

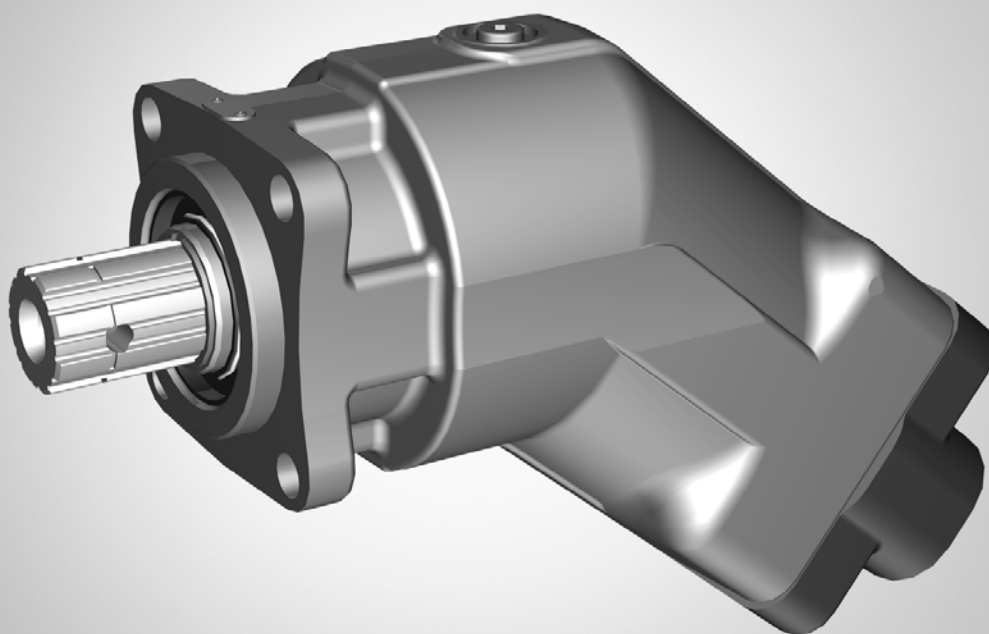
Axial Piston Fixed Pump A17FO/A17FNO

Series 10

RE 91520-01-B/02.11

Replaces: RE 91501-01-B/07.09
English

Instruction manual



The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

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

The original operating instructions were created in the German language.

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1 About this manual

This manual contains important information on the safe and appropriate installation, transport, commissioning, maintenance, removal and simple troubleshooting of the axial piston fixed pump A17FO/A17FNO Series 10.

- Read this manual completely, especially chapter "2 General safety instructions", before working with the axial piston fixed pump A17FO/A17FNO.

1.1 Related documents

The axial piston fixed pump A17FO/A17FNO is a system component. Also observe the manuals for the other system components.

Further information on the axial piston fixed pump A17FO/A17FNO, its installation and operation can be found in the Rexroth documents listed in the following table.

Table 1: Related documents

Related documents	Contents
Order confirmation	Contains the technical data of the A17FO/A17FNO axial piston fixed pump .
Installation drawing	Contains the outer dimensions, all connections and the hydraulic circuit diagram for the A17FO/A17FNO axial piston fixed pump . The installation drawings can be requested from your responsible contact person at Rexroth.
Data sheet RE 91510	Contains the permissible technical data for the A17FNO axial piston fixed pump Series 10.
Data sheet RE 91520	Contains the permissible technical data for the A17FO axial piston fixed pump Series 10.
Data sheet RE 90220	Describes the requirements on a mineral-oil based hydraulic fluid and related hydrocarbons for the operation with Rexroth hydraulic components, and assists you in selecting a hydraulic fluid for your system.
Data sheet RE 90221	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 system.
Data sheet RE 90312	Contains additional information about storing and preserving axial piston units.

Also observe the generally applicable, legal or otherwise binding regulations of the European and national legislation and the rules for the prevention of accidents and for environmental protection applicable in your country.

1.2 Abbreviations used

As umbrella term for "A17FO/A17FNO axial piston fixed pump", the designation "axial piston unit" will be used in the following.

Table 2: Abbreviations

Abbreviation	Meaning
A17FO/A17FNO	Axial piston fixed pump, open circuit
DIN	Deutsche Industrie Norm (German Institute for Standardization)
ISO	International Organization for Standardization
RE	Rexroth document in the English language
VDI 2230	Directive for the systematic calculation of high duty bolted joints and joints with one cylindrical bolt from the VDI (Verein Deutscher Ingenieure - Association of German Engineers)

2 General safety instructions

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 damage to equipment if the following general safety instructions and the warnings before the steps contained in this manual are not complied with.

- ▶ Read this manual completely and thoroughly before starting work with the axial piston unit.
- ▶ Keep this manual in a location where they are accessible to all users at all times.
- ▶ Always include the instruction manual when you pass the axial piston unit on to third parties.

2.1 Intended use

Axial piston units are hydraulic components, meaning that in their application they are classified neither as complete nor as incomplete machines in the sense of the EU machine directive 2006/42/EC. A component is exclusively intended to form an incomplete or a complete machine together with other components.

The component may only be commissioned after it has been installed in the machine/system for which it is intended.

The product is intended for the following use:

The axial piston unit is only approved as a pump for hydrostatic drives in open circuit.

- ▶ Observe the technical data, application and operating conditions and performance limits as specified in data sheet RE 91510 and RE 91520 and in the order confirmation. Information about approved hydraulic fluids can be found in data sheet RE 91510 and RE 91520.

The axial piston unit is only intended for professional use and not for private use. Intended use includes having read and understood this documentation, especially the chapter "2 General safety instructions".

2.2 Improper use

Any use other than that described as intended use shall be considered as improper and is therefore impermissible.

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 injury to persons or property damage. For this reason, products should only be used in safety-relevant applications if this usage is expressly specified and approved in the documents related to the product. For example, in explosion protection areas or in safety-related parts of a control system (functional safety).

Bosch Rexroth AG shall accept no liability whatsoever for damage resulting from improper use. The user shall bear all risks arising from improper use.

Similarly, the following predictable faulty usages are also considered to be not as intended:

- Using the axial piston unit in explosive environments unless the component or system has been certified as compliant with the ATEX directive 94/9/EC
- Pumping non-approved fluids compliant with data sheet RE 92260, e.g. water or polyurethane components.
- Modification of factory settings by non-authorized persons
- Use of add/on parts (e.g. mountable filter, control unit, valves) that are not specified Rexroth components
- Using the axial piston unit under water at a depth of more than 10 meters without necessary additional measures, e.g. pressure equalization
- Using the axial piston unit in aircraft or space craft
- Using the axial piston unit when the exterior pressure is greater than the interior pressure (case pressure)
- Using the axial piston unit in an aggressive atmosphere
- Using outside the operating parameters approved in the data sheet (unless special approval has been granted)

2.3 Personnel qualifications


Installation, commissioning and operation, removal, care and maintenance require basic mechanical, hydraulic and electrical knowledge, as well as knowledge of the appropriate technical terms. For transporting and handling the product, additional knowledge is necessary with regard to working with a lifting device and the corresponding attachment equipment. In order to ensure operating safety, these activities may therefore only be carried out by qualified personnel or an instructed person under the direction and supervision of qualified personnel.

Qualified personnel are those who can recognize possible hazards and institute the appropriate safety measures due to their professional training, knowledge, and experience, as well as their understanding of the relevant conditions pertaining to the work to be done. Qualified personnel must observe the rules relevant to the subject area.

2.4 Safety instructions in this manual





In this manual, there are safety instructions before the steps whenever there is a danger of personal injury or damage to equipment. The measures described to avoid these hazards must be observed.

Safety instructions are set out as follows:

SIGNAL WORD! 	Type of danger! Consequences ► Precautions
	<ul style="list-style-type: none"> • Safety signs: (warning triangle): draw attention to danger • Signal word: identifies the degree of the danger • Type of danger: identifies the type or source of the danger • Consequences: describes what occurs if the safety instructions are not complied with • Precautions: states how the danger can be avoided.

General safety instructions

The signal words have the following meaning:

Signal word	Application
DANGER! 	Indicates an imminently hazardous situation which, if not avoided, will certainly result in death or serious injury.
WARNING! 	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION! 	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment.
	If this information is disregarded, the operating procedure may be impaired.

2.5 Adhere to the following instructions

General instructions

- Observe the regulations for accident prevention and environmental protection for the country where the product is used and at the workplace.
- Only use Rexroth axial piston units in good technical order and condition.
 - Inspect the product for obvious defects.
- Do not modify or convert the axial piston unit. You are only authorized to exchange the pressure connection on the service line ports. For further information, please refer to chapter "6.4.2 Direction of rotation and changing direction".
- Use the product only within the performance range provided in the technical data.
- Persons who install, commission, operate, remove or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.
- The warranty applies only to the delivered configuration.
- The warranty is rendered void if the product is incorrectly installed, commissioned or operated, and also if not used as intended and/or handled improperly.
- Do not expose the product to any mechanical loads under any circumstances. Never use the product as a handle or step. Do not place/lay any objects on it.
- The noise emission of axial piston units depends on speed, operating pressure and installation conditions. The sound pressure level may rise above 70 dBA during normal application conditions. This can cause hearing damage.
 - Always wear hearing protection while working in the vicinity of the operating axial piston unit.
- The axial piston unit can heat up so much during operation that you can burn yourself on it.
 - Allow the axial piston unit to cool down sufficiently before touching it.
 - Wear heat-resistant protective clothing, e.g. gloves.
- Hydraulic fluid is easily flammable.
 - Keep open flames and ignition sources away from the axial piston unit.

