

Axial piston variable motor A6VM

Series 71

Size 280

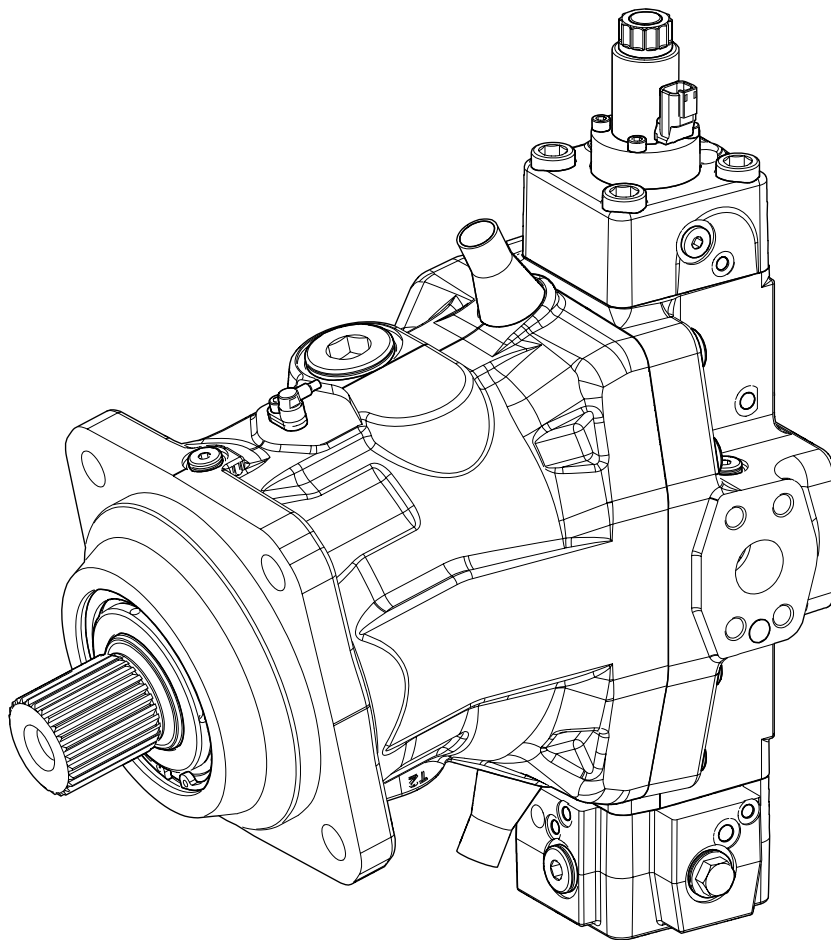
S033

Repair Instruction

RE 91610-10-S033/06.2019

First edition

English



Rexroth_00026-19

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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 is valid for the following products:


- Axial piston variable motor A6VM Series 71 Size 280

This documentation is intended for machine/system manufacturers, assemblers and service engineers.











This documentation contains important information on the safe and proper repair of the Axial piston unit.

> Read this documentation completely, particularly the chapter on 2 „Safety instructions" [[▶Page 10](#)] and the chapter on 3 „General instructions on property and product damage" [[▶Page 18](#)] before you start work with the Axial piston unit.

1.2 Required and supplementary documentation

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

Tab. 1: Required and supplementary documentation

Title	Document number	Document type
 Order confirmation Contains the order-related technical data of your Axial piston variable motor A6VM.	-	Order confirmation
 Installation drawing Contains the outer dimensions, all connections and the hydraulic circuit diagram of your Axial piston variable motor A6VM	Please request the installation drawing from your contact at Bosch Rexroth.	Installation drawing
 Axial piston variable motor A6VM The product-specific special tools catalog contains special tools required especially for the Axial piston variable motorA6VM.	91610-01-S083	Special tools catalog
 Axial piston variable motor A6VM This document contains important information for the safe and proper transport, assembly, operation, maintenance and dismantling of the Axial piston variable motorA6VM .	91610-01-B	Instruction manual
 Axial piston variable motor A6VM Contains the permissible technical data.	91610	Data sheet
 Hydraulic fluids based on mineral oils and related hydrocarbons Describes the requirements on a mineral oil-based hydraulic fluid and related hydrocarbons for operation with Rexroth hydraulic components, and assists you in selecting a hydraulic fluid for your hydraulic system.	90220	Data sheet
 Environmentally acceptable hydraulic fluids Describes the requirements on an environmentally acceptable hydraulic fluid for operation with Rexroth hydraulic components and assists you in selecting a hydraulic fluid for your hydraulic system.	90221	Data sheet
 Fire-resistant, water-free hydraulic fluids (HFDU/HFDR) Describes the requirements on fire-resistant, water-free hydraulic fluids (HFDU/ HFDR) for operation with Rexroth hydraulic components and assists you in selecting a hydraulic fluid for your hydraulic system.	90222	Data sheet
 Notices on the use of hydrostatic drivetrains at low temperatures Contains additional information on the use of Rexroth axial piston units at low temperatures.	90300-03-B	Instruction manual
 Storage and preservation of axial piston units Contains additional information on storage and preservation.	90312	Data sheet

1.3 Display of information

Standardized safety instructions, symbols, terms and abbreviations are used throughout this documentation so that you can work quickly and safely with your product. To give you a better understanding they are explained in the sections below.

1.3.1 Safety instructions




This documentation includes safety instructions in chapter 2.6 „Product-specific safety instructions“ [►Page 14] and in chapter 3 „General instructions on property and product damage“ [►Page 18] and before a sequence of actions or an instruction for action involving a risk of personal injury or damage to equipment. The described danger prevention measures must be observed.

Safety instructions are set out as follows:

 SIGNAL WORD
Type and source of danger! Consequences of noncompliance ► Measures to prevent danger

- **Warning sign:** draws attention to the danger
- **Signal word:** identifies the degree of the danger
- **Type and source of danger:** indicates the type and source of the danger
- **Consequences:** describes what occurs if the safety instructions are not complied with
- **Precautions:** states how the danger can be avoided



Tab. 2: Hazard classes as defined in ANSI Z535.6

Warning sign, signal word	Meaning
 DANGER	Identifies a dangerous situation that will result in death or serious injuries if it is not avoided.
 WARNING	Identifies a dangerous situation that may result in death or serious injuries if it is not avoided.
 CAUTION	Identifies a dangerous situation that may result in minor to moderate injuries if it is not avoided.
NOTICE	Property damage: The product or the environment may get damaged.

1.3.2 Symbols

The following symbols indicate information that is not safety-relevant but increases understanding of the documentation.

Tab. 3: Meaning of the symbols

Symbol	Meaning
	If this information is disregarded, the product cannot be used and/or operated to the optimum extent.
	Single, independent action.
1. 2. 3.	Numbered instruction: The numbers indicate that the actions must be completed one after the other.

1.3.3
Designations

This documentation uses the following designations:

Tab. 4: Designations

Designation	Meaning
A6VM	Axial piston variable motor, open and closed circuit
Threaded plug	Metal screw, pressure-resistant
Protective plug	Made from plastic, not pressure-resistant, only for transportation

As a generic term for the "Axial piston variable motor A6VM", the designation "Axial piston unit" will be used in the following.

1.3.4 Abbreviations

This documentation uses the following abbreviations:

Tab. 5: Abbreviations

Abbreviation	Meaning
ANSI	A merican N ational S tandards I nstitute is an organization that coordinates the development of voluntary standards in the United States
ATEX	EC directive on explosion protection (A tmosphère e xplosible)
DIN	D eutsches I nstitut für N ormung (German Institute for Standardization)
ISO	I nternational O rganization for S tandardization
RE	R exroth document in E nglish language
RE	R exroth document in E nglish language
VDI 2230	Directive for the systematic calculation of high duty screwed joints and cylindrical screw joints from the VDI (V erein D eutscher I ngenieure - Association of German Engineers)

1.3.5 Figures

The figures are simplified representations of the axial piston unit. Details that are not essential for a repair step, such as threads, are not depicted.

The supplied axial piston unit may deviate from the figures in details.

2 Safety instructions

2.1 About this chapter

The Axial piston unit has been manufactured according to the generally accepted rules of current technology. There is, however, still a danger of personal injury or property damage if this chapter and the safety instructions in this documentation are not complied with.

- ▶ Read this documentation completely and thoroughly before working with the Axial piston unit.
- ▶ Keep it in a location where it is accessible to all users at all times.
- ▶ Always include the required documentation when you pass the Axial piston unit on to third parties.

2.2 Intended use

The axial piston unit is a hydraulic component, meaning that in its field of application, it is classified neither as complete nor as partly completed machinery in the sense of the EC Machinery Directive 2006/42/EC. The component is exclusively intended to form partly completed machinery or complete machinery together with other components. The component should only be commissioned after it has been installed in the machine/system for which it is intended and the safety of the entire system has been established in accordance with the Machinery Directive.

This product is intended for the following use:

The axial piston unit is only approved as a hydraulic motor in hydrostatic drivetrains.

- ▶ Observe the technical data, the application and operating conditions and the performance limits as specified in data sheet RD-E91604 and in the order confirmation. Information about approved hydraulic fluids can be found in data sheet RD-E91604.

The axial piston unit is only intended for commercial use and not for private use.

Intended use includes having completely read and understood this documentation, especially the chapter on 2 „Safety instructions“ [[▶Page 10](#)].

2.3 Improper use

Any use other than that described as intended use is considered improper.

Bosch Rexroth AG is not liable for damages resulting from improper use. The user is solely responsible for any risks arising from improper use.

The foreseeable faulty usage below is also considered to be improper (this list makes no claim to completeness):

- Use outside the operating parameters approved in the data sheet or in the order confirmation (unless specifically approved by the customer).
- Use of non-approved fluids, for example water or polyurethane components.
- Changes to factory settings by unauthorized persons.
- Use of assembled parts (e.g. attachment filter, control unit, valves) other than the specified Rexroth components.
- Use of the Axial piston unit with assembled parts under water at a depth of more than 10 meters without the necessary additional measures, for example pressure equalization. Units with electrical components (e.g. sensors) generally must not come into contact with water. Axial piston units may only be used on a case-to-case basis for this application.
- The maximum permissible case pressure specified in the data sheet must not be exceeded.
- Use of the Axial piston unit in explosive environments unless the component or machine/system has been certified as compliant with ATEX Directive 2014/34/EU.
- Use of the Axial piston unit in a corrosive atmosphere.
- Use of the Axial piston unit in aircrafts or spacecrafts.

2.4 Personnel qualifications

The activities described in this documentation require basic mechanical, electrical and hydraulics expertise, as well as knowledge of the associated technical terms. For transporting and handling the product, additional knowledge is necessary with regard to working with lifting devices and their slings. In order to ensure safe use, these activities should only be performed by skilled personnel or an instructed person under the direction and supervision of skilled personnel.

Skilled persons are those who can recognize possible dangers and take the appropriate safety measures due to their professional training, knowledge, and experience, as well as their understanding of the relevant regulations pertaining to the work to be done. Skilled personnel must follow the rules relevant to their field and have the necessary hydraulics expert knowledge.

Hydraulic expert knowledge includes:

- Reading and fully understanding hydraulic circuit diagrams,
- especially fully understanding the relationships with regard to safety devices
- and understanding how hydraulic components work and are put together.



Bosch Rexroth offers training support for specialist fields. An overview of the training contents can be found online at: <http://www.boschrexroth.com/training>.

2.5 General safety instructions

- Observe the applicable accident prevention and environmental protection regulations.
- Observe the safety regulations of the country in which the product is used/operated.
- Use Rexroth products only when they are in good technical order and condition.
- Repairs to the Axial piston unit may only be performed by authorized, skilled and instructed personnel.
- Observe all notices on the product.
- Persons, who repair, install, operate, remove, or maintain Rexroth products, must not be under the influence of alcohol, or any drugs or medication that may affect their ability to respond.
- Only use genuine Rexroth accessories and spare parts to make sure there is no risk to personnel from unsuitable spare parts.
- Observe the technical data and ambient conditions specified in the product documentation.
- If unsuitable products are installed or used in applications that are of relevance to safety, unexpected operating conditions may occur in the application, which could result in personal injury or property damage. For this reason, only use the product in

safety-relevant applications if this use is expressly indicated and approved in the product documentation, e.g., in explosion protection applications or in safety-related parts of a control system (functional safety).

- Only commission the product if it has been determined that the end product (e.g., machinery or system) in which the Rexroth products are installed complies with the country-specific provisions, safety regulations and standards for the application.
- Use tools appropriate for the work being performed and wear appropriate protective clothing to prevent punctures and cuts (e.g. when removing protective covers, disassembly).
- There is a risk of entanglement when operating the axial piston unit with a bare shaft end. Check whether or not your machine requires additional safety measures for your application. If necessary, make sure these are properly implemented.
- Depending on the type of control used, electromagnetic effects can be produced when using solenoids. Use of the recommended direct current (DC) on the electromagnet does not produce any electromagnetic interference (EMI) nor is the electromagnet influenced by EMI. Potential electromagnetic interference (EMI) exists if the solenoid is energized with a modulated direct current (e.g., PWM signal). The machine manufacturer should conduct appropriate tests and take appropriate measures to ensure that other components or operators (e.g., with a pacemaker) are not affected by this potentiality.

2.6 Product-specific safety instructions

The following safety instructions apply to chapter 4 „Product description“ [►Page 21] to chapter 11 „Tightening torques“ [►Page 56].

WARNING

Danger from excessive pressure!

Danger to life, risk of injury or property damage!

Improperly changing the factory pressure settings can result in a pressure increase beyond the max. permissible pressure. Operating the unit above the max. permissible pressure can cause components to burst and hydraulic fluid to escape under high pressure.

- Changes to the factory settings may only be made by Bosch Rexroth specialists.
- In addition, a pressure relief valve is required in the hydraulic system as a back-up.
- If the axial piston unit is equipped with a pressure cut-off and/or pressure controller, this is not an adequate safeguard against pressure overload.

WARNING

Danger due to suspended loads!

Danger to life, risk of injury or property damage!

Improper transportation may cause the Axial piston unit to fall down and lead to injury, e.g., crushing or fracture, or damage to the product.

