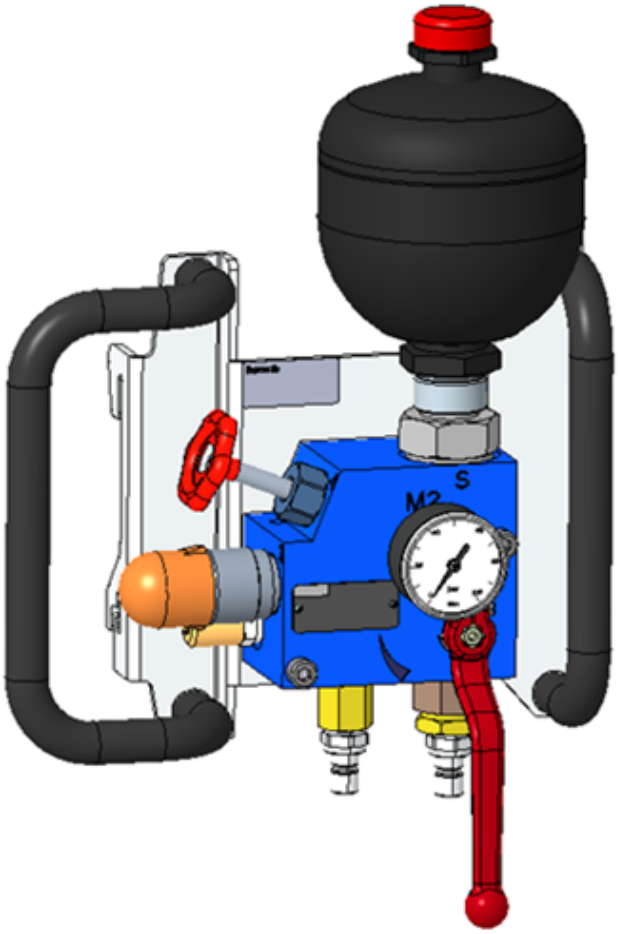
DIAPHRAGM ACCUMULATOR

TS-HC-HAD0,7-210-1X/&

RE 09978-B/03.24

Ersetzt: RE 09978-B/08.08
English

Operating instructions



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.

The title page shows a sample configuration. Thus, the delivered product may vary from the figure.

The original operating instructions have been created in German.

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1 Regarding These Instructions

These instructions contain important information for the safe and appropriate assembly, transportation, commissioning, operation, maintenance, disassembly and troubleshooting of simple failures.

- Read these instructions completely and particularly chapter 2 “General Safety Instructions” before you work with the accumulator assembly.

1.1 Advanced Documentation

You must moreover observe the following instructions:

- General information Data sheet RE 64020 "Hydraulic components for mobile applications"
- Data sheet RE 50150 Diaphragm-type accumulator HAD type
- Operating instructions RE05154-B "Diaphragm-type accumulator HAD TYPE"
- Data sheet RE 50131Accumulator safety block ABZSS

You must moreover comply with generally applicable, legal and other binding regulations of the European and/or national legislation as well as with the accident prevention and environmental protection regulations valid in your country.

2 General Safety Instructions

The accumulator assembly has been produced according to the generally acknowledged rules of technology. Nevertheless, there is the risk of personal injuries and property damage if you do not comply with the following general safety instructions and the warnings before or when acting according to these operating instructions.

- Read these instructions carefully and completely before you work with the accumulator assembly .
- Keep the instructions so that they are accessible for all users at any time.
- When passing the accumulator assembly on to third parties, always pass the operating instructions on, as well.

Assemble and disassembly circuits only if they are depressurised. Connect the "T" return line correctly.

Never disassemble components under pressure! There is a risk of injury caused by flying components (projectiles) and by leaking oil (oil jet).

Observe the accumulator safety! In this connection, also refer to the project manuals.

Before performing an exercise, observe the following:

- Do not use any force.
- The set-up of the circuits must be depressurised.
- In case of blocked couplings, move directional valves in both directions several times and open the relief valve in order to discharge remaining pressures that might still be locked in.

After performing an exercise, observe the following:

- Reduce the load.
- Open the relief valve
- Move directional valves in both directions several times in order to discharged remaining pressures that are still locked in.
- Discharge the pressure accumulator. Switch-off the hydraulic pump.
- Control: 0 bar in P, A, and B by means of a manometer.

2.1 Intended Use

The product is exclusively intended for the use in the performance of hydraulic exercises with the Bosch Rexroth DS4 training system. These exercises are described in the Bosch Rexroth project manuals.

The product may only be commissioned if it has been installed into a Bosch Rexroth training system.

► The operating conditions and performance limits specified in the technical data must be observed in any case.

The accumulator assembly is technical working equipment and not intended for the private use.

The intended use also includes the complete reading and understanding of these instructions and particularly chapter 2 “General Safety Instructions”.

2.2 Unintended Use

Any use of the accumulator assembly contrary to the description contained in chapter "Intended Use" is regarded as unintended use.

The accumulator assembly must not be operated with any other hydraulic system than the Bosch Rexroth training system.

The accumulator assembly must not be used in any other way than the ones described in the Bosch Rexroth project manuals.

2.3 Personnel Qualification

2.3.1 Training operation

Students and trainees may only work at the accumulator assembly under direct supervision and with corresponding guidance of a trainer or trained personnel.

The **trainer** at the training system must be a trained expert disposing of knowledge in the area hydraulic systems.

The trainer must

- give clear instructions if trainees or participants in trainings are to install control circuits at the training system.
- check the installation and functional consequences of the control circuit before switch-on for a safe process.
- check the correct connection of the pressure relief line T.
- answer questions clearly and understandably.

2.3.2 Transportation, Set-up, Installation, and Commissioning

Works with the training system and the accumulator assembly like set-up, connection, maintenance and repair may only be performed by commissioned experts or persons with sufficient qualification and authorisation.

Persons commissioned with works with the accumulator assembly must be able to follow the specifications of this documentation and to independently complete missing specifications on the basis of their personal professional qualification.

2.3.3 Troubleshooting, Maintenance, and Repair

Maintenance, repair, and troubleshooting works require special knowledge and may only be carried out by trained experts!

Works at hydraulic components may only be carried out by experts having special knowledge and experience regarding hydraulic systems!

