

Diaphragm type accumulator

Type HAD...-1X/ and HAD...-2X/



CE

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The cover shows an example configuration. The product supplied may therefore differ from the figure shown.

The original operating instructions were prepared in German.

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1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- Diaphragm type accumulator type HAD...-1X/ and HAD...-2X/

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

This documentation contains important information on how to transport, install, commission, maintain and dismantle the diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/ safely and correctly and how to rectify simple faults yourself.

- Read this documentation in full and in particular chapter 2 "Safety instructions" and chapter 3 "General information on damage to property and damage to the product", before working with the diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/.

1.2 Required and amending documentation

- The product must not be commissioned until you have been provided with the documentation marked with the book symbol  and you have understood and observed it.

Table 1: Required and amending documentation

Title	Document number	Document type
 Diaphragm type accumulator, type HAD, component series 1X and 2X Contains technical data, operating conditions, performance limits and project planning information for diaphragm type accumulators of type HAD...-1X/ and HAD...-2X/	50150	Data sheet
Charging and test device for hydro-pneumatic accumulators Describes the set-up and use of a charging and test device for hydro-pneumatic accumulators	50144-B	Operating instructions
Hydraulic fluids based on mineral oils and related hydrocarbons Describes the requirements on hydraulic fluids on mineral oil basis and related hydrocarbons for operation with Rexroth hydraulic components and helps you to select a hydraulic fluid for your hydraulic system	90220	Data sheet
Environmentally compatible hydraulic fluids Contains application notes and requirements for Rexroth hydraulic products	90221	Data sheet
Flame-resistant, water-free hydraulic fluids (HFDR/HFDU) Contains application notes and requirements for Rexroth hydraulic products	90222	Data sheet
Flame-resistant hydraulic fluids – containing water (HFAE, HFAS, HFB, HFC) Contains application notes and requirements for Rexroth hydraulic products	90223	Data sheet
General product information on hydraulic products Contains general information on hydraulic products	07008	Operating instructions

Title	Document number	Document type
Assembly, commissioning and maintenance of hydraulic systems Contains general information on the assembly, commissioning and maintenance of hydraulic systems	07900	Data sheet

The membrane accumulator, type HAD...-1X/ or HAD...-2X/ is a system component.

- ▶ Also observe the instructions for the other system components and the system manufacturer’s documentation.

1.3 Representation of information

Uniform safety instructions, symbols, terms and abbreviations are used so that you can quickly and safely work with your product using this documentation. For a better understanding, they are explained in the following sections.

1.3.1 Safety instructions

In this documentation, safety instructions are contained in chapter 2.6 "Product- and technology-dependent safety instructions" and in chapter 3 "General information on damage to property and damage to the product" and wherever a sequence of actions or instructions are explained which bear the danger of personal injury or damage to property. The measures described for hazard avoidance must be observed.

Safety instructions are structured as follows:

 **SIGNAL WORD**

Type and source of danger
Consequences in case of non-compliance

- ▶ Hazard avoidance measures
- ▶ <Enumeration>

- **Warning sign:** Draws attention to the danger
- **Signal word:** Identifies the degree of danger
- **Type and source of danger:** Specifies the type and source of danger
- **Consequences:** Describes the consequences of non-compliance
- **Precaution:** Specifies how the danger can be prevented

Table 2: Risk classes according to ANSI Z535.6-2006

Warning sign, signal word	Meaning
 DANGER	Indicates a dangerous situation which will cause death or severe injury if not avoided.
 WARNING	Indicates a dangerous situation which may cause death or severe injury if not avoided.
 CAUTION	Indicates a dangerous situation which may cause minor to moderate (personal) injury if not avoided.
NOTICE	Damage to property: The product or the environment could be damaged.

1.3.2 Symbols

The following symbols indicate notes which are not safety-relevant but increase the comprehensibility of the documentation.

Table 3: Meaning of the symbols

Symbol	Meaning
	If this information is not observed, the product cannot be optimally used and/or operated.
►	Individual, independent action
1. 2. 3.	Numbered instruction: The numbers indicate that the actions must be carried out consecutively.

1.3.3 Designations

The following designations are used in this documentation:

Table 4: Designations

Designation	Meaning
P0	Gas filling pressure
PS	Maximum admissible pressure
TS	Admissible min./max. temperature

1.3.4 Abbreviations

The following abbreviations are used in this documentation:

Table 5: Abbreviations

Abbreviation	Meaning
Type HAD...-1X/ and HAD...-2X/	Diaphragm type accumulator HAD, component series 1X and 2X
RE	R exroth document in the E nglish language

2 Safety instructions

2.1 About this chapter

The diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/ has been manufactured in accordance with the generally recognized rules of technology. However, there is still the danger of personal injury and damage to property if you do not observe this chapter and the safety instructions in this documentation.

- ▶ Read this documentation thoroughly and completely before working with the diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/.
- ▶ Keep this documentation in a location where it is accessible to all users at all times.
- ▶ Only pass on the diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/ to third parties together with the required documentation.

2.2 Intended use

Diaphragm type accumulators are hydraulic components intended for the installation into hydraulic drive systems for the purposes of energy storage, shock and vibration absorption, and leakage oil or volume compensation. Diaphragm type accumulators are pressure equipment in the sense of the Pressure Equipment Directive 2014/68/EU.

The diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/ is exclusively intended to be installed in a machine or system or to be combined with other components to form a machine or system.

Diaphragm type accumulators must not be installed in closed systems.

The diaphragm type accumulator may only be commissioned if it has been integrated into the machine/system for which it is intended and after it was confirmed that the machine/system complies with the provisions of the Machinery Directive, the Pressure Equipment Directive and other locally applicable provisions. The operating data specified in data sheet 50150, such as the admissible minimum/maximum temperature TS and the maximum admissible pressure PS, must not be exceeded. Moreover, the gas filling pressure P0 intended in the hydraulic circuit diagram or operating instructions of the system must be adhered to.

The diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/ is a piece of technical equipment and is not intended for private use.

Intended use includes having read and understood this documentation, in particular, chapters 2 "Safety instructions" and 3 "General information on damage to property and damage to the product".

2.3 Improper use

Any use deviating from the intended use is improper and thus not admissible. Bosch Rexroth AG does not assume any liability for damage caused by improper use. The user assumes all risks involved with improper use.

Improper use of the diaphragm type accumulator includes:

- Use outside the admissible operating data approved in data sheet 50150, e.g. exceeding the maximum permissible pressure PS specified in the data sheet and noted on the device
- Charging the diaphragm type accumulator with a gas other than 99.99 vol.% nitrogen
- Operation of the diaphragm type accumulator using group 1 hydraulic fluids (potentially explosive, inflammable, fire-accelerating, toxic) or corrosive fluids
- Performing welding or soldering works at the diaphragm type accumulator
- Mechanical processing of the diaphragm type accumulator
- Installation or attachment of spare parts not approved by the manufacturer

2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of mechanics and hydraulics as well as knowledge of the appropriate technical terms. For transporting and handling the product, additional knowledge of how to handle lifting gear and the necessary attachment devices is required. In order to ensure safe use, these activities may only be carried out by an expert in the respective field or an instructed person under the direction and supervision of an expert.

Experts are those who can recognize potential dangers and apply 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 undertaken. An expert must observe the relevant specific professional rules and have the necessary hydraulic expert knowledge.

Hydraulic expert knowledge means, among other things:

- reading and completely understanding hydraulic circuit drawings,
- in particular, completely understanding the relationships regarding the safety equipment, and
- having knowledge of the function and set-up of hydraulic components.

The expert has to have successfully completed training for qualified persons for pressure containers and have regularly attended further training courses.



Bosch Rexroth offers training in specific fields. Please find an overview of the training contents on the internet at: www.boschrexroth.com/de/de/academy/.

2.5 General safety instructions

- Observe the valid regulations on accident prevention and environmental protection.
- Observe the safety regulations and provisions of the country in which the product is used/applied.
- Only use Rexroth products in technically perfect condition.
- Observe all notes on the product.
- Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to react.
- Only use spare parts approved by the manufacturer in order to exclude any hazard to persons due to unsuitable spare parts.
- Observe the technical data and environmental conditions specified in the product documentation and on the embossing on the container.
- The installation or use of inappropriate products in safety-relevant applications could result in unintended operating conditions during use which in turn could cause personal injuries and/or damage to property. Therefore, only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product, or if the safe suitability of the product in the application is confirmed by a separate conformity assessment procedure for the end product, e.g. in explosion-protected areas or in safety-related parts of control systems (functional safety).
- Do not commission the product until you can be sure that the end product (for example a machine/system) into which the Rexroth products are installed complies with the country-specific provisions, safety regulations and standards of the application.

2.6 Product- and technology-dependent safety instructions

The following safety instructions apply to chapters 6 to 14.



WARNING

Pressurized diaphragm type accumulator/pressurized machine/system!

Danger to life, risk of injury, severe injury when working at machines/systems that have not been stopped! Damage to property!

- ▶ Ensure that all relevant components of the hydraulic system are depressurized. Follow the instructions of the machine/system manufacturer.
- ▶ Do not disconnect line connections, connections or components as long as the hydraulic system is pressurized.
- ▶ Secure the machine/system against restarting.

Leakage of (pressurized) hydraulic fluid and oil mist!

Danger to life! Risk of injury! Explosion hazard, risk of fire, health hazard, environmental pollution! Damage to property!

