentation


## 1.1 Validity of the documentation

This documentation applies to load-sensing control blocks SB24/34 of Bosch Rexroth including the following control block segments:



- Connecting plate, central connecting plate, intermediate plate and end plate
- Control valves SB24-M, SB24-EHS and SB34-EHS
- Hitch control valves EHR24-EHS and EHR24-EM2

- ▶ Read this documentation completely and, in particular, the chapter 2 "Safety instructions" and the chapter 3 "General instructions on property and product damage" in the related instruction manual 66170-B before you start working with the product.

## 1.2 Required and supplementary documentation

- ▶ Only commission the product if the documentation marked with the book symbol  is available to you and you have understood and observed it.

**Table 1: Required and supplementary documentation**

Title	Document number	Document type
 <b>Load-sensing control block SB24/34</b> Contains important information on the safe and proper transport, installation, commissioning, maintenance and disassembly of the SB24/34 control block.	66170-B	Instruction manual
 <b>Technical data sheet</b> Contains the permissible technical data. Please bear in mind that different technical data sheets apply depending on the version:		Data sheet
Load-sensing control block SB24/34	66170	
Load-sensing directional valves in sandwich plate design SB24-EHS, SB34-EHS	66171	
Load-sensing directional valves in sandwich plate design SB24-M	66172	
Plates SB24, SB34	66173	
Hitch control valves EHR5, EHR24-EM2, EHR24-EHS	66126	



For related documentation on the assembly and repair, please refer to the above-mentioned manual and, if necessary, to

[www.boschrexroth.com/mobile-hydraulics-catalog](http://www.boschrexroth.com/mobile-hydraulics-catalog).


### 1.3 Representation of information

Uniform safety instructions, symbols, terms and abbreviations are used throughout this documentation to ensure safe and proper use of the product. For clarification, they are explained in the sections below.

#### 1.3.1 Symbols

The following symbols indicate notices that are not safety-relevant but increase understanding of the documentation.

**Table 2: Meaning of symbols**

Symbol	Meaning
	If this information is disregarded, the product cannot be used and/or operated to its full extent.
▶	Single, independent action
1. 2. 3.	Numbered instruction: The numbers indicate that the actions must be completed in order.
❶	Black circle with white number: Auxiliary marking for a better understanding.
①	White circle with black number: Position or assembly group with reference to the parts list and to the graphics within a chapter.
Ⓐ	White circle with black letters: Assembly group with reference to the parts list and to the graphics within a chapter.

#### 1.3.2 Designations

This documentation uses the following designations:

**Table 3: Designations**

Designation	Meaning
SB24-M	Control valve with mechanical control
SB24-EHS/SB34-EHS	Control valve with CAN bus-controlled electrohydraulic actuating unit
EHR24-EHS	Control valve with CAN bus-controlled electrohydraulic actuating unit for electrohydraulic hitch control
EHR24-EM2	Control valve with PWM signal control for electrohydraulic hitch control
Control valve	Directional valve type SB
Hitch control valve	Directional valve type EHR

### 1.3.3 Abbreviations

This documentation uses the following abbreviations:

**Table 4: Abbreviations**

Abbreviation	Meaning
AP	Connecting plate
CVL	Connection valve (with LS signaling direction from right to left)
EHR	Electrohydraulic hitch control
EHS	Electrohydraulic actuating unit
EVL	End valve (with LS signaling direction from right to left)
EP	End plate
SVL	Standard valve (with LS signaling direction from right to left)
ZAP	Central connecting plate

## 2 Safety instructions

- ▶ Always follow all safety instructions in the instruction manual 66170-B.

## 3 General instructions on property damage and product damage

- ▶ Always follow all instructions in the instruction manual 66170-B.

### **Housing and parts**

- Rexroth original spare parts may be used only.
- Replace elastic sealing elements after disassembly.
- The housing and parts must be clean and undamaged.
- Damaged housings and parts may not be used again.
- Reworking threads is not permissible.
- Reworking bores is not permissible.
- Protect bores and threads from any deposition of dirt.

### **Flange surfaces and sealing surfaces**

- During disassembly, adhesion forces might take an effect between the flange surfaces.
- Remove any contamination with a whetstone and clean it with a cleaning cloth.
- Surfaces with imprints or signs of wear in the sealing surface may not be continued to be used.
- Reworking sealing surfaces is not permissible.

### **Bench vise**

- Use protective jaws with hard rubber. Sealing and flange surfaces may not be damaged.

### **Required tools**

- Oil-soaked cleaning cloth
- Whetstone
- Mechanical tools
- Torque wrench

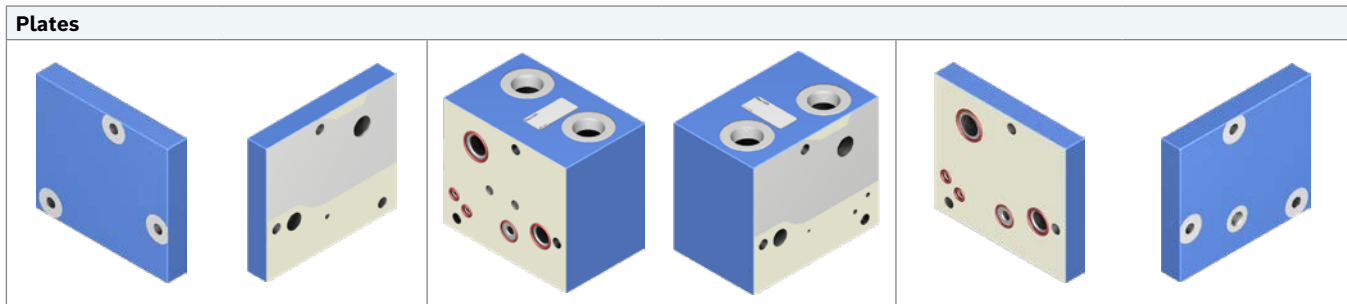
## 4 About these products



To ensure clear presentation of the control block assembly / disassembly, the representation of the control block segments has been simplified and/or reduced to the essential and summarized in dummies.

The work steps are described based on a control block with dummy block segments.

### 4.1 Overview of control block segments



▲ End plate (EP)

▲ Central connecting plate (ZAP)

▲ Connecting plate (AP)



▲ End valve (EVL)

▲ Standard directional valve (SVL)

▲ Connection valve (CVL)

▲ Hitch control valve EHR24-EM2

### 4.2 Tie rod bores and threads

The control block segments are clamped together by means of tie rods and nuts. For this purpose, the control block is provided with threaded bores at one control block segment and the following control block segments are provided with through bores in the flange surfaces.