General safety instructions

- Contact with hydraulic fluid may cause health damage.
 - When working with hydraulic fluids, strictly observe the safety instructions provided by the hydraulic fluids manufacturer.
- During transport** • Make certain that the lifting device has adequate lifting capacity. The weight can be found in chapter "5 Transport and storage".
- During installation** • Before installation, make sure that all fluids have been removed from the axial piston unit to prevent mixing with the hydraulic fluid used in the system.
 - Always set up the relevant part of the system so that it is depressurized before you install the product. Protect the system against being energized.
 - Before commissioning, ensure that all of the hydraulic connections are leakproof and that all seals are undamaged to prevent fluids and contaminants from penetrating the product.
 - During installation, provide for absolute cleanliness in order to prevent contaminants, such as welding beads or metal cuttings, from getting into the hydraulic lines and causing product wear or malfunctions.
- During commissioning** • Ensure that all hydraulic connections and ports are connected or plugged. Only commission a completely installed product.
- During cleaning** • Plug all openings with the appropriate protective equipment in order to prevent detergents from penetrating the system.
 - Never use solvents or aggressive detergents. Use only water and, if necessary, a mild detergent to clean the axial piston unit.
 - Do not point a power washer at sensitive components, such as e.g. shaft seal ring.
- During maintenance and repair** • Perform the prescribed maintenance work at the intervals specified in the instruction manual (see chapter "9.3 Maintenance").
 - Make certain that no lines, connections or components are disconnected as long as the system is under pressure. Protect the system against being energized.
- During disposal** • Dispose of the product and the hydraulic fluid in accordance with the currently applicable national regulations in your country.

2.6 Operator's obligations

The operator of the Rexroth axial piston unit must provide personnel training on a regular basis regarding the following subjects:

- Observation and use of the instruction manual and the legal regulations
- Intended use and operation of the axial piston unit
- Observation of the instructions from the factory security offices and of the work instructions from the operator



Rexroth offers training support for special fields. You can find an overview of the training contents on the Internet at:

<http://www.boschrexroth.de/didactic>.

3 Delivery contents

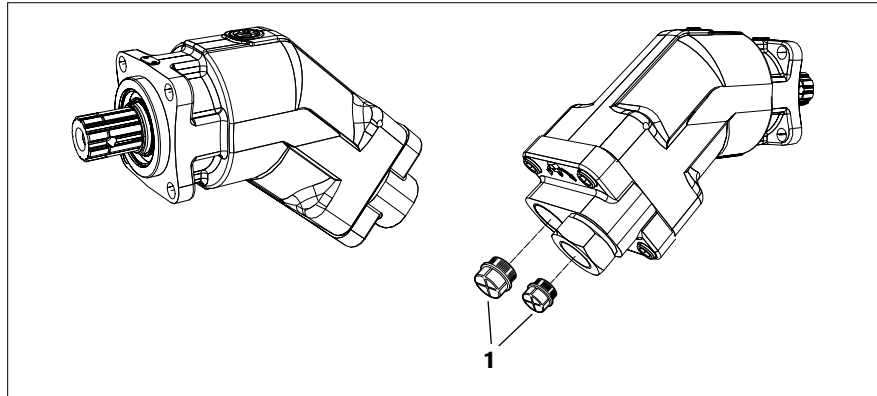


Fig. 1: Axial piston unit

Included in the delivery contents are:

- Axial piston unit as per order confirmation

The following parts are also installed on delivery:

- Plastic plugs / threaded plugs (1).
- Check the delivery contents for completeness and transport damages.

4 Product description

4.1 Performance description

The axial piston fixed pump generates a hydraulic fluid flow. It is designed for use in commercial vehicles.

Refer to the data sheet and order confirmation for the technical data, operating conditions and operating limits of the axial piston unit.

4.2 Device description

The A17FO/A17FNO is a fixed pump with axial tapered piston rotary group in bent-axis design for hydrostatic drives in open circuits. Flow is proportional to drive speed and displacement. For axial piston units with bent-axis design, the pistons are arranged diagonally with respect to the drive shaft.

Open circuit

In an open circuit, the hydraulic fluid flows from the reservoir to the hydraulic pump from where it is fed via a directional valve to the consumer, e.g. cylinder. From the consumer, the hydraulic fluid flows back to the reservoir via the directional valve.

4.2.1 Assembly of the axial piston unit

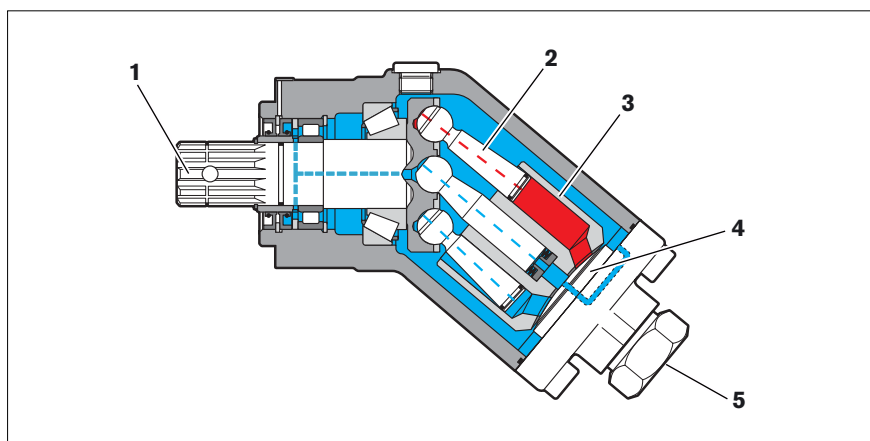


Fig. 2: Assembly of the A17FO/A17FNO Series 10

- | | |
|---------------|-----------------------|
| 1 Drive shaft | 4 Control plate |
| 2 Piston | 5 Pressure connection |
| 3 Cylinder | |

Product description**4.2.2 Functional description**

Pump Torque and a rotational speed are applied to the drive shaft (1) by an engine. The drive shaft and cylinder (3) pick up and turn the piston (2). The cylinder then glides on the control plate (4). With every revolution, the pistons execute one stroke in the cylinder bores. During a revolution, each piston moves over the bottom and top dead centers back to its initial position. Here, hydraulic fluid is fed into and out through two control slots in the control plate according to the displacement. On the suction side, hydraulic fluid flows into the enlarging piston chamber. At the same time, on the high-pressure side the hydraulic fluid is pushed out of the cylinder chamber into the hydraulic system by the pistons. The drive direction of the axial piston fixed pump is defined via a pressure connection screwed into the service line port (5) and can easily be changed (see chapter "6.4.2 Direction of rotation and changing the direction of rotation").

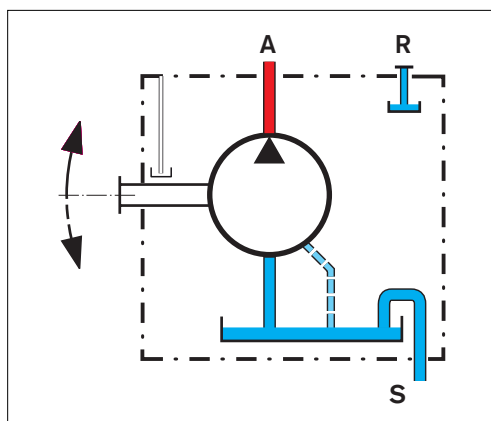
Circuit diagram

Fig. 3: Circuit diagram A17FO/A17FNO Series 10

4.3 Product identification

The axial piston unit can be identified from the name plate. The following example shows a A17FO name plate:

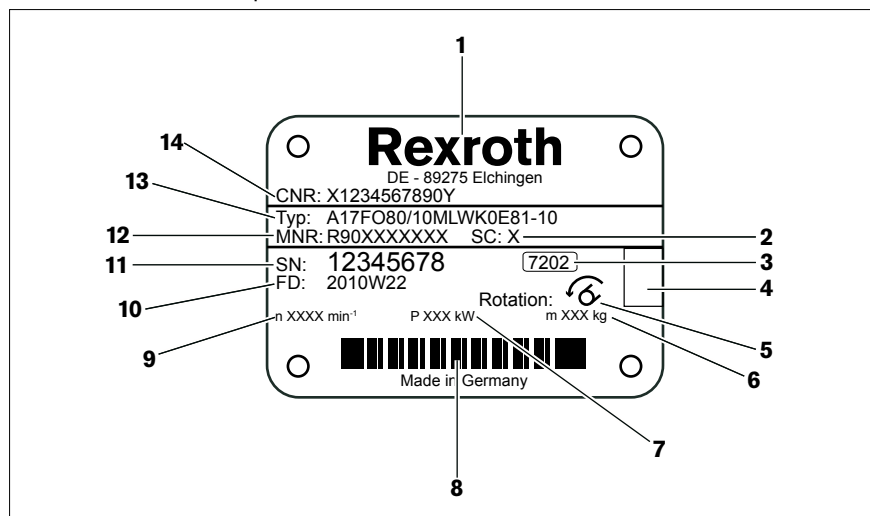


Fig. 4: A17FO name plate

- | | |
|---|---|
| 1 Manufacturer | 8 Bar code |
| 2 Sample category (optional) | 9 Speed |
| 3 Internal plant designation | 10 Production date |
| 4 Specified area for test stamp | 11 Serial number |
| 5 Direction of rotation (viewed on drive shaft)
– here: clockwise (as delivered) | 12 Material number of the axial piston unit |
| 6 Ground (optional) | 13 Ordering code |
| 7 Power | 14 Customer material number |

5 Transport and storage

5.1 Transporting the axial piston unit

CAUTION!