- ▶ Switch the machine/system off immediately (emergency off switch).
- ▶ Identify and remedy the leakage.
- ▶ Never try to stop or seal the leakage or the oil jet using a cloth.
- ▶ Avoid direct contact with the leaking hydraulic fluid.
- ▶ Use your personal protective equipment, e.g. safety goggles.
- ▶ Keep open fire and ignition sources away from the diaphragm type accumulator.
- ▶ When dealing with hydraulic fluids, you must be sure to observe the information from the hydraulic fluid manufacturer.

Bursting of the diaphragm type accumulator due to welding, soldering or other mechanical work!

Danger to life! Danger of bursting! Damage to property!

- ▶ Do not carry out any mechanical works such as welding or soldering works on the diaphragm type accumulator.

Loud hissing when gas is drained!

Danger of hearing damage!

- ▶ Drain the gas slowly.

Uncontrolled release of a significant amount of gas!

Danger to life! Risk of suffocation!

- ▶ Make sure that the workplace is sufficiently ventilated.
- ▶ Always use a suitable charging and test device when checking the gas filling pressure.

**CAUTION****Hot/cold surfaces at the diaphragm type accumulator!**

Risk of burning! Danger of frostbite!

The diaphragm type accumulator may considerably heat up/cool down during operation.

- ▶ Only touch the surfaces of the diaphragm type accumulator with heat-/cold-resistant protective clothing, e.g. gloves, or do not work at hot/cold surfaces.
- ▶ Allow the diaphragm type accumulator to cool down/heat up sufficiently before touching it.
- ▶ Observe the protective measures of the system manufacturer.

Contact with hydraulic fluid!

Health hazard/impairment of health, e.g. eye injuries, skin lesions, poisoning due to inhalation!

- ▶ Avoid contact with hydraulic fluids.
- ▶ When dealing with hydraulic fluids, you must imperatively observe the safety instructions of the hydraulic fluid manufacturer.
- ▶ Use your personal protective equipment, e.g. safety goggles.
- ▶ If, however, hydraulic fluid comes into contact with the eyes, enters the bloodstream or is swallowed, consult a doctor immediately.

Slip hazard due to oily surfaces!

Risk of injury!

- ▶ Protect and mark the danger zone.
- ▶ Immediately remove leaked hydraulic fluid.
- ▶ Use an oil binding agent in order to bind the leaked hydraulic fluid.
- ▶ Remove and dispose of the contaminated oil binding agent, see chapter 12 "Disposal".
- ▶ Wear the protective equipment, e.g. safety shoes, prescribed for your activity.

2.7 Personal protective equipment

During operation and maintenance work as well as during installation and removal of the diaphragm type accumulator, you must always wear the following personal protective equipment:

- Heat- or cold-resistant protective gloves
- Ear protection
- Safety shoes
- Perfectly fitting safety goggles
- Protective helmet

2.8 Obligations of the machine end-user

The diaphragm type accumulator is supplied ex works with a black coating. The coating meets the salt spray test of at least 240 hours according to ISO 9227. The machine end-user is responsible for assuring sufficient corrosion protection corresponding to the environmental conditions and requirements.

In order to ensure safety when handling the diaphragm type accumulator and its components, the machine end-user of the system must:

- ensure that the diaphragm type accumulator and its components are used as intended, as described in chapter 2.2 "Intended use".
- instruct the operating personnel regularly in all items of the operating instructions and make sure that they are observed.
- ensure compliance with the instructions on occupational safety and with the operating instructions.
- ensure compliance with the operating data specified in the embossing on the tank of the diaphragm type accumulator, such as the admissible minimum/maximum temperature TS and the maximum admissible pressure PS, as well as compliance with the gas filling pressure P0 specified in the hydraulic circuit diagram or operating instructions for the system.

The operation of installations, systems and machines basically requires the implementation of a holistic IT security concept which is state-of-the-art in terms of technology. Accordingly, Rexroth products and their properties have to be considered as components of installations, systems and machines for their holistic IT security concept.

Unless otherwise documented, Rexroth products are designed for operation in local, physically and logically secured networks with access restricted to authorized persons, and which are not classified according to IEC 62443-4-2.

3 General information on damage to property and damage to the product

The following information applies to chapters 6 to 14:

NOTICE

Danger due to improper handling!

Damage to property!

- ▶ Do not expose the diaphragm type accumulator to any inadmissible mechanical load.
- ▶ Do not place/put any objects on top of the diaphragm type accumulator.
- ▶ Never use the diaphragm type accumulator as a handle or step.
- ▶ Do not apply further loads/forces.
- ▶ Leave the protective covers (e.g. cover cap on the gas port, protective cap on the hydraulic fluid connection) on the diaphragm type accumulator until shortly before connecting the lines.

Contamination of the hydraulic fluid!

Early wear and malfunctions!

- ▶ It is imperative that the working environment at the site of installation is free of dust and foreign substances in order to prevent foreign particles (e.g. welding beads or metal chips) from getting into the hydraulic lines and causing wear or malfunctions at the diaphragm type accumulator. The diaphragm type accumulator must be protected from dirt during installation.
- ▶ Make sure that all connections, hydraulic lines and attachment parts (e.g. measuring devices) are clean and free of chips.
- ▶ For removing lubricants or any other contamination, use industrial residue-free wipes.
- ▶ No contamination must enter when closing the connections.
- ▶ Before commissioning, ensure that all hydraulic connections are tight and that all seals and caps of the plug-in connections are correctly installed and undamaged in order to prevent fluids and foreign particles from penetrating the diaphragm type accumulator.

Environmental pollution caused by incorrect disposal!

Environmental pollution! Damage to property!

- ▶ Dispose of the diaphragm type accumulator, the hydraulic fluid and the packaging in accordance with the applicable national regulations in your country.
- ▶ Dispose of the hydraulic fluid in accordance with the valid safety data sheet for the hydraulic fluid.

NOTICE

Leaking or spilled hydraulic fluid!

Environmental pollution and contamination of the ground water!

- ▶ Immediately remedy possible leakage.
- ▶ If hydraulic fluid is spilled, use an oil binding agent.
- ▶ Observe the information in the safety data sheet for the hydraulic fluid and the system manufacturer's provisions.



The warranty only applies to the delivered configuration. The claim to warranty expires if the product is assembled, commissioned and operated incorrectly, not used as intended and/or handled improperly.

4 Scope of delivery

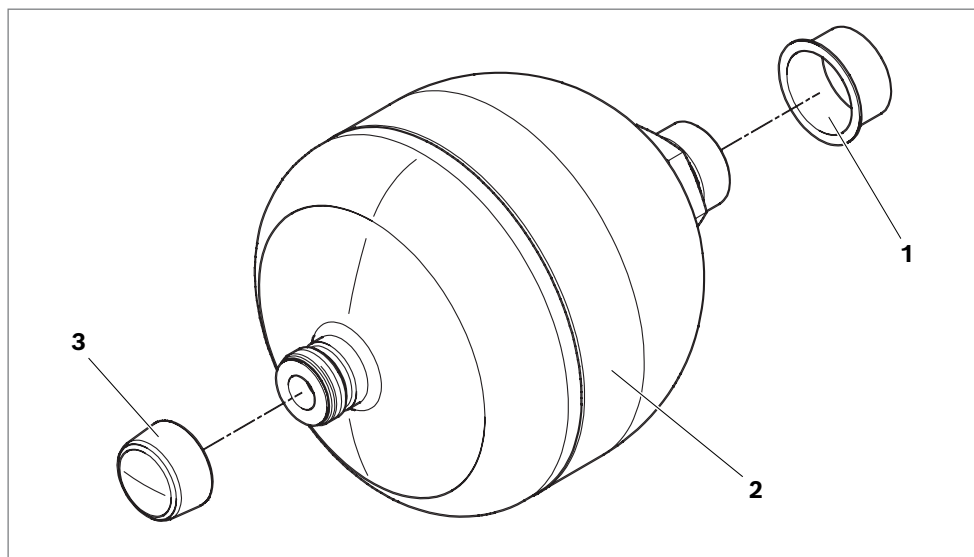


Fig. 1: Scope of delivery for diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/

- | | |
|---|-------------------------------------|
| 1 Protective cap on the hydraulic fluid connection | 2 Diaphragm type accumulator |
| | 3 Cover cap on the gas port |

The scope of delivery includes:

- 1 diaphragm type accumulator, type HAD...-1X/ or HAD...-2X/ (2)
- 1 set of operating instructions in German and English
- 1 declaration of conformity (only for diaphragm type accumulators having a capacity of more than 1l)

Upon delivery, the following parts are also mounted:

- Cover cap on the gas port (1)
- Protective cap on the hydraulic fluid connection (3)

The diaphragm type accumulator is delivered primed.

5 Product information

5.1 Product description

Diaphragm type accumulators are intended for use in hydraulic systems.

They are used for energy storage, shock and vibration absorption, and leakage oil compensation or volume compensation.

The high compressibility of gases is used for the diaphragm type accumulator.