- Make sure that the load bearing capacity of the lifting device is sufficient to safely bear the weight of the Axial piston unit.
- Never step under or grip suspended loads.
- Ensure a stable transport position.
- Use your personal protective equipment (e.g. safety goggles, safety gloves, suitable working clothes, safety shoes).
- Use suitable lifting gear for transport.
- Observe the prescribed position of the lifting strap.
- Observe the national laws and specifications of occupational safety and health and transport.

WARNING

System/machine under pressure!

Danger to life or risk of injury, serious injuries when working on machines/systems that are not shut down! Risk of property damage!

- Switch off the entire system and secure it against reconnection according to parameters provided by the machine/system manufacturer.
- Make sure that all relevant components of the hydraulic system are depressurized. Follow the parameters given by the machine/system manufacturer.
- Note that the hydraulic system may still be under pressure even after the pressure supply itself has been disconnected.
- Do not disconnect any line connections, ports and components as long as the hydraulic system is under pressure.

WARNING

Escaping hydraulic fluid mist!

Risk of explosion and fire, health hazard, risk of environmental pollution!

- ▶ Depressurize the relevant machine/system component and repair the leak.
- ▶ Only perform welding work when the machine/system is depressurized.
- ▶ Keep open flames and ignition sources away from the Axial piston unit.
- ▶ If axial piston units are located in the vicinity of ignition sources or powerful thermal radiators, a shield must be erected to ensure any escaping hydraulic fluid cannot be ignited, and to protect hose lines from premature aging.

WARNING

Danger from unforeseen machine movement!

Danger to life or risk of injury!

Unintentional or careless actuation of the manual override of the solenoids can cause unexpected machine movements.

- ▶ Use the manual override only for functional testing or in the event of technical malfunctions.
- ▶ Using the manual override on a permanent basis (e.g. by wedging, blocking) is not permitted.
- ▶ The use of the manual override is only permitted with limited technical data (e.g. $0.25 \times$ maximum data).
- ▶ Check whether additional protective measures are necessary for the application on your machine in order to avoid unintentional actuation. If necessary, make sure that these are properly implemented.
- ▶ Wear suitable protective clothing.

WARNING

Electrical voltage!

Risk of injury from electric shock or risk of property damage!

- ▶ Before installing or removing a component or inserting or pulling an electrical connector make sure that the relevant machine/system component is voltage free. Protect the machine/system against being re-energized.

WARNING

Restriction of the control function!

Risk of injury or property damage!

Moving parts in control equipment (e.g. valve spools) can, under certain circumstances, get stuck in position as a result of contamination (e.g. impure hydraulic fluid, abrasion, or residual dirt from components). As a result, the hydraulic fluid flow and the build-up of torque in the axial piston unit can no longer respond correctly to the operator's specifications. Even the use of various filter elements (external or internal flow filtration) will not rule out a fault but merely reduce the risk.

- ▶ Check whether your application requires that remedial measures be taken on your machine in order to bring the driven consumer into a safe position (e.g. safe stop).
- ▶ If necessary, make sure that these are properly implemented.

WARNING

Danger due to components under mechanical tension!

Risk of injury or property damage!

Components, especially retaining rings, can become deformed under mechanical tension. In the event of improper installation or removal, the mechanical tension can move components in an unforeseeable manner.

- ▶ Make sure that the components, especially retaining rings, are correctly incorporated using the appropriate tools.
- ▶ Wear safety goggles and safety gloves!

CAUTION

High noise development during operation!

Danger of hearing damage or hearing loss!

The noise emission of the Axial piston unit depends on, among other factors, rotational speed, working pressure and installation conditions. The sound pressure level may rise above 70 dB (A) in certain application conditions.

- ▶ Always wear hearing protection when you are in the vicinity of the running Axial piston unit.

CAUTION

Hot surfaces on the Axial piston unit!

Risk of burning!

- ▶ Allow the Axial piston unit to cool down sufficiently before touching it.
- ▶ Wear heat-resistant protective clothing, e.g. gloves.

⚠ CAUTION

Improper routing of cables and lines!

Risk of stumbling and property damage!

Improper routing of cables and lines can cause a risk of stumbling as well as damage to equipment and components, for example, tearing of lines and connectors.

- ▶ Always route cables and lines in such a way that no one can trip over them, that they do not become kinked or twisted, do not rub on edges and do not run without adequate protection through sharp-edged ducts.

⚠ CAUTION

Contact with hydraulic fluid!

Risk of adverse health effects, e.g. eye injury, skin irritation, poisoning from inhalation!

- ▶ Avoid contact with hydraulic fluids.
- ▶ When working with hydraulic fluids, strictly observe the safety instructions provided by the lubricant manufacturer.
- ▶ Wear your personal protective equipment (e.g. safety goggles, safety gloves, suitable working clothes, safety shoes).
- ▶ Consult a doctor immediately if hydraulic fluid gets in your eyes or bloodstream, or is swallowed.

⚠ CAUTION

Escaping hydraulic fluid due to machine/system leakage!

Risk of burning and risk of injury due to escaping hydraulic fluid jet!

- ▶ Depressurize the relevant machine/system component and repair the leak.
- ▶ Never attempt to block or seal the leak or hydraulic fluid jet with a cloth.

⚠ CAUTION

Danger from improper handling!

Risk of slipping!

Risk of slipping on wet surfaces when climbing on the axial piston unit.

- ▶ Never grab or climb onto the axial piston unit.
- ▶ Check how to safely get on top of the machine/system.

2.7 Personal protective equipment

The personal protective equipment is the responsibility of the user of the motor.

Observe the safety regulations and provisions in your country. All pieces of personal protective equipment must be intact.

3 General instructions on property and product damage

The notices below apply to chapter 4 „Product description“ [►Page 21] to chapter 11 „Tightening torques“ [►Page 56].

NOTICE

Danger from improper handling!

Product can be damaged!

- Do not subject the product to improper mechanical loads.
- Never use the product as handle or step.
- Do not put/place any objects on the product.
- Do not hit the drive shaft of the Axial piston unit.
- Do not set/place the Axial piston unit on the drive shaft or assembled parts.
- Do not strike assembled parts (e.g. sensors or valves).
- Do not hit sealing surfaces (e.g. on the work connections).
- Leave the protective covers on the Axial piston unit until shortly before the lines are connected.
- Disconnect all electrical connectors before arc welding or painting.
- Ensure that the electronic components (e.g. sensors) are not electro-statically charged (e.g. during painting operations).

NOTICE

Risk of property damage due to inadequate lubrication!

Product can be damaged or destroyed!

- Never operate the Axial piston unit with insufficient hydraulic fluid. Specifically, make sure that the rotary group has sufficient lubrication.
- When commissioning a machine/system, make sure that the housing area and the working lines of the Axial piston unit are filled with hydraulic fluid and remain filled during operation. Avoid air inclusions in the forward drive shaft bearing, especially with the axial piston unit installed with the drive shaft up.
- Check the hydraulic fluid level in the housing area regularly and recommission, if necessary. For above-reservoir installation, the housing may drain out through the drain line after prolonged standstill periods (air enters through the shaft seal) or through the working line (gap leakage). This means the bearings are insufficiently lubricated when the system is turned on.
- Make sure the suction line is always filled with hydraulic fluid during commissioning and operation.
- With above-reservoir installation, the Axial piston unit must be moved to full swivel angle after no more than three seconds during commissioning and recommissioning (with axial piston variable pumps in an open circuit). Make sure that the Axial piston unit sucks in hydraulic fluid and builds up pressure.

NOTICE

Mixing hydraulic fluids!

Product can be damaged!

- ▶ Before installation, remove all fluids from the Axial piston unit to prevent mixing with the hydraulic fluid used in the machine/system.
- ▶ Any mixture of hydraulic fluids of different manufacturers and/or different types of the same manufacturer is generally not permissible.

NOTICE

Contamination of the hydraulic fluid!

The cleanliness of the hydraulic fluid has a considerable impact on the cleanliness and service life of the hydraulic system. Contamination of the hydraulic fluid can cause premature wear and malfunctions!

- ▶ Always ensure a work environment in the assembly location that is free from dust and foreign particles to prevent foreign particles, e.g. welding beads or metal cuttings, from entering the hydraulic lines and lead to wear and malfunctions in the product. The Axial piston unit must be installed in a clean condition.
- ▶ Only use clean ports, hydraulic lines and attachments (e.g. measuring devices).
- ▶ When plugging the ports, no contamination may ingress.
- ▶ Before commissioning, ensure that all hydraulic connections are tight and that all seals and plugs of the plug-in connection are correctly installed and undamaged to prevent fluids and foreign particles from entering the product.
- ▶ Use a suitable filter system to filter hydraulic fluid during filling to minimize solid particle contamination and water in the hydraulic system.

NOTICE

Improper cleaning!

Product can be damaged!

- ▶ Close all openings with appropriate protective covers in order to prevent cleaning agents from entering the hydraulic system.
- ▶ Never use solvents or aggressive cleaning agents. Use only water and, if necessary, a mild cleaning agent to clean the Axial piston unit.
- ▶ Do not point a high-pressure cleaner at sensitive components, e.g. shaft seal, electrical connections and components.
- ▶ Use fibre-free cleaning cloths for cleaning.

NOTICE

Environmental pollution due to incorrect disposal!

Careless disposal of the Axial piston unit and its fittings, the hydraulic fluid and the packaging material could lead to pollution of the environment.

- ▶ Dispose of the Axial piston unit, hydraulic fluid and packaging in accordance with the national regulations in your country.
- ▶ Dispose of the hydraulic fluid in accordance with the applicable safety data sheet of the hydraulic fluid.

NOTICE

Danger from chemical or corrosive environmental conditions!

Product can get damaged! If the axial piston unit is exposed to chemical or corrosive environmental conditions, such as sea water, fertilizer or road salt, it can result in corrosion or, in extreme cases, malfunction. Hydraulic fluid can escape if leaks occur.

- ▶ Take appropriate steps to protect the axial piston unit from chemical or corrosive environmental conditions.

NOTICE

Leakage or spilling of hydraulic fluid!

Environmental pollution and contamination of the ground water!

- ▶ When filling and draining the hydraulic fluid, always place a drip tray under the Axial piston unit.
- ▶ Use a suitable binding agent if hydraulic fluid is spilled.
- ▶ Observe the safety data sheet for the hydraulic fluid and the specifications provided by the system manufacturer.

NOTICE

Danger from hot components!

Nearby products can become damaged! Components which heat up (for example, solenoids) can cause damage to nearby products if they are too close.

- ▶ When installing the axial piston unit, check the distances to nearby products to ensure that they do not get damaged.

NOTICE

Danger from improper repair!

The Axial piston unit can be damaged!

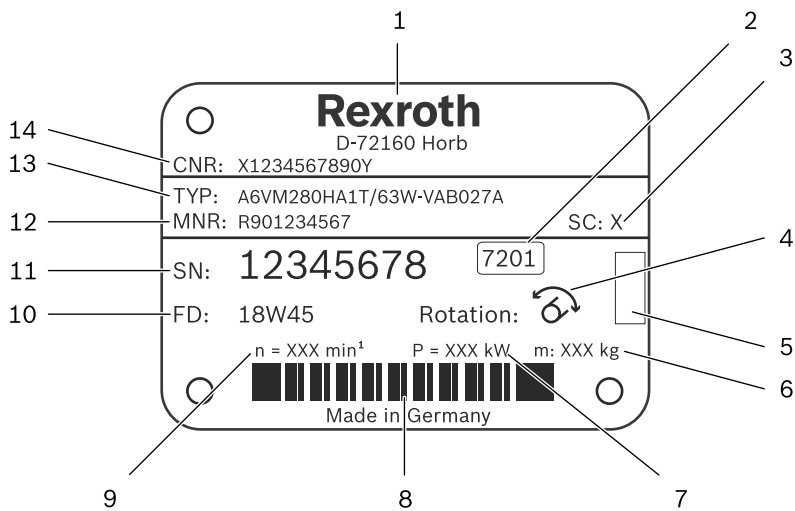
- ▶ Before repairing, ensure that all fluids are removed from the Axial piston unit.
- ▶ During installation, provide for absolute cleanliness in order to prevent foreign particles, such as dirt, welding beads or metal cuttings from getting into the Axial piston unit and causing product wear or malfunctions.
- ▶ Special tools are required for the repair. A repair without the required special tool is not permissible.
- ▶ Only use original spare parts from Bosch Rexroth for a repair.
- ▶ Replace the sealing elements with new ones during repairs.
- ▶ All components must be clean and undamaged.
- ▶ Damaged components must not be reused.
- ▶ Reworking threads, bores, sealing and connection surfaces is not permissible.

The warranty exclusively applies to the delivered configuration. Warranty claims shall be rendered void in the event of a faulty repair, assembly, commissioning and operation as well as in the event of unintended use and/or improper handling.

4 Product description

4.1 Name plate

The Axial piston unit can be identified by means of the name plate. The name plates can vary.



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Fig. 1: Name plate

1	Manufacturer	8	Bar code
2	Internal plant designation	9	Rotational speed
3	Sample category (optional)	10	Manufacturing date
4	Direction of rotation (viewed on drive shaft) – here: bi-directional	11	Serial number
5	Designated area for inspection stamp	12	Material number of Axial piston unit
6	Weight (optional)	13	Type code
7	Power (optional)	14	Customer material number

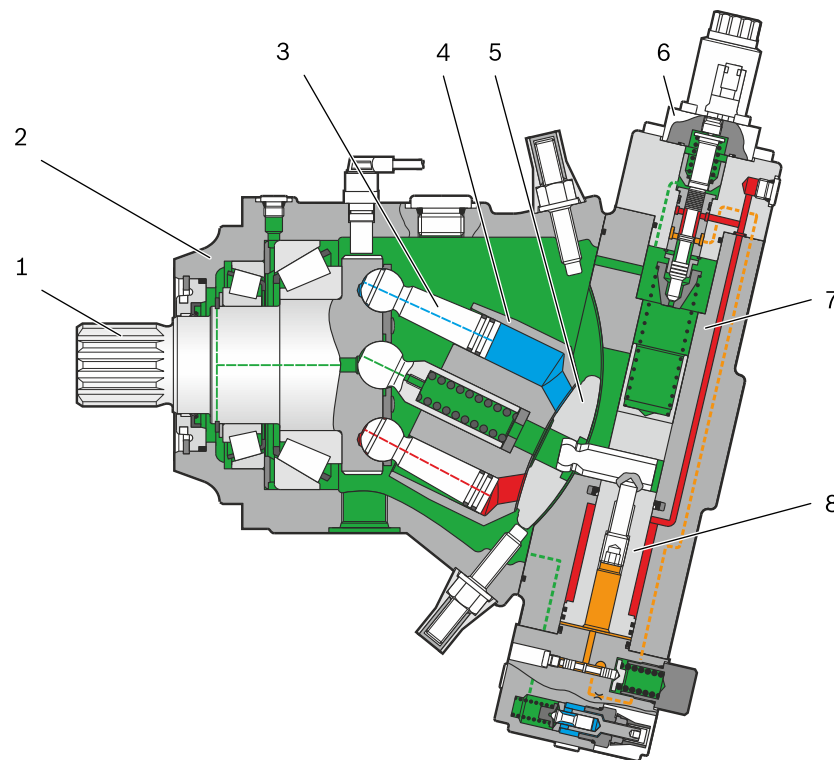
Make sure that the type and nominal size of the Axial piston unit to be repaired correspond to this repair manual.