Risk of damage!

Striking or impulsive forces could damage the axial piston unit.

- ▶ Do not strike the drive shaft of the axial piston unit.
- ▶ Do not set/place the axial piston unit on the drive shaft.
- ▶ Do not strike sensitive fittings (e.g. sensors or valves).
- ▶ Do not strike sealing surfaces (e.g. service line ports).

Axial piston units can be transported with a forklift truck or with a lifting device.

- ▶ Make certain that the forklift truck or lifting device has adequate lifting capacity.

Dimensions and weights

Table 3: Dimensions and weights

Size	A17FO	23	32	45	63	80	107	
	A17FNO							125
Ground	kg	5.8	5.8	8.0	9.0	11.6	14.5	14.5
Width	mm	The dimensions vary with the unit type. The values applicable for your axial piston unit can be found in the installation drawing (request if necessary).						
Height	mm							
Depth	mm							

The weight specifications may vary depending on the unit type.

Carrying the axial piston unit

Axial piston units with a weight of up to 15 kg can be transported by hand if necessary.

5.1.1 Transporting with lifting device

For transporting, the axial piston unit can be connected to a lifting device via a ring screw or a lifting strap.

Transport with ring screw

The drive shaft can be used to transport the axial piston unit as long as only outward (pulling) axial forces occur. Thus, you can suspend the axial piston unit from the drive shaft.

- ▶ For all female threads, use a threaded plug from the same system of units and of the correct size.
- ▶ To do this, screw a ring screw completely into the thread on the drive shaft. The thread sizes is stated in the installation drawing.
- ▶ Make sure that each ring screw can bear the total weight of the axial piston unit plus approx. 20%.

You can hoist the axial piston unit as shown in Fig. 5 with the ring screw screwed into the drive shaft.

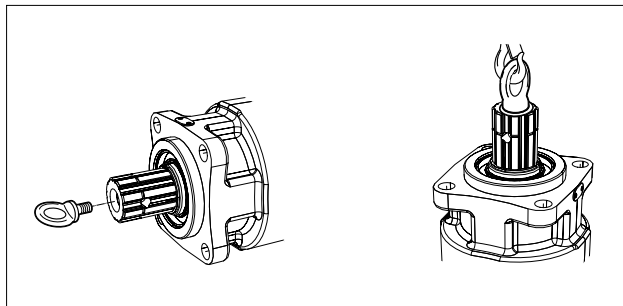


Fig. 5: Fixing the ring screw

Transport with lifting strap

- Place the lifting strap around the axial piston unit in such a way that it passes over neither the attachment parts (e.g. valves) nor such that the axial piston unit is hung from attachment parts (see Fig. 6).

WARNING!



Risk of injury!

During transport with a lifting device, the axial piston unit can fall out of the lifting strap and cause injuries.

- Use the widest possible lifting strap.
- Make sure that the axial piston unit is securely fixated with the lifting strap.
- Only guide the axial piston unit by hand for fine positioning and to avoid oscillations.
- Never stand under or put your hands under suspended loads.

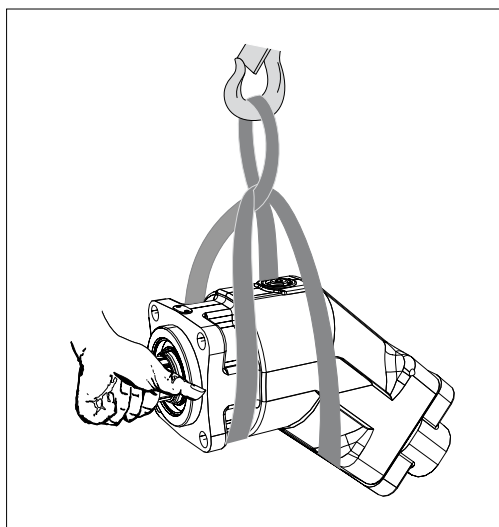


Fig. 6: Transport with lifting strap

5.2 Storing the axial piston unit

- Requirement
- The storage areas must be free of corrosive materials and gasses.
 - The storage areas must be dry.
 - Ideal storage temperature: +5 °C to +20 °C.
 - Minimum storage temperature: -50 °C.
 - Maximum storage temperature: +60 °C.
 - Avoid intense lights.
 - Do not stack axial piston units and store them shock-proof.
 - Do not store the axial piston unit on sensitive attachment parts.
 - For other storage conditions, see Table 4.
- Check the axial piston unit monthly to ensure proper storage.

After delivery

The axial piston units are provided ex-works with corrosion protection packaging (corrosion protection film).

The following table lists the maximum permissible storage times for an originally packed axial piston unit as per data sheet RE 90312.

Table 4: Storage time with factory corrosion protection

Storage conditions	Standard corrosion protection	Long-term corrosion protection
Closed, dry room, uniform temperature between +5 °C and +20 °C. Undamaged and closed corrosion protection film.	Maximum 12 months	Maximum 24 months



The warranty is rendered void if the requirements and storage conditions are not adhered to or after expiration of the maximum storage time (see Table 4).

Procedure after expiration of the maximum storage time:

1. Check the entire axial piston unit for damage and corrosion prior to installation.
2. Check the axial piston unit for proper function and leaks during a test run.
3. If the storage time exceeds 24 months, both shaft seal rings must be replaced.



After expiry of the maximum storage time, we recommend that you have the axial piston unit inspected by your responsible Rexroth Service partner.

In the event of questions regarding repair and spare parts, contact your responsible Rexroth Service partner or the service department of the manufacture's plant for the axial piston unit, see chapter "9.5 Spare parts" for further information.

After removal

If a dismantled axial piston unit is to be stored, it must be preserved against corrosion for the duration of the storage.



The following instructions only refer to axial piston units which are operated with a mineral-oil based hydraulic fluid. Other hydraulic fluids require preservation methods that are specifically designed for them. In such a case, consult with Rexroth Service (see chapter "9.5 Spare parts" for address).

Rexroth recommends the following procedure:

1. Clean the axial piston unit, see chapter "9.1 Cleaning and care".
2. Completely empty the axial piston unit.
3. For storage time up to 12 months: Moisten the inside of the axial piston unit with mineral oil and fill with approx. 100 ml mineral oil.
For storage time up to 24 months: Fill the axial piston unit with corrosion protection medium VCI 329 (20 ml).
Filling is performed via port "**R**", see chapter "6.4 Installing the axial piston unit", Fig. 13.
4. Seal all ports airtight.
5. Moisten the unpainted surfaces of the axial piston unit with mineral oil or a suitable, easily removed corrosion protection agent, e.g. acid-free grease.
6. Package the axial piston unit airtight together with desiccant in corrosion protection film.
7. Store the axial piston unit so that it is protected against jolts. See "Requirement" in this chapter for further conditions.

6 Installation

Prior to installation, the following documents must be available:

- Installation drawing for axial piston unit (can be obtained from your responsible contact person at Rexroth)
- Hydraulic circuit diagram for the axial piston unit (in the installation drawing)
- Hydraulic circuit diagram for the system (available from the system manufacturer)
- Order confirmation (contains the data of the axial piston unit)
- Data sheet for the axial piston unit (contains the technical data)

6.1 Unpacking

The axial piston unit is delivered in a corrosion protection film made of polyethylene material (PE).

- Dispose of the packaging according to the environmental regulations of your country.

CAUTION!**Risk of parts falling out!**

If the packaging is not opened correctly, parts may fall out and damage the parts or even result in injury.

- Place the packaging on a flat and solid surface.
 - Only open the packaging from the top.
-

6.2 Installation conditions

- The installation location and position of the axial piston unit essentially determine the procedures during installation and commissioning (such as when filling and air bleeding the axial piston unit).
 - Correct filling and air bleeding is necessary to prevent damage to the axial piston unit and to maintain correct function.
- Observe all data specified in the data sheet, e.g. temperature, viscosity, purity of the hydraulic fluid and direction of rotation.
 - Make sure that the axial piston unit is air bled and filled with hydraulic fluid during commissioning and operation. This is also to be observed following relatively long standstill periods as the axial piston unit may empty via the hydraulic lines.
 - To achieve favorable noise values, decouple all connecting lines from all vibration-capable components (e.g. reservoir) using elastic elements.