Diaphragm type accumulators of type HAD...-1X/ and HAD...-2X/ basically comprise the following components:

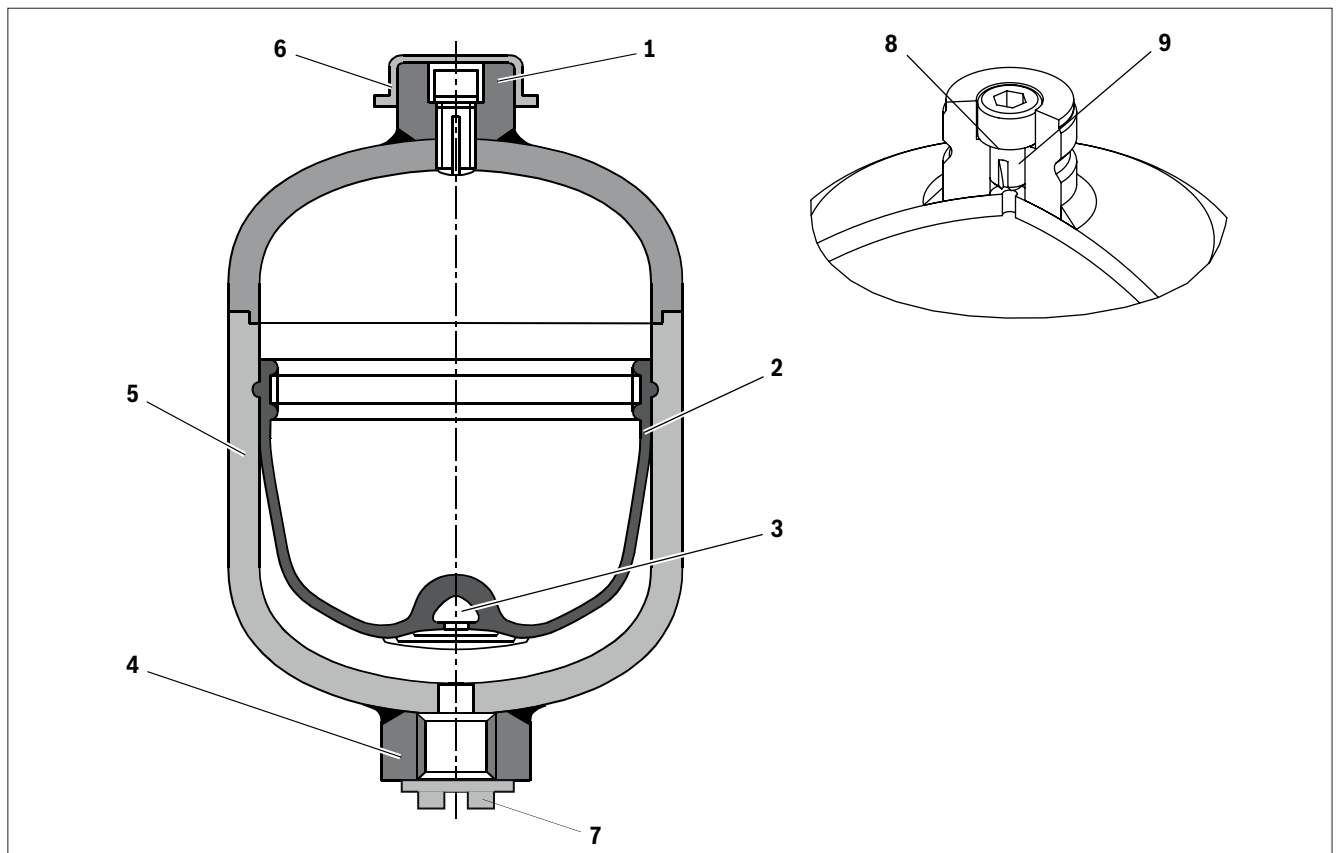


Fig. 2: Set-up of the diaphragm type accumulator

- | | |
|-------------------------------------|---|
| 1 Gas port | 7 Protective cap on the hydraulic fluid connection |
| 2 Diaphragm | 8 Seal ring (below the gas filling screw) |
| 3 Closing button | 9 Gas filling screw with bleeding groove |
| 4 Hydraulic fluid connection | |
| 5 Tank | |
| 6 Cover cap on the gas port | |

Diaphragm type accumulators consist of a pressure-resistant vessel **(5)** made of high-tensile steel which most commonly has a spherical or cylindrical form. In the interior of the tank, the hydro-pneumatic accumulator is separated into a gas side and a fluid side by an elastic diaphragm **(2)** made of a flexible material (elastomer).

When the operating pressure is increased, hydraulic fluid flows into the diaphragm type accumulator and compresses the gas until the gas pressure is identical to the fluid pressure. When the operating pressure is reduced, the gas expands again and feeds the hydraulic system with fluid.

The closing button **(3)** is located on the diaphragm base and covers the pressure fluid connection **(4)** when the diaphragm type accumulator is completely drained, preventing the diaphragm from leaking into the hydraulic fluid channel and causing damage.

The gas side of the diaphragm type accumulator is filled with nitrogen to the intended gas filling pressure P_0 via the gas port **(1)** at the factory or using a charging and test device (material number: 0538103012 for diaphragm type accumulators). The gas filling screw **(9)** is provided with a bleeding groove which allows the gas filling pressure to escape safely after a few rotations when released. In order to protect the gas port, a cover cap **(6)** is provided on the gas port.



For more detailed information on the operating conditions, connection dimensions and performance limits of the diaphragm type accumulator, please refer to data sheet 50150, see chapter 1.2 "Required and amending documentation".

5.2 Product identification

The diaphragm type accumulator can be identified by means of the embossing on its housing.



The operation of the diaphragm type accumulator is only admissible, when the embossing is present and fully legible.

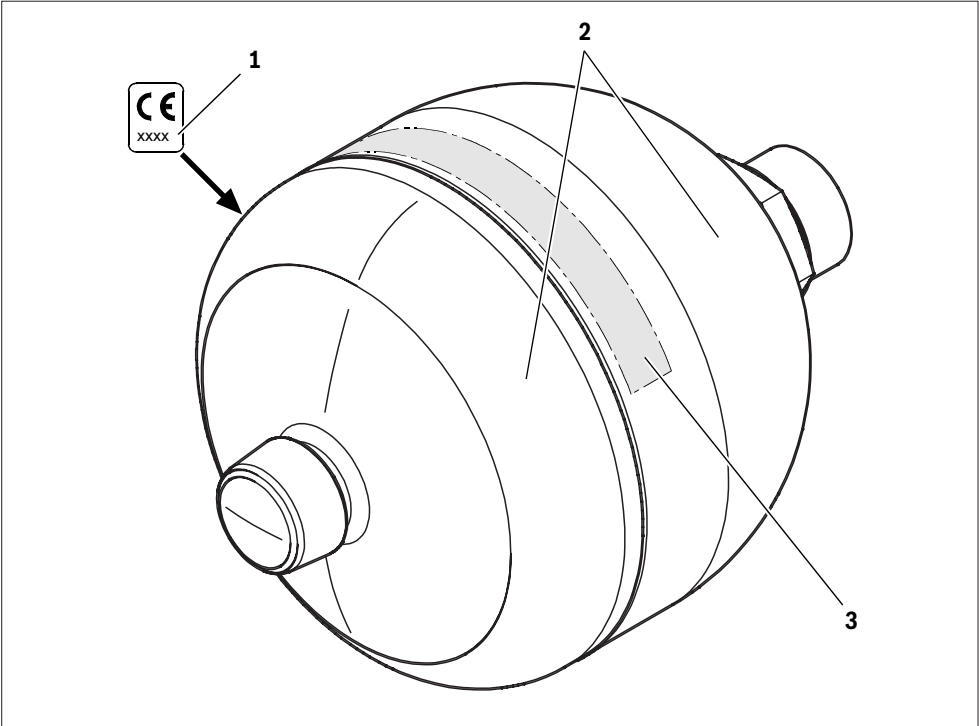


Fig. 3: Position of the markings on the diaphragm type accumulator

- 1

CE mark (only for diaphragm type accumulators having a capacity of > 1 liter)
- 2

Marking of material batch
- 3

Reservoir embossing

1	2	3	4	5	6			
XX	Rexroth	R90103950898	V 2.8 L	PS 250 BAR	TS -15/80 °C			
	HAD2.8-250-20	Made in Germany	7920	FG2/N2 GAS	0 BAR	2019	SN	19W41 00001
	7		8	9	10	11	12	13

Fig. 4: Example: Embossing on the housing of the diaphragm type accumulator

- 1

Examiner
- 2

Rexroth word mark
- 3

Material number
- 4

Volume
- 5

Max. admissible pressure PS
- 6

Admissible min./max. temperature TS
- 7

HAD volume pressure series
- 8

Works number
- 9

Charging gas
- 10

Gas filling pressure P0 at 20 °C
- 11

Manufacturing year
- 12

Date of production
- 13

Serial factory no.

6 Transport and storage

- ▶ Always comply with the required environmental conditions with regards to transport and storage, see chapter 6.3 "Storage of the diaphragm type accumulator".



For notes on unpacking, refer to chapter 7.1 "Unpacking".

6.1 Transport of the diaphragm type accumulator

WARNING

Falling of the diaphragm type accumulator due to improper transport!

Risk of injury! Danger of crushing! Danger of bone fractures! Damage to property!

- ▶ Never step or reach below suspended loads.
- ▶ Provide for a stable center of gravity position during transport.
- ▶ Use your personal protective equipment, e.g. safety shoes.
- ▶ Place the diaphragm type accumulator carefully onto the contact surface in order not to damage it.

Uncontrolled rolling away, tipping over or falling of the diaphragm type accumulator!

Risk of injury! Damage to property!

- ▶ Ensure that the diaphragm type accumulator is safely stored and secured against unintentional rolling away, tipping over or falling.