At the final control block segment, the tie rods protrude at the end surface. On the protrusion, the tie rod nuts are located.

Example:

	Bore	Bore	Thread	Bore	Bore	
Nut	EP / EVL	SVL	ZAP	SVL	AP / CVL	Nut

### 4.3 Tie rod

- ▶ Use tie rods (stud screws) according to DIN 835 - M10 × length, property class 10.9.

On each shaft end ① and ②, the tie rod is provided with a thread for different use.

- Interference thread ① with 20 mm length (thread undercut + thread), which is screwed into the ZAP.
- Nut thread ②

The required tie rod length depends on the number and combination of the control block segments.

The tie rod length **L** is determined as follows:  $L = \text{①} + \text{②} + \text{③}$

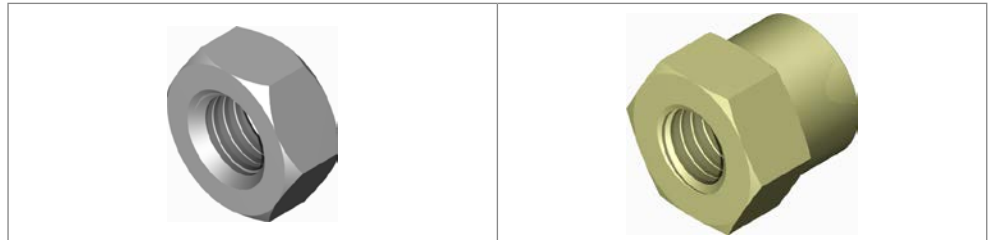


The determination process for the required tie rod length is exactly described in data sheet 66170.

**NOTICE!** The tie rods must not be deformed during assembly/disassembly of the control block segments!

### 4.4 Nut

For the tie rod nut thread ②, different nuts are used, depending on the final control block segment (AP or CVL and/or EP or EVL).



▲ **DIN 970-M10 for connecting plate (AP) and end plate (EP)**

▲ **Shoulder nut M10 for connection valve (CVL) and end valve (EVL)**

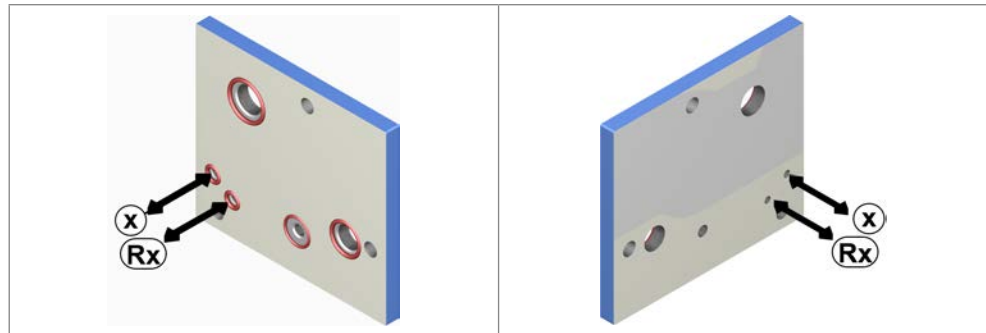
#### 4.5 EHS pilot oil bores

For control blocks in EHS version, control block segments with pilot oil line **X** and **Rx** are required.

With mixed control blocks (control block segments with and without EHS), the pilot oil line **X** and **Rx** has to be considered in the control block segment selection. The position of the control block segment with the pilot oil feed influences the order and/or version of the following control block segments.

To control block segments without EHS, the following applies:

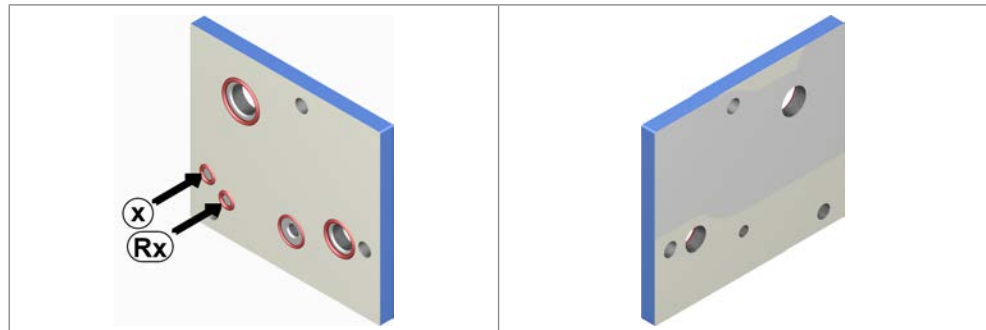
- **With** continuous pilot oil line **X** and **Rx**, if any of the following control block segments requires the pilot oil line **X** and **Rx**.



▲ **O-ring side:**  
**X and Rx with O-ring counterbores and O-rings**

▲ **Opposite O-ring side:**  
**X and Rx with through bore**

- **Without** continuous pilot oil line **X** and **Rx**, if none of the following control block segment requires the pilot oil line **X** and **Rx**.



▲ **O-ring side:**  
**X and Rx with O-ring counterbores and O-rings**

▲ **Opposite O-ring side:**  
**closed**

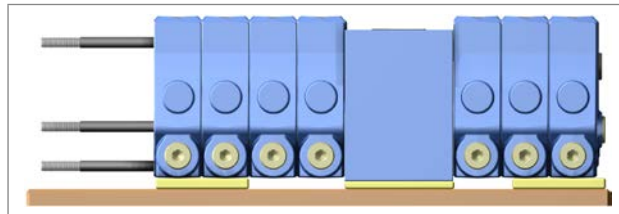
#### 4.6 Configuring the control block

1. Determine the desired order of the block segments (see chapter 4.2), e.g. starting with the central connecting plate.
2. Determine the tie rod length (see chapter 4.3).
3. Consider the control block segments with pilot oil line **X** and **Rx** in the order (see chapter 4.5).
4. Determine the tie rod nut (see chapter 4.4) depending on the version of the final control block segment (end plate or end valve).

#### 4.7 Alignment of the control block on the working surface

The control block segments can only be assembled / disassembled horizontally.

In case of horizontal assembly, the height difference of the individual block segments should be compensated with a suitable underlayer from the fifth control block segment in order to ensure safe orientation of the control block segments to each other.