Special knowledge regarding hydraulic systems means that the personnel must be able to read and completely understand hydraulic diagrams and in particular have completely understood the correlations regarding the installed safety equipment and have knowledge regarding the function and set-up of hydraulic components.

2.4 Warnings in these Instructions

In the present document, instructions regarding certain actions in connection with which there is the danger of personal injuries or property damage are preceded by warnings. The described danger prevention measures must be complied with.

Warnings are structured as follows:

Signal word! 	**Kind of danger!** Consequences ► Prevention

- Warning sign (warning triangle): draws the attention to the danger
- Signal word: specifies the seriousness of the danger
- Kind of danger: specifies the kind or source of danger
- Consequences: describes the consequences in case of non-compliance
- Prevention: specifies how the danger can be avoided

The signal words have the following meaning:

Table 1: Meaning signal words

Signal word	Use
DANGER! 	marks an immediately pending, major danger that will certainly lead to serious injuries or even to death if the danger is not avoided.
WARNING! 	marks a possible danger that may lead to serious injuries or even to death if the danger is not avoided.
CAUTION! 	refers to a potentially dangerous situation which may lead to moderate or minor bodily injuries or to property damage if it is not avoided
	if this information is not observed, the operating procedure may be deteriorated.

2.5 You must note the following

2.5.1 General information

- Comply with the operating instructions RE 50154-B and data sheet RE 50131.
- Comply with the valid accident prevention and environmental protection regulations in the country of use and at the workplace.
- Only use Rexroth products if they are in an unobjectionable technical condition.
- Check the product for apparent defects like, for example, cracks in the housing or missing seals, screws, cover caps, leakage, manometer function.
- You must generally not change or convert the accumulator assembly.
- Only use the product within the performance range specified in the technical data.
- Persons assembling, operating, disassembling or maintaining Rexroth products must not be under the influence of alcohol, other drugs of abuse or drugs influencing the reactivity.
- Ensure that the whole safety equipment is available, properly installed and fully functional. You must not change the position of safety equipment, bypass or disable it.
- If you are required to decommission safety equipment, for example for commissioning or maintenance works, you must complete measures ensuring that no dangerous situations may arise for persons and material assets. In this connection, comply with the superordinate operating instructions of the machine or system.
- Never remove or damage seals applied by Bosch Rexroth.
- The warranty is only applicable to the delivered configuration.
- The warranty will forfeit in case of wrong assembly, unintended use and/or improper handling.
- You must under no circumstances load the product mechanically in an admissible form. Never use the product as handle or step. Do not put objects on it.
- Do not switch on the system with uncoupled hoses.
- Exchange defective couplings immediately.
- Never try to connect coupling connections with force but always open the relief valve for relieving the system. Then, the connection can be established without problems.
- Never discharge the pressure by opening the hydraulic system (screw connections).
- Comply with the information regarding the pressure discharge in the project manual!

2.5.2 During transport

- ▶ Comply with the transport information on the packaging.
- ▶ Note the components' weight. 2 persons might be necessary to carry a component.

2.5.3 During the assembly

- Always ensure that the relevant system part is depressurised and de-energised before assembling the accumulator assembly.
- Pass the lines so that they are not damaged and do not constitute a tripping hazard.
- Before the commissioning you must ensure that all seals and locks of the plug-in connections are installed correctly and undamaged in order to prevent the penetration of liquids and foreign bodies into the product.
- During the assembly, you must guarantee extreme cleanliness in order to prevent the penetration of contaminations into the hydraulic lines causing wear and functional disorders in the product.

2.5.4 During the commissioning

- Ensure that the training system is depressurised before filling the diaphragm-type accumulator with nitrogen.
- Fill the diaphragm-type accumulator exclusively with nitrogen 99.99 vol. %. If it is filled with other gases - particularly air or oxygen - the diaphragm-type accumulator may explode.
- If the pressure in the gas bottle is higher than the accumulator's operating pressure (210 bar), a pressure reducing valve must be put in-between. At this valve, the max. admissible pressure is set. Otherwise, the diaphragm-type accumulator might explode.
- For filling the diaphragm-type accumulator with nitrogen, always use a filling and testing device according to RE 50154-B.
- Only commission a completely installed product.
- Ensure that the accumulator assembly is filled with the correct gas filling pressure.
- Comply with the project manuals of the training system.

2.5.5 During the operation

- Students and trainees may only work at the training system under the instruction of trainers or trained personnel.
- Only persons authorised by the operator may be granted access to the system's immediate operating area. This also applies during the system's standstill.
- In case of emergency, failure or of other irregularities, switch off the system and secure it against restart.
- Ensure that no line links, connections, and components are removed as long as the system is pressurised and energised. Ensure the system against restart.

2.5.6 During the cleaning

- Close all openings using appropriate protective equipment so that no detergent may enter the system.
- Never use solvents or aggressive detergents.
- Do not use high-pressure cleaners for the cleaning.
- Before using detergents, read up on their usability and possible dangers in the user information and the DIN safety data sheet.

2.5.7 During maintenance and repair

- The operator is obliged to subject the diaphragm-type accumulator to regular controls according to locally valid provisions. Ensure that you know which provisions or regulations must be complied with in your country and/or in connection with your application.
- Repairs at the accumulator assembly may only be performed by the manufacturer or their authorised dealers and branches. No warranty will be accepted for repairs that you have performed yourself.
- Perform the prescribed maintenance works in the time intervals described in the operating instructions of the whole system.
- If there are no other instructions, we recommend the maintenance intervals according to chapter 9.1 "Maintenance".
- Ensure that no line links, connections, and components are removed as long as the system is pressurised and energised or the diaphragm-type accumulator is under hydraulic pressure. Ensure the system against restart.
- Ensure the diaphragm-type accumulator against unintended fall down and rolling.
- For emptying the diaphragm-type accumulator, always use the filling and testing device according to RE 50154-B. Due to the uncontrolled release of filling gas, there is a risk of suffocation and of injury caused by entrained components. During the emptying, provide for an appropriate ventilation of the working room.
- For filling the diaphragm-type accumulator, always use the filling and testing device according to RE 50154-B.
- Fill the diaphragm-type accumulator exclusively with nitrogen 99.99 vol. %. If it is filled with gas not corresponding to the intended use, the diaphragm-type accumulator may explode.
- Ensure after completion of the repair works that the fluid connection has been re-connected properly and that the gas connection has been tightened and covered.