NOTICE

Impact or similar forces during transport!

Risk of damage! Damage to property! Risk of corrosion!

- ▶ Pack the diaphragm type accumulator using shock-absorbing materials, e.g. cardboard.
- ▶ Allow the diaphragm type accumulator to reach ambient temperature before packing.
- ▶ Protect the diaphragm type accumulator against the influence of salt-containing air during sea freight, e.g. with a plastic film.

Close openings

- ▶ Before transport, close all openings with the supplied protective caps/cover caps in order to prevent dirt or humidity from penetrating the diaphragm type accumulator.

Weight

The weight indicated only refers to the diaphragm type accumulator, the weight of any add-on units is not taken into account.



For information on the weight of the diaphragm type accumulators, please refer to data sheet 50150, see chapter 1.2 "Required and amending documentation".

6.2 Shipping of the diaphragm type accumulator

The diaphragm type accumulator may only be shipped alone or installed in a machine or assembly and securely fastened.

When shipping with a gas filling pressure of 2 bar or more, the diaphragm type accumulator must be declared as UN number 3164 (object under pneumatic pressure with non-flammable gas). Depending on the type of dispatch, the relevant directives must be observed.

Diaphragm type accumulators are only shipped by air freight ex works in a depressurized condition. Gas filling pressures specified by type code are also released at the factory. The pressure release is demonstrated on a certificate enclosed with the accumulator.

6.3 Storage of the diaphragm type accumulator

The diaphragm type accumulator is supplied with a coating. The machine end-user must ensure sufficient corrosion protection during storage.

Requirements

- ▶ Ensure that the storage rooms are dry and free of corrosive substances and gases.
- ▶ Ensure a constant temperature, if possible.
Ideal storage temperature: +5 °C to +30 °C
- ▶ Make sure the diaphragm type accumulator cannot roll away.
- ▶ Make sure that the cover cap on the gas port and the protective cap on the hydraulic fluid connection are in place.

Maximum storage time

The maximum storage time of the diaphragm type accumulator amounts to 5 years.

Commissioning after storage

Procedure after expiration of maximum storage time:

- ▶ Carry out a visual inspection of the diaphragm type accumulator and check for any damage and corrosion.
- ▶ As a precaution, have the complete diaphragm type accumulator checked by a specialist after the maximum storage time has expired, see chapter 2.4 "Qualification of personnel".



Please note that the warranty period is not prolonged by the storage time. The claim to warranty expires in case of non-compliance with the requirements and the storage conditions or after expiry of the maximum storage time.



Please note that, according to the provisions and ordinances valid in your country, the test intervals mostly refer to the date of manufacture and are also not prolonged by the storage time.

7 Assembly

Prior to assembly, make sure the following documents are to hand:

- Hydraulic circuit diagram and an assembly drawing for the machine/system (can be obtained from the machine/system manufacturer)
- Data sheet 50150 of the diaphragm type accumulator (contains the admissible technical data), see chapter 1.2 "Required and amending documentation"

7.1 Unpacking

CAUTION! Danger due to falling parts or rolling of the diaphragm type accumulator!

Risk of injury! Damage to property!

- ▶ Put the pallet/packaging on level, bearing ground.
- ▶ Only open the packaging from the top.
- ▶ Before opening the packaging and/or loosening the tension belts, make sure that the diaphragm type accumulator cannot roll away.
- ▶ Open the packaging of the diaphragm type accumulator or loosen the tension belts.
- ▶ Remove the diaphragm type accumulator.
- ▶ Check the diaphragm type accumulator for transport damage and completeness, see chapter 4 "Scope of delivery".
- ▶ Dispose of the packaging in accordance with the applicable national provisions of your country.

7.2 Installation conditions

Fastening

- ▶ Attach the diaphragm type accumulator in such a way that any forces caused, for example, by application-related vibrations or accelerations can be safely absorbed.



Bosch Rexroth offers suitable holding devices in the form of mounting clamps and consoles as accessories.

For further information on the accessories, refer to data sheet 50150, see chapter 1.2 "Required and amending documentation".

Installation position The diaphragm type accumulator may be installed in any installation position. A clearance area of 200 mm must be maintained above the gas port for the charging and test device.



Bosch Rexroth offers the charging and test device for diaphragm type accumulators (HAD), material number: 0538103012 and the charging and test device for bladder and diaphragm type accumulators (HAB/HAD), material number: 0538103014.

For further information on the accessories, refer to data sheet 50150, see chapter 1.2 "Required and amending documentation".

Fuse protection The diaphragm type accumulator has to be secured against operation outside the admissible limits according to the Pressure Equipment Directive 2014/68/EU.

Cleanliness It is imperative to ensure absolute cleanliness. The diaphragm type accumulator and all other parts used must be installed free from dirt. Contamination of the hydraulic fluid may considerably impair the life cycle of the diaphragm type accumulator.

Temperature The temperature of the diaphragm type accumulator must correspond to the ambient temperature of the site of installation. Allow the diaphragm type accumulator to acclimatize sufficiently in order to adapt to the temperature conditions.

Connections Before installing the diaphragm type accumulator on the hydraulic fluid connection, make sure that the design of the connection on the accumulator side corresponds to the connection on the system side.

7.3 Required tools

For the assembly of the diaphragm type accumulator, you need:

- Charging and test device for diaphragm type accumulators (HAD), material number: 0538103012 or for bladder and diaphragm type accumulators (HAB/HAD), material number: 0538103014, according to data sheet 50150/ operating instructions 50144-B, see chapter 1.2 "Required and amending documentation"
- Open-end wrench

Table 6: Required wrench sizes of the open-end wrench

Diaphragm type accumulator with hydraulic fluid connection	Open-end wrench: Wrench size
Type of mounting C up to 0.16 liters	32 mm
Type of mounting C from 0.35 liters	41 mm
Type of mounting E	
Type of mounting E5	50 mm
Type of mounting F 0.075 liters	19 mm
Type of mounting F from 0.16 liters	27 mm

7.4 Assembly of the diaphragm type accumulator

WARNING

Bursting of the diaphragm type accumulator (mounting type E and E5) due to wall thickness undercut caused by corrosion!

Danger to life! Risk of injury! Damage to property!

- ▶ After the installation of a diaphragm type accumulator of mounting type E or E5, see also data sheet 50150, section "ordering codes", restore adequate corrosion protection to the male threads.

NOTICE

Leakage on the diaphragm type accumulator!

Damage to property!

- ▶ Before installation, check the sealing surface at the hydraulic fluid connection of the diaphragm type accumulator, see Fig. 2, item 4, on intact.
- ▶ Only have the diaphragm type accumulator installed by qualified personnel, see chapter 2.4 "Qualification of personnel".

To assess the necessity and design of suitable holding devices, the application and installation conditions must be examined more closely.



Bosch Rexroth offers suitable holding devices in the form of mounting clamps and consoles as accessories, and recommends that these are integrated for static applications.

For further information on the accessories, refer to data sheet 50150, see chapter 1.2 "Required and amending documentation".

7.4.1 Assembling the diaphragm type accumulator on a block

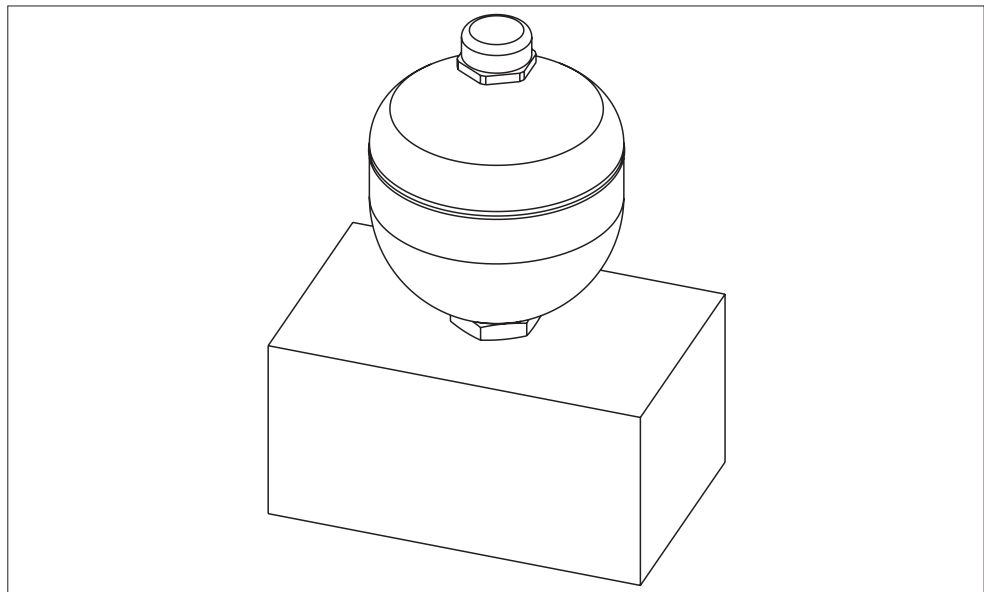


Fig. 5: Diaphragm type accumulator installed on a block

For installing the diaphragm type accumulator on a manifold block, the following work steps are required:

CAUTION! Residual oil escapes when the protective cap is removed from the hydraulic fluid connection!

Slip hazard! Health hazard! Environmental pollution!

- ▶ Remove leaking residual oil immediately.
- ▶ Use your personal protective equipment, e.g. safety goggles.
- ▶ If, however, hydraulic fluid comes into contact with the eyes, enters the bloodstream or is swallowed, consult a doctor immediately.