▲ Compensating height differences

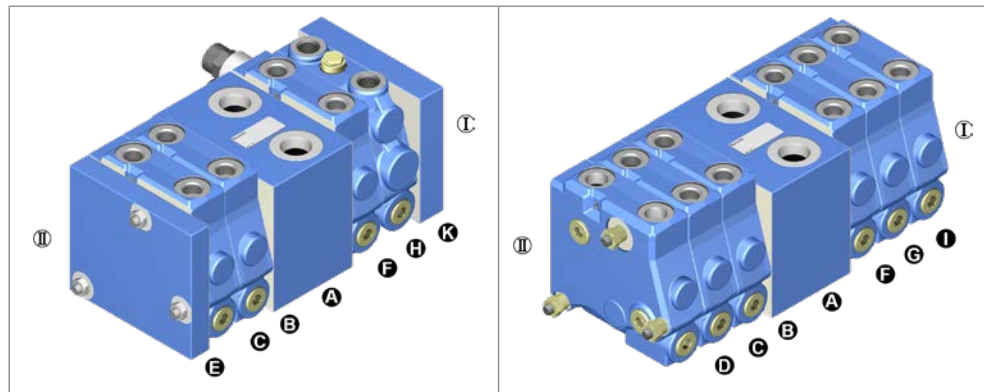
## 5 Assembly description



The assembly / disassembly is described using two dummy control blocks with 7 block segments each as example.

**Table 5: Control block segments**

Position	Designation	Abbreviation	Control block side
<b>A</b>	Central connecting plate	ZAP	
<b>B, C</b>	Directional valve SB / EHR	SVL	II
<b>D</b>	End valve	EVL	II
<b>E</b>	End plate	EP	II
<b>F, G</b>	Directional valve SB / EHR	SVL	I
<b>H</b>	Directional valve EHR-EM2	SVL	I
<b>I</b>	Connection valve	CVL	I
<b>K</b>	Connecting plate	AP	I



▲ Example with end plate

▲ Example with end valve

### 5.1 Control block assembly

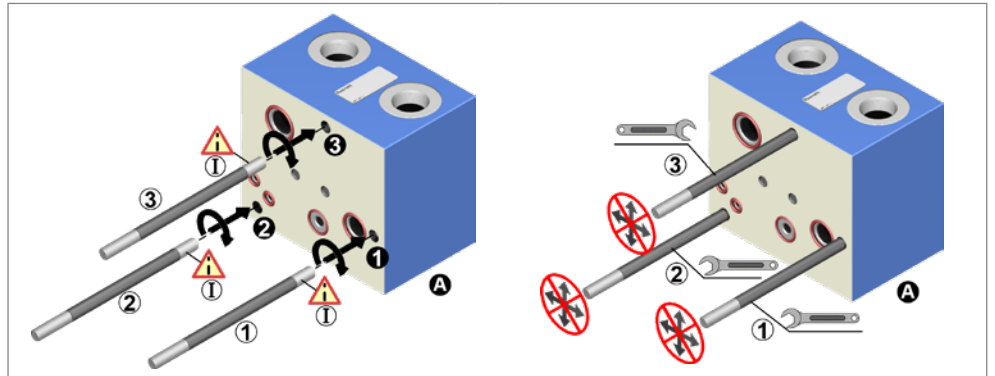
#### 5.1.1 Preparation of the block segments for the assembly

Prepare the flange surface O-ring side of the block segments as follows:

1. Block segments with shuttle valve:  
Assemble the shuttle valve according to chapter 6.2 "Repairing the shuttle valve".
2. Block segments with shuttle valve with spring pre-tension:  
Assemble the shuttle valve according to chapter 6.3 "Repairing the spring pre-tensioned shuttle valve".
3. Assemble the sealing elements according to chapter 6.1 "Sealing elements for control block segments".

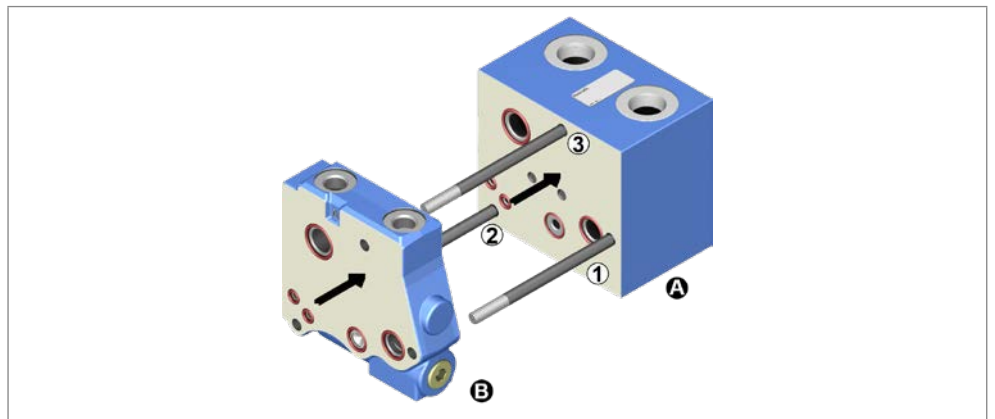
### 5.1.2 Assembly, central connecting plate **A**, side **II**

1. Manually screw-in the three tie rod screws **1**...**3** with the thread side **I** into the tie rod thread bores **1** ... **3** of the connecting plate **A** in a clockwise direction and tighten them. Tightening torque  $M_A = 45^{+5}$  Nm.



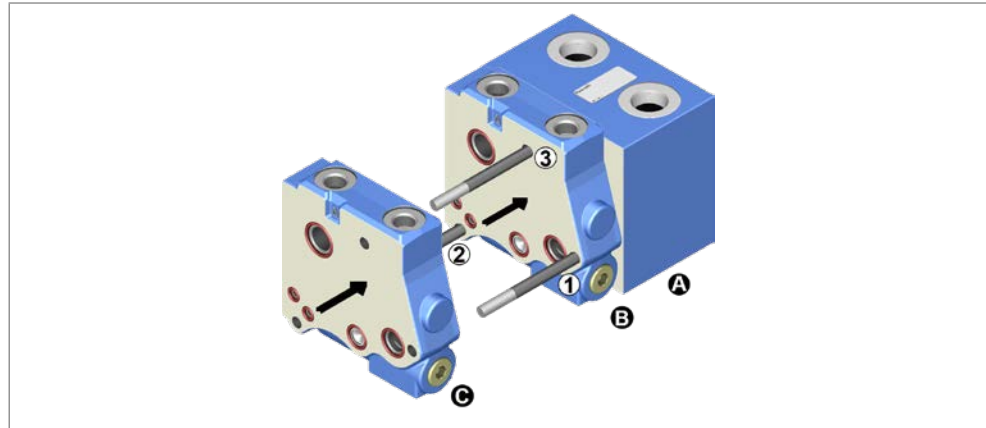
### 5.1.3 Assembly, directional valve section **B**

- Orientate the control block segment **B** with the flange surface of the opposite O-ring side to the connecting plate **A** and slide it via the tie rod screws **1**...**3** to the stop at the connecting plate **A**.