- Make certain that the suction line flows into the reservoir below the minimum fluid level in all operational states. This will prevent air from being drawn in and foam from being formed.

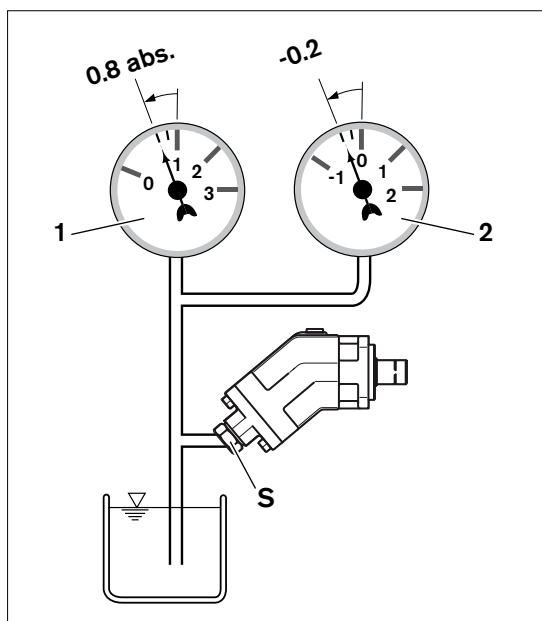


Fig. 7: Suction pressure

- 1 Absolute pressure gauge
- 2 Standard pressure gauge

- Make sure that a minimum suction pressure of 0.8 bar absolute is present at port "S" during operation and on cold starts in all installation positions and installation locations for the axial piston pump, see Fig. 7. See data sheet for additional values.



The suction conditions improve with below-reservoir installation.

- Absolute cleanliness is required. The axial piston unit must be installed in a clean condition. Dirt contamination in the hydraulic fluid can seriously impair the function and service life of the axial piston unit.
- Do not use any cotton waste or linty cloths for cleaning.
- Use suitable liquid detergents to remove lubricants and other difficult-to-remove contamination. Cleaning agents must not penetrate the hydraulic system.

CAUTION!



Risk of damage due to lack of lubrication!

Sufficient lubrication must be guaranteed to prevent damage to the axial piston unit.

- During installation make sure that the case is fully filled with hydraulic fluid for commissioning and operation (e.g. no air intrusion).
- Make sure that the suction line is always filled with hydraulic fluid during commissioning and operation.

6.3 Installation position

The following installation positions are permissible. The shown piping layout illustrates the basic layout.



The case drain chamber is internally connected to the suction chamber. A separate case drain line from the case to the reservoir is not required.

6.3.1 Below-reservoir installation (standard)

Below-reservoir installation is when the axial piston unit is installed outside of the reservoir below the minimum fluid level.



Recommended installation positions: 1 and 2.

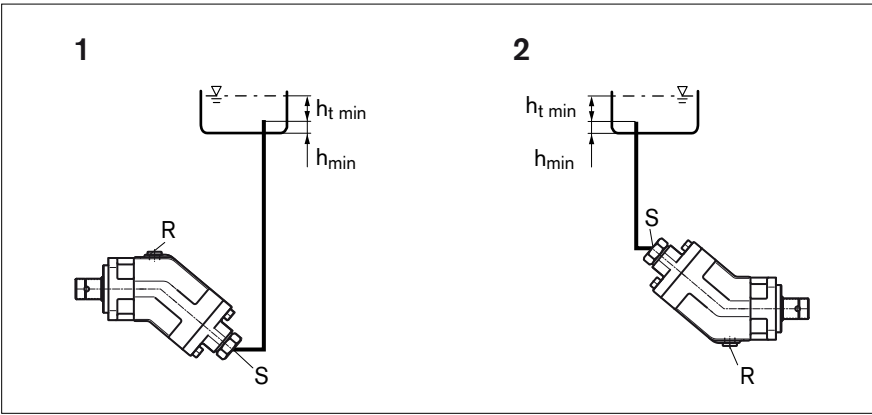


Fig. 8: Below-reservoir installation with installation positions 1–2

R	Air bleed port	$h_{t\ min}$	Minimum necessary immersion depth (200 mm)
S	Suction port	h_{min}	Minimum necessary spacing from suction port to reservoir base (100 mm)

Table 5: Below-reservoir installation

Installation position	Air bleed	Filling
1	R	S
2	-	S

6.3.2 Above-reservoir installation

Above-reservoir installation is when the axial piston unit is installed above the minimum fluid level of the reservoir.



- Risk of damage due to lack of lubrication!**
- Sufficient lubrication must be guaranteed to prevent damage to the axial piston unit.
- ▶ When installing, make sure that the case is fully filled with hydraulic fluid for commissioning and operation (e.g. no air intrusion).
 - ▶ Check the hydraulic fluid level in the case interior regularly; if necessary, recommission. With above-reservoir installation, the case interior may drain after longer standstill periods via the service line (gap leakage). The bearings are thus insufficiently lubricated for recommissioning.
 - ▶ Make sure that the suction line is always filled with hydraulic fluid during commissioning and operation.



Observe the maximum permissible suction height $h_{S\ max} = 800\text{ mm}$. The permissible suction height h_s is derived from the total pressure loss.

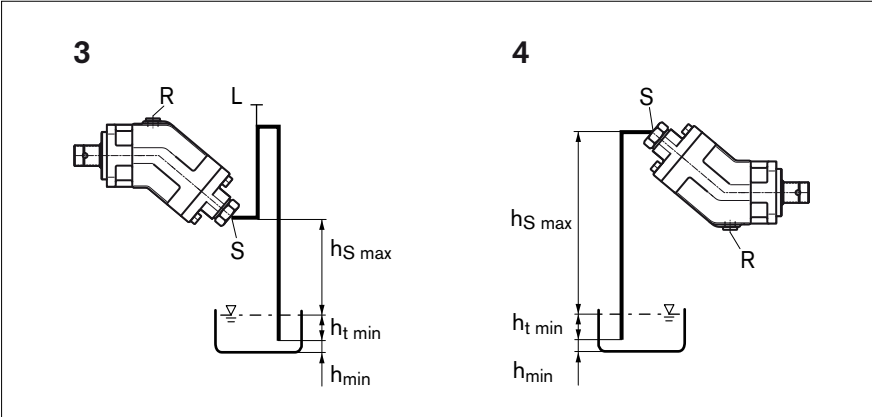


Fig. 9: Above-reservoir installation with installation positions 3–4

L	Filling / air bleeding	$h_{t\ min}$	Minimum necessary immersion depth (200 mm)
R	Air bleed port	h_{min}	Minimum necessary spacing from suction port to reservoir base (100 mm)
S	Suction port	$h_{S\ max}$	Maximum permissible suction height (800 mm)

Table 6: Above-reservoir installation

Installation position	Air bleed	Filling
3	R	L
4	S	S

6.4 Installing the axial piston unit

DANGER!



Systems which are in operation pose a risk of injury!

Working on operating systems poses a danger to life and limb. The work steps described in this chapter must only be performed on systems which are at a standstill. Before beginning work:

- ▶ Ensure that the engine cannot be switched on.
- ▶ Ensure that all power-transmitting components and connections (electric, pneumatic, hydraulic) are switched off according to the manufacturer's instructions and are secured against being switched on again. If possible, remove the main fuse for the system.
- ▶ Ensure that the system is completely hydraulically relieved and depressurized. Please follow the system manufacturer's instructions.
- ▶ Only qualified personnel (see chapter "2.3 Personnel qualifications") are authorized to install the axial piston unit.

6.4.1 Preparation

1. Check the delivery contents for completeness and transport damages.
2. Compare the material number and designation (ordering code) with the details in the order confirmation.



If the material number for the axial piston unit does not correspond to the one in the order confirmation, contact Rexroth Service for clarification, see chapter "9.5 Spare parts" for address.

3. Before installing, completely empty the axial piston unit to prevent mixing with the hydraulic fluid used in the system.
4. Check the direction of rotation of the axial piston unit and make sure that this corresponds to the direction of rotation of the power take-off.

6.4.2 Direction of rotation and changing the direction of rotation



The pressure connection is pre-installed upon delivery and must be tightened with the torque stipulated for the appropriate thread size prior to installation.

CAUTION!



Risk of property damage!

Operating in the wrong direction of rotation can damage the axial piston unit.

- ▶ Before installing the pump, check the direction of rotation of the pump and of the power take-off.

The direction of rotation of the axial piston unit is defined by means of a pressure connection screwed into the service line port and can easily be changed.

By changing the pressure connection, the service line port and the suction port are exchanged. As a result, the permissible drive direction is changed.

Direction of rotation on delivery

On delivery, the pressure connection (1) is pre-installed in the right-hand service line port of the axial piston unit. The permissible drive direction of the pump looking at the drive shaft: counter-clockwise. The power take-off turns clockwise.

- Tighten the pressure connection (1) with the torque stipulated for the appropriate thread size, before you install the axial piston unit (for tightening torques, see Table 7).