- ▶ Remove the protective cap from the hydraulic fluid connection of the diaphragm type accumulator.
- ▶ Ensure that the hydraulic fluid connection is clean and free of foreign particles.
- ▶ Ensure that the connection thread is intact.
- ▶ Check the hydraulic fluid connection for existing seals.
- ▶ Place the diaphragm type accumulator on the oil port.
- ▶ Screw the diaphragm type accumulator into the thread of the oil port by hand.
- ▶ Make sure that the thread interlocks after one rotation at the latest.
- ▶ Use a suitable tool to tighten the diaphragm type accumulator.

The diaphragm type accumulator is now mounted.

7.4.2 Assembling the diaphragm type accumulator by means of a mounting clamp

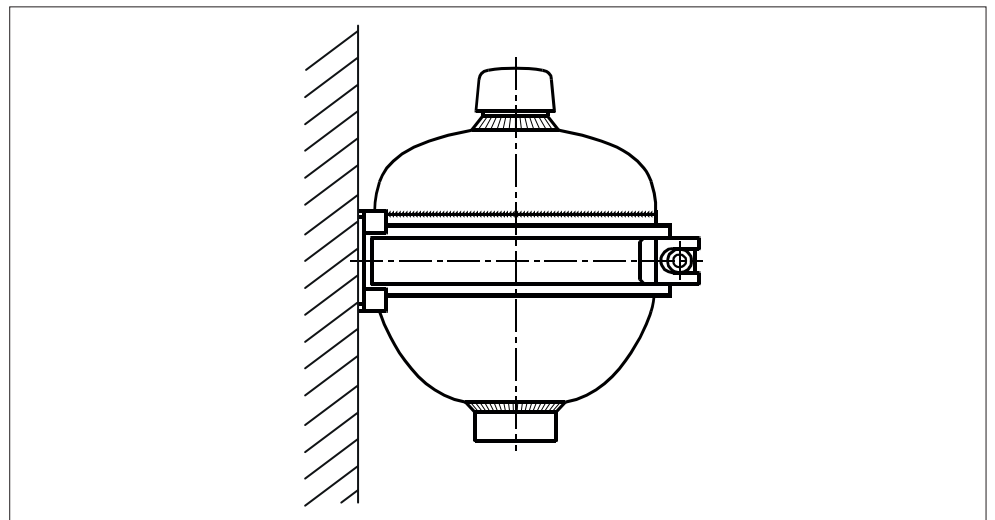


Fig. 6: Mounting by means of a mounting clamp

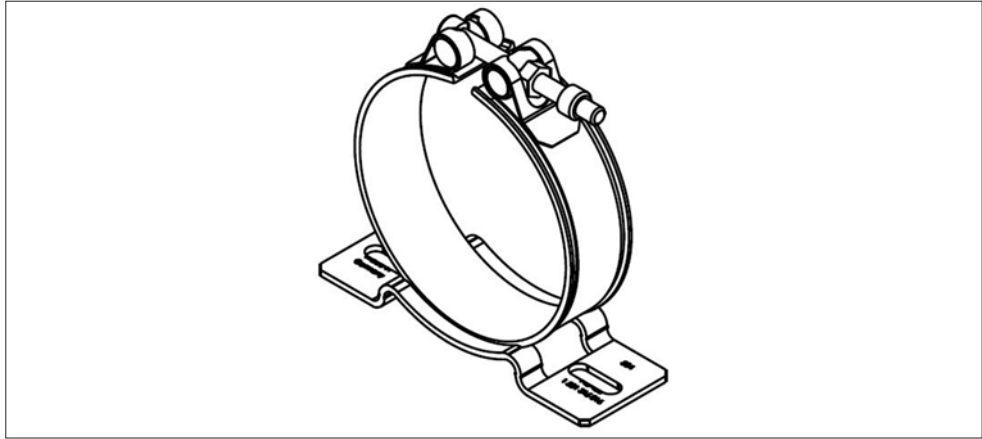


Fig. 7: Mounting clamp

To install the diaphragm type accumulator with a mounting clamp, the following work steps are required:

- ▶ Mount the mounting clamp of the diaphragm type accumulator to the provided positions on the wall or the machine.
- ▶ Position the diaphragm type accumulator in the mounting clamp so that the embossing on the housing remains visible.
- ▶ Tighten the screws of the mounting clamp.

CAUTION! Residual oil escapes when the protective cap is removed from the hydraulic fluid connection!

Slip hazard! Health hazard! Environmental pollution!

- ▶ Remove leaking residual oil immediately.
- ▶ Use your personal protective equipment, e.g. safety goggles.
- ▶ If, however, hydraulic fluid comes into contact with the eyes, enters the bloodstream or is swallowed, consult a doctor immediately.

- ▶ Remove the protective cap from the hydraulic fluid connection of the diaphragm type accumulator.
- ▶ Connect the hydraulic lines to the hydraulic fluid connection of the diaphragm type accumulator.
- ▶ Tighten the hydraulic lines by exerting counterpressure with a suitable tool until they fit tightly.
- ▶ Ensure that the diaphragm type accumulator is mounted without tension stress and check if any tension stress may occur due to vibrations and/or thermal expansion of the components and/or the piping.

The diaphragm type accumulator is now mounted.

7.4.3 Diaphragm type accumulator mounted on the male thread

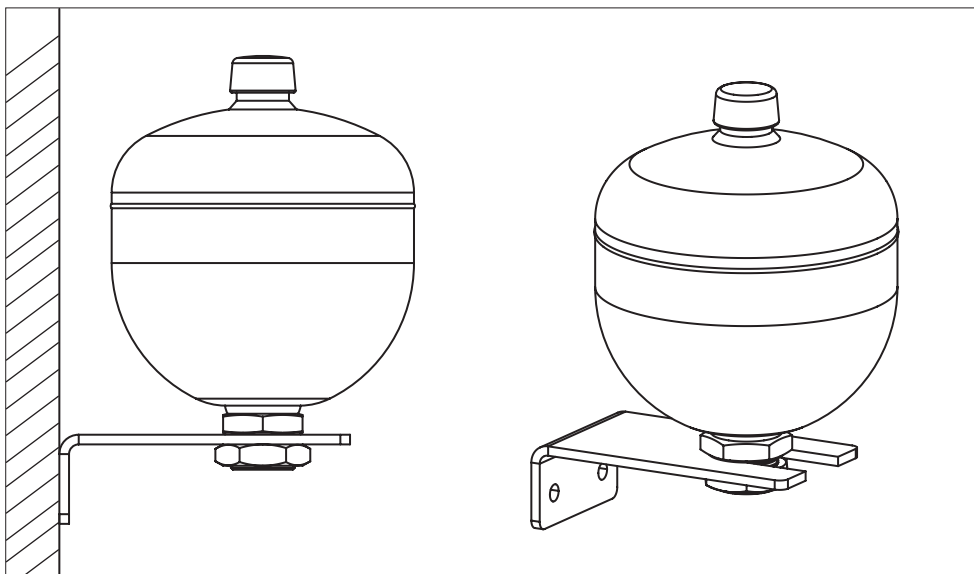


Fig. 8: Mounting on the male thread

To install the diaphragm type accumulator by means of a screw connection on the male thread,
the following work steps are required:

CAUTION! Residual oil escapes when the protective cap is removed from the hydraulic fluid connection!

Slip hazard! Health hazard! Environmental pollution!

- ▶ Remove leaking residual oil immediately.
- ▶ Use your personal protective equipment, e.g. safety goggles.
- ▶ If, however, hydraulic fluid comes into contact with the eyes, enters the bloodstream or is swallowed, consult a doctor immediately.

- ▶ Remove the protective cap from the hydraulic fluid connection of the diaphragm type accumulator.
- ▶ Position the diaphragm type accumulator in the opening provided in the mounting element so that the embossing on the housing remains visible.
- ▶ Assemble the mounting nut to the male thread of the diaphragm type accumulator.
- ▶ Use a suitable tool to tighten the nut while holding the diaphragm type accumulator.
- ▶ Connect the hydraulic lines to the hydraulic fluid connection of the diaphragm type accumulator.
- ▶ Tighten the hydraulic lines by exerting counterpressure with a suitable tool until they fit tightly.
- ▶ Ensure that the diaphragm type accumulator is mounted without tension stress and check if any tension stress may occur due to vibrations and/or thermal expansion of the components and/or the piping.

The diaphragm type accumulator is now mounted.

7.4.4 Attaching a warning sign

- Attach a warning sign with the symbol of a diaphragm type accumulator so that it is clearly visible and accessible.

Bosch Rexroth offers the following warning sign (sticker) for diaphragm type accumulators:

Accumulator volume in liters: from 0.35
 Size: 100 mm x 20 mm
 Material number: R901441614

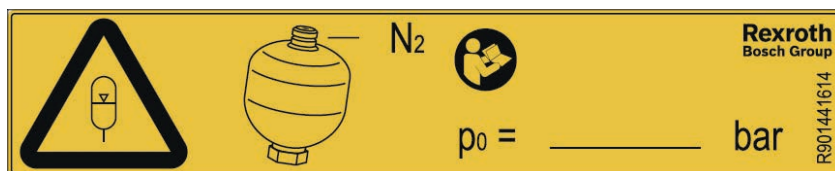


Fig. 9: Example of warning sign

- Enter the set gas filling pressure P0 on the warning sign.