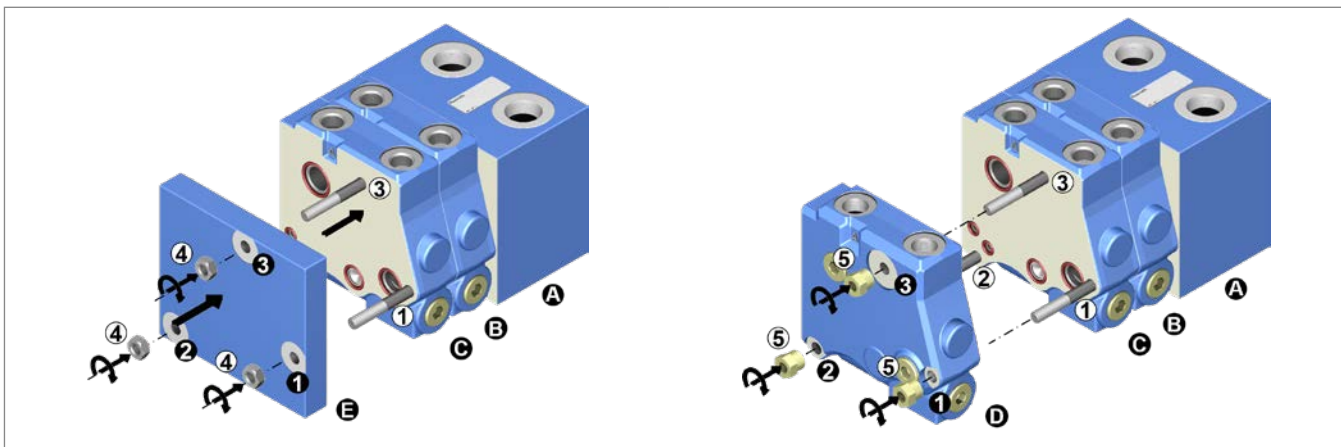
### 5.1.4 Assembly, directional valve section C

- ▶ Orientate the control block segment C with the flange surface of the opposite O-ring side to the already mounted control block segment and slide on via the tie rod screws ①...③ to the stop.

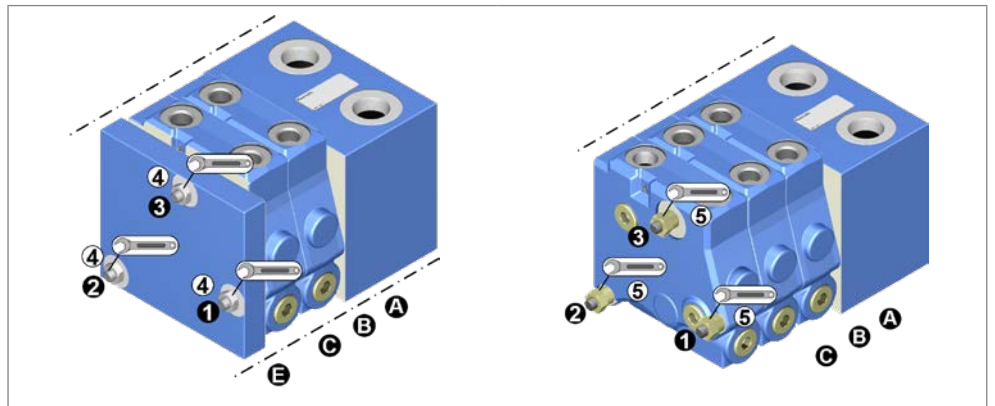


### 5.1.5 Assembly, end plate E / end valve D

1. Orientate the end plate E / end valve D with the flange surface of the opposite O-ring side to the already mounted control block segment and slide on via the tie rod screws ①...③ to the stop.
2. Screw the nuts ④ and/or ⑤ onto the tie rods ①...③ without using any washers or locking washers.



3. Align the control block segments to each other and pre-tension the nuts ④ and/or ⑤ in the order ① → ② → ③ with a torque of approx.  $5^{+1}$  Nm.
4. Tighten the nuts ④ and/or ⑤ in the order ① → ② → ③. Tightening torque  $M_A = 45^{+5}$  Nm.

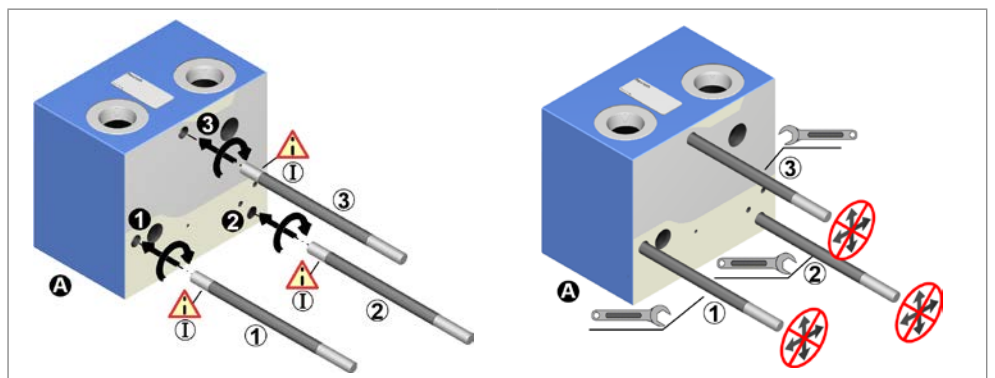


### 5.1.6 Assembly, central connecting plate **A**, side **I**



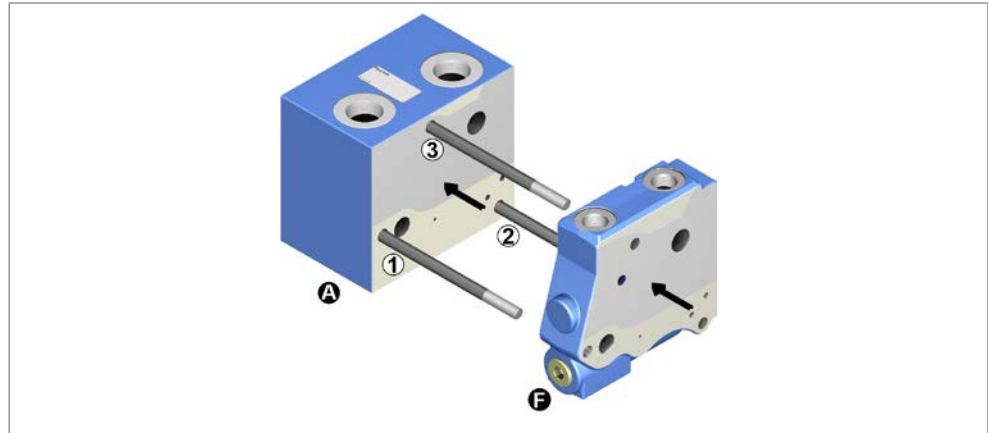
For a better overview, only the relevant control block side **I** of the ZAP is shown.