4.2 Functional description

A hydraulic motor converts hydrostatic energy into mechanical energy. Hydraulic fluid is directed via the port plate () and the lens plate () to the cylinder bores. The pistons () in the cylinder bores execute a stroke that is converted into a rotary movement by the piston on the drive shaft flange. During this process, the pistons move the cylinder and generate an output torque on the drive shaft. The output torque increases with the pressure difference between the high- and low-pressure sides and increasing displacement. The output speed is proportional to the inward flow and inversely proportional to the displacement of the hydraulic motor.

A detailed functional description can be found in the product-specific instruction manual 91610-01-B.

The following cutaway drawing represents the schematic assembly of an Axial piston variable motor A6VM Series 71.



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Fig. 2: Sectional drawing

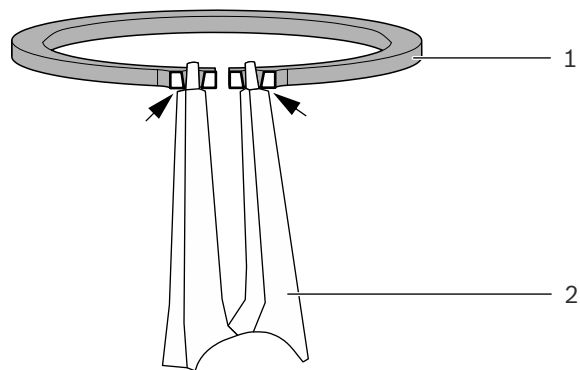
- | | | | |
|----------|-------------|----------|-----------------|
| 1 | Drive shaft | 5 | Lens plate |
| 2 | Housing | 6 | Control part |
| 3 | Piston | 7 | Port plate |
| 4 | Cylinder | 8 | Stroking piston |

4.3 Technical data

The technical data of the Axial piston unit can be found in the order confirmation. These are supplemented by the technical data sheet. For the Axial piston unit A6VM, data sheet 91610 applies.

4.4 Installation rules

- ▶ Loosen and tighten the mounting bolts in a crosswise direction!
- ▶ Do not reuse screws, nuts and seals!
- ▶ Wet the O-rings with the operating medium used before mounting!
- ▶ Make sure that the threads are clean.
- ▶ When replacing the SEAL LOCK sealing nuts on valves and adjustment spindles, replace the protective caps!
- ▶ Protective caps are destroyed during removal; you can get spare protective caps from your responsible Bosch Rexroth Service partner.
- ▶ Tighten the screws, nuts, valves and orifices with the permissible torque, see 11 „Tightening torques“ [▶Page 56] chapter!
- ▶ To hold retaining rings safely at installation, it is advisable that the smaller diameter of the bores in the retaining ring points toward the retaining ring pliers!



Rexroth_00096

Fig. 3: Retaining ring

1 Retaining ring

2 Retaining ring pliers

5 Control part

5.1 Dismounting/ sealing the control part

This section explains how to dismount and seal the EP control unit.



The instruction is only shown on one variant as an example.

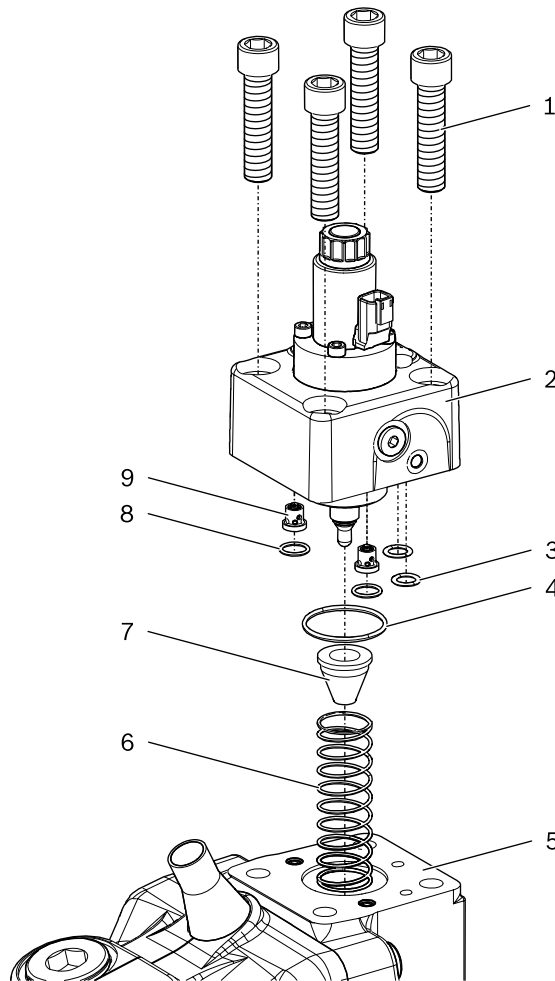


Fig. 4: Dismounting the control part

- | | | | |
|----------|----------------|----------|--------------------|
| 1 | Mounting bolts | 6 | Compression spring |
| 2 | Control part | 7 | Spring seat |
| 3 | O-ring | 8 | O-ring |
| 4 | O-ring | 9 | Check valve |
| 5 | Port plate | | |

- Procedure** For dismounting the control part:
- 1.** Unscrew the mounting bolts (**1**).
 - 2.** Remove the control part (**2**) from the port plate (**5**).



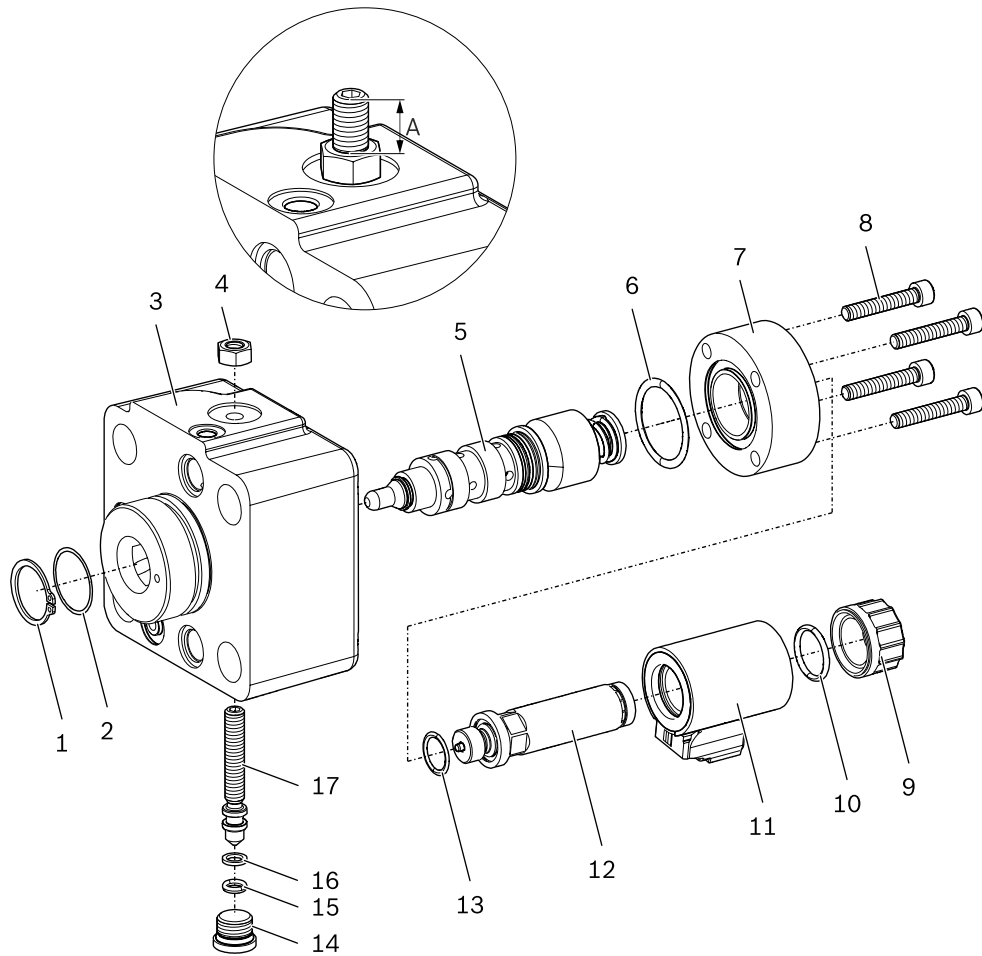
The check valves are not secured in the control part and may fall out!

3. Remove the compression spring **(6)** and spring seat **(7)** from the port plate **(5)**.
4. Remove the O-rings **(3, 4, 8)**.
5. Check the control part and the O-ring grooves for damage, wear and contamination.

5.2 Disassemble and assemble the EP control part

This section explains how to disassemble and assemble the EP control part.

Requirement: The EP control part must be dismounted.



Rexroth_00028-19

Fig. 5: Disassembling the EP control part

- | | | | |
|----------|-----------------|-----------|---------------|
| 1 | Retaining ring | 10 | O-ring |
| 2 | Shim | 11 | Solenoid coil |
| 3 | Control housing | 12 | Pole tube |
| 4 | Hexagon nut | 13 | O-ring |
| 5 | Valve insert | 14 | Threaded plug |
| 6 | O-ring | 15 | O-ring |
| 7 | Valve cover | 16 | Support ring |
| 8 | Mounting bolt | 17 | Threaded pin |
| 9 | Mounting nut | | |

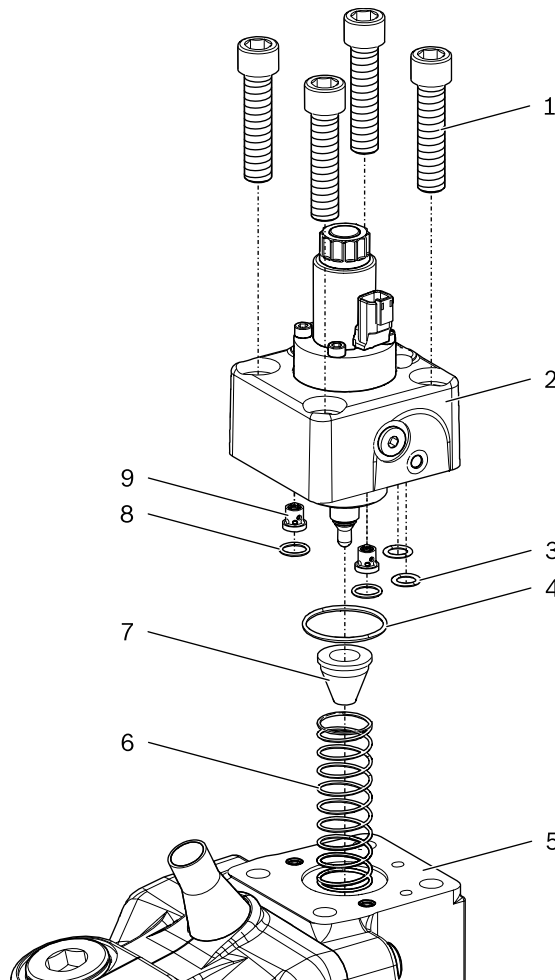
Procedure For disassembling and assembling the EP control part:

- 1.** Unscrew the mounting nut (**9**) from the solenoid coil (**11**).
- 2.** Pull the solenoid coil (**11**) off the pole tube (**12**).
- 3.** Unscrew the pole tube (**12**) from the valve cover (**7**).
- 4.** Replace the O-rings (**10**, **13**).

- 5.** Measure the dimension (**A**) and note it down for assembly.
- 6.** Unscrew the hexagon nut (**4**).
- 7.** Loosen the threaded pin (**17**) until the stop.
- 8.** Unscrew the mounting bolts (**8**).
- 9.** Remove the valve cover (**7**) from the control housing (**3**).
- 10.** Replace the O-ring (**6**).
- 11.** Dismount the retaining ring (**1**) and remove the shim (**2**).
- 12.** Pull out the valve insert (**5**) from the control housing (**3**).
- 13.** Unscrew the threaded plug (**14**).
- 14.** Screw-in the threaded pin (**17**) and remove it on the opposite side of the control housing (**3**).
- 15.** Replace the O-ring (**15**) and the support ring (**16**).
- 16.** The assembly is done in the reverse sequence.

5.3 Installing the control part

This section explains how to mount the control part.



Rexroth_00027-19

Fig. 6: Installing the control part

- | | | | |
|----------|----------------|----------|--------------------|
| 1 | Mounting bolts | 6 | Compression spring |
| 2 | Control part | 7 | Spring seat |
| 3 | O-ring | 8 | O-ring |
| 4 | O-ring | 9 | Check valve |
| 5 | Port plate | | |

Procedure For mounting the control part:



The check valves are not secured in the control part and may fall out! For installing the control part, secure the check valves against falling out by using grease.