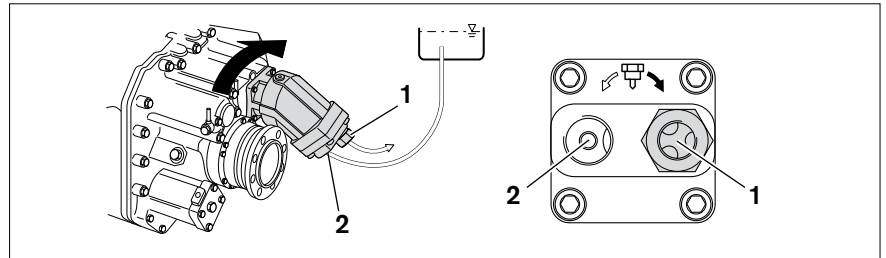


Fig. 10: Pressure connection on delivery – for clockwise rotation of the power take-off (= pump rotates counter-clockwise)

1 Pressure connection
(in right port)

2 Suction port

Changing the direction of rotation

For power take-offs with counter-clockwise rotation, the direction of rotation of the axial piston unit must be changed.

- To change the direction of rotation of the axial piston unit, you must convert the pressure connection (1) from the right port to the left port, see Fig. 11 (for tightening torques, see Table 7).

CAUTION!**Risk of property damage!**

If the pump drive shaft moves during conversion, the axial piston unit may be damaged.

- After unscrewing the pressure connection, do not turn the drive shaft of the pump!

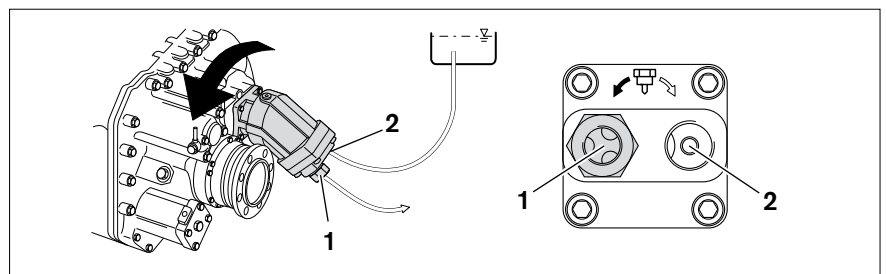


Fig. 11: Pressure connection after conversion – for counter-clockwise rotation of the power take-off (= pump rotates clockwise)

1 Pressure connection
(in left port)

2 Suction port

Tightening torques

The following tightening torques apply:

Table 7: Tightening torque M_D of the pressure connection

Size	A17FO	NG	23, 32	45, 63	80, 107
	A17FNO	NG			
Tightening torque M_D		Nm	145	270	525
Size WAF		mm	36	41	50

Installation**6.4.3 Dimensions**

The installation drawing contains the dimensions for all connections and ports on the axial piston unit. Also observe the manuals provided by the manufacturers of the other components when selecting the required tools.

6.4.4 General instructions

During installation (and disassembly) of the axial piston unit, observe the following general instructions and handling instructions:

- When driving the input or output drive of an axial piston unit with the aid of a cardan shaft, vibrations may occur which may result in leakages on the shaft seal rings of the axial piston unit depending on the temperature and frequency.
 - ▶ Fix the axial piston unit so that the expected forces and torques can be transferred without any danger.
 - ▶ The permissible axial loading of the drive shaft, the permissible torsional vibration, the optimum direction of load force, as well as the limit speeds can be found in the data sheet.
- Radial forces on the drive shaft are not permissible.

**CAUTION!****Risk of damage!**

Striking or impulsive forces could damage the axial piston unit.

- ▶ Do not install the coupling hub onto the drive shaft of the axial piston unit by striking it.
- ▶ Do not set/place the axial piston unit on the drive shaft.
- ▶ Do not strike sensitive fittings (e.g. sensors or valves).
- ▶ Do not strike sealing surfaces (e.g. suction port or through drive).

How to install the axial piston unit depends on the connecting elements to the drive side. The following descriptions explain the installation of the axial piston unit:

- with a clutch
- on a gearbox

6.4.5 Installation with clutch

The installation procedure for the axial piston unit with a coupling is described in detail in the following:

1. Install the specified coupling half onto the drive shaft of the axial piston unit according to the instructions of the coupling manufacturer.



The drive shaft of the axial piston unit is equipped with a threaded bore. Use this threaded bore to pull the coupling element onto the drive shaft. Refer to the installation drawing for the dimensions of the threaded bore.

2. Make certain that the installation location is clean and free from dirt and contaminants.
3. Clamp the coupling hub onto the drive shaft or ensure permanent lubrication of the drive shaft. This prevents the formation of frictional corrosion and the associated wear.
4. Transport the axial piston unit to the installation location.
5. Install the coupling onto the input according to the instructions of the coupling manufacturer.



The axial piston unit may not be bolted down until the coupling has been correctly installed.

6. Fix the axial piston unit at the installation location.
7. If necessary, details on the required tools and tightening torques for the fixing screws are available from the machine or system manufacturer.
 - For bell housing installation, check the coupling axial play through the bell window according to the manufacturer's instructions.
 - For flange installation, align the support for the axial piston unit with the input.
8. When using flexible couplings, check that the input is free of resonance after completing the installation.

6.4.6 Installation on a gearbox

The installation layout for the axial piston unit on a gearbox is described in detail in the following:

After installing on a gearbox, the axial piston unit is covered and is difficult to access:

- Therefore, before installing, make sure that the centering spigot centers the axial piston unit (observe tolerances) and that no impermissible axial or radial forces act on the drive shaft of the axial piston unit (installation length).
- Protect the spline of the drive shaft from frictional corrosion by providing permanent lubrication.

Installation**6.4.7 Completing installation**

1. Remove any mounted transport screws.
2. Remove the transport protection.
The axial piston unit was delivered with protective covers and plastic plugs or threaded plugs. These must be removed before connecting. Use appropriate tools.
3. Make certain that the sealing and functional surfaces are not damaged. If sealing or functional surfaces are damaged, contact your responsible Rexroth Service partner or the service department of the manufacture's plant for the axial piston unit.



Ports which are intended for connecting lines are provided with plastic plugs or threaded plugs, which serve as transport protection.

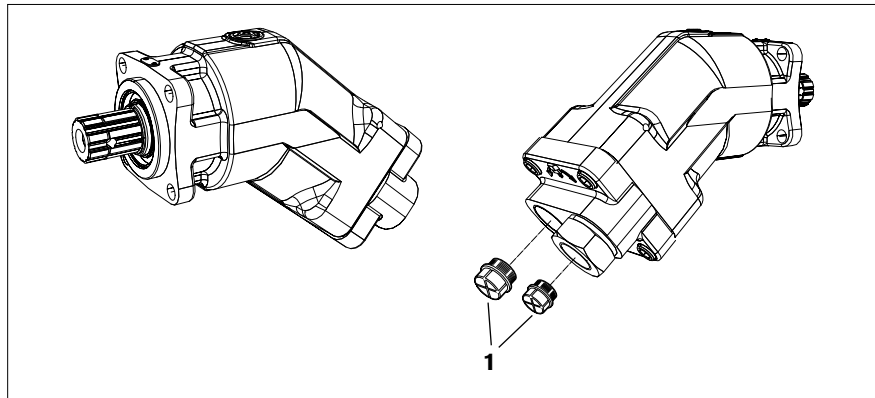


Fig. 12: Removing transport protection

- 1 Plastic plugs / threaded plugs

6.4.8 Hydraulically connecting the axial piston unit

The machine or system manufacturer is responsible for dimensioning the lines. The axial piston unit must be connected to the rest of the hydraulic system in accordance with the hydraulic circuit diagram of the machine or system manufacturer.

CAUTION!**Damage to the axial piston unit!**

Hydraulic lines and hoses that are installed under mechanical stress generate additional mechanical forces during operation, which will reduce the service life of the axial piston unit and the entire machine or system.

- Install hydraulic lines and hoses without mechanical stress.
-

CAUTION!**Risk of damage!**

Generally, a minimum permissible suction pressure at port "S" is specified for axial piston pumps in all installation positions. If the pressure at port "S" drops below the specified values, damage may occur which may lead to the axial piston pump being damaged beyond repair.

- Make certain that the necessary suction pressure is not undercut.
This is influenced by:
 - the piping (e.g. suction cross-section, pipe diameter, length of suction line)
 - the position of the reservoir
 - the viscosity of the hydraulic fluid
 - if fitted, a filter cartridge or check valve in the suction line (regularly check the level of soiling of the filter cartridge)
-



Only connect suitable hydraulic lines to the service and function ports.

CAUTION!**Wear and malfunctions**

The cleanliness of the hydraulic fluid has a considerable impact on the cleanliness and service life of the hydraulic system. Any contamination of the hydraulic fluid will lead to wear and malfunctions. In particular, contaminants, such as welding beads or metal cuttings in the hydraulic lines, may damage the axial piston unit.

- Absolute cleanliness is required.
 - The axial piston unit must be installed in a clean condition.
 - Make sure that all ports, hydraulic lines and add-on units (e.g. measuring equipment) are clean.
 - Make certain that no contaminants enter when sealing the ports.
 - Make certain that no detergents enter the hydraulic system.
 - Do not use any cotton waste or linty cloths for cleaning.
 - Do not use hemp as a sealant under any circumstances.
-

Installation

Notes on routing the lines

Observe the following notes when routing the suction and pressure lines.