1. Manually screw-in the three tie rod screws ①...③ with the thread side **I** into the tie rod thread bores ① ... ③ of the connecting plate **A** in a clockwise direction and tighten them. Tightening torque  $M_A = 45^{+5}$  Nm.



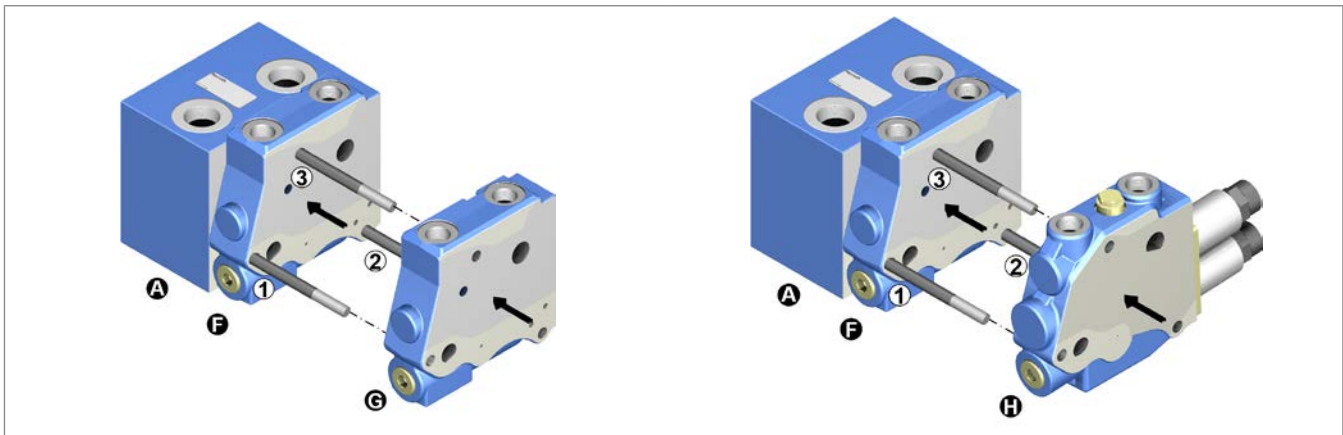
### 5.1.7 Assembly, directional valve section **F**

- ▶ Orientate the control block segment **F** with the flange surface of the O-ring side to the connecting plate **A** and slide it via the tie rod screws ①...③ to the stop at the connecting plate **A**.



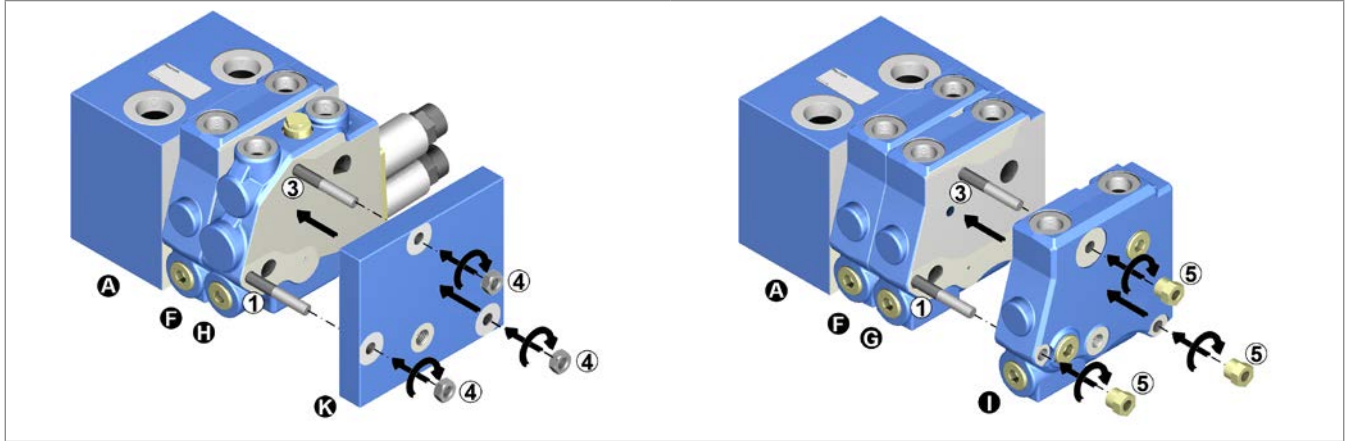
### 5.1.8 Assembly, directional valve section **H**, **G**

- ▶ Orientate the control block segments **H**, **G** with the flange surface of the O-ring side to the already mounted control block segment and slide on via the tie rod screws ①...③ to the stop.

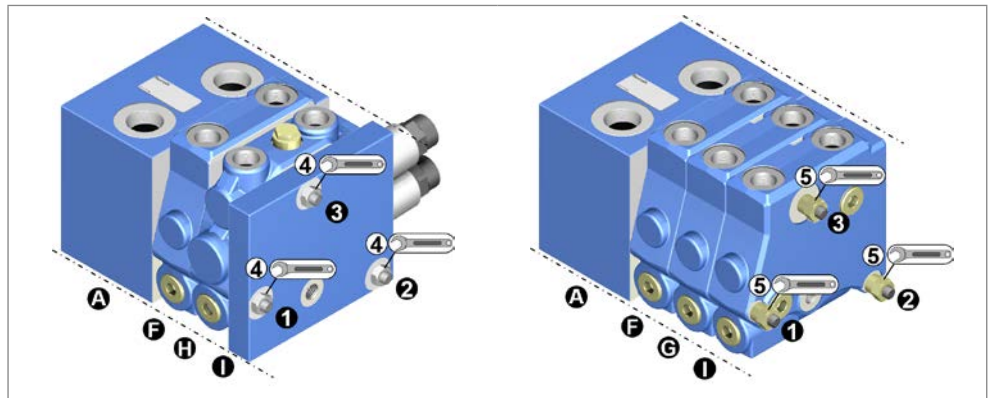


### 5.1.9 Assembly, connecting plate **K** / connection valve **I**

1. Orientate the connecting plate **K** / connection valve **I** with the flange surface of the O-ring side to the already mounted control block segment and slide on via the tie rod screws **1**...**3** to the stop.
2. Screw the nuts **4** and/or **5** onto the tie rods **1**...**3** without using any washers or locking washers.