2.5.8 During the disposal

- Dispose of the product according to the national provisions of your country.
- Dispose of the hydraulic fluid according to the national provisions of your country.
- Dispose of the remains of the hydraulic fluid according to the respectively valid safety data sheets for hydraulic fluids.

2.6 Operator's Duties

- The operator must guarantee the necessary prerequisites for the set-up and the installation of the accumulator assembly and
  - provides for the safe set-up of the training system by their personnel and/or persons commissioned by them.
  - informs their employees and/or those of third companies about possible dangers at the place of installation.
  - makes sure that the accident prevention regulations, the safety regulations of the Accident Prevention and Insurance Association as well as other internal, local conditions are complied with.

- At the place of installation of the training system, the operator must provide for sufficient illumination.
- The operator of Bosch Rexroth's training system must regularly train their personnel with regard to the following topics:

  - Compliance with and use of the operating instructions as well as of the legal provisions
  - Intended operation of the accumulator assembly
  - Compliance with the instructions of the factory security officers and the operator's operating instructions
  - Behaviour in case of emergency

Bosch Rexroth offers you supporting measures for the training regarding special areas. For an overview of the training contents visit our website in the Internet under http://www.boschrexroth.de/didactic.

2.7 Safety Labels on the Hydraulic Accumulator

The diaphragm-type accumulator of the accumulator assembly shows the following labels:

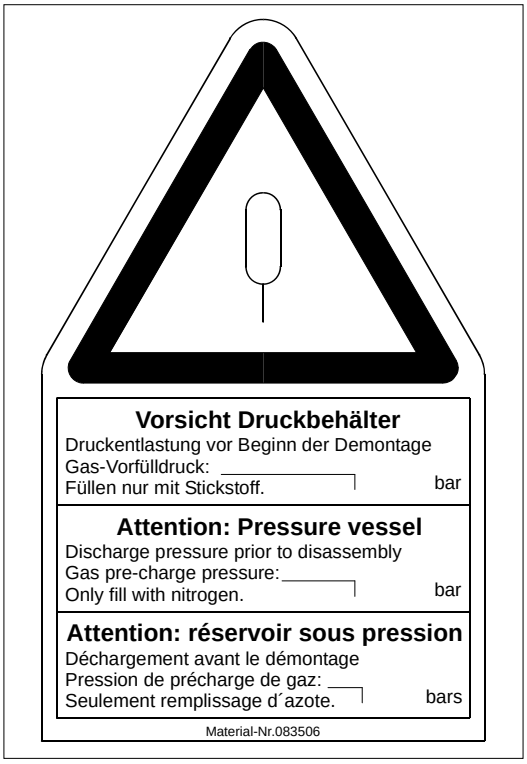

Fig. 1: "Caution pressure vessel" with gas pilot pressure before the commissioninge

No preload pressure is noted on the "Caution pressure vessel" label at the factory. This is set to 2 bar at the factory. When commissioning the accumulator assembly, the desired precharge pressure must be entered on the label (e.g. 15 bar).

The "Caution pressure vessel" label informs that

- the hydraulic accumulator is a pressure vessel,
- a pressure relief must be completed before the assembly,
- the diaphragm-type accumulator may only be filled with nitrogen.

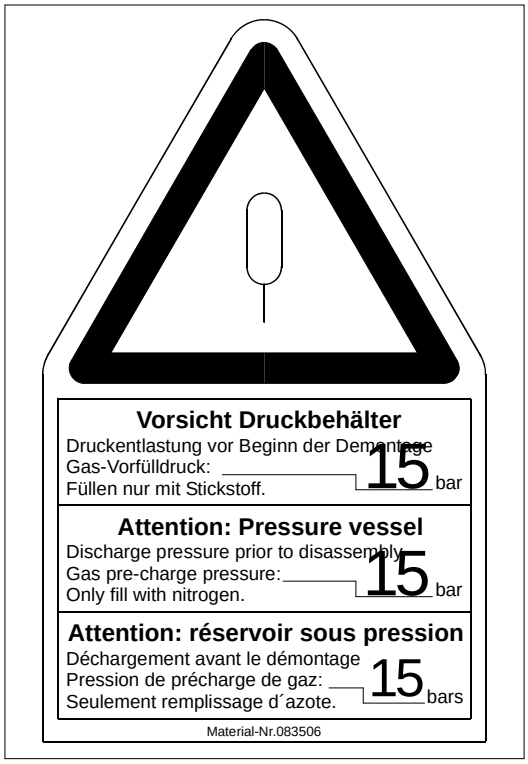

Fig. 2: Caution pressure vessel with gas pilot pressure after the commissioning

When commissioning the accumulator assembly, the set nitrogen pre-filling pressure (e.g. 15 bar) is entered on the label on the hydraulic accumulator.

The "Caution pressure vessel" label informs that

- the hydraulic accumulator is a pressure vessel,
- a pressure relief must be completed before the assembly,
- the diaphragm accumulator has been charged with a pilot pressure of 15 bar,
- the diaphragm accumulator may only be filled with nitrogen.

2.8 Safety Equipment

2.8.1 Pressure Limiting Valve

For protecting persons, the diaphragm-type accumulator is equipped with an accumulator safety block for protection, shut-off and relief. By means of the pressure limiting valve, the accumulator is protected from an inadmissible overpressure. The pressure limiting valve must not have any control tasks.

It must be ensured that the difference between the maximum operating pressure and the working pressure is sufficiently large. If possible, activation of the pressure limiting valve is to be avoided.

2.8.2 Personal Protective Equipment

- The operator must provide the personal protective equipment (like, e.g. gloves, working shoes, protective goggles, working clothing, etc.).

3 Scope of Delivery

The following is included in the scope of delivery:

- Accumulator assembly , completely assembled
- Operating instructions accumulator assembly

4 Product Description

4.1 Performance Description

The hydraulic accumulator is an accumulator assembly that has been modified for didactic purposes.