- ▶ Make certain that the suction line (pipe or hose) is as short and straight as possible.
- ▶ The line cross section of the suction line is to be sized so that the minimum permissible pressure at the suction port and the maximum permissible pressure are not exceeded.
- ▶ On the suction line, make sure that all junctions are air-tight and that the pressure capability of all hoses meets specifications, including with respect to the external air pressure.
- ▶ With the pressure lines, make certain that the pipes, hoses and connecting elements are approved for the operating pressure range.



The ports and fixing threads are designed for the maximum pressure specified in the data sheet. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified application conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.

Procedure

To connect the axial piston unit to the hydraulic system:

1. Remove the threaded plugs at the ports at which the connections are to be made according to the hydraulic circuit diagram.
2. Only use clean hydraulic lines or rinse out the hydraulic system with a flushing unit before commissioning. Follow the instructions of the flushing unit manufacturer.
3. Connect the lines in accordance with the installation drawing and the machine or system circuit diagram. Make sure that all ports are piped up or plugged with suitable threaded plugs.



The installation drawing contains the dimensions for all connections and ports on the axial piston unit. Also observe the manuals provided by the manufacturers of the other hydraulic components when selecting the required tools.

4. Make certain that the union nuts on the fittings and flanges are tightened correctly (observe the manufacturer's tightening torques!). Mark all checked fittings using e.g. a permanent marker.
5. Make certain that the pipes and hose lines and every combination of connecting piece, coupling or connecting point with hoses or pipes have been inspected by a technically qualified person for safe working condition.

Connecting the line to the pressure connection

- ▶ If the tightening torque required for connecting the fittings used exceeds the tightening torque of the pressure connection (see Table 7), the pressure connection must be counterheld.
The maximum permissible tightening torque of the female thread (see Table 9) must not be exceeded.

Port overview

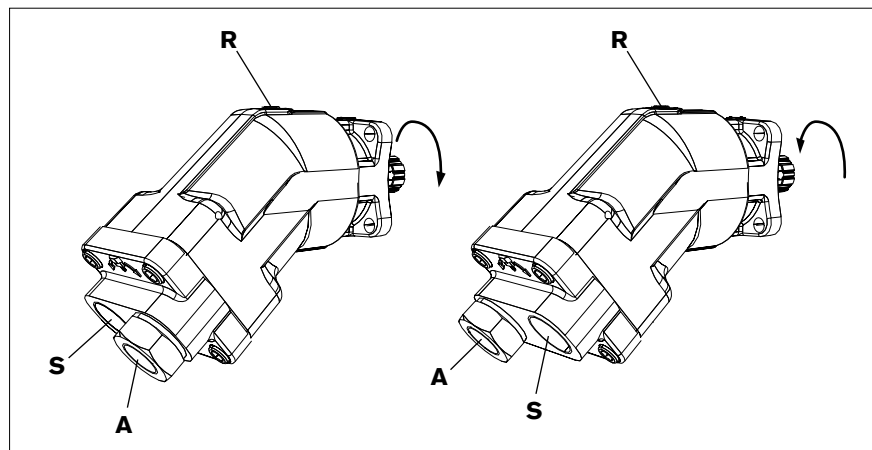


Fig. 13: Port overview A17FO/A17FNO Series 10

Table 8: Ports A17FO/A17FNO Series 10

Designation	Port for	Standard	Maximum pressure [bar] ¹⁾	State
A	Service line Fixing threads	DIN ISO 228	350 ²⁾	O
S	Suction	DIN ISO 228	2	O
R	Air bleed	DIN 3852 ³⁾	2	X ⁴⁾

¹⁾ Short term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring equipment and fittings.

²⁾ 300 bar for size 125 (A17FNO).

³⁾ The countersink may be deeper than specified in the standard.

⁴⁾ Only open port "R" for filling and air bleeding.

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Tightening torques

The following tightening torques apply:

- Female thread of the axial piston unit:
The maximum permissible tightening torque M_{Gmax} are maximum values of the female threads and must not be exceeded. For values, see the following table.
- Fittings:
Observe the manufacturer's instructions regarding the tightening torques of the fittings used.
- Fixing screws:
For fixing screws with metric ISO thread according to DIN 13 or thread according to ASME B1.1, we recommend checking the tightening torque individually according to VDI 2230.
- Threaded plugs:
For the metallic threaded plugs supplied with the axial piston unit, the required tightening torques of threaded plugs M_V apply. For values, see the following table.

Table 9: Tightening torques of the female threads and threaded plugs

Ports				
Standard	Thread size	Maximum permissible tightening torque of the female threads M_{Gmax}	Required tightening torque of the threaded plugs M_V	WAF hexagon socket for the threaded plugs
DIN 3852	M10 x 1	13 Nm	12 Nm	5 mm
DIN ISO 228	G1/2	200 Nm	–	–
	G3/4	330 Nm	–	–
	G1	480 Nm	–	–
	G1 1/4	720 Nm	–	–

Installation**Risk of mix-ups with threaded connections**

The axial piston units are used in application areas with metric as well as with Imperial systems of units.

Both the system of units as well as the size of female thread and threaded plug (e.g. threaded plug) must match.

Due to the limited options for visually detecting differences, there is a risk of mix-ups.

WARNING!**Risk of damage to persons and property!**

If a threaded plug which is of a different measurement system and size with respect to the female thread is pressurized, the threaded plug may loosen itself or even be ejected from the hole in a projectile-like manner.

This can result in serious injury and damage to equipment. Hydraulic fluid can be discharged from this leakage point.

- ▶ Use the drawings (installation drawing/data sheet) to determine the required threaded plug for each fitting.
 - ▶ Make certain that there are no mix-ups when installing fittings, fixing screws and threaded plugs.
 - ▶ For all female threads, use a threaded plug from the same system of units and of the correct size.
-

7 Commissioning

WARNING!**Danger while working in the danger zone of a machine or system!**

It is not permissible to work in the danger zone of a machine or system.

- ▶ The machine or system may only be commissioned if safe working is ensured.
 - ▶ Pay attention to and rectify potential danger sources before commissioning the machine or system.
 - ▶ Nobody may stand in the danger zone of the machine or system.
 - ▶ The emergency stop button for the machine or system must be within the operator's reach.
 - ▶ Always follow the instructions of the machine or system manufacturer during commissioning.
-

CAUTION!**Risk of damage to persons and property!**

Commissioning of the axial piston unit requires basic mechanical and hydraulic knowledge.

- ▶ Only qualified personnel (see chapter "2.3 Personnel qualifications") are authorized to commission the axial piston unit.
-

WARNING!**Risk of toxication and injury!**

Contact with hydraulic fluids may cause health damage (e.g. eye injury, skin damage, toxication upon inhalation).

- ▶ Always check the lines for wear and damage before each commissioning.
 - ▶ While performing these checks, wear safety gloves, safety glasses and suitable working clothes.
 - ▶ If hydraulic fluid should, nevertheless, come into contact with your eyes or penetrate your skin, consult a doctor immediately.
 - ▶ When working with hydraulic fluids, strictly observe the safety instructions provided by the hydraulic fluid manufacturer.
-

WARNING!**Fire hazard!**

Hydraulic fluid is easily flammable.

- ▶ Keep open flames and ignition sources away from the axial piston unit.
-

CAUTION!**Missing seals and connections lead to noncompliance with the protection class!**

Fluids and contaminants may penetrate and damage the product beyond repair.

- ▶ Prior to installation, make sure that all seals and connectors are tight.
-

7.1 First commissioning

CAUTION!



Risk of damage to the product!

Any contamination of the hydraulic fluid will lead to wear and malfunctions. In particular, contaminants, such as welding beads or metal cuttings in the hydraulic lines, may damage the axial piston unit.

- ▶ Ensure utmost cleanliness during commissioning.
- ▶ Make sure that no contaminants may penetrate when sealing the gauge ports.

CAUTION!



Risk of damage to the product!

If you commission the axial piston unit without hydraulic fluid or with insufficient hydraulic fluid, the axial piston unit could be damaged immediately, possibly beyond repair.

- ▶ When commissioning or recommissioning a machine or system, make sure that the case interior and the suction and service lines of the axial piston unit are filled with hydraulic fluid and remain filled during operation.



When commissioning the axial piston unit, observe the basic safety instructions and intended use provided in chapter "2 General safety instructions".

- ▶ Connect the pressure gauge to the measurement points provided for operating pressure, case pressure and suction pressure to allow the technical data to be checked during initial operation.

7.1.1 Filling the axial piston unit

You will require an approved hydraulic fluid:

The machine or system manufacturer can provide you with exact details of the hydraulic fluid. Details on minimum requirements for mineral-oil based hydraulic fluids and environmentally acceptable hydraulic fluids for the axial piston unit are available in the Rexroth publications RE 90220 and RE 90221, respectively.