3. Align the control block segments to each other and pre-tension the nuts **4** and/or **5** in the order **1** → **2** → **3** with a torque of approx. 5+1 Nm.
4. Tighten the nuts **4** and/or **5** in the order **1** → **2** → **3**. Tightening torque  $M_A = 45^{+5}$  Nm.



## 5.2 Control block disassembly

### 5.2.1 Preparation of the disassembly

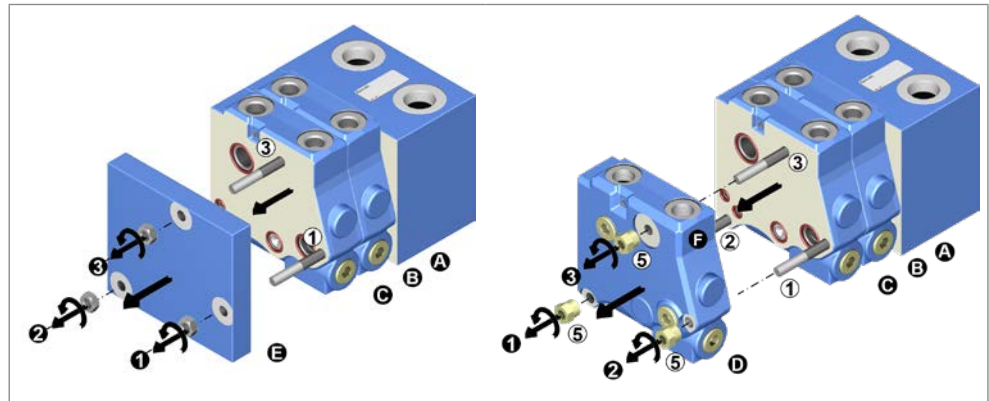
- ▶ Dismount the control block according to the parameters provided by the machine manufacturer and place it on a clean and stable underlayer.
- ▶ The height difference of the individual block segments is to be equalized with a suitable underlayer. The sealing and flange surfaces may not be damaged by the underlayer (see chapter 4.7).
- ▶ The control block segments are to be numbered individually.

### 5.2.2 Disassembly, end plate **E** / end valve **D**, side **II**



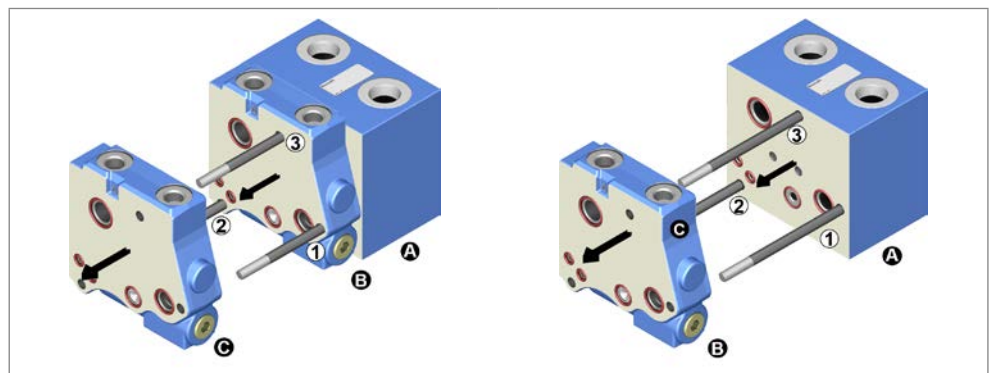
For a better overview, only the relevant control block side **II** of the ZAP is shown.

1. Loosen the nuts **4** and/or **5** by turning them counterclockwise and remove them from the tie rods **1**...**3**.
2. Remove the end plate **E** / end valve **D** via the tie rods **1**...**3** without jamming.



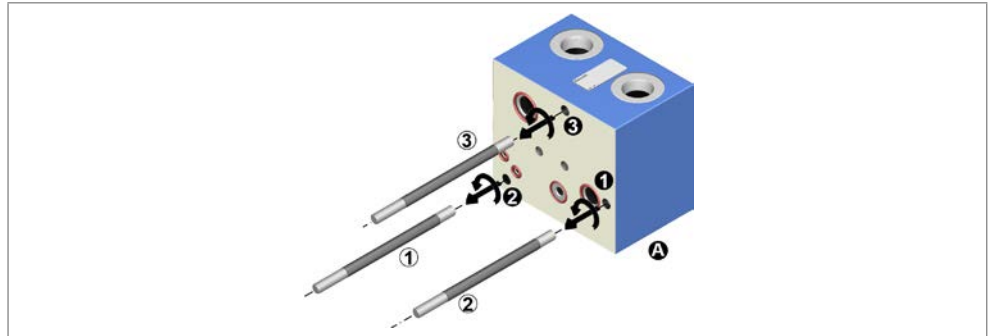
### 5.2.3 Disassembly, directional valve section **B**, **C**

- ▶ Remove the control block segments **C**, **B** one after another via the tie rods **1**...**3**.



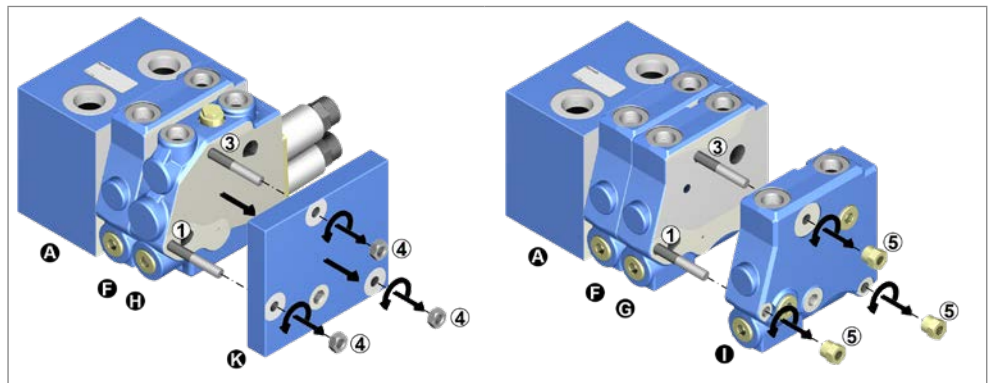
### 5.2.4 Disassembly, connecting plate **A**

- ▶ Loosen the three tie rods **①...③** by turning them counter-clockwise and unscrew them from the connecting plate **A**.