The accumulator assembly consists of the following components:

- 0.7 l diaphragm-type accumulator for p_{max} 210 bar
- Shut-off and safety block with sealed pressure protection 100 bar
- Shut-off valve, manual discharge valve, manometer, measuring point
- Quick lock couplings
- Fastening plate with handles

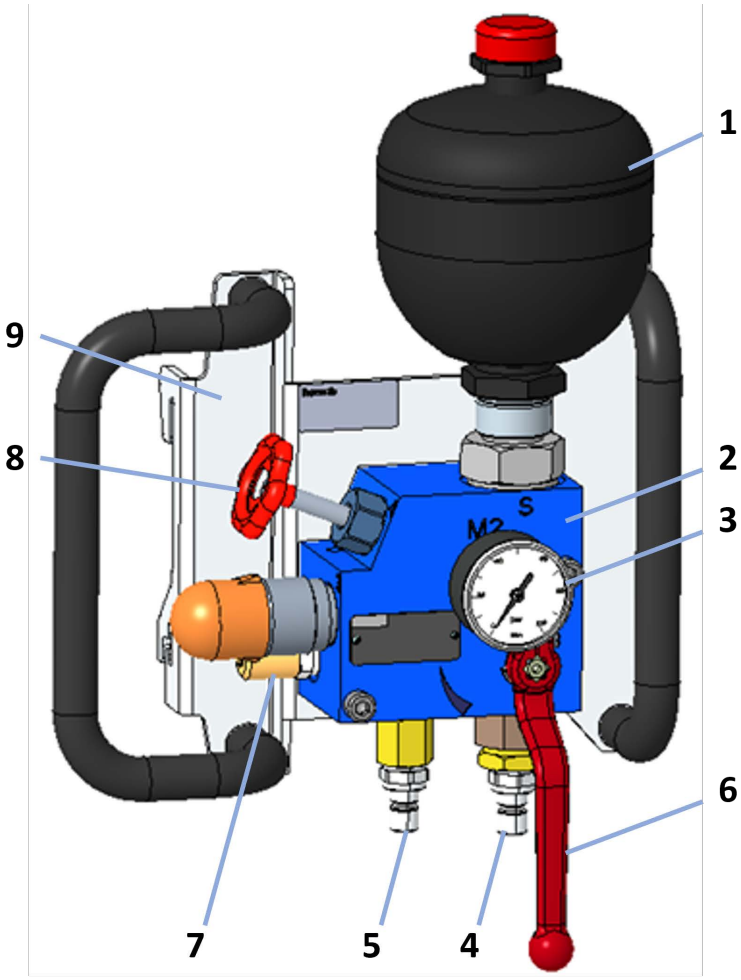

Fig. 3: Accumulator assembly DZ3.2 didactic hydraulic accumulator

1	Diaphragm-type accumulator	**6**	System shut-off cock
2	Shut-off and safety block	**7**	Measurement connection
3	Manometer	**8**	Relief valve with hand wheel
4	Quick lock coupling line "P"	**9**	Fastening plate with handles
5	Quick lock coupling pressure relief line "T"		

Diaphragm accumulators are intended for use in hydraulic systems. They serve the energy storage, pulsation dampening as well as the leakage oil or volume compensation. In the diaphragm accumulator, the high compressibility of gas is used.

4.2 Device Description

Diaphragm accumulator

Diaphragm accumulators consist of a pressure vessel of high-strength steel.

By means of an elastic diaphragm mounted inside the vessel, the accumulator is separated into a gas and a fluid side.

At the gas-side end of the vessel, there is a gas lock screw for filling and emptying the vessel with gas.

By increasing the operating pressure, fluid flows into the diaphragm-type accumulator and compresses the gas until the gas pressure corresponds to the

fluid pressure. When lowering the operating pressure, the gas re-expands and thus provides the hydraulic system with fluid.

On the fluid side, a plate integrated into the diaphragm prevents its damaging during emptying and/or in case the accumulator is only filled on the gas side.

For more detailed information regarding the operating conditions, connection dimensions, and performance limits refer to chapter 15 “Technical Data”.

Shut-off and safety block

The shut-off and safety block serves the protection and relief of the diaphragm accumulator. It considers the German safety provisions for the operation of hydraulic accumulators.

At the shut-off and safety block, there is a manometer for reading out the current oil pressure. By means of the hand wheel, the relief valve is opened manually.

4.3 Product Identification

The accumulator assembly can be identified by means of its type plate. The accumulator assembly may only be operated if the type plate is available and completely readable.

The following example shows the type plate of an accumulator assembly:

Fig. 4: Type plate accumulator assembly

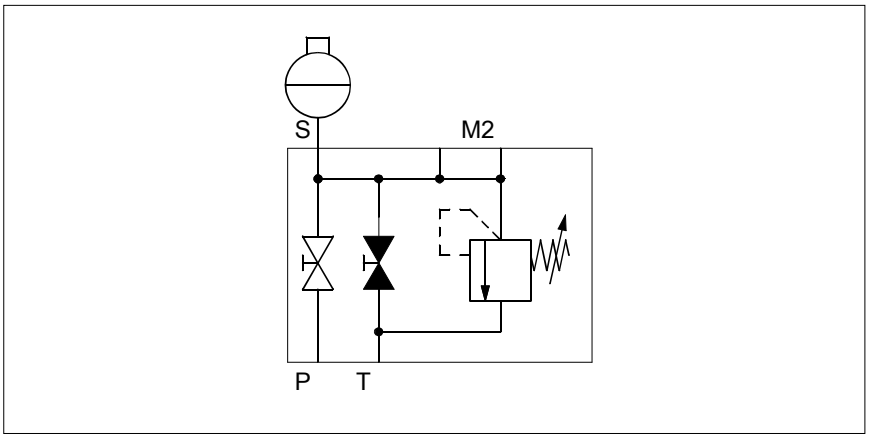

Fig. 5: Symbol accumulator assembly

5 Transport and Storage

When storing and transporting the assembly, you must in any case comply with the environmental conditions specified in chapter 15 “Technical Data”.

CAUTION!

Risk of injury!

The accumulator assembly may fall down during lifting.

- For transporting the accumulator assembly, wear safety shoes.

- Always open the packaging of the accumulator assembly from the top.
- Carefully lift the accumulator assembly out of the delivery cardboard box.
- Put the accumulator assembly on a flat surface with enough load-bearing capacity.

6 Assembly

CAUTION!

Risk of property damage and personal injuries!

For the assembly of the accumulator assembly, basic mechanical and hydraulic knowledge is necessary.