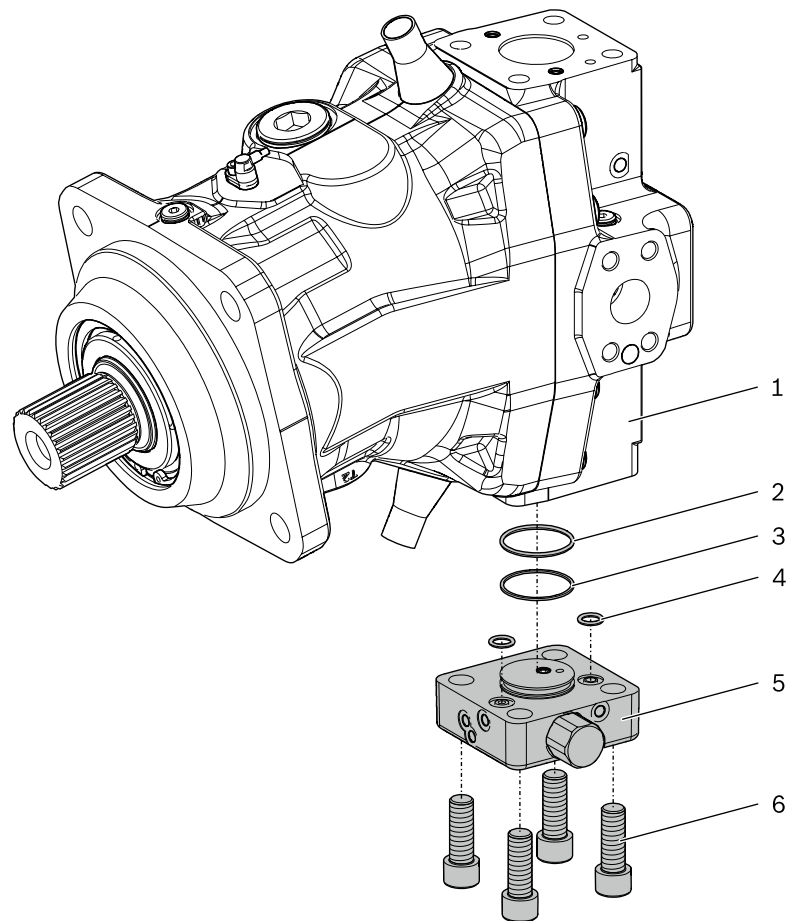
1. Insert the compression spring (6) and spring seat (7) into the port plate (5).
2. Install new O-rings (3, 4, 8).
3. Attach the control part (2) and carefully press it into the port plate (5). Here, ensure the correct centering of the control piston in the spring seat (7) and the correct seat of the check valves (9).

4. Screw in and tighten the mounting bolts (1).

6 Cover

6.1 Dismounting/ sealing the cover without flushing and boost-pressure valve.

This section explains how to dismount and seal the cover without flushing and boost-pressure valve .



Rexroth_00033-19

Fig. 7: Dismounting the cover without flushing and boost-pressure valve

- | | | | |
|----------|--------------|----------|---------------|
| 1 | Port plate | 4 | O-ring |
| 2 | O-ring | 5 | Cover |
| 3 | Support ring | 6 | Mounting bolt |

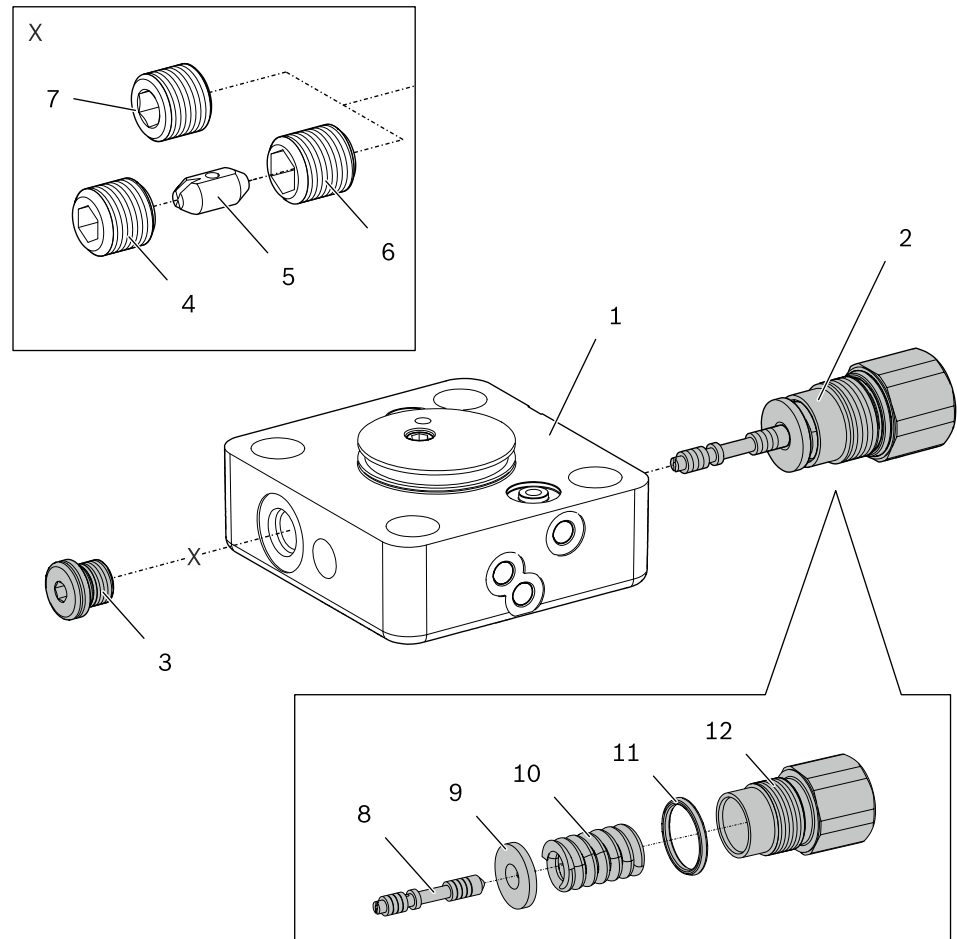
Procedure For dismounting the cover without flushing and boost-pressure valve:

- 1.** Mark the position of the cover (**5**) towards the port plate (**1**).
- 2.** Unscrew the mounting bolts (**6**).
- 3.** Remove the cover (**5**) from the port plate (**1**).
- 4.** Remove the O-rings (**2, 4**) and the support ring (**3**).
- 5.** Check the cover and the O-ring grooves for damage, wear and contamination.

6.2 Disassembly/assembling the cover without flushing and boost-pressure valve

This section explains how to disassemble and assemble the cover without flushing and boost-pressure valve .

Requirement: The cover must have been dismantled.



Rexroth_00034-19

Fig. 8: Disassembling the cover without flushing and boost-pressure valve

1	Cover	7	Orifice
2	Set pressure reducing valve	8	Control spool
3	Threaded plug	9	Spring seat
4	Throttle screw	10	Compression spring
5	Throttle pin (on one side)	11	O-ring
6	Throttle screw	12	Threaded plug

Procedure For dismounting/ mounting the set pressure reducing valve:

1. Unscrew the threaded plug (**12**).
2. Remove the compression spring (**10**), the spring seat (**9**), and the control spool (**8**) from the cover (**1**).
3. Replace the O-ring (**11**).

4. The assembly is done in the reverse sequence.

Procedure For dismounting/ mounting the orifice:



Installation variant (**X**) according to plant order.

5. Unscrew the threaded plug (**3**).
6. Unscrew the orifice (**7**) from the cover (**1**).
7. The assembly is done in the reverse sequence.

Procedure For dismounting/ mounting the throttle pin:



Installation variant (**X**) according to plant order.

8. Unscrew the threaded plug (**3**).
9. Unscrew the throttle screw (**4**) from the cover (**1**).
10. Remove the throttle pin (**5**).

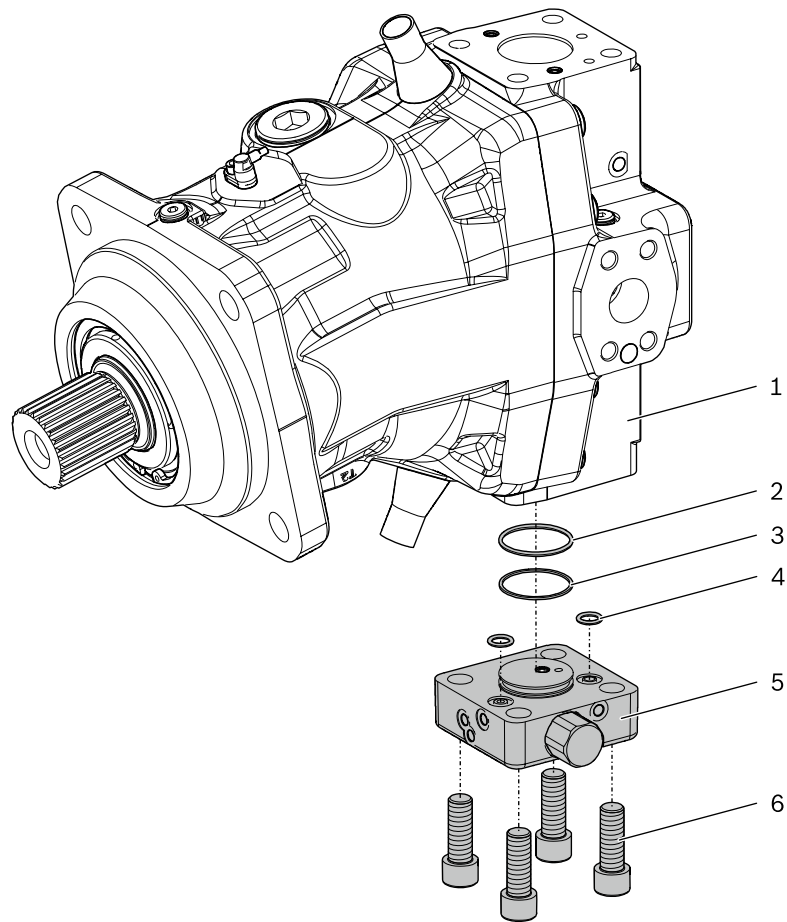


Observe the position of the throttle pin groove!

11. Unscrew the throttle screw (**6**) from the cover (**1**).
12. The assembly is done in the reverse sequence.

6.3 Assembling the cover without flushing and boost-pressure valve

This section explains how to assemble the cover without flushing and boost-pressure valve .



Rexroth_00033-19

Fig. 9: Assembling the cover without flushing and boost-pressure valve

- | | | | |
|----------|--------------|----------|---------------|
| 1 | Port plate | 4 | O-ring |
| 2 | O-ring | 5 | Cover |
| 3 | Support ring | 6 | Mounting bolt |

Procedure To assemble the cover without flushing and boost-pressure valve:

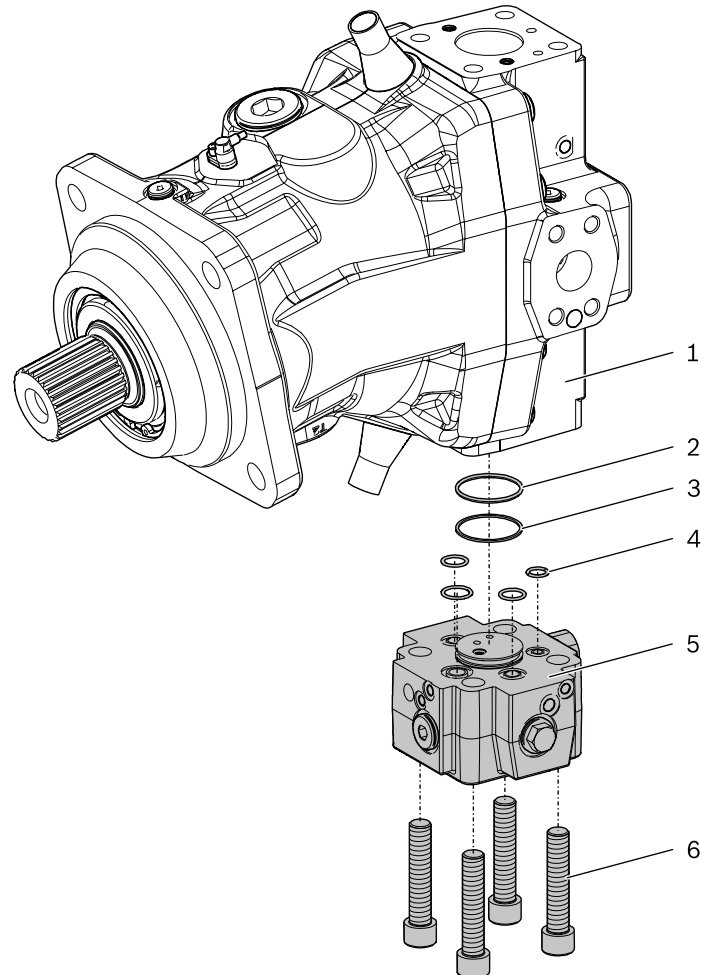


Mark the position of the cover towards the port plate!

1. Slightly grease and install the new O-rings (**2**, **4**) and the new support ring (**3**).
2. Put the cover (**5**) on the port plate (**1**).
3. Screw in and tighten the mounting bolts (**6**).

6.4 Dismounting/ sealing the cover with flushing and boost-pressure valve

This section explains how to dismount and seal the cover with flushing and boost-pressure valve .