8 Commissioning

WARNING

Reduction of wall thickness of the pressure container when operated using corrosive hydraulic fluids! Wear of the pressure container and the elastic elements (sealing devices) during operation with abrasive hydraulic fluids!

Danger to life! Danger of bursting! Damage to property!

- ▶ Only use the hydraulic fluids recommended in data sheet 50150, see chapter 1.2 "Required and amending documentation".
- ▶ Check the diaphragm type accumulator regularly for abrasive wear.

Bursting of the diaphragm type accumulator due to exceeding the maximum admissible pressure PS!

Danger to life! Risk of injury! Damage to property!

- ▶ Observe the maximum admissible pressure PS specified on the embossing.

CAUTION

Leakage of hydraulic fluid under high pressure due to faulty assembly of the diaphragm type accumulator!

Risk of injury! Damage to property!

- ▶ Ensure that the diaphragm type accumulator has been completely installed by a specialist, see chapter 2.4 "Qualification of personnel", and is de-energized before putting the diaphragm type accumulator into operation.
- ▶ Ensure that the tightening torques required from the system side have been observed.

NOTICE

Wear or cracks in the diaphragm due to insufficient or excessive gas filling pressure! Sudden gas losses into the system!

Damage to property!

- ▶ Observe the gas filling pressure P0 specified on the hydraulic circuit diagram and embossing.



When commissioning the diaphragm type accumulator, always observe the operating instructions of the overall system.

When commissioning the diaphragm type accumulator, use the charging and test device for diaphragm type accumulators (HAD), material number: 0538103012 or for bladder and diaphragm type accumulators (HAB/HAD), material number: 0538103014, according to data sheet 50150 and operating instructions 50144-B, see chapter 1.2 "Required and amending documentation".

8.1 Preparing for commissioning

The diaphragm type accumulator is shipped ex works with a coating and level of protection of a 240 hours salt spray test according to ISO 9227. The system end-user is responsible for providing adequate corrosion protection in accordance with the environmental conditions and requirements.



The examination of the diaphragm type accumulator prior to commissioning as well as the recurring tests are to be performed according to national rules.

- ▶ Add the coating at the gas port, if required.
- ▶ Make sure that the diaphragm type accumulator is intact.
- ▶ Ensure by means of the information provided on the embossing that the diaphragm type accumulator corresponds to the specifications provided on the hydraulic circuit diagram or in the system parts list.
- ▶ Ensure that the hydraulic fluid used in the hydraulic system corresponds to the specifications in data sheet 50150 and on the embossing of the diaphragm type accumulator.
- ▶ Ensure that the maximum admissible pressure PS of the diaphragm type accumulator is equal to or greater than the maximum operating pressure of the hydraulic circuit.
- ▶ Check that the admissible min./max. temperature TS is within the limits stated on the embossing.
- ▶ Make sure that the diaphragm type accumulator has been installed completely and without tension stress.
- ▶ Prepare the charging and test device for diaphragm type accumulators (HAD), material number: 0538103012 or for bladder and diaphragm accumulators (HAB/HAD), material number: 0538103014, and its operating instructions 50144-B, see chapter 1.2 "Required and amending documentation".

8.2 First commissioning

- ▶ Every time it is commissioned bring the diaphragm type accumulator to the gas filling pressure specified in the hydraulic circuit diagram.

Set gas filling pressure

Proceed as follows to set the gas filling pressure:

- ▶ Make sure that the system is depressurized.
- ▶ Remove the cover cap from the gas side of the diaphragm type accumulator.

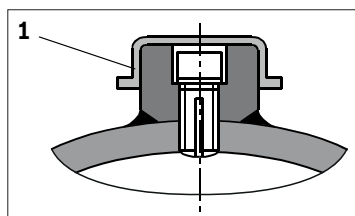


Fig. 10: Removing the cover cap

- 1 Cover cap on the gas port

- ▶ Screw the charging and test valve of the charging and test device, material number: 0538103012 or 0538103014, to the gas port of the diaphragm type accumulator.



Additionally, please observe the operating instructions 50144-B, see chapter 1.2 "Required and amending documentation".

WARNING! Explosion of the diaphragm type accumulator if filled with unauthorized gas, e.g. oxygen!

Danger to life! Risk of injury!

- ▶ Only use nitrogen 99.99% by volume to fill the diaphragm type accumulator.

WARNING! Uncontrolled release of a significant amount of gas!

Danger to life! Risk of suffocation!

- ▶ Make sure that the workplace is sufficiently ventilated.
- ▶ For checking the gas filling pressure, always use the charging and test device, material number: 0538103012 or 0538103014.

CAUTION! High surface temperature during filling of the diaphragm type accumulator with gas!

Risk of burning!

- ▶ Only touch the surfaces of the diaphragm type accumulator with heat-resistant protective clothing, e.g. gloves, or do not work at hot surfaces.
- ▶ Allow the diaphragm type accumulator to cool down sufficiently before touching it.
- ▶ Observe the protective measures of the system manufacturer.

NOTICE! Bursting diaphragm during fast filling with gas!

Damage to property!

- ▶ Fill the diaphragm type accumulator via a pressure regulator.
- ▶ Fill the diaphragm type accumulator slowly.
- ▶ Connect a nitrogen bottle with a pressure-reducing valve to the gas port of the diaphragm type accumulator using the hose of the charging and test device.
- ▶ The prescribed gas filling pressure P₀ is indicated in the hydraulic circuit diagram.
- ▶ Loosen the gas filling screw via the charging and test valve until gas can flow into the diaphragm type accumulator.
- ▶ Slowly open the shut-off cock of the gas bottle to make sure that the diaphragm touches the interior wall evenly.
- ▶ Leave the shut-off cock open until the specified gas filling pressure P₀ is displayed at the pressure gauge of the charging and test device.
- ▶ Always keep an eye on the pressure gauge during the charging process.
- ▶ Close the shut-off cock of the gas bottle.
- ▶ The gas filling pressure is temperature-dependent. During the charging, the diaphragm type accumulator heats up. Wait until the diaphragm type accumulator has cooled down.

- ▶ Check the gas filling pressure P0 and correct it if necessary.
- ▶ Remove the charging and test valve of the charging and test device.
- ▶ Screw the cover cap back onto the gas port of the diaphragm type accumulator.
- ▶ Mark the set gas filling pressure P0 clearly on the diaphragm type accumulator.
 - Do not use stamps, punch presses or other mechanical markings in this connection.
 - Bosch Rexroth recommends the use of a sticker, e.g. a warning sign for diaphragm type accumulators, material number R901441614, see Fig. 9.

The gas filling pressure is now checked and set.

Commissioning the diaphragm type accumulator

- ▶ Commission the diaphragm type accumulator with the system according to the operating instructions of the overall system.

8.3 Re-commissioning after standstill

- ▶ Check that the gas filling pressure corresponds to the intended value P0 according to the hydraulic circuit diagram. Proceed as described in chapter 10.4 "Maintenance".
- ▶ Check the gas port for leak-tightness.
- ▶ Make sure that there are no signs of corrosion on the diaphragm type accumulator and that the coating is undamaged.
- ▶ Commission the diaphragm type accumulator with the system according to the operating instructions of the overall system.
- ▶ Check the hydraulic fluid connection for leak-tightness.

9 Operation

WARNING

Uncontrolled loosening of the diaphragm type accumulator due to mechanical stress caused by relative motion or due to dynamic load caused by vibrations from the environment!

Danger to life! Risk of injury! Damage to property!

- ▶ Use suitable holding devices, e.g. mounting clamps and, if necessary, a console, to secure the diaphragm type accumulator.
- ▶ Ensure installation without tension stress.
- ▶ Observe the tightening torques specified on the system side.



WARNING

Crack in the diaphragm type accumulator due to reduction in stability caused by high ambient temperature!

Danger to life! Damage to property!

- ▶ Ensure that the ambient temperature of the diaphragm type accumulator does not exceed or fall below the temperature specified in data sheet 50150, see chapter 1.2 "Required and amending documentation".
- ▶ Maintain the admissible min./max. temperature TS, taking into account the ambient temperature.

Reduction of wall thickness of the pressure container when operated using corrosive hydraulic fluids! Wear of the pressure container and the elastic elements (sealing devices) during operation with abrasive hydraulic fluids!

Danger to life! Danger of bursting! Damage to property!

- ▶ Only use the hydraulic fluids recommended in data sheet 50150, see chapter 1.2 "Required and amending documentation".
- ▶ Check the diaphragm type accumulator regularly for abrasive wear.

Bursting of the diaphragm type accumulator due to exceeding the maximum admissible pressure PS!

Danger to life! Risk of injury! Damage to property!

- ▶ Observe the maximum admissible pressure PS specified on the embossing.

Crack in the diaphragm type accumulator due to wall thickness undercut caused by corrosion!

Danger to life! Risk of injury! Damage to property!

- ▶ Check the diaphragm type accumulator for external corrosion regularly – depending on the application.
- ▶ Determine the frequency of the corrosion checks according to the application.
- ▶ Check which provisions or ordinances in your country and/or for your application are to be complied with.



CAUTION

Leakage of hydraulic fluid under high pressure due to faulty assembly of the diaphragm type accumulator!

Risk of injury! Damage to property!

- ▶ Ensure that the diaphragm type accumulator has been completely installed by a specialist, see chapter 2.4 "Qualification of personnel", and is de-energized before putting the diaphragm type accumulator into operation.
- ▶ Ensure that the tightening torques required from the system side have been observed.