- The assembly of the hydraulic accumulator may only be performed under the supervision of qualified personnel (see "Personnel Qualification" in chapter 2 "General Safety Instructions").

Assembly Preparations Before the assembly, make yourself familiar with the hydraulic diagram.

Assembly

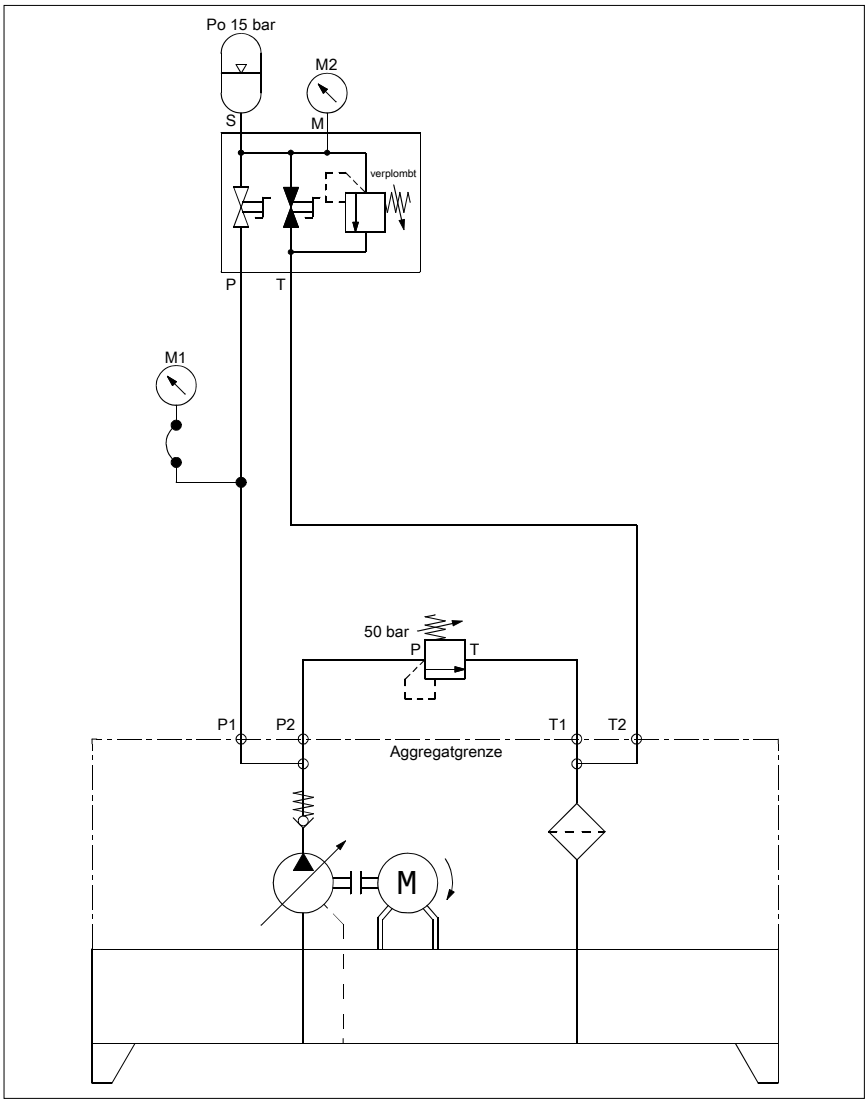

Fig. 6: Hydraulic diagram accumulator assembly

CAUTION!

Risk of property damage!

Punch or impact forces may damage the diaphragm accumulator.

- You must under no circumstances load the product mechanically.
- Never use the product as lever, handle or step.
- Do not put objects on it.

DANGER!

Danger of bursting!

Bursting of the diaphragm accumulator due to welding, soldering or other mechanical works may cause serious injuries.

- Do not carry out any mechanical works or welding or soldering works at the diaphragm accumulator.

For an unobjectionable performance of the assembly:

- all necessary components must be within reach and in a functional condition,
- the lighting conditions at the training system must be sufficient.

Attaching the accumulator assembly

In order to safely attach the accumulator assembly to the grid of the training system, you must proceed as follows:

- Safely grip the accumulator assembly with both hands.
- Guide at an angle to the grid until the holding plate the cross rod of the fixing grid.
- lower (lower mounting aligns itself in the process)
- Check that the exercise components are holding securely.

The accumulator assembly is now safely attached to the raining system.

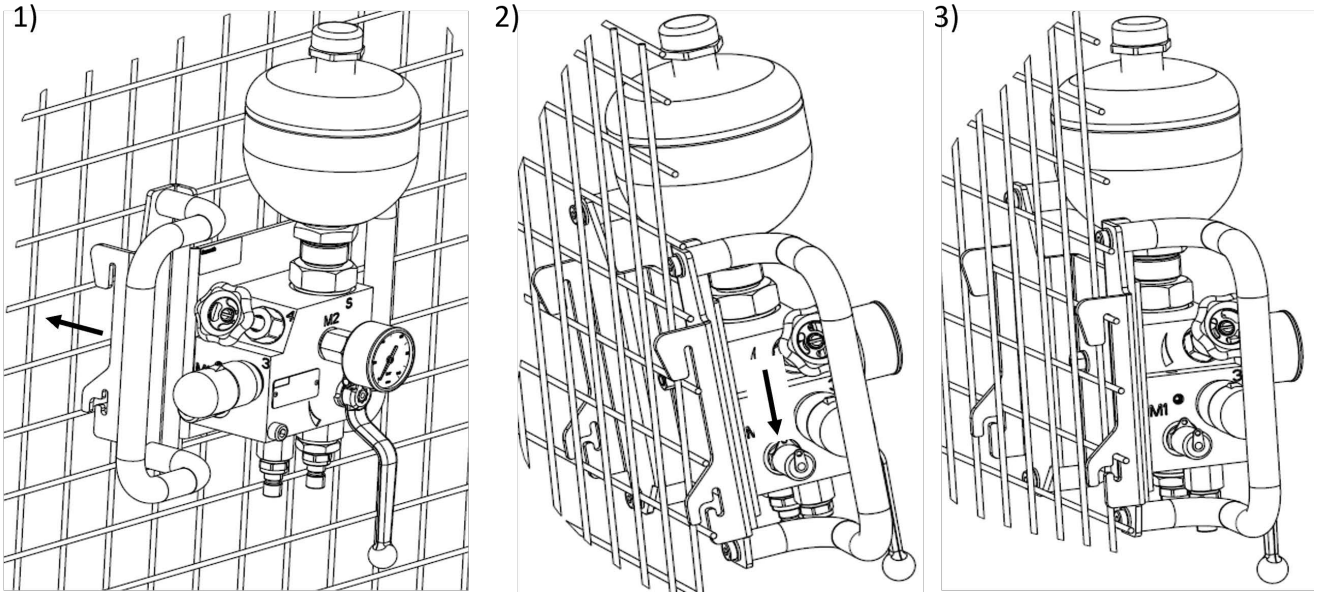

Fig. 7: Accumulator assembly in the grid of the training system

7 Commissioning

CAUTION!