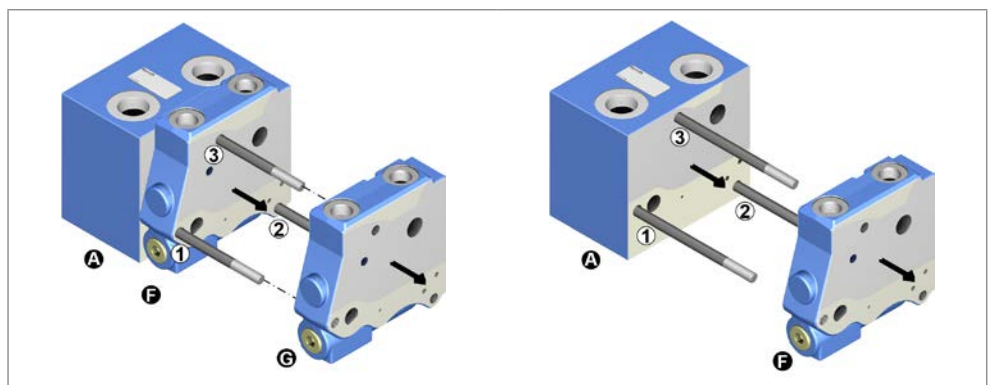
### 5.2.5 Disassembly, connecting plate **K** / connection valve **L**, side **①**

1. Loosen the nuts **④** and/or **⑤** by turning them counterclockwise and remove them from the tie rods **①...③**.
2. Remove the connecting plate **K** / connection valve **L** via the tie rods **①...③** without jamming.



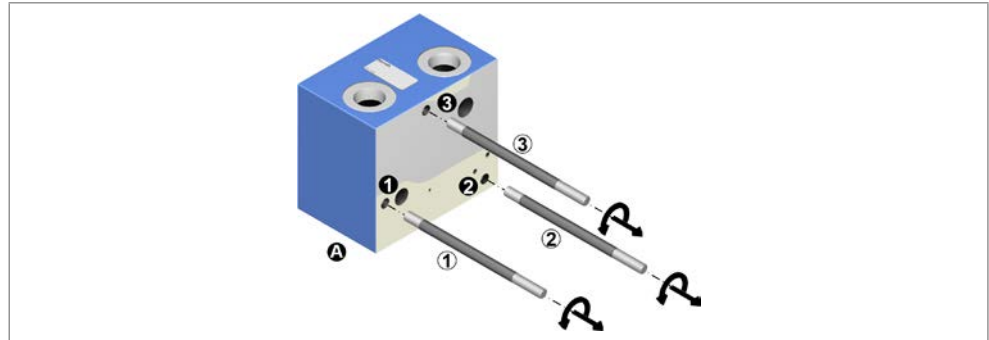
### 5.2.6 Disassembly, directional valve section **H**, **G**, **F**

- ▶ Remove the control block segments **H**, **G**, **F** one after another via the tie rods **①...③**.



### 5.2.7 Disassembly, central connecting plate **A**

- ▶ Loosen the three tie rods **1**...**3** by turning them counter-clockwise and unscrew them from the connecting plate **A**.



## 6 Repairing the flange surface

### 6.1 Sealing elements for control block segments

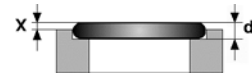
**Table 6: Sealing elements**

Position	Designation	Use		Dimension	Number
①	O-ring	Reservoir, return flow	<b>R</b>	27 × 2.5	1
②	O-ring	Inlet	<b>P</b>	22 × 2.5	1
③	O-ring	LS signal	<b>Y</b>	18 × 2.5	1
④	O-ring	Pilot oil return/supply	<b>Rx, X</b>	9 × 2.5	2
⑤	O-ring	Return flow, secondary pressure relief valve	<b>RfB</b>	14 × 2.5	1

**Flange surfaces  
O-ring protrusion**

**Table 7: O-ring thickness - Flange surface protrusion**

O-ring $\varnothing$ d	Protrusion X
1.5 mm	0.3 to 0.4 mm
2 mm	0.4 to 0.5 mm
2.5 mm	0.5 to 0.7 mm
3 mm	0.6 to 0.9 mm



**Disassembly/assembly,  
sealing elements**

1. Remove the O-rings from the ports **P**, **R**, **Y**, **Rx**, **X** and **RfB**.
2. Insert new O-rings into the ports **P**, **R**, **Y**, **Rx**, **X** and **RfB** in the flange surface, see Table 6.

**Table 8: Disassembly/assembly, sealing elements**

Flange surface	Disassembly	Assembly

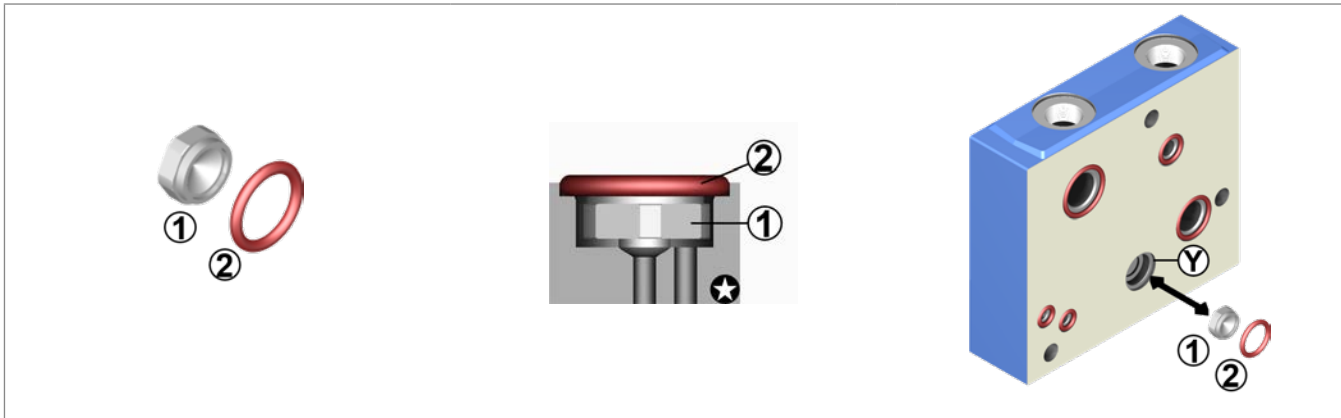


Control block segments with a recess for an O-ring for **Rx** and **X** (without continuous bore through the valve housing) must also be equipped with O-rings.