NOTICE

Wear or cracks in the diaphragm due to insufficient or excessive gas filling pressure! Sudden gas losses into the system!

Damage to property!

- ▶ Observe the gas filling pressure P0 specified on the hydraulic circuit diagram and the embossing on the reservoir.

Gas or oil leakage due to loss of preload/elasticity of the sealing devices due to too high/low temperature! Cracking of the diaphragm due to material embrittlement in too low a temperature!

Damage to property!

- ▶ Ensure that the temperature of the diaphragm type accumulator does not exceed or fall below the temperature specified in data sheet 50150, see chapter 1.2 "Required and amending documentation".
- ▶ Observe the operating temperature and consider the ambient temperature.

During operation of the diaphragm type accumulator, observe the following points:

- ▶ Make sure that the embossing is always present and legible. Otherwise, further operation is not allowed.
- ▶ Make sure that no loads/forces, e.g. temperature expansions or vibrations, occur and are transferred to the diaphragm type accumulator. The effect of external forces can lead to damage to the hydraulic fluid connection and the uncontrolled release of pressurized hydraulic fluid.
- ▶ Ensure that the diaphragm type accumulator of type HAD...-1X/ and HAD...-2X/ is only operated within the performance limits specified in data sheet 50150, see chapter 1.2 "Required and amending documentation", in particular within the admissible minimum/maximum temperature TS and the maximum admissible pressure PS embossed on the tank.
- ▶ Make sure that the diaphragm type accumulator is only operated in impeccable condition.
- ▶ In case of emergency, an error case, or any other irregularity, switch off the system and secure it against restarting.



Changes in operating speeds, temperatures, increasing noises or power consumption are an indication of wear or damage at the diaphragm type accumulator or the system. To ensure high operational safety and availability of the system, Bosch Rexroth recommends permanently monitoring these values.

10 Maintenance and repair



WARNING

Crack in the diaphragm type accumulator due to wall thickness undercut caused by corrosion!

Danger to life! Risk of injury! Damage to property!

- ▶ Check the diaphragm type accumulator for external corrosion regularly – depending on the application.
- ▶ Determine the frequency of the corrosion checks according to the application.
- ▶ Check which provisions or ordinances in your country and/or for your application are to be complied with.

Maintenance

- ▶ Perform the prescribed maintenance work at the intervals specified in the operating instructions of the overall system.



If no other instructions are available, Bosch Rexroth recommends maintenance intervals according to chapter 10.4 "Maintenance".

Maintenance and repair of the diaphragm type accumulator may only be carried out by specialists, see chapter 2.4 "Qualification of personnel".

Close openings

- ▶ Before transport, close all openings with the supplied protective caps/cover caps in order to prevent dirt or humidity from penetrating the diaphragm type accumulator.

10.1 Cleaning and care

- ▶ Close the pressurized fluid connection if it is not connected to the hydraulic fluid connection, and cover the gas port with the cover caps provided.
- ▶ Do not use solvents or aggressive cleaning agents.
- ▶ Only clean the diaphragm type accumulator with residue-free industrial wipes.
- ▶ Do not use a high-pressure washer for cleaning.

10.2 Inspection

- ▶ Check the hydraulic lines, line connections and seals for leak-tightness and check the diaphragm type accumulator for external corrosion.
- ▶ To do so, follow the system manufacturer's instructions.

10.3 Maintenance schedule

For a safe operation and a long life cycle of the diaphragm type accumulator, a maintenance schedule is to be drawn up for the power unit, the machine, or the system. The maintenance schedule must guarantee that the operating conditions of the diaphragm type accumulator stay in the prescribed limits during the entire period of use.

In particular, compliance with the following operating parameters must be ensured:

- Maximum admissible pressure PS
- Admissible min./max. temperature TS
- Gas filling pressure P0

Changes made to these parameters increase the wear to the diaphragm type accumulator. The cause must be identified and remedied immediately.

In order to achieve a high operational safety of the diaphragm type accumulator in the machine/system, Bosch Rexroth recommends checking the parameters mentioned above continuously and automatically, and shutting the system off automatically in case of modifications which exceed the usual fluctuations in the intended operating range.



Further information on maintenance is provided in the operating instructions of the overall system.

10.4 Maintenance

10.4.1 Required tests/maintenance activities

Once filled with gas, Rexroth diaphragm type accumulators are largely maintenance-free. In order to guarantee a fault-free operation and a long life cycle, however, the following tasks are to be carried out:

- Checking the gas filling pressure
- Inspection of the safety equipment, fittings
- Inspection of the line connections
- Inspection of accumulator fixation



For maintenance work requiring the storage tank to be removed, the diaphragm type accumulator tank/system must be depressurized.

For disassembly, assembly and commissioning, proceed as described in the corresponding chapters.

Checking the gas filling pressure

To check the gas filling pressure of the diaphragm type accumulator, proceed as follows:

- ▶ Make sure that the system is depressurized.
- ▶ Refer to the hydraulic circuit diagram of the system for the intended gas filling pressure P0.

WARNING! Uncontrolled release of a significant amount of gas!
Danger to life! Risk of suffocation!

- ▶ Make sure that the workplace is sufficiently ventilated.
- ▶ To test the gas filling pressure, always use the charging and test device for diaphragm type accumulators (HAB), material number: 0538103012 or for bladder and diaphragm type accumulators (HAB/HAD), material number: 0538103014.
- ▶ Remove the cover cap from the gas side of the diaphragm type accumulator.
- ▶ Screw the charging and test valve of the charging and test device onto the gas port of the diaphragm type accumulator.



Additionally, please observe the operating instructions 50144-B of the charging and test device, material number: 0538103012 or 0538103014, see chapter 1.2 "Required and amending documentation".

- ▶ Loosen the gas filling screw over the charging and test valve until the gas filling pressure appears on the pressure gauge.
- ▶ Check whether the gas filling pressure displayed on the pressure gauge of the charging and test device corresponds to the specified value P0 in the hydraulic circuit diagram. If the two values differ, set the gas filling pressure as described in chapter 8.2 "Re-commissioning after standstill".
- ▶ Screw the gas filling screw back over the charging and test valve.
- ▶ Remove the charging and test valve of the filling and charging and test device from the gas port of the diaphragm type accumulator.
- ▶ Screw the cover cap back onto the diaphragm type accumulator.

The gas filling pressure is now checked and set.

10.4.2 Test intervals of the diaphragm type accumulator

Table 7: Test intervals of the diaphragm type accumulator

Test	Interval	Maintenance activity
Checking of the gas filling pressure with external visual inspection	Test 1: Within one week as of commissioning	▶ Check the gas filling pressure. ▶ Check the connection thread for leak-tightness. ▶ Perform a visual inspection for external corrosion.
	Test 2: Within 3 months after commissioning, if no gas losses during test 1	
	Test 3: Annual test, if no gas losses during test 2	
Internal visual inspection	Every 10 years	Notice: Internal visual inspection in accordance with national provisions is not possible due to the design. ▶ Replace the diaphragm type accumulator.

10.5 Replacing wear parts

- ▶ Only use spare parts approved by the manufacturer to replace wear parts.

10.6 Repair

The diaphragm type accumulator is not repairable. In case of damage, an adequate replacement is to be acquired.

If you have any questions, contact your local Bosch Rexroth Service department or the service department of the diaphragm type accumulator manufacturer, see chapter 16.1 "List of addresses".

11 Disassembly and replacement



WARNING

Parts flying off due to residual pressure still present after draining!

Danger to life! Risk of injury!

- ▶ Check the residual pressure in the diaphragm type accumulator using the charging and test device.

11.1 Required tools

For the disassembly of the diaphragm type accumulator, you need:

- Charging and test device for diaphragm type accumulators (HAB), material number: 0538103012 or for bladder and diaphragm type accumulators (HAB/HAD), material number: 0538103014, according to data sheet 50150/ operating instructions 50144-B, see chapter 1.2 "Required and amending documentation"
- Open-end wrench



For further details on wrench sizes, refer to chapter 7 "Assembly", Table 6.

11.2 Preparing for disassembly

Overall system

- ▶ Decommission the overall system as described in the operating instructions of the system.

Afterwards, prepare the disassembly of the diaphragm type accumulator as follows:

- ▶ Depressurize the hydraulic system.
- ▶ Make sure that the relevant system parts are depressurized and de-energized.

Diaphragm type accumulator

- ▶ Discharge the diaphragm type accumulator via the discharge device of the system.
- ▶ Please note that the gas filling pressure still exists on the gas side after hydraulic unloading.

11.3 Disassembly process

Proceed as follows to disassemble the diaphragm type accumulator:

- ▶ Ensure that the hydraulic system is depressurized and the diaphragm type accumulator is hydraulically unloaded.
- ▶ Remove the cover cap from the gas side of the diaphragm type accumulator.
- ▶ Screw the charging and test valve of the charging and test device onto the gas port of the diaphragm type accumulator.

WARNING! Increased nitrogen concentration in the environment when releasing the gas filling pressure of multiple large diaphragm type accumulators!

Danger to life! Risk of suffocation!

- ▶ Make sure that the workplace is sufficiently ventilated.

WARNING! Loud hissing when gas is drained!

Danger of hearing damage!

- ▶ Drain the gas slowly.

CAUTION! Low surface temperature when draining the gas!

Danger of frostbite!