Risk of property damage and personal injuries!

For the commissioning of the accumulator assembly , basic mechanical and hydraulic knowledge is necessary.

- The assembly of the hydraulic accumulator may only be performed under the supervision of qualified personnel (see "Personnel Qualification" in chapter 2 "General Safety Instructions").

For commissioning the diaphragm-type accumulator, you need the filling and testing device according to RE 50154-B (Mat.nr.: 0538103012) by Bosch Rexroth.

7.1 Commissioning Preparation

The examination before the commissioning as well as the recurring examinations are to be performed according to the national rules.

- Ensure that the pressure accumulator is undamaged.
- Ensure that the fluid used in the hydraulic system complies with the specifications in chapter 15 “Technical Data”.
- Ensure that the operating temperatures lie within the limits specified in chapter 15 “Technical Data”.
- Put out the Bosch Rexroth filling and testing device according to RE 50154-B.

7.2 Initial Commissioning

CAUTION

Risk of property damage

The accumulator's diaphragm will be damaged if before setting the pilot pressure, the oil side of the hydraulic accumulator will be operated under pressure.

- Please note that the pressure of the gas bottle must not be higher than the operating pressure of the diaphragm-type accumulator. If necessary, use a pressure reducer.
- Always check the pilot pressure before putting the oil side of the accumulator under pressure.

Setting the pilot pressure

In order to commission the hydraulic accumulator, proceed as follows:

In each commissioning, the diaphragm-type accumulator must be brought to the prescribed pilot pressure of 15 bar.

For setting the pilot pressure, proceed as follows:

- Ensure that the training system is depressurised.

DANGER!

Risk of injury and suffocation!

Risk of suffocation due to the uncontrolled release of larger gas quantities and risk of injury due to entrained components.

- Provide for an appropriate ventilation at the workplace.
- For checking the pilot pressure, always use a filling and testing device.

- Screw the filling and testing valve for pressure accumulators to the gas valve of the diaphragm-type accumulator. In this connection, comply with the operating instructions of the filling and testing device.

DANGER!

Danger of explosion!

Danger of serious injuries caused by explosion of the hydraulic accumulator during filling of the hydraulic accumulator with inadmissible gas or too high pressure in the gas bottle.

- If the pressure in the gas bottle is higher than the accumulator's operating pressure, put a pressure reducing valve in-between.
- For filling the accumulator, only use nitrogen 99.99 %.

- Connect the gas bottle with the hose of the filling and testing device with the filling valve. If the pressure in the gas bottle is higher than the accumulator's operating pressure (210 bar), a pressure reducing valve must be put in-between. At this valve, the max. admissible pressure is set. Otherwise, the diaphragm-type accumulator might explode.
- Open the shut-off cock of the gas bottle and the filling device until the intended pilot pressure of 15 bar is shown at the filling valve's manometer. Keep an eye on the manometer at any time during the filling.
- Close the shut-off cock of the gas bottle and the filling device.
- The pilot pressure depends on the temperature. During the filling, the hydraulic accumulator warms up. Wait until the accumulator has cooled down.
- Check the pilot pressure p_0 and correct it, if necessary.
- Enter the set pilot pressure of 15 bar on the "Caution pressure vessel" label.

The pilot pressure is now checked and set.

Connecting the accumulator assembly hydraulically

- Connect T accumulator with T2 at the P/T distributor.
- Connect P accumulator with P2 at the P/T distributor.

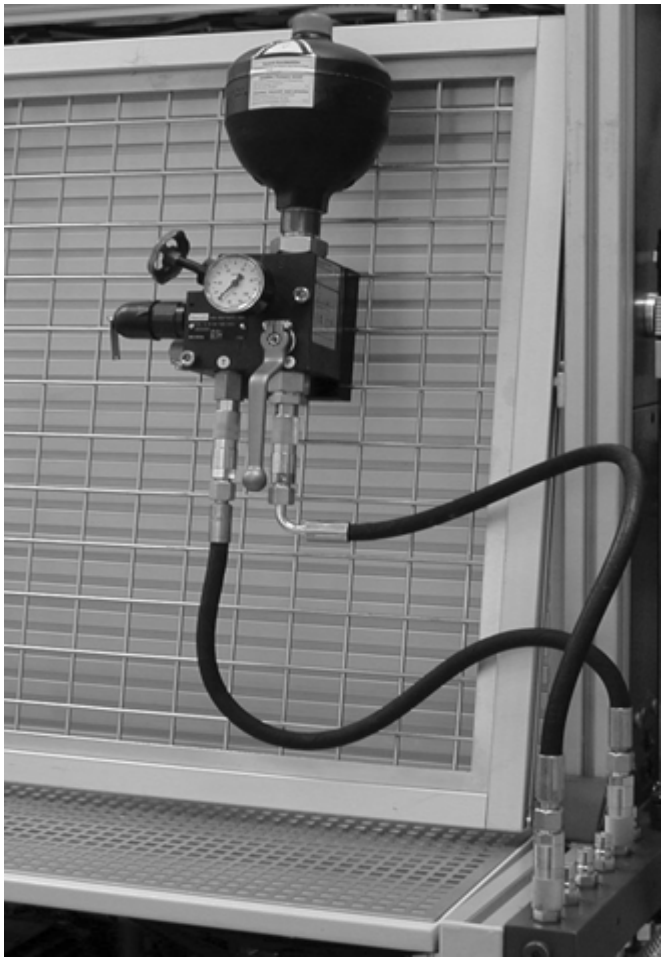

Fig. 8: Arrangement of the line connection (actual product picture may differ)

Commissioning the accumulator assembly

Commission the accumulator assembly according to the project manual specifications and RE 50154-B.