Rexroth_00029-19

Fig. 10: Dismounting the cover with flushing and boost-pressure valve

- | | | | |
|----------|--------------|----------|---------------|
| 1 | Port plate | 4 | O-ring |
| 2 | O-ring | 5 | Cover |
| 3 | Support ring | 6 | Mounting bolt |

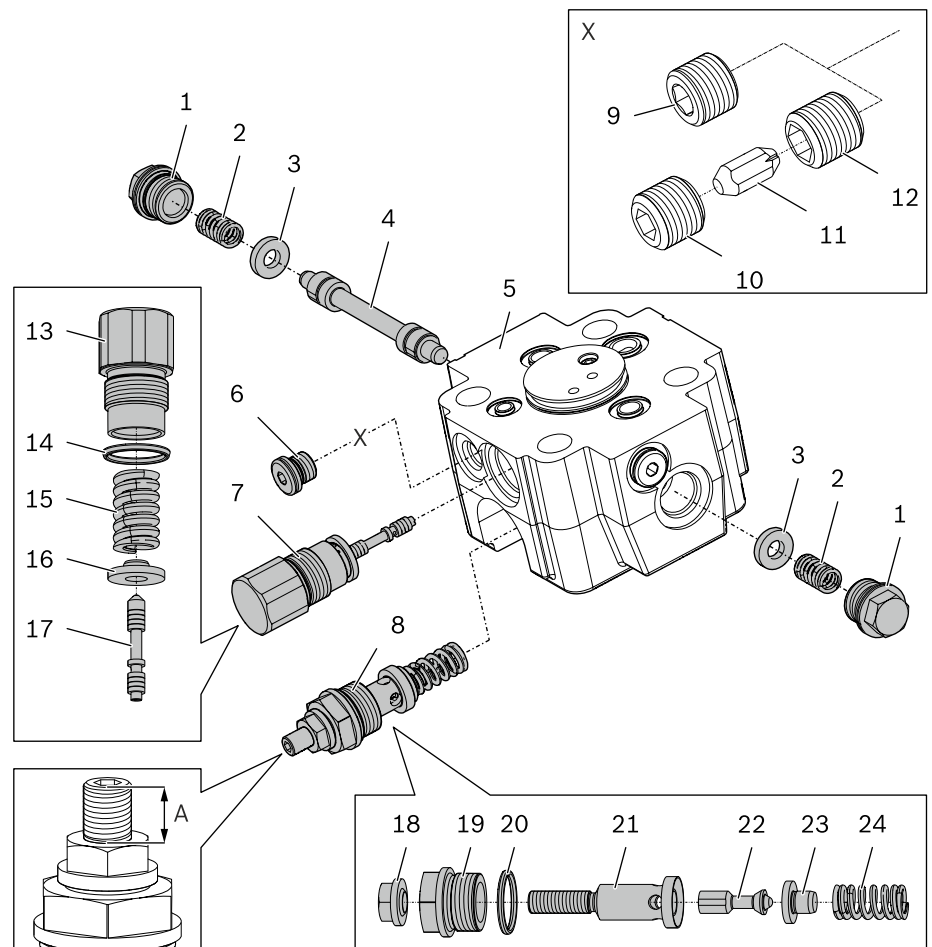
Procedure For dismounting the cover with flushing and boost-pressure valve:

- 1.** Mark the position of the cover (**5**) towards the port plate (**1**).
- 2.** Unscrew the mounting bolts (**6**).
- 3.** Remove the cover (**5**) from the port plate (**1**).
- 4.** Remove the O-rings (**2, 4**) and the support ring (**3**).
- 5.** Check the cover and the O-ring grooves for damage, wear and contamination.

6.5 Disassembling/assembling the cover with flushing and boost-pressure valve

This section explains how to disassemble and assemble the cover with flushing and boost-pressure valve .

Requirement: The cover with flushing and boost-pressure valve must be dismantled.



Rexroth_00030-19

Fig. 11: Disassembling the cover with flushing and boost pressure valve

1	Threaded plug	13	Threaded plug
2	Compression spring	14	O-ring
3	Disc	15	Compression spring
4	Flushing spool	16	Spring seat
5	Cover	17	Control spool
6	Threaded plug	18	SEAL LOCK nut
7	Set pressure reducing valve	19	Threaded plug
8	Low-pressure relief valve	20	O-ring
9	Orifice	21	Setting screw
10	Throttle screw	22	Valve spool
11	Throttle pin (on one side)	23	Spring seat
12	Throttle screw	24	Compression spring

Procedure For disassembling and assembling the cover with flushing and boost-pressure valve:

1. Unscrew the threaded plugs (**1**) from the cover (**5**).
2. Remove the compression springs (**2**) and discs (**3**) from the cover (**5**).
3. Remove the flushing spool (**4**) from the cover (**5**).
4. Unscrew the threaded plug (**13**).

5. Remove the compression spring (15), the spring seat (16), and the control spool (17) from the cover (5).
6. Replace the O-ring (14).



The dimension (A) is required when replacing the SEAL-LOCK sealing nut or the low-pressure relief valve.

7. Measure the dimension (A) and note it down for assembly.
8. Unscrew the threaded plug (19) from the cover (5).
9. Remove the valve spool (22), the spring seat (24) and the compression spring from the cover (5).
10. Replace the O-ring (20).
11. The assembly is done in the reverse sequence.

Procedure For dismounting/ mounting the orifice:



Installation variant (X) according to plant order.

12. Unscrew the threaded plug (6).
13. Unscrew the orifice (9) from the cover (5).
14. The assembly is done in the reverse sequence.

Procedure For dismounting/ mounting the throttle pin:



Installation variant (X) according to plant order.

15. Unscrew the threaded plug (6).
16. Unscrew the throttle screw (10) from the cover (5).
17. Remove the throttle pin (11).

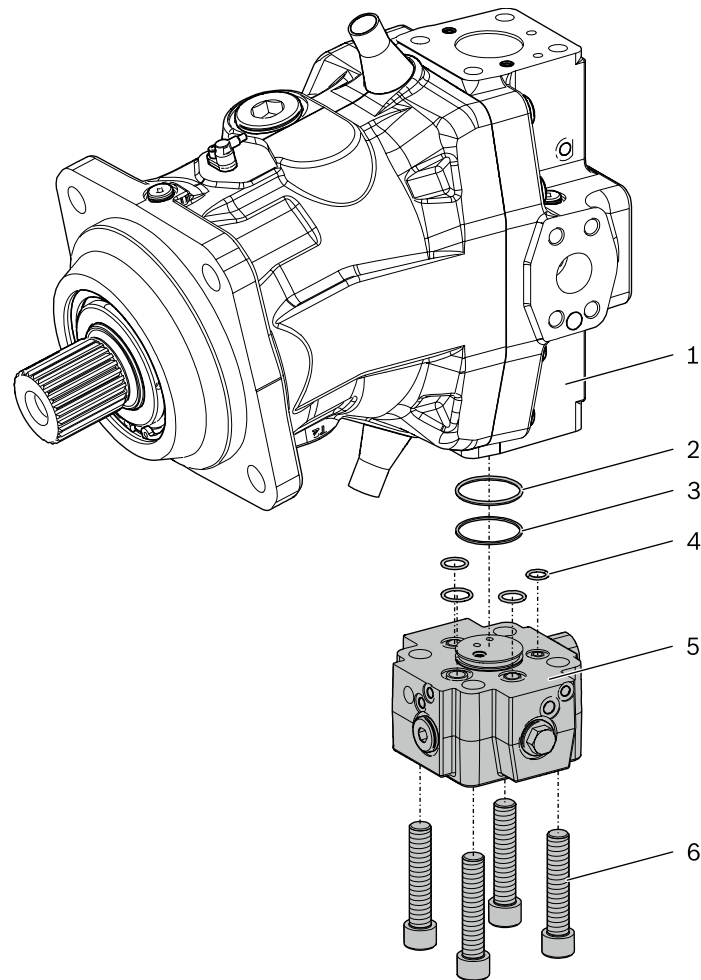


Observe the position of the throttle pin groove!

18. Unscrew the throttle screw (12) from the cover (5).
19. The assembly is done in the reverse sequence.

6.6 Mounting the cover with flushing and boost-pressure valve

This section explains how to mount the cover with flushing and boost-pressure valve .



Rexroth_00029-19

Fig. 12: Mounting the cover with flushing and boost-pressure valve

- | | | | |
|----------|--------------|----------|---------------|
| 1 | Port plate | 4 | O-ring |
| 2 | O-ring | 5 | Cover |
| 3 | Support ring | 6 | Mounting bolt |

Procedure For mounting the cover with flushing and boost-pressure valve:



Mark the position of the cover towards the port plate!

- 1.** Slightly grease and install the new O-rings (**2, 4**) and the new support ring (**3**).
- 2.** Put the cover (**5**) on the port plate (**1**).
- 3.** Screw in and tighten the mounting bolts (**6**).

7 Drive shaft



The material numbers of the special tools can be found in the Special Tool Catalog 91610-01-S083.

7.1 Sealing the drive shaft

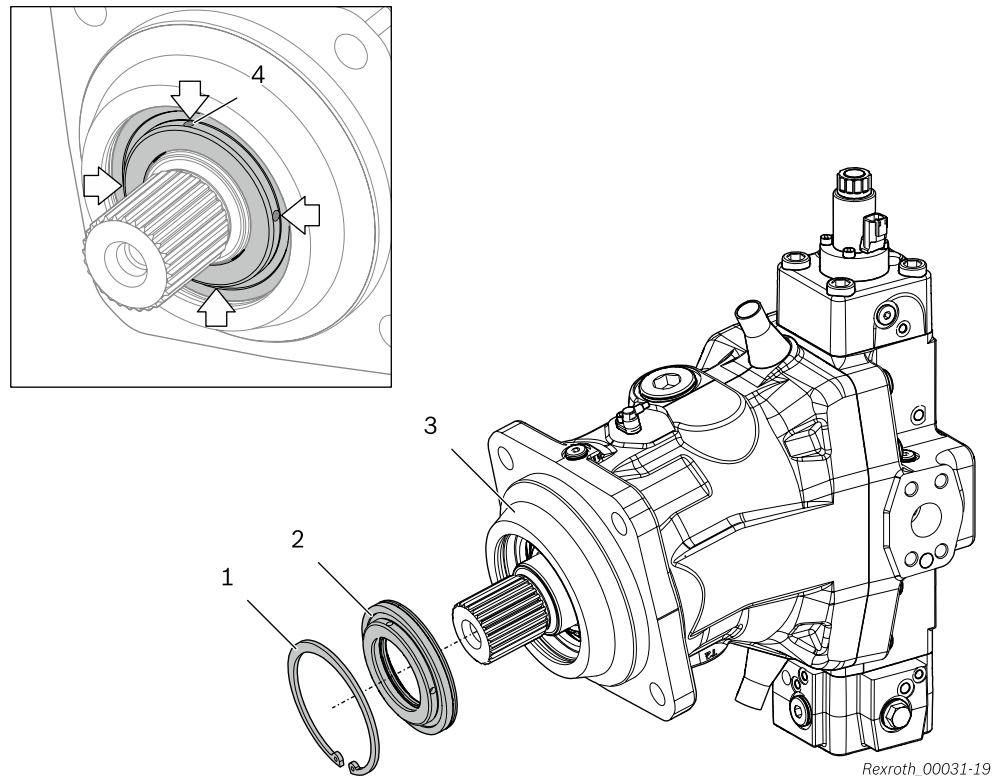
This section explains how to seal the drive shaft .

WARNING

Risk of injury or property damage!

Make sure that the pliers grip retaining rings correctly!

Wear safety goggles and safety gloves!



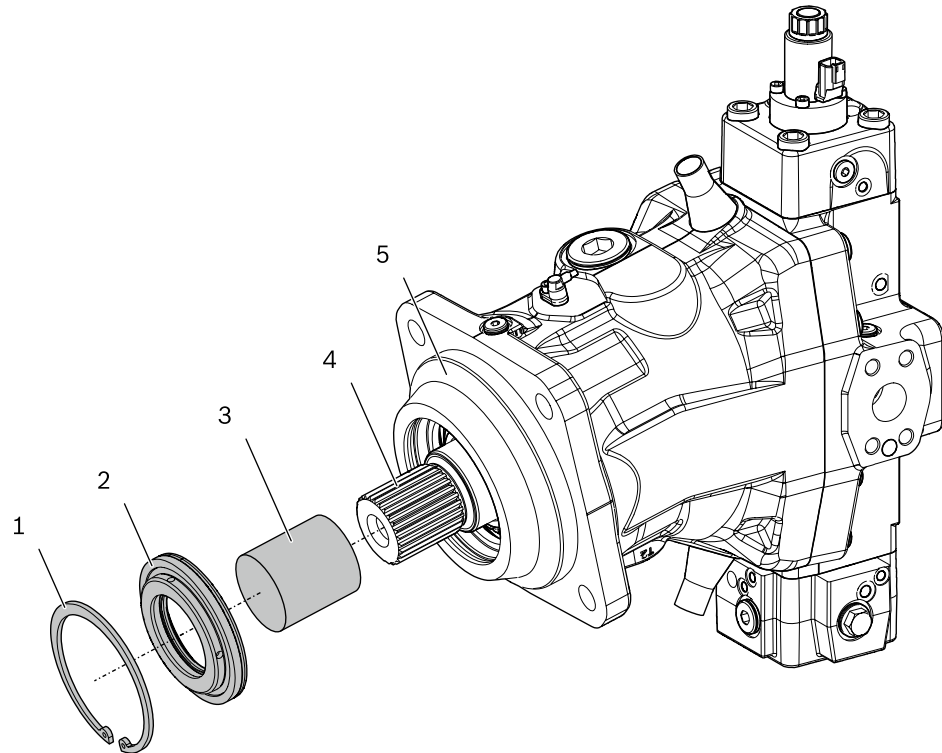
Rexroth_00031-19

Fig. 13: Dismounting the sealing flange

- | | | | |
|----------|----------------|----------|---------|
| 1 | Retaining ring | 3 | Housing |
| 2 | Sealing flange | 4 | Bore |

Procedure For dismounting the sealing flange:

1. Dismount the retaining ring (1).
2. Carefully lift the sealing flange (2) out of the housing (3). For this purpose, put a suitable tool into the bores (4) and prop at the housing (3). Repeat the work step circumferentially in every bore (4) until the sealing flange (2) can be removed manually.



Rexroth_00032-19

Fig. 14: Mounting the sealing flange

- | | | | |
|----------|------------------------------|----------|-------------|
| 1 | Retaining ring | 4 | Drive shaft |
| 2 | Sealing flange | 5 | Housing |
| 3 | Special assembly sleeve tool | | |

Procedure

For mounting the sealing flange:

- 3.** Slide the special assembly sleeve tool (**3**) onto the drive shaft (**4**).
- 4.** Lightly grease the shaft sealing ring in the new sealing flange (**2**) between the sealing and the dust lip to prevent dry running.
- 5.** Use the installation stamp special tool to press the sealing flange (**2**) into the housing (**5**) until it reaches the stop.
- 6.** Install the retaining ring (**1**). Make sure that the retaining ring (**1**) is correctly positioned in the provided groove in the housing (**5**).
- 7.** Remove the special assembly sleeve tool (**3**).