- ▶ Only touch the surfaces of the diaphragm type accumulator with cold-resistant protective clothing, e.g. gloves, or do not work on cold surfaces.
- ▶ Allow the diaphragm type accumulator to warm up sufficiently before accessing it.
- ▶ Observe the protective measures of the system manufacturer.
- ▶ Release the gas filling pressure on the gas side.



Additionally, please observe the operating instructions 50144-B of the charging and test device, material number: 0538103012 or 0538103014.

- ▶ The gas filling pressure is temperature-dependent. The diaphragm type accumulator cools down during draining. Wait until the diaphragm type accumulator has warmed back up to ambient temperature.
- ▶ Release the gas filling pressure that has built back up during heating on the gas side.



Additionally, please observe the operating instructions 50144-B of the charging and test device, material number: 0538103012 or 0538103014.

- ▶ Remove the charging and test valve of the charging and test device from the gas port of the diaphragm type accumulator.

WARNING! Uncontrolled release of the gas filling screw of the diaphragm type accumulator due to residual pressure!

Danger to life! Risk of injury!

- ▶ Use the bleeding groove in the thread of the gas filling screw (whistles when opened) to ensure that the diaphragm type accumulator is fully unloaded on the gas side.
- ▶ Do not use standard bolts as a gas filling screw.



Bosch Rexroth offers a gas filling screw, material number: R901586888, as spare part.

Further information on the spare parts can be found in data sheet 50150, see chapter 1.2 "Required and amending documentation".

- ▶ Completely release the residual pressure.
- ▶ Unscrew the gas filling screw by hand.
- ▶ If necessary, remove the gas filling screw to keep the diaphragm type accumulator permanently depressurized.
- ▶ Screw the cover cap back onto the gas side of the diaphragm type accumulator.

CAUTION! Residual oil escapes when the hydraulic fluid connection is removed! Slip hazard! Health hazard! Environmental pollution!

- ▶ Remove leaking residual oil immediately.
- ▶ Wear protective gloves and safety goggles.
- ▶ If, however, hydraulic fluid comes into contact with the eyes or penetrates the skin, please consult a doctor immediately.
- ▶ Disconnect the diaphragm type accumulator from the system.
- ▶ Attach the protective cap to the hydraulic fluid connection.
- ▶ If necessary, loosen the holding devices of the diaphragm type accumulator.

The diaphragm type accumulator is now disassembled.

WARNING! Uncontrolled rolling away, tipping over or falling of the diaphragm type accumulator!

Risk of injury! Damage to property!

- ▶ Ensure that the diaphragm type accumulator is safely stored and secured against unintended rolling away, tipping over and falling.

12 Disposal



WARNING

Bursting of the container due to excessive thermal pressure in a diaphragm type accumulator which is preloaded with gas!

Risk of injury! Risk of fire!

- ▶ Before disposing of the product, make sure the gas filling pressure is drained and the gas filling screw is removed, if necessary.

- ▶ Permanently mark a diaphragm type accumulator which should no longer be used, to prevent reuse as a pressure vessel.

For the disposal of the diaphragm type accumulator, the following instructions have to be complied with:

- ▶ Drain the diaphragm type accumulator completely.
- ▶ Remove the gas filling screw. Observe the procedure and safety instructions in chapter 11.3 "Close openings".

12.1 Environmental protection

Careless disposal of the diaphragm type accumulator and the hydraulic fluid still contained in it as well as the packaging material can lead to environmental pollution.

- ▶ Dispose of the diaphragm type accumulator and the packaging material in accordance with the applicable national regulations in your country.
- ▶ Dispose of the hydraulic fluid in accordance with the currently applicable national regulations in your country. Also observe the valid safety data sheet of the hydraulic fluid.

13 Extension and modification



WARNING

Bursting of the container or oil leakage due to structural changes, mechanical processing or welding at pressurized parts!

Danger to life! Risk of injury! Damage to property!

- Install the diaphragm type accumulator in the machine/system without making any structural changes.

You will be considered responsible for any extensions or modifications to the product.

**Any declarations shall
become invalid**

If you undertake any extensions or modifications to the product marketed by Bosch Rexroth, this means you are changing the condition as supplied.

Any statements made by Bosch Rexroth regarding this product will then lose their validity.



The Bosch Rexroth warranty applies only to the configuration supplied. Following an extension or a modification, the claim to warranty expires.

14 Troubleshooting



Table 8 may assist you when troubleshooting. This table is not exhaustive. In practice, there may be problems that are not included here.

14.1 How to proceed when troubleshooting

- ▶ Always work systematically and purposefully, even when under time pressure. Random, thoughtless disassembly and changing of settings might result in inability to determine the original cause of error.
- ▶ First, get a general idea of how the diaphragm type accumulator works in conjunction with the overall system.
- ▶ Try to establish whether the diaphragm type accumulator worked properly in conjunction with the overall system before the error first occurred.
- ▶ Try to determine any changes in the overall system in which the diaphragm type accumulator is integrated:
 - Were there any changes to the diaphragm type accumulator's conditions or area of application?
 - Has any maintenance work been performed recently? Is there an inspection or maintenance record?
 - Have modifications (e.g. refittings) or repair works been performed to the overall system (machine/system, electrical system, control) or on the diaphragm type accumulator? If so, what were they?
 - Was the hydraulic fluid changed?
 - Was the diaphragm type accumulator or machine used as intended?
 - How did the fault become apparent?
- ▶ Try to get a clear idea of the cause of the fault. If necessary, ask the actual (machine) operator.
- ▶ Document all works done.
- ▶ If the error could not be remedied, please contact one of the contact addresses provided in chapter 16.1 "List of addresses".

Table 8: Fault table diaphragm type accumulator type HAD...-1X/ and HAD...-2X/

Fault	Possible cause	Remedy
Initial gas tension changes during operation	Leakage/gas port not tight	▶ Perform a visual inspection. ▶ Perform a leak test with leak spray during final assembly.
	Gas port damaged	▶ Replace the gas filling screw and seal ring on the gas port, material number: R901586888, according to data sheet 50150, see chapter 1.2 "Required and amending documentation". ▶ Replace the diaphragm type accumulator. ▶ Always use the charging and test device for filling with gas and draining, material number: 0538103012 or 0538103014, according to data sheet 50150/Operating instructions 50144-B, see chapter 1.2 "Required and amending documentation".
	Gas port functionality impaired due to contamination	▶ Screw the cover caps back on after using the charging and test device.
	System-related change of pressure dependent on the temperature	Temperature-dependent changes to the gas filling pressure cannot be avoided. ▶ The gas filling pressure must therefore be chosen in accordance with the expected operating temperatures.
	Reduction due to permeation	▶ Refill gas.
Cracks on the container	Application out of specification	▶ Stop the system immediately. ▶ Replace the diaphragm type accumulator. The diaphragm type accumulator must not be put into operation again, but must be disposed of, see chapter 12 "Disposal".
	Operation outside the prescribed temperature range	▶ Stop the system immediately. ▶ Replace the diaphragm type accumulator. The diaphragm type accumulator must not be put into operation again, but must be disposed of, see chapter 12 "Disposal". ▶ After commissioning, check the operating temperature.
Internal corrosion	Use of inappropriate hydraulic fluid	▶ Stop the system immediately. ▶ Replace the diaphragm type accumulator. The diaphragm type accumulator must not be put into operation again, but must be disposed of, see chapter 12 "Disposal". ▶ Use suitable hydraulic fluid.
	Residual humidity in the container due to inappropriate storage conditions	▶ Stop the system immediately. ▶ Replace the diaphragm type accumulator. The diaphragm type accumulator must not be put into operation again, but must be disposed of, see chapter 12 "Disposal". ▶ Observe the prescribed storage conditions.

Table 8: Fault table diaphragm type accumulator type HAD...-1X/ and HAD...-2X/

Fault	Possible cause	Remedy
Oil loss at interfaces to the outside	Incorrect order of assembly in service case	► Have the service performed by an expert only.
	Seal ring of the gas filling screw is damaged or hardened due to excessive oil temperature	► Have the seal ring on the gas filling screw replaced by a professional. ► Check the oil temperature.
	Hydraulic fluid connection torn due to de-energized installation of the diaphragm type accumulator	► Assemble it in a de-energized condition.
	Inadmissible environmental force effect	► Assemble free of stress.
	Damage to the hydraulic fluid connection during transport	► Perform a visual inspection after transport.
Impossible to assemble	Wrong thread	► Replace the affected parts.
	Thread damaged	► Replace the affected parts.

15 Technical data



The admissible technical data of the diaphragm type accumulator can be found in data sheet 50150, see chapter 1.2 "Required and amending documentation".

For further information on the product, visit www.boschrexroth.com/had.

16 Appendix

16.1 List of addresses

**Contacts for service
and spare parts:**

Bosch Rexroth AG
Industrial Hydraulics Service
Bürgermeister-Dr.-Nebel-Straße 8
97816 Lohr am Main
Germany

Phone: +49 (0) 9352/40 50 60

Email: service@boschrexroth.com

For nearby service representatives outside of Germany, please refer to
www.boschrexroth.com.

Headquarters:

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

Phone: +49 (0) 9352/18 0

**For questions about
the product:**

Bosch Rexroth AG
Online Customer Support

Phone: +49 (0) 9352/40 30 20

Email: my.support@boschrexroth.com

For the addresses of our sales and service network and sales organizations,
visit www.boschrexroth.com/adressen.

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