7.3 Recommissioning after Standstill

- Check whether the pilot pressure corresponds to the intended value of 15 bar. For doing so, proceed as described in chapter 9.1 "Maintenance".
- Check the oil valve for tightness.
- Make sure that there are no signs of corrosion visible at the accumulator assembly.
- Commission the accumulator block according to the project manual specifications.

8 Operation

The accumulator assembly may only be operated if it is in an unobjectionable condition.

WARNING!

Risk of property damage and personal injuries!

Danger of bursting and explosion due to safety equipment at the accumulator assembly that does not function.

- ▶ Ensure that the T connection of the accumulator assembly is connected to the "T" P/T distributor.

CAUTION!

Risk of property damage and personal injuries!

Wrongly set-up circuits and faulty operations may cause property damage and personal injuries.

- ▶ The accumulator assembly may only be used for project exercises specified in the project manuals.

Before the Exercise

Before the set-up of exercises, the following is to be observed:

- Circuits may only be assembled and disassembled if they are depressurised.
- Do not use any force!
- In case of blocked couplings, move directional valves in both directions several times and open the relief valve in order to discharge remaining pressures that might still be locked in.

After completion of the exercise

After the termination of exercises, the following is to be observed:

- Reduce the load.
- Move directional valves in both directions several times in order to discharged remaining pressures that are still locked in.
- Empty the diaphragm-type accumulator by opening the relief valve.
- Switch-off the pump.
- Complete the control: 0 bar in P, A, B by means of a manometer.

If during the operation irregularities, deviations, failures and wear occur, the following must be done in any case:

- The training system must be decommissioned immediately.
- The cause must be determined and the defect must be removed.
- The defective component must be exchanged.

9 Maintenance and Repair

Maintenance The accumulator assembly may only be assembled, maintained and repaired by the manufacturer or their authorised dealers and branches. No warranty will be accepted for repairs that you have performed yourself!

Closing openings For the transport, close all openings using appropriate protective caps and/or equipment so that contamination or humidity cannot enter into the hydraulic accumulator.

9.1 Maintenance

Insufficient maintenance will cause malfunctions, possibly failures and high repair costs.

If during the operation or during the test irregularities, deviations, failures and wear occur, the following must be done in any case:

- The whole training system must be decommissioned immediately.
- The cause must be determined and the defect must be removed.
- The defective component must be exchanged.

WARNING!

Slipping hazard!

Slipping may cause serious injuries. When removing covers, residual oil may leak in a pressureless form.

- ▶ Before filling, refilling or exchanging oil, prepare a binding agent.
- ▶ Absorb leaking residual oil immediately.

WARNING!

Risk of poisoning and injury due to leaking hydraulic medium!

Contact with hydraulic fluids will cause damage to health (e.g. eye injuries, skin damage, poisoning in case of inhaling).

- ▶ Wear protective gloves, protective goggles and suitable working clothes.
- ▶ Consult a doctor immediately if the hydraulic fluid contacts your eyes or your skin nevertheless.
- ▶ Always check the lines for wear and/or damage before each commissioning.

DANGER!

Risk of injury and suffocation!

Hydraulic accumulators are energy accumulators. Risk of suffocation due to the uncontrolled release of larger gas quantities and risk of injury due to entrained components.

- ▶ Ensure before the beginning of maintenance and repair works that the fluid side of the training system is depressurised.
- ▶ Provide for an appropriate ventilation at the workplace.
- ▶ For checking the pilot pressure, always use a filling and testing device.

After having been filled with gas, the accumulator assembly is largely maintenance-free. For ensuring failure-free working and a long life time, the following works have to be performed:

- Checking the pilot pressure
- Checking safety equipment, fittings
- Checking the line connection
- Checking the accumulator attachment

Checking intervals

Table 2: Checking intervals accumulator assembly

Inspection	Interval	Maintenance activity
Checking the pilot pressure of 15 bar with external visual inspection	Inspection 1: Within one week after commissioning	Checking the pilot pressure, checking the oil valve tightness, visual inspection corrosion protection
	Inspection 2: Within 3 months after commissioning – if no gas loss in inspection 1	
	Inspection 3: Annual inspection – if no gas loss in inspection 2	
Visual inspection inside of the diaphragm-type accumulator	Every ten years	Inspection of the pressure vessel according to national provisions

Checking the pilot pressure

For checking the pilot pressure of the hydraulic accumulator, proceed as follows:

- ▶ Ensure that the training system is depressurised.

DANGER!

Risk of injury and suffocation!

Hydraulic accumulators are energy accumulators. Risk of suffocation due to the uncontrolled release of larger gas quantities and risk of injury due to entrained components.

- ▶ Ensure before the beginning of maintenance and repair works that the fluid side of the training system is depressurised.
- ▶ Provide for an appropriate ventilation at the workplace.
- ▶ For checking the pilot pressure, always use a filling and testing device.

- ▶ Screw the filling and testing valve for pressure accumulators to the gas valve of the hydraulic accumulator. In this connection, comply with the operating instructions of the filling and testing device.
- ▶ Check whether the pilot pressure shown at the manometer of the filling and testing device is 15 bar and adjust it, if necessary, as described in chapter 7.2 “Initial Commissioning”.
- ▶ Remove the filling and testing valve for pressure accumulators from the gas valve of the hydraulic accumulator.

The pilot pressure has now been checked.

Exchanging Parts

Use only original spare parts.

When ordering spare parts, please always state device type and material number, year of construction and parts designation.

Please contact the Bosch Rexroth customer service.

For the "Address and contact data", please refer to the back side of these operating instructions.

After removing the wear and before recommissioning, the following is to be checked by a qualified expert:

- ∉ the orderly performance of the work(s).
- ∉ the unlimited operational readiness of the training system.

10 Decommissioning

For information regarding the decommissioning of the training system please refer to the project manuals.

11 Disassembly and Exchange

After termination of the exercises, the accumulator assembly must be depressurised on the oil side and the relief valve must be opened before the disassembly of the exercise set-up. The information in the project manuals is to be complied with.

Disassembly

- ▶ Ensure that the training system has been depressurised.

GANGER!