To ensure the functional reliability of the axial piston unit, at least cleanliness level 20/18/15 according to ISO 4406 is necessary for the hydraulic fluid. At very high hydraulic fluid temperatures (+90 °C to maximum +115 °C), a cleanliness level of at least 19/17/14 according to ISO 4406 is necessary. For permissible temperatures, see the data sheet.

CAUTION!



Risk of damage due to lack of lubrication!

Sufficient lubrication must be guaranteed to prevent damage to the axial piston unit.

- ▶ Make sure that the case is fully filled with hydraulic fluid for commissioning and operation (e.g. no air intrusion).
- ▶ Make sure that the suction line is always filled with hydraulic fluid during commissioning and operation.



The axial piston unit should be filled with a filling unit (10 µm filter grade). The axial piston unit must not be operated while it is being filled with the filling unit.

CAUTION!**Danger of environmental contamination!**

The discharge or spillage of hydraulic fluid while filling the axial piston unit can lead to environmental pollution and contamination of the groundwater.

- ▶ When filling and changing the hydraulic fluid, always place a drip tray under the axial piston unit.
- ▶ Observe the information in the safety data sheet for the hydraulic fluid and the specifications provided by the system manufacturer.

1. Fill and air bleed the axial piston unit via the appropriate ports, see chapter "6.3 Installation position". The hydraulic lines of the system must also be filled.
2. Test the direction of rotation of the engine. To do this, rotate the engine briefly at the lowest rotational speed (inching). Make sure that the direction of rotation of the axial piston unit agrees with the direction of rotation of the power take-off, e.g. PTO turns clockwise, direction of rotation of the pump drive, viewed onto the drive shaft is counter-clockwise, see chapter "6.4.2 Direction of rotation and changing direction".
3. Operate the axial piston pump at a lower speed (starter speed for internal combustion engines or inching operation for electric motors) until the pump system is completely filled and bled.
4. Make certain that all ports are either piped up or plugged according to the general circuit diagram.
5. If a shut-off valve is used in the suction and/or case drain line, make sure that the axial piston unit is not operated with the shut-off valves closed.

7.1.2 Testing the hydraulic fluid supply

The axial piston unit must always have a sufficient supply of hydraulic fluid. For this reason, the supply of hydraulic fluid must be ensured at the start of the commissioning process.

When you test the hydraulic fluid supply, constantly monitor the noise development and check the hydraulic fluid level in the reservoir. If the axial piston unit becomes louder (cavitation), this indicates that the axial piston unit is not adequately supplied with hydraulic fluid.

Notes on troubleshooting can be found in chapter "14 Troubleshooting".

To test the hydraulic fluid supply:

1. Allow the engine to run at the lowest speed. The axial piston unit must be operated without load. Pay attention to leakage and noise.
2. Increase the load and check whether the operating pressure rises as expected.
3. Check the suction pressure at port "S" of the axial piston pump at nominal speed and maximum flow. Refer to data sheet RE 91510 and RE 91520 for the permissible value.

Commissioning

7.1.3 Performing functional test

WARNING!**Risk of injury in case of incorrectly connected machine or system!**

Any change of the connections will lead to malfunctions (e.g. lift instead of lower) and thus represents a corresponding danger to persons and equipment.

- ▶ When connecting hydraulic components, observe the specified piping according to the hydraulic circuit diagram of the machine or system manufacturer.

Once you have tested the hydraulic fluid supply, you must perform a functional test on the machine or system. The functional test should be performed according to the instructions of the machine or system manufacturer.

The axial piston unit is checked for functional capability before delivery according to the technical data. During commissioning, it must be ensured that the axial piston unit was installed as intended in the machine or system.

- ▶ In particular, check whether the axial piston unit builds up pressure after the engine is started and that the case pressure does not rise to an impermissible level.
- ▶ If necessary, remove the pressure gauge and plug the ports so that they are pressure-proof.

7.1.4 Performing flushing cycle

In order to remove foreign particles from the system, Rexroth recommends a flushing cycle for the entire system.



The flushing cycle must be performed with an additional flushing unit. Follow the instructions of the flushing unit's manufacturer for the exact procedure during the flushing cycle. To avoid internal contamination, the axial piston unit must not be included in the flushing cycle.

7.2 Recommissioning after standstill

Depending on the installation conditions and ambient conditions, changes may occur in the system which make recommissioning necessary.

Among others, the following criteria may make recommissioning necessary:

- Air in the hydraulic system
 - Water in the hydraulic system
 - Aged hydraulic fluid
 - Other contamination
- ▶ Before recommissioning, proceed as described in chapter "7.1 First commissioning".

7.3 Running-in phase

The bearings and sliding surfaces are subject to a running-in phase. The increased friction at the start of the running-in phase results in increased heat development which decreases with increasing operating hours. The volumetric and mechanical-hydraulic efficiency increases as well through the conclusion of the running-in phase of approx. 10 operating hours.

CAUTION!**Risk of damage by insufficient viscosity!**

Increased temperature of the hydraulic fluid can cause the viscosity to move out of the permissible range.

- ▶ Monitor the operating temperature during the running-in phase.
 - ▶ Reduce the loading (pressure, rpm) of the axial piston unit if impermissible operating temperatures and/or viscosities occur.
-

8 Operation

The product is a component which requires no settings or changes during operation. For this reason, this chapter of the manual does not contain any information on adjustment options. Use the product only within the performance range provided in the technical data. The machine or system manufacturer is responsible for the proper project planning of the hydraulic system and its control.

9 Maintenance and repair

9.1 Cleaning and care

CAUTION!

Damage to the surface caused by solvents and aggressive detergents!

Aggressive detergents may damage the seals on the axial piston unit and cause them to age faster.

- ▶ Never use solvents or aggressive detergents.

CAUTION!

Damage to the hydraulic system and the seals!

The water pressure of a power washer could damage the seals of the axial piston unit.

- ▶ Do not point a power washer at sensitive components, such as e.g. shaft seal ring.

For cleaning and care of the axial piston unit, observe the following:

- ▶ Plug all openings with suitable protective caps/devices.
- ▶ Check whether all seals and fittings on the connections are securely seated to ensure that no moisture can penetrate into the axial piston unit during cleaning.
- ▶ Use only water and, if necessary, a mild detergent to clean the axial piston unit.

9.2 Inspection

In order to enable long and reliable operation of the axial piston unit, Rexroth recommends testing the hydraulic system and axial piston unit on a regular basis and documenting the following operating conditions:

Table 10: Inspection schedule

Task to be carried out		Interval
Hydraulic system	Check level of hydraulic fluid in the reservoir.	Daily
	Check the operating temperature (comparable load conditions) at the case drain port and in the reservoir.	Weekly
	Perform a hydraulic fluid analysis Viscosity, aging, contamination	Yearly or every 2000 h (which ever occurs first)
Axial piston unit	Check axial piston unit for leakage. Early detection of hydraulic fluid loss can help to identify and eliminate faults on the machine or system. For this reason, Rexroth recommends that the axial piston unit and system always be kept in a clean condition.	Daily
	Check axial piston unit for noise development.	Daily
	Check fasteners for tight seating. All fasteners have to be checked when the system is switched off, non-pressurized and cooled down.	Monthly

9.2.1 Checking the inspection hole

CAUTION!**Risk of property damage!**

If hydraulic fluid leaks from the inspection hole, both the axial piston unit and the power take-off may drain and be damaged.

- Check the inspection hole daily for leakage.

- Check the inspection hole (1) of the axial piston unit daily for leakage.

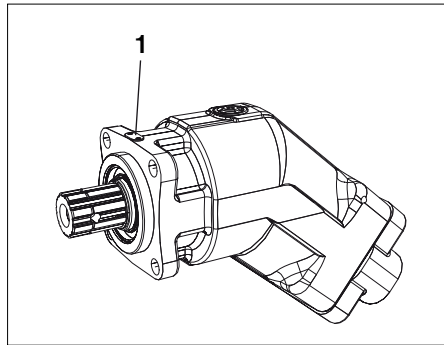


Fig. 14: Inspection hole



The inspection hole is protected against external contamination with a cover. The cover must not be removed.

- If hydraulic fluid leaks from the inspection hole, at least one of the two shaft seal rings is leaky. Both shaft seal rings of the axial piston unit must be replaced.

In the event of questions regarding repair and spare parts, contact your responsible Rexroth Service partner or the service department of the manufacture's plant for the axial piston unit, see chapter "9.5 Spare parts" for further information.

9.3 Maintenance

The axial piston unit is low maintenance when used as intended.

The service life of the axial piston unit is heavily dependent on the quality of the hydraulic fluid. For this reason, we recommend changing the hydraulic fluid at least once per year or every 2000 operating hours (which ever occurs first) or having it analyzed by the hydraulic fluid manufacturer or a laboratory to determine its suitability for further use.

The service life of the axial piston unit is limited by the service life of the bearings fitted. The service life can be requested from the responsible Rexroth Service partner, see "9.5 Spare parts" for address. Based on these details, a maintenance period is to be determined by the system manufacturer for the replacement of the bearings and included in the maintenance schedule of the hydraulic system.

Maintenance and repair

9.4 Repair

Rexroth offers a comprehensive range of services for the repair of Rexroth axial piston units.