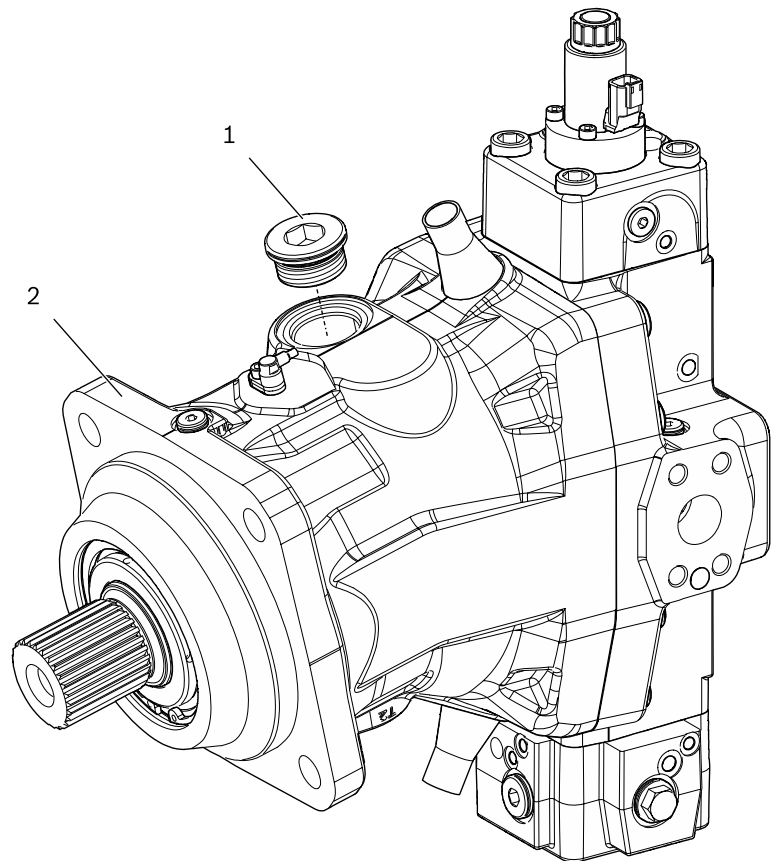
8 Seals

8.1 Sealing/replacing plug screws

This section explains how to seal/replace the plug screws .



The instruction is only shown on a threaded plug as example. The procedure is the same for all other threaded plugs.



Rexroth_00035-19

Fig. 15: Replacing the threaded plug

1 Threaded plug

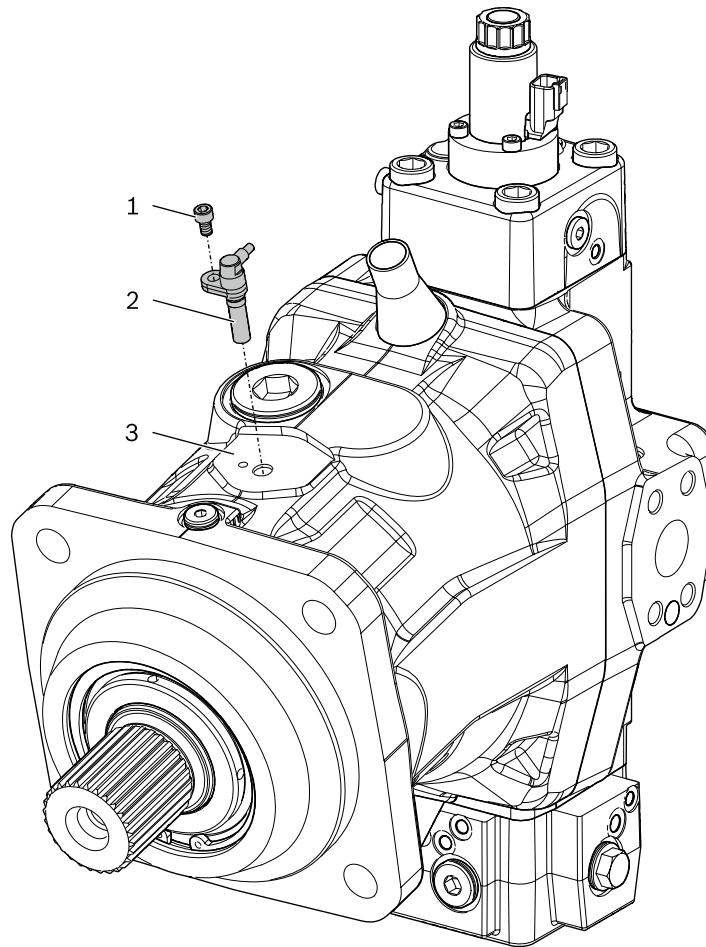
2 Housing

Procedure For sealing/replacing the threaded plug:

- 1.** Unscrew the setting screw (**1**) from the housing (**2**).
- 2.** Check the bores and sealing surfaces for damage, wear and contamination.
- 3.** Screw a new threaded plug (**1**) into the housing (**2**) and tighten it.

8.2 Sealing/replacing the speed sensor

This section explains how to seal/replace the speed sensor.



Rexroth_00036-19

Fig. 16: Speed sensor

- | | | | |
|----------|---------------|----------|---------|
| 1 | Mounting bolt | 3 | Housing |
| 2 | Speed sensor | | |

Procedure To seal or replace the speed sensor:

1. Unscrew the mounting bolt (1).
2. Pull the speed sensor (2) out of the housing (3).
3. Check the bores for damage, wear and contamination.
4. Slide the new speed sensor (2) into the housing (3).



Slide the speed sensor into the housing until it reaches the stop! Do not tighten the speed sensor with mounting bolts since this could damage or displace the O-ring!

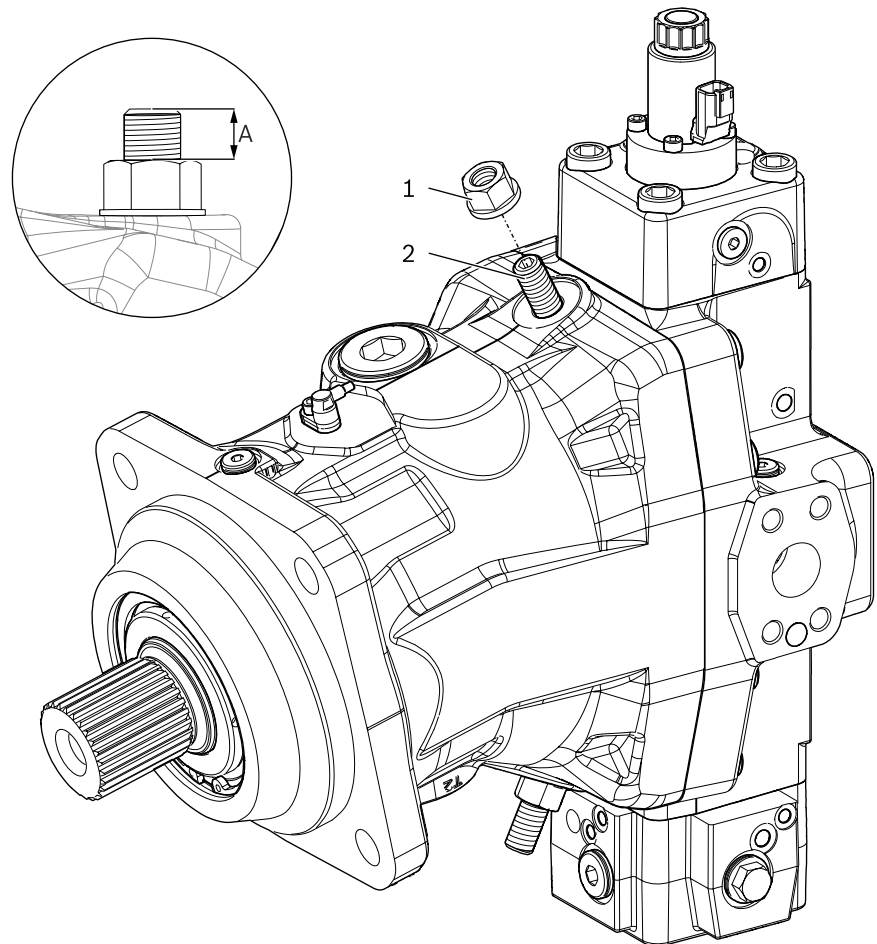
5. Screw in and tighten the mounting bolt (1).

8.3 Replacing the SEAL-LOCK sealing nuts

This section explains how to replace the SEAL-LOCK sealing nuts .



The instruction is only shown on a SEAL-LOCK sealing nut as example. The procedure is the same for all other SEAL-LOCK sealing nuts.



Rexroth_00037-19

Fig. 17: Replacing the SEAL-LOCK sealing nuts

1 SEAL LOCK nut

2 Setting screw

Procedure To replace the SEAL-LOCK sealing nut:



Upon replacing the SEAL-LOCK sealing nut, replace the protective cap.

1. Measure the dimension (**A**) and note it down.
2. Unscrew the SEAL-LOCK sealing nut (**1**).
3. Screw in the new SEAL-LOCK sealing nut (**1**) and set the dimension (**A**).
4. Tighten the SEAL-LOCK sealing nut (**1**) holding the setting screw (**2**) against it.
5. Check the dimension (**A**).

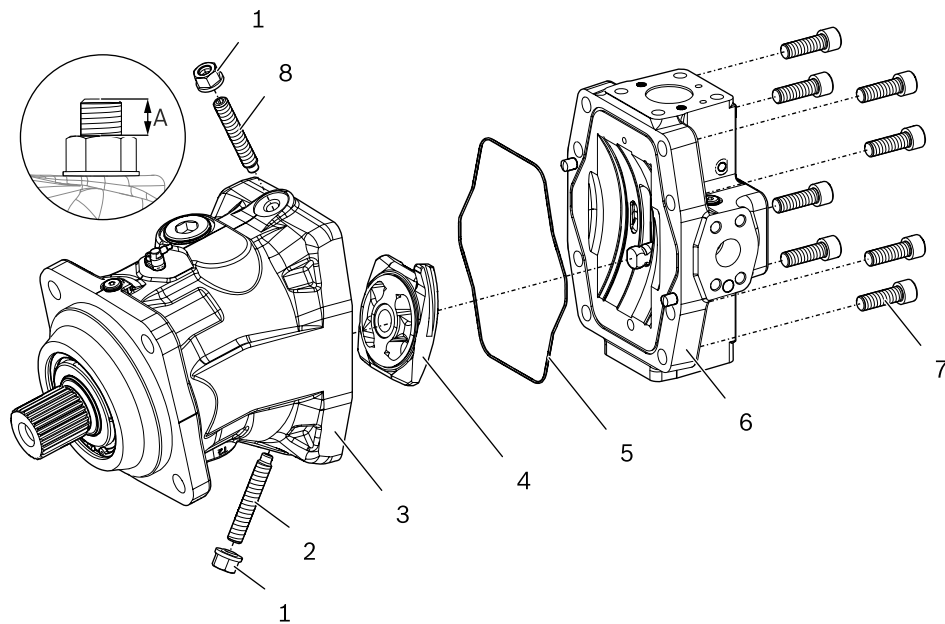
9 Port plate



The material numbers of the special tools can be found in the Special Tool Catalog 91610-01-S083.

9.1 Dismounting/ mounting the port plate

This section explains how to dismount/mount the port plate .



Rexroth_00038-19

Fig. 18: Dismounting/ mounting the port plate

- | | | | |
|----------|--------------------------|----------|--------------------------|
| 1 | SEAL LOCK nut | 5 | O-ring |
| 2 | Setting screw Q_{\max} | 6 | Port plate |
| 3 | Housing | 7 | Mounting bolt |
| 4 | Lens plate | 8 | Setting screw Q_{\min} |

Procedure For dismounting the port plate:

1. Mark the position of the port plate (6) towards the housing (3).
2. Measure the dimension (A) of the setting screw Q_{\max} (2) and Q_{\min} (8) and note it down for assembly.
3. Unscrew the SEAL-LOCK sealing nuts (1).
4. Unscrew the setting screws Q_{\max} (2) and Q_{\min} (8).
5. Unscrew the mounting bolts (7).



The lens plate may fall out of the port plate!
Note the installation position of the lens plate. Mark it if necessary.

6. Lift the port plate (6) off from the housing (3).

7. Remove the O-ring (5).
8. Check the O-ring groove and sealing surfaces for damage, wear and contamination.

Procedure For assembling the port plate:



Observe the installation position of the lens plate and the port plate!



The cylinder and lens plate must be lapped in pairs before the installation!

9. Mount the new O-ring (5) in the port plate (6).
10. Grease the lens plate (4) and place it on positioning trunnions in the port plate (6).

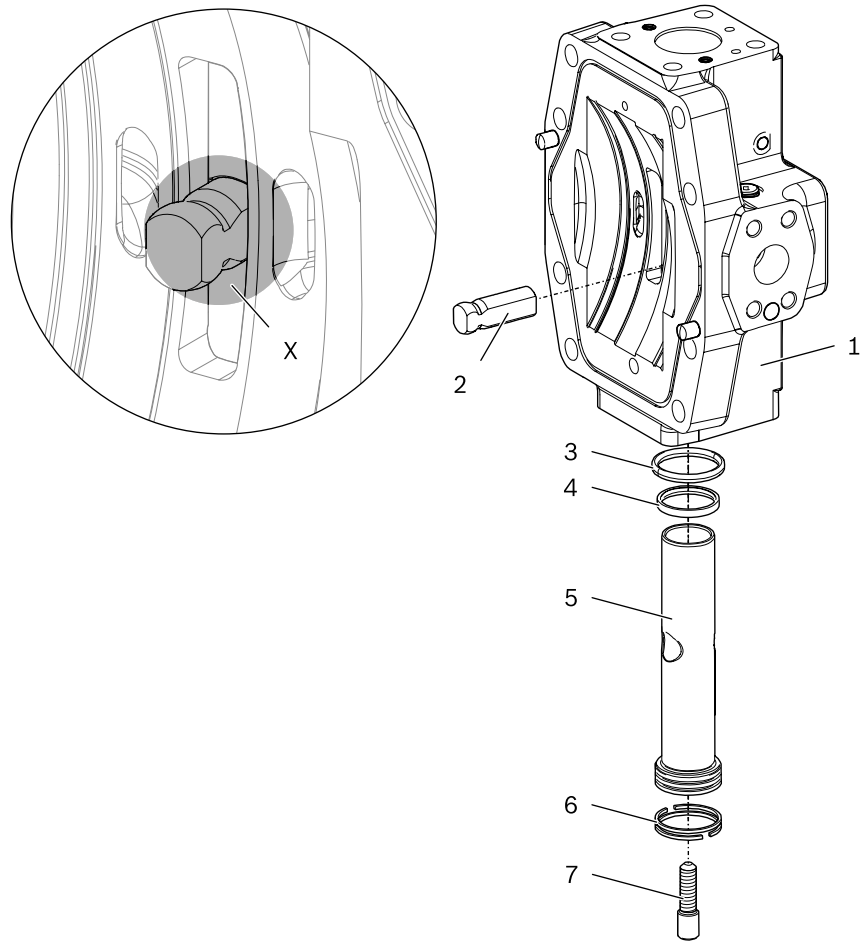


The rotary group must be positioned at the minimum swivel angle.

