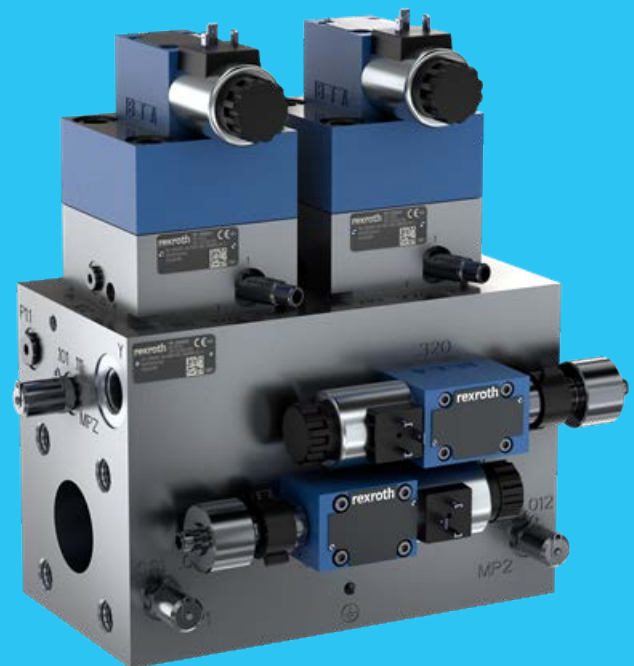


STO manifolds

Type STOM



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

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The cover shows an example 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:

- STO manifolds, type STOM

This documentation is intended for assemblers, machine and system end-users as well as machine and system manufacturers.

This documentation contains important information on how to transport, assemble, commission, operate, use, maintain, dismantle and dispose of the product safely and properly and how to rectify simple faults yourself.

- ▶ Read this documentation thoroughly, and in particular chapter 2 "Safety instructions" and chapter 3 "General information on damage to property and damage to product", before handling the product.

1.2 Required and additional 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 additional documentation

Title	Document number	Document type
 STO manifolds, type STOM	62340	Data sheet
 Type-specific hydraulic circuit diagram	-	Hydraulic circuit diagram
 Type-specific installation drawing	-	Overall drawing
 Type-specific parts list	-	Parts list
General product information on hydraulic products	07008	Data sheet
Assembly, commissioning and maintenance of hydraulic systems	07900	Data sheet
Hydraulic valves and hydroelectric pressure switches for industrial applications; on/off valves, continuous control valves, pressure switches	07600-B	Operating instructions
Installation, commissioning and maintenance of industrial valves	07300	Data sheet
Hydraulic fluids based on mineral oils and related hydrocarbons; application notes and application requirements for Rexroth hydraulic components	90220	Data sheet
Flame-resistant, water-free hydraulic fluids (HFDR/HFDU); application notes and requirements for Rexroth hydraulic components	90222	Data sheet
Reliability characteristics MTTFd regarding the functional safety according to EN ISO 13849	08012	Data sheet
Check valve, M-SR	20380	Data sheet
Check valve, pilot operated; type SV and SL	21468	Data sheet
2/2, 3/2 and 4/2 directional seat valve with solenoid actuation; type M-SED	22049	Data sheet
Directional spool valves, direct operated, with solenoid actuation; type WE	23178	Data sheet
2-way cartridge valve, actively controllable; type LC2A, series 1X	21040	Data sheet

Title	Document number	Document type
2-way cartridge valves, actively controllable; type LC2A, series 2X	21071	Data sheet
2-way cartridge valve, actively controllable; type LC2A016...125	21040-MON	Assembly instructions
2-way cartridge valves, directional functions; type LC (cartridge valves), type LFA (control cover), series 7X	21010	Data sheet
2-way cartridge valves; type LC (cartridge valves), series 8X	21004	Data sheet
On/off valves with spool position monitoring, directional valves	24830	Data sheet
Pressure transducer for hydraulic applications; type HM20	30272	Data sheet
Pressure transducer for hydraulic applications; type HM20-2x	30272-B	Operating instructions

The STO manifold is a machine/system component.

- ▶ Also observe the instructions for the other machine/system components and the machine/system manufacturer's documentation for the machinery/system.

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 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
<p>Type and source of danger</p> <p>Consequences in case of non-compliance</p> <ul style="list-style-type: none"> ▶ 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.	Numbered instruction: The numbers indicate that the actions must be carried out one after the other.
2.	
3.	

1.3.3 Abbreviations

The following abbreviations are used in this documentation:

Table 4: Abbreviations

Abbreviation	Meaning
ANSI	American National Standards Institute
CCF	Caused Common Failure
EMC	Electro-magnetic Compatibility
PE	Protective Earth (protective grounding conductor)
QR	Quick Response
RE	R exroth document in E nglish language
REXXXX-B	R exroth operating instructions in E nglish language
SDE	Safe De-Energizing (safe pressure relief)
SLS	Safely Limited Speed (safe reduced velocity / safe reduced flow)
STO	Safe Torque Off (safe energy separation)

1.3.4 Designations

The following designations are used in this documentation:

Table 5: Designations

Designation	Meaning
Non-pressure-resistant closure elements	Closure elements to be removed for protection against dust, dirt and leaks, such as plastics protective caps, sheet metal flange covers, magnetic plates, cork and cardboard covers, foils
Pressure-resistant closure elements	Closure elements remaining on the product for auxiliary bores or for unneeded ports, such as plug screws, blind flanges, cover plates

2 Safety instructions

2.1 About this chapter

The STO manifold has been manufactured according to the generally accepted codes of practice. 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 completely and thoroughly before working with the STO manifold.
- ▶ Keep this documentation in a location where it is accessible to all users at all times.
- ▶ Always include the required documentation when you pass the STO manifold on to third parties.
- ▶ Additionally, please observe the safety instructions for the machinery/system.

The safety information in these instructions refers only to the scope of delivery. Due to the interaction between the STO manifold and the machinery/system, the installation of the STO manifold into the machine/system involves additional hazards. This applies in particular to the influence of hydraulic and electric controls on hydraulic drives generating mechanical movements. It is therefore essential for the manufacturer of the machinery/system to have undertaken an independent risk assessment. Furthermore, the manufacturer must on this basis have prepared operating instructions for the complete machinery.



These operating instructions do not serve as replacement of the operating instructions of the machinery/system.

2.2 Intended use

2.2.1 Information on the use of the product

The product is a hydraulic manifold. It is designed for use in industrial machines and systems as a shut-off block in the hydraulic pressure supply (> 100 l/min) with different safety functions (STO, SDE, SLS).

You may use the product to control movement on machines and systems in compliance with the operating and environmental conditions and the specified performance limits in accordance with data sheet 62340, see chapter 1.2 "Required and additional documentation".

You must only use the product in its original state without damage.

The product is intended only for professional use and not for private use.

Intended use also means that you have fully read and understood this documentation and in particular chapters 2 "Safety instructions" and 3 "General information on damage to property and damage to product".

2.2.2 Classification according to Directive 2006/42/EC

The STO manifold is a safety-related component intended only to be incorporated into or assembled with machinery or partly completed machinery to form, together with them, a machine within the meaning of Directive 2006/42/EC. The STO manifold is neither a machine, nor a safety component, nor a partly completed machinery in terms of Directive 2