## 6.2 Repairing the shuttle valve

**Table 9: Parts list**

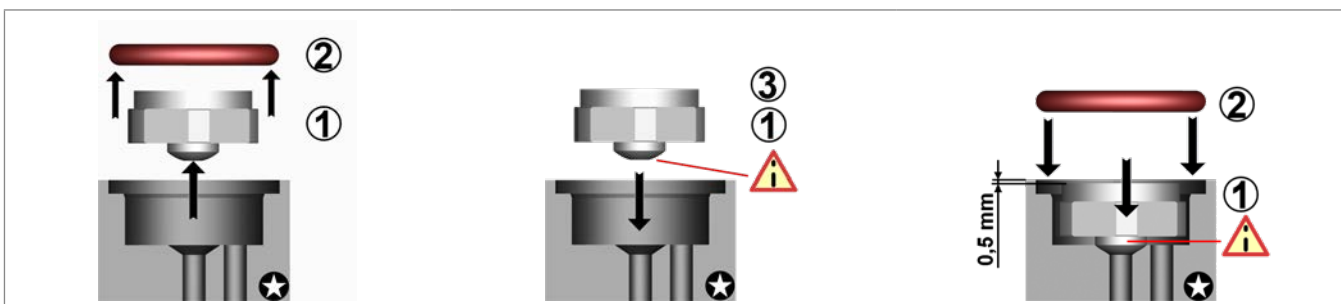
Position	Designation
①	Shuttle valve
②	O-ring



### Disassembly/assembly, shuttle valve

1. Remove the O-ring ② from port Y.
2. Remove the shuttle valve ① from port Y.
3. Align the shuttle valve ① with the spherical sealing cup to port Y and insert without jamming.
4. Check the distance dimension 0.5 mm from the flange surface of the control block segment to the upper edge of the inserted shuttle valve.
5. Insert a new O-ring ② into port Y.

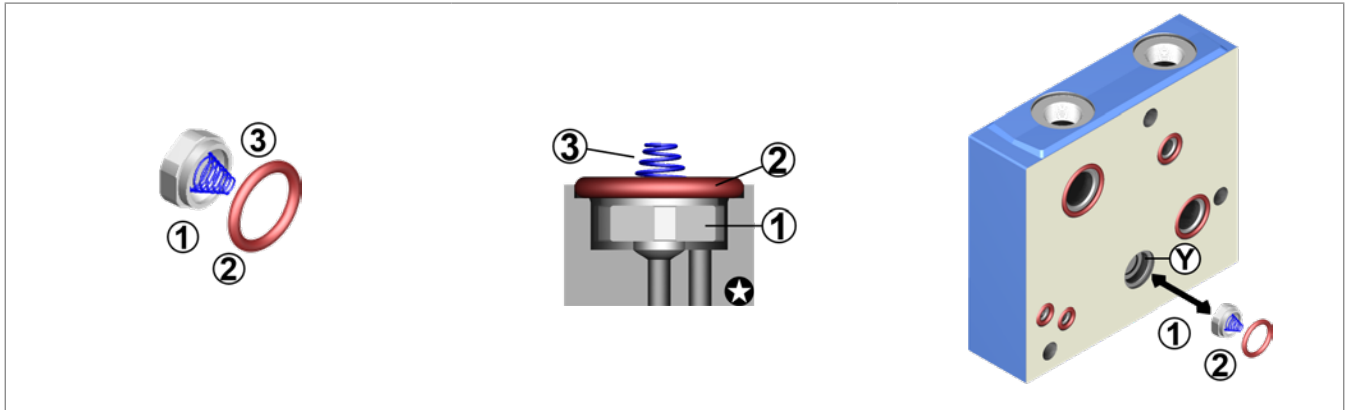
**NOTICE!** The shuttle valve ① must remain freely moveable within the O-ring ②.



### 6.3 Repairing the spring pre-tensioned shuttle valve

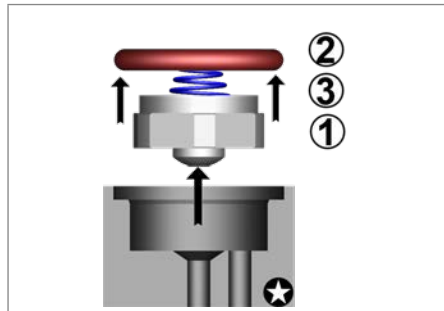
Table 10: Parts list

Position	Designation
①	Shuttle valve
②	O-ring
③	Conical compression spring (conical spring)



**Disassembly/assembly,  
spring pre-tensioned  
shuttle valve**

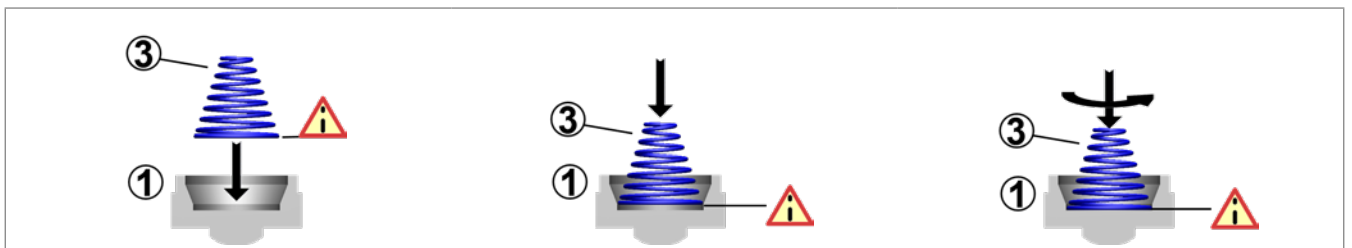
1. Remove the O-ring ② from port Y.
2. Remove the shuttle valve ① from port Y together with the compression spring ③.



3. Align the compression spring ③ with the end side with the larger diameter concentrically to the shuttle valve bore and insert it.
4. Push the compression spring ③ in the shuttle valve bore down to the bore ground while simultaneously turning it counter-clockwise.



Die compression spring ③ is held at the bore ground by its form and tension.



5. Align the shuttle valve ① with the spherical sealing cup to port Y and insert without jamming.
6. Check the distance dimension 0.5 mm from the flange surface of the control block segment to the upper edge of the inserted shuttle valve.
7. Insert a new O-ring ② into port Y.

**NOTICE!** The shuttle valve ① must remain freely moveable within the O-ring ②.









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