11. Place the port plate (6) on the housing (3).
12. Screw in and tighten the mounting bolts (7).
13. Screw in the setting screws Q_{\max} (2) and Q_{\min} (8) into the housing (3).
14. Screw in the SEAL-LOCK sealing nuts (1) and set the dimension (A).
15. Tighten the SEAL-LOCK sealing nuts (1) holding the setting screws Q_{\max} (2) and Q_{\min} (8) against them.
16. Check the dimension (A).

9.2 Dismounting the stroking piston/positioning trunnion

This section explains how to dismount the stroking piston and the positioning trunnion .
Requirements: The port plate, control part and the cover must have been dismounted.



Rexroth_00039-19

Fig. 19: Dismounting the stroking piston/positioning trunnion

- | | | | |
|----------|----------------------|----------|-----------------|
| 1 | Port plate | 5 | Stroking piston |
| 2 | Positioning trunnion | 6 | R-ring |
| 3 | O-ring | 7 | Threaded pin |
| 4 | Turcon slide ring | | |

Procedure For dismounting the stroking piston and positioning trunnion:

WARNING

Risk of burns!

Burns from touching hot components!
Wear safety gloves!



Heat the positioning trunnion at the connection point (X) to the stroking piston to at least 120 °C to release the glue seal on the threaded pin.

1. Heat the positioning trunnion (2) and stroking piston (5).
2. Unscrew the threaded pin (7) from the stroking piston (5).

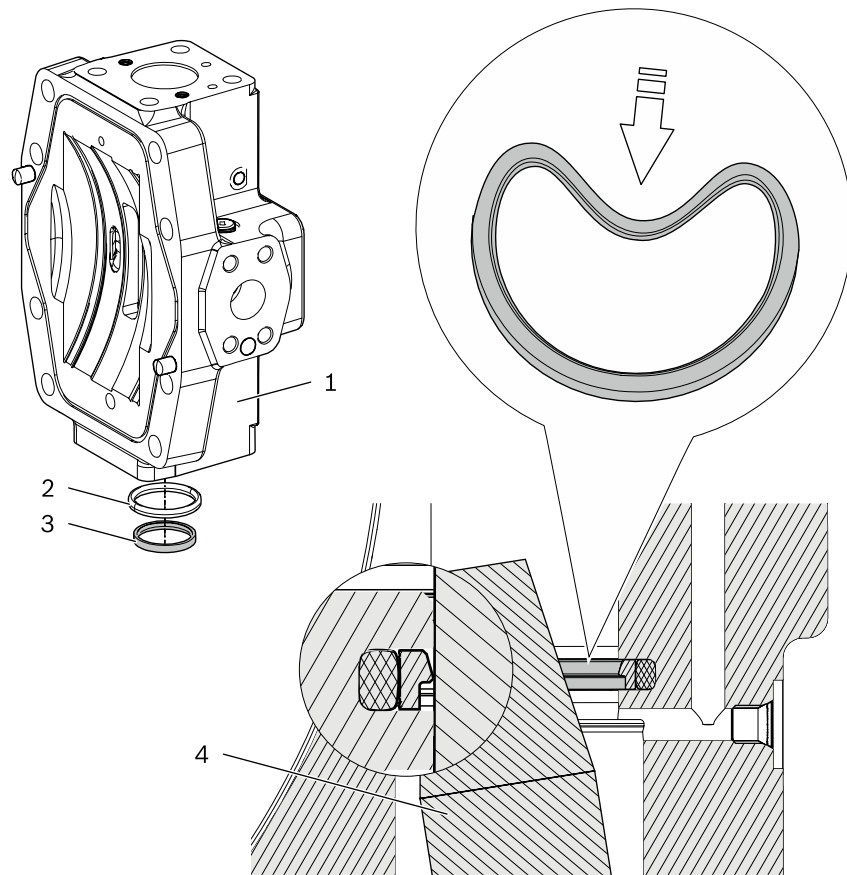


Remove all glue residues in the stroking piston by recutting the thread!

3. Pull the positioning trunnion (2) out of the stroking piston (5).
4. Pull the stroking piston (5) out of the port plate (1).
5. Remove the Turcon slide ring (4) and the O-ring (3) from the port plate (1).
6. Remove the R-rings (6) from the stroking piston (5).
7. Check the stroking piston (5) and positioning trunnion (2) for damage, wear and contamination and replace them if applicable.

9.3 Assembling the stroking piston/positioning trunnion

This section explains how to assemble the stroking piston and the positioning trunnion .



Rexroth_00040-19

Fig. 20: Mounting the Turcon slide ring

- | | | | |
|----------|------------|----------|----------------------|
| 1 | Port plate | 3 | Turcon slide ring |
| 2 | O-ring | 4 | Mandrel special tool |

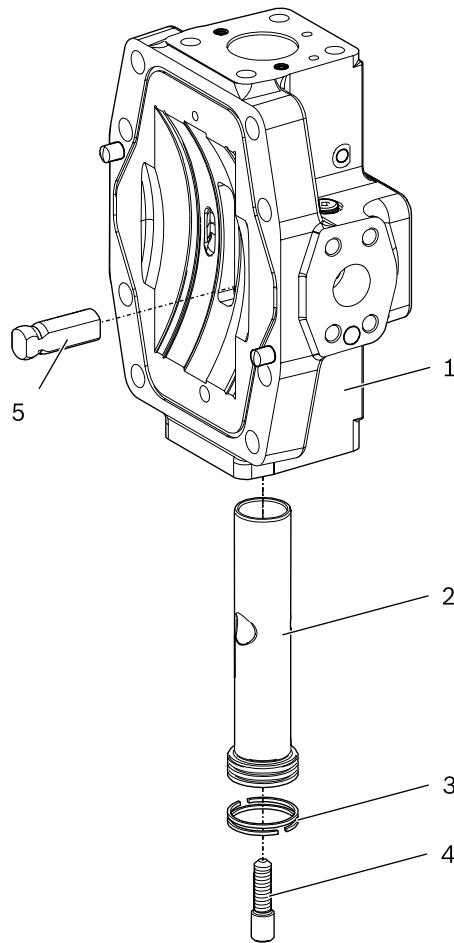
Procedure For assembling the stroking piston and positioning trunnion:



Observe the installation position of the Turcon slide ring!

For mounting in the port plate, the Turcon slide ring is to be re-shaped into kidney shape.

- 1.** Mount the new O-ring (**2**) and the new Turcon slide ring (**3**) in the port plate.
- 2.** Press the Turcon slide ring (**3**) into the groove and calibrate it with the mandrel special tool (**4**).



Rexroth_00041-19

Fig. 21: Assembling the stroking piston/positioning trunnion

- | | | | |
|----------|-----------------|----------|----------------------|
| 1 | Port plate | 4 | Threaded pin |
| 2 | Stroking piston | 5 | Positioning trunnion |
| 3 | R-ring | | |

3. Mount the R-rings (3) on the stroking piston (2).



The stroke clearance of the R-rings must be offset by 180°!



The positioning trunnion bore must not have any sharp edges to prevent damage to the Turcon slide ring during its assembly in the port plate!
Slide the stroking piston into the port plate by slightly turning it to both sides.



Tension the R-rings when mounting the stroking piston until they are located in the port plate.

- 4.** Slide the stroking piston (2) into the port plate (1).
- 5.** Install the positioning trunnion (5) in the correct position in the stroking piston (2).
- 6.** Screw in the new threaded pin (4) into the stroking piston (2) and tighten it.

10 Rotary group

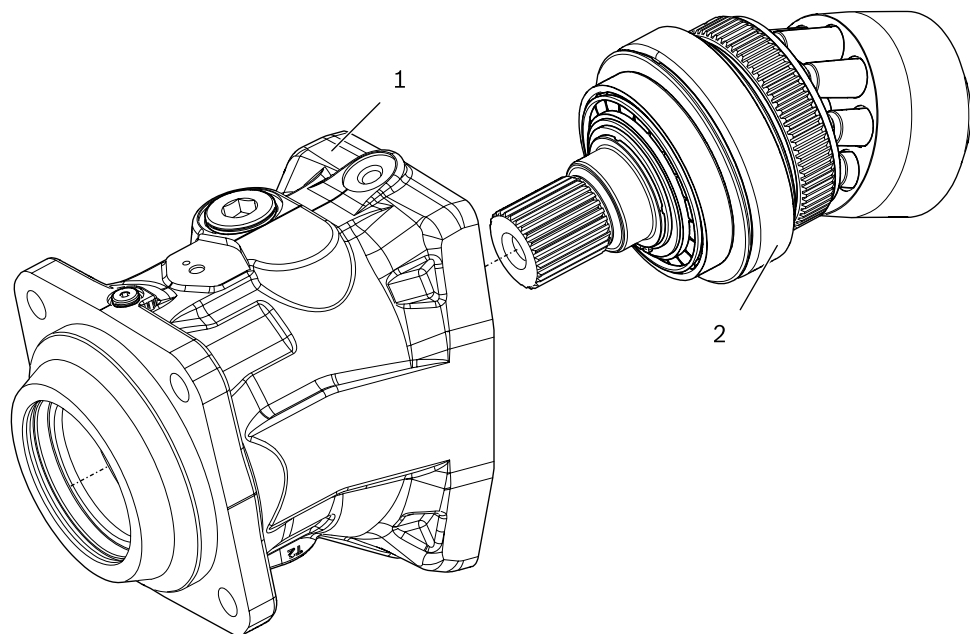


The material numbers of the special tools can be found in the Special Tool Catalog 91610-01-S083.

10.1 Dismounting the rotary group

This section explains how to dismount the rotary group .

Requirements: The port plate and the sealing flange of the drive shaft must have been dismounted.



Rexroth_00042-19

Fig. 22: Dismounting the rotary group

1 Housing

2 Rotary group

Procedure For dismounting the rotary group:

1. Fix the rotary group (2) on the pressure journal by means of a special tool (bridge the pre-charge pressure in the cylinder).



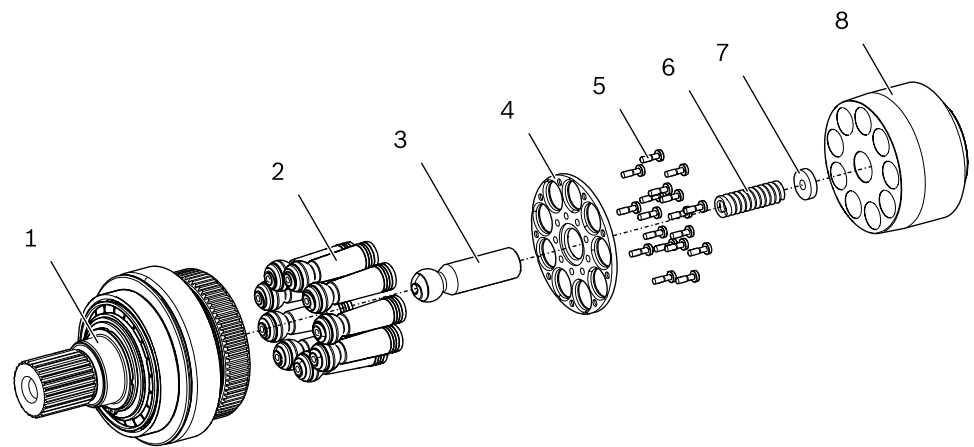
For dismounting, place the rotary group on a minimum swivel angle!

2. Use the puller to slide the rotary group (2) out of the housing (1).
3. Check the bearing seat in the housing for damage, wear and contamination.

10.2 Disassembling the rotary group

This section explains how to disassemble the rotary group.

Requirement: The rotary group must have been dismantled.



Rexroth_00043-19

Fig. 23: Disassembling the rotary group

1	Drive shaft with bearing kit	5	Mounting bolts
2	Piston	6	Central spring
3	Pressure journal	7	Shim
4	Retaining plate	8	Cylinder

Procedure For disassembling the hydraulic part of the rotary group:



Remove the fixture of the rotary group!

- 1.** Pull off the cylinder (**8**) from the piston (**2**).
- 2.** Remove the shim (**7**) and the central spring (**6**) from the pressure journal (**3**).
- 3.** Unscrew the mounting bolts (**5**).
- 4.** Remove the piston (**2**) and the pressure journal (**3**) with the retaining plate (**4**) from the drive shaft (**1**).
- 5.** Check all components for damage, wear and contamination.