Risk of injury and suffocation!

Hydraulic accumulators are energy accumulators. Risk of suffocation due to the uncontrolled release of larger gas quantities and risk of injury due to entrained components.

- ▶ Ensure before the beginning of maintenance and repair works that the fluid side of the training system is depressurised.
- ▶ Provide for an appropriate ventilation at the workplace.
- ▶ For checking the pilot pressure, always use a filling and testing device.

- ▶ For the pressure relief open the manual discharge (hand wheel) at the accumulator assembly as long as the manometer at the accumulator assembly shows 0 bar. Otherwise, the oil will remain under pressure, locked in the system.
- ▶ The pilot pressure depends on the temperature. During the emptying, the hydraulic accumulator cools down. Wait until the accumulator has reached ambient temperature again.
- ▶ Discharge the pilot pressure that has built up in the accumulator during the warming.

WARNING!

Risk of poisoning and injury due to leaking hydraulic medium in case of disassembly under pressure!

Contact with hydraulic fluids will cause damage to health (e.g. eye injuries, skin damage, poisoning in case of inhaling).

- Never use force to open the quick lock couplings.
- Do not open the pressure relief socket.
- Wear protective gloves, protective goggles and suitable working clothes.

- Disassemble the hose lines.
- Grip the accumulator assembly securely with both hands.
- Turn the component away from the grid and lift it at the same time.
- Release the component from the grid at an angle.

The accumulator assembly has been disassembled.

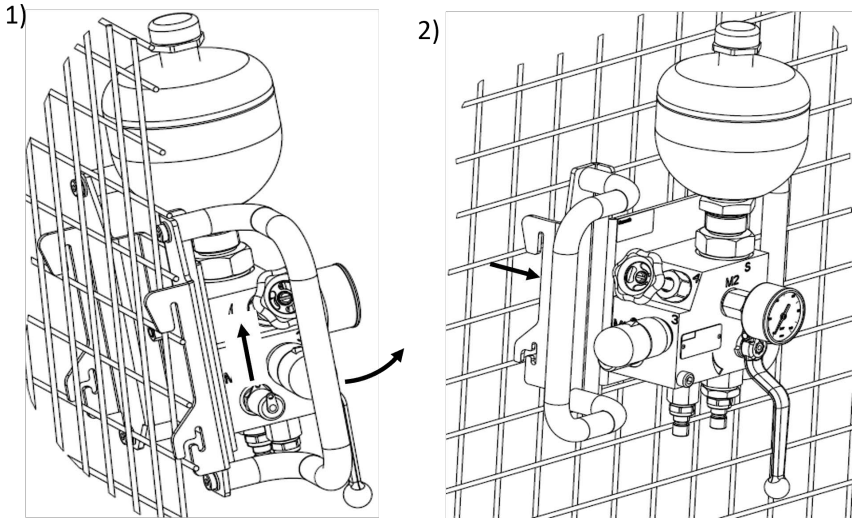

Fig. 9: Unhinge the accumulator assembly

12 Disposal

12.1 Environmental Protection

Store leaked and used operating and auxiliary materials as prescribed and dispose of them according to the legal provisions.
In case of doubt, obtain information regarding the type of storage and disposal from the respective material manufacturer and/or material supplier.

13 Extension and Conversion

Conversion or extension of the accumulator assembly is not admissible. As a consequence of any mechanical work at the accumulator assembly, the further operation will be prohibited.

14 Troubleshooting

Proceed in a systematic and targeted way even if you are under time pressure. At worst, random, inconsiderate disassembling and adjustments of set values may lead to the inability to determine the original error cause. Get a general idea of the product's function in connection with the whole training system.

Try to clarify whether the product has performed the required function in the total system before the error occurred.

Try to detect changes in the total system in which the product has been installed:

- Have the conditions of use or the area of use of the product been changed?
- Have changes (e.g. conversions) or repairs been carried out at the training system (machine/system, electrical systems, control) or at the product? If yes: Which ones?
- Has the product or the machine been operated as intended?
- How does the failure show?

Table 3: Failure list accumulator assembly

Failure	Cause	Remedy
The accumulator oil pressure cannot be increased	The relief valve is opened	Close the relief valve
	The shut-off valve is closed	Open the shut-off valve
The accumulator withdrawal quantity is too low	The gas charging is not 15 bar	Set the gas charging to 15 bar
	The accumulator's diaphragm is defective	Exchange the accumulator diaphragm
	The oil pressure is too low	Increase the oil pressure
The accumulator loading process is very short	The gas charging is not 15 bar	Set the gas charging to 15 bar
	The accumulator's diaphragm is defective	Exchange the accumulator diaphragm
Oil leakage when opening the lock screw on the gas side	The accumulator's diaphragm is defective	Exchange the accumulator diaphragm
Manometer shows oil pressure in the disassembled accumulator assembly	The hose lines have accidentally disassembled under pressure	**In this case, the quick lock couplings must under no circumstances be opened using force or the pressure relief socket. This may result in an uncontrolled and dangerous oil leakage.** Ask for the help of a hydraulic expert. Discharge can only be effected via the measurement connection. For this purpose, a measurement hose must firstly be connected at the return connection T at the P/T distributor in a pressureless form. Then, connect the measurement hose at the measurement connection of the accumulator assembly and discharge the accumulator until the manometer shows 0 bar.

15 Technical Data

General

Table 4: Technical data, general, accumulator assembly

Designation	Unit	Value
Weight	kg	ca. 10
Installation position		any
Kind of fastening		Hooking into a 50x50 grid
Ambient temperature range	°C	15 - 30
Line link		Quick lock couplings

Hydraulics

Table 5: Technical data, hydraulics, accumulator assembly

Designation	Unit	Value
Nominal volume diaphragm-type accumulator	l	0,7
Max. admissible operating pressure	bar	210
Hydraulic fluid		Hydraulic oil HLP22/46
Hydraulic fluid temperature range	°C	20-40

Pneumatics

Table 6: Technical data, pneumatics, accumulator assembly

Designation	Unit	Value
Filling gas		Use only nitrogen!
Effective gas volume	l	0,7
Filling pressure for transport	bar	2
Pilot pressure p_0	bar	15

16 Annex

16.1 Address Directory

For the addresses of our local representations refer to
www.boschrexroth.com/adressen

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