Repairs to the axial piston unit may only be performed by authorized, skilled and instructed personnel.

- Only use genuine spare parts from Rexroth for repairing the Rexroth axial piston units.

Tested and pre-installed original Rexroth assembly groups allow for successful repair requiring only little time.

9.5 Spare parts

CAUTION!**Personal injury and property damage due to faulty spare parts!**

Spare parts that do not meet the technical requirements specified by Rexroth may cause personal injury or property damage.

- Use only original spare parts from Rexroth.

The spare parts lists for axial piston units are order specific. When ordering spare parts, quote the material and serial number of the axial piston unit as well as the material numbers of the spare parts.

Address all questions regarding spare parts to your responsible Rexroth Service partner or the service department of the manufacture's plant for the axial piston unit.

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10 Decommissioning

The axial piston unit is a component that does not require decommissioning. For this reason, this chapter of the manual does not contain any information.

For details about how to remove or replace your axial piston unit, please refer to chapter "11 Removal and replacement".

11 Removal and replacement

11.1 Required tools

Removal can be performed using standard tools. No special tools are necessary.

11.2 Preparing for removal

WARNING!**Risk of injuries due to remove under pressure and voltage!**

If you do not switch off the pressure and power supply before removing the product, you may get injured or the device or system components may be damaged.

- Make certain that the relevant system components are not under pressure or voltage.

-
1. Decommission the entire system as described in the overall manual for the machine or system.
 2. Protect the complete system against being energized.
 3. Relieve the hydraulic system according to the instructions of the machine or system manufacturer.

11.3 Removing the axial piston unit

Proceed as follows to remove the axial piston unit:

1. Make sure that the hydraulic system is non-pressurized.
2. Check whether the axial piston unit has cooled down far enough so that it can be removed without danger.
3. For below-reservoir installation, before removing the axial piston unit from the complete system, seal the connection to the reservoir or drain the reservoir.
4. Place a drip tray under the axial piston unit to collect any hydraulic fluid that may escape.

Removal and replacement**CAUTION!****Danger of environmental contamination!**

The discharge or spillage of hydraulic fluid while removing the axial piston unit can lead to environmental pollution and contamination of the groundwater.

- ▶ When draining the hydraulic fluid, always place a drip tray under the axial piston unit.
- ▶ Observe the information in the safety data sheet for the hydraulic fluid and the specifications provided by the system manufacturer.

5. To do this, loosen the lines and collect the escaping hydraulic fluid in the drip tray.
6. Remove the axial piston unit. Use a suitable lifting device.
7. Completely empty the axial piston unit.
8. Plug all openings.

11.4 Preparing the components for storage or further use

- ▶ Proceed as described in section "5.2 Storing the axial piston unit".

12 Disposal

Observe the following points when disposing of the axial piston unit:

1. Completely empty the axial piston unit.
2. Dispose of the hydraulic fluid according to the national regulations of your country.
3. Remove the axial piston unit into its individual parts and properly recycle these parts.
4. Separate parts by:
 - Cast parts
 - Steel
 - Aluminum
 - Non-ferrous metal
 - Electronic waste
 - Plastic
 - Seals.

12.1 Environmental protection

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

- ▶ Therefore, dispose of the axial piston unit, the hydraulic fluid and the packaging material in accordance with the currently applicable regulations in your country.
- ▶ Dispose of residual hydraulic fluid in accordance with the applicable safety data sheets for these hydraulic fluids.

13 Extension and conversion

Do not convert the axial piston unit. You are only authorized to change the pressure connection on the service line ports according to the instructions in chapter "6.4.2 Direction of rotation and changing the direction of rotation".



The Rexroth warranty only applies to the delivered configuration. In case of extensions or conversions, the warranty will become void.
Exception: Converting the pressure connection

14 Troubleshooting

The following table may assist you in troubleshooting. The table makes no claim for completeness.

In practical use, problems which are not listed here may also occur.

14.1 How to proceed for troubleshooting

- ▶ Always act systematically and targeted, even under pressure of time. Random and imprudent removal and readjustment of settings could result in the inability to ascertain the original error cause.
- ▶ First obtain a general overview of how your product works in conjunction with the entire system.
- ▶ Try to determine whether the product worked properly in conjunction with the entire system before the error occurred.
- ▶ Try to determine any changes of the entire system in which the product is integrated.
 - Were there any changes to the product's application conditions or operating range?
 - Were there any changes or repair works on the complete system (machine / system, electrics, control) or on the product? If yes, which?
 - Has the hydraulic fluid been changed?
 - Was the product or machine operated as intended?
 - How did the malfunction appear?
- ▶ Try to get a clear idea of the error cause. Directly ask the (machine) operator.
- ▶ If you cannot rectify the error, contact one of the contact addresses which can be found under:
www.boschrexroth.com/addresses.

14.2 Malfunction table

Table 11: Malfunction table - fixed pump

Malfunction	Possible cause	Remedy
Unusual noises	Drive speed too high.	Machine or system manufacturer.
	Wrong direction of rotation.	For how to convert the pressure connection, see chapter "6.4.2 Direction of rotation and changing the direction of rotation".
	Insufficient suction conditions, e.g. air in the suction line, insufficient diameter of the suction line, viscosity of the hydraulic fluid too high, suction height too high, suction pressure too low, contaminants in the suction line.	Machine or system manufacturer (e.g. optimize inlet conditions, use suitable hydraulic fluid).
		Completely air bleed the axial piston unit, fill the suction line with hydraulic fluid.
		Remove contaminants from the suction line.
	Improper fixing of the axial piston unit.	Check fixing of the axial piston unit according to the specifications of the machine or system manufacturer. Observe tightening torques.
	Improper fixing of the attachment parts, e.g. coupling and hydraulic lines.	Fix attachment parts according to the information provided by the coupling or fitting manufacturer.
No or insufficient flow	Mechanical damage to the axial piston unit (e.g. bearing damage).	Exchange axial piston unit, contact Rexroth Service.
	Faulty mechanical drive (e.g. defective coupling).	Machine or system manufacturer.
	Drive speed too low.	Machine or system manufacturer.
	Insufficient suction conditions, e.g. air in the suction line, insufficient diameter of the suction line, viscosity of the hydraulic fluid too high, suction height too high, suction pressure too low, contaminants in the suction line.	Machine or system manufacturer (e.g. optimize inlet conditions, use suitable hydraulic fluid).
		Completely air bleed the axial piston unit, fill the suction line with hydraulic fluid.
		Remove contaminants from the suction line.
	Hydraulic fluid not in optimum viscosity range.	Use suitable hydraulic fluid (machine or system manufacturer).
	Wear of axial piston unit.	Exchange axial piston unit, contact Rexroth Service.
No or insufficient pressure	Mechanical damage to the axial piston unit.	Exchange axial piston unit, contact Rexroth Service.
	Faulty mechanical drive (e.g. defective coupling).	Machine or system manufacturer.
	Drive power too low.	Machine or system manufacturer.
	Insufficient suction conditions, e.g. air in the suction line, insufficient diameter of the suction line, viscosity of the hydraulic fluid too high, suction height too high, suction pressure too low, contaminants in the suction line.	Machine or system manufacturer (e.g. optimize inlet conditions, use suitable hydraulic fluid).
		Completely air bleed the axial piston unit, fill the suction line with hydraulic fluid.
		Remove contaminants from the suction line.
	Hydraulic fluid not in optimum viscosity range.	Use suitable hydraulic fluid (machine or system manufacturer).
	Wear of axial piston unit.	Exchange axial piston unit, contact Rexroth Service.
	Mechanical damage to the axial piston unit (e.g. bearing damage).	Exchange axial piston unit, contact Rexroth Service.
	Output unit defective (e.g. hydraulic motor or cylinder).	Machine or system manufacturer.

Table 11: Malfunction table - fixed pump

Malfunction	Possible cause	Remedy
Pressure/flow fluctuations	Axial piston unit not or insufficiently air bled.	Completely air bleed axial piston unit.
	Insufficient suction conditions, e.g. air in the suction line, insufficient diameter of the suction line, viscosity of the hydraulic fluid too high, suction height too high, suction pressure too low, contaminants in the suction line.	Machine or system manufacturer (e.g. optimize inlet conditions, use suitable hydraulic fluid).
		Completely air bleed the axial piston unit, fill the suction line with hydraulic fluid.
		Remove contaminants from the suction line.
Excessive hydraulic fluid and case temperature	Excessive inlet temperature at the axial piston unit.	Machine or system manufacturer: inspect system, e.g. malfunction of the cooler, insufficient hydraulic fluid in the reservoir.
	Wear of axial piston unit.	Exchange axial piston unit, contact Rexroth Service.
Instability/vibrations	Setpoint value not stable.	Machine or system manufacturer.

15 Technical data

The technical data of your axial piston unit can be found in data sheet RE 91510 (A17FNO) and RE 91520 (A17FO).

The data sheet can be found on the internet at

www.boschrexroth.com/axial-piston-pumps

The technical data of your axial piston unit can be found in the order confirmation.

16 Appendix

16.1 Address directory

For the addresses of foreign subsidiaries, please refer to

www.boschrexroth.com/addresses

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