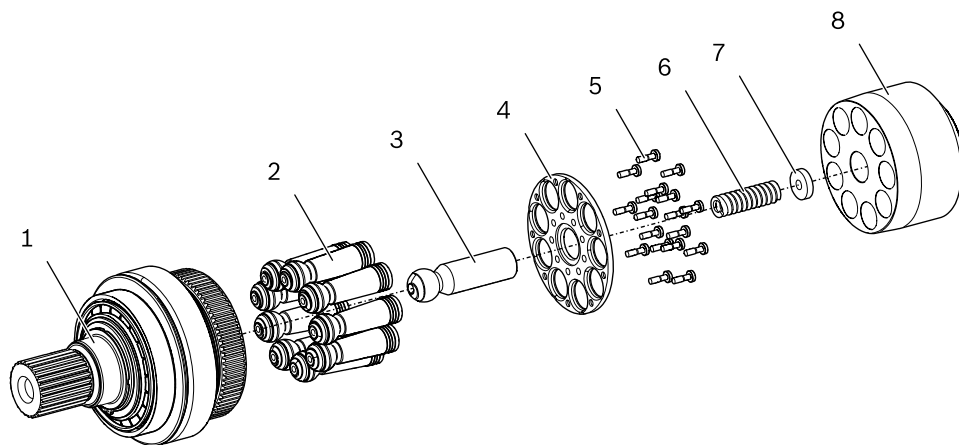
Do not reuse the mounting bolts!

Remove glue residues in the drive shaft by recutting the thread!

10.3 Assembling the rotary group

This section explains how to assemble the rotary group.

Requirement: Drive shaft with bearing kit must be installed.



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Fig. 24: Assembling the rotary group

- | | | | |
|----------|------------------------------|----------|----------------|
| 1 | Drive shaft with bearing kit | 5 | Mounting bolts |
| 2 | Piston | 6 | Central spring |
| 3 | Pressure journal | 7 | Shim |
| 4 | Retaining plate | 8 | Cylinder |

Procedure To assemble the hydraulic part of the rotary group:



If individual parts of the rotary group are replaced, the positioning of the rotary group with respect to the case must be checked and if necessary, corrected by inserting a new shim - see 10.5 „Adjusting the rotary group" [►Page 54].



The cylinder and lens plate must be lapped in pairs before the installation!

- 1.** Insert the piston (**2**) and the pressure journal (**3**) with the retaining plate (**4**) into the spherical cup of the drive shaft (**1**).



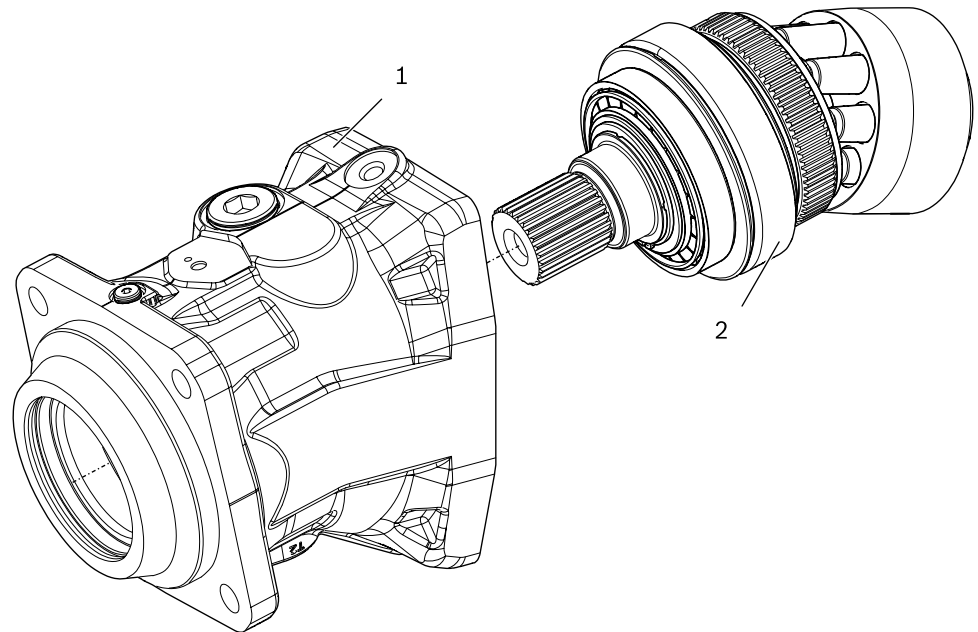
Only use new mounting bolts!

Observe the tightening sequence! First tighten the inner mounting bolts in a clockwise direction and then proceed with the outer mounting bolts!
Ensure the clearance of the pistons!

- 2.** Screw in and tighten the mounting bolts (**5**).
- 3.** Insert the central spring (**6**) into the pressure journal (**3**) and the shim (**7**) into the cylinder (**8**).
- 4.** Push the cylinder (**8**) onto the piston (**2**) and pressure journal (**3**).
- 5.** Fix the cylinder (**8**) on the pressure journal (**3**) using the special tool.

10.4 Installing the rotary group

This section explains how to install the rotary group .



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Fig. 25: Installing the rotary group

1 Housing

2 Rotary group

Procedure To install the rotary group:

WARNING

Risk of burns!

Burns from touching hot components!
Wear safety gloves!



Heat the housing to at least 80°C!

1. Heat the housing (**1**).

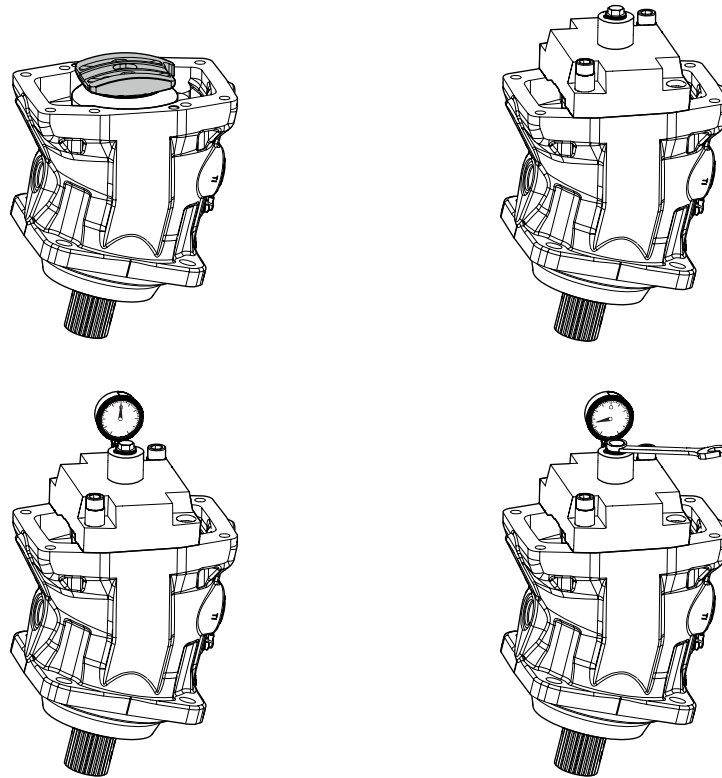


For assembly, place the rotary group on a minimum swivel angle!

2. Mount the rotary group (**2**) in the housing (**1**) in a way that it reaches the stop.
3. Remove the fixture of the rotary group (**2**).

10.5 Adjusting the rotary group

This section explains how to adjust the rotary group.



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Fig. 26: Rotary group adjustment

Procedure

To establish the play in the rotary group:

1. Wet the contact surface of the cylinder with the corresponding operating medium.
2. Place the lens plate on the rotary group.
3. Mount the adjustment device special tool on the housing.
4. Rotate the drive shaft by one turn using the hexagon socket wrench to place the bearings.
5. Set the dial gauge on the adjustment device and set the scale to zero.
6. Rotate the screwdriver in a counter-clockwise direction until obstruction occurs. Here, the needle of the dial gauge moves in a counter-clockwise direction.
7. Read off measured value.



If the play in the rotary group is outside the permissible tolerance, the shim must be replaced and the measurement repeated. For the adjustment process, shims in various thicknesses are available in steps of 0.1 mm.

Tab. 6: Adjustment dimension

Size	Adjustment dimension in mm
280	0.2 ^{+0.4}

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11 Tightening torques

In this chapter, you will find the tightening torques required for the different types of screws. You can also find the tightening torques in the spare parts list from Bosch Rexroth.

11.1 Tightening torques

The following tightening torques apply:

- Fittings:
Observe the manufacturer's specifications regarding the tightening torques of the fittings used.
- Screw-in threads in the axial piston unit:
The maximum permissible tightening torques M_{Gmax} are the maximum values for female threads and must not be exceeded, see Table 11.1.1 „Tightening torques for female threads and threaded plugs" [►Page 57].
- Threaded plugs:
The required tightening torques of threaded plugs apply to the metal threaded plugs supplied with the axial piston unit, see Table 11.1.1 „Tightening torques for female threads and threaded plugs" [►Page 57].
- Mounting bolts:
For mounting bolts with metric ISO threads according to DIN 13 or threads according to ASME B1.1, we recommend checking the tightening torque in individual cases in accordance with VDI 2230, see Table 11.1.2 „Tightening torques for mounting bolts" [►Page 58].
- SEAL LOCK nuts:
The tightening torques required for SEAL LOCK nuts M_A apply, see Table 11.1.3 „Tightening torques SEAL LOCK nuts" [►Page 59].
- Flat head screws with internal TORX:
The required tightening torques of the flat head screws M_A apply, see table 11.1.4 „Tightening torques, flat head screws with internal TORX" [►Page 59]
- Product-specific tightening torques:
The product-specific tightening torques apply, see table:
 - 11.1.5 „Tightening torques, port plate" [►Page 60]
 - 11.1.6 „Tightening torques, cover" [►Page 60]
 - 11.1.7 „Tightening torques for speed sensor" [►Page 60]
 - 11.1.8 „Tightening torques, solenoid" [►Page 60]



The tightening torques apply to screws with the “slightly oiled” delivery condition according to the parts list (friction factor $\mu = 0.1$).



The following information applies to the screws listed in the parts list, not to customer connections such as working ports.

11.1.1 Tightening torques for female threads and threaded plugs

Tab. 7: Tightening torques for female threads and threaded plugs

Ports Standard	Thread size	Maximum permissible tightening torque for the female threads $M_{G \max}$	Required tightening torque for the threaded plugs M_v	WAF hexagon socket of the threaded plug
ISO 6149	M10 x 1	30 Nm	15 Nm	5 mm
	M12 x 1.5	50 Nm	25 Nm	6 mm
	M14 x 1.5	80 Nm	45 Nm	6 mm
	M16 x 1.5	100 Nm	55 Nm	8 mm
	M18 x 1.5	140 Nm	70 Nm	8 mm
	M22 x 1.5	210 Nm	100 Nm	10 mm
	M27 x 2	330 Nm	170 Nm	12 mm
	M33 x 2	540 Nm	310 Nm	17 mm
	M42 x 2	720 Nm	330 Nm	22 mm
	M48 x 2	900 Nm	420 Nm	22 mm
ISO 11926	5/16-24 UNF-2B	10 Nm	7 Nm	1/8 in
	3/8-24 UNF-2B	20 Nm	10 Nm	5/32 in
	7/16-20 UNF-2B	40 Nm	18 Nm	3/16 in
	9/16-18 UNF-2B	80 Nm	35 Nm	1/4 in
	3/4-16 UNF-2B	160 Nm	70 Nm	5/16 in
	7/8-14 UNF-2B	240 Nm	110 Nm	3/8 in
	1 1/16-12 UN-2B	360 Nm	170 Nm	9/16 in
	1 5/16-12 UN-2B	540 Nm	270 Nm	5/8 in
	1 5/8-12 UN-2B	960 Nm	320 Nm	3/4 in
	1 7/8-12 UN-2B	1200 Nm	390 Nm	3/4 in

11.1.2 Tightening torques for mounting bolts

Tab. 8: Tightening torques for mounting bolts

Thread	Tightening torque M _A		
	Tensile strength classes		
	8.8	10.9	12.9
M3	1.1 Nm	1.6 Nm	1.9 Nm
M4	2.6 Nm	3.9 Nm	4.5 Nm
M5	5.2 Nm	7.6 Nm	8.9 Nm
M6	9 Nm	13.2 Nm	15.4 Nm
M8	21.6 Nm	31.8 Nm	37.2 Nm
M10	43 Nm	63 Nm	73 Nm
M12	73 Nm	108 Nm	126 Nm
M14	117 Nm	172 Nm	201 Nm
M16	180 Nm	264 Nm	309 Nm
M18	259 Nm	369 Nm	432 Nm
M20	363 Nm	517 Nm	605 Nm
M22	495 Nm	704 Nm	824 Nm
M24	625 Nm	890 Nm	1041 Nm



The values apply for slotted screws with metric ISO-threads according to DIN 13 Part 13, as well as underhead bearing areas according to DIN 912 Socket-head screws, DIN 931 Hexagon screws partially threaded or Hexagon screws fully threaded.

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11.1.3 Tightening torques SEAL LOCK nuts

Tab. 9: Tightening torques SEAL LOCK nuts

Thread size	Required tightening torque of SEAL LOCK nut M_A
M6	10 Nm
M6 x 0.5	11 Nm
M8	22 Nm
M8 x 1	24 Nm
M10	40 Nm
M10 x 1	44 Nm
M12	69 Nm
M12 x 1.5	72 Nm
M14	110 Nm
M14 x 1.5	120 Nm
M16	170 Nm
M16 x 1.5	180 Nm

11.1.4 Tightening torques, flat head screws with internal TORX

Tab. 10: Tightening torques of flat head screws with internal TORX; thread precoated with "precote 80"

Thread	Required tightening torque M_A	
	Property classes	
	10.9	11.9
M3	2.1 Nm	-
M4	4.7 Nm	-
M5	9.1 Nm	9.5 Nm
M6	15.8 Nm	-
M8	37.7 Nm	-

11.1.5 Tightening torques, port plate

Tab. 11: Tightening torques, port plate

Component	Thread	Required tightening torque
Threaded pin	M6	8.5 Nm
	M8	14 Nm
	M10	30 Nm
	M12	52 Nm

11.1.6 Tightening torques, cover

Tab. 12: Tightening torques, cover

Component		Required tightening torque M _A
Orifice		12 Nm
Throttle screw		12 Nm
Threaded plug	Set pressure reducing valve	120 Nm
	Flushing and boost-pressure valve	120 Nm
	Low-pressure relief valve	70 Nm
SEAL LOCK nut		30 Nm

11.1.7 Tightening torques for speed sensor

Tab. 13: Tightening torques for speed sensor

Thread	Required tightening torque
M6	8 Nm

11.1.8 Tightening torques, solenoid

Tab. 14: Tightening torques, solenoid

Component	Required tightening torque
Mounting nut	5 Nm
Pole tube	19 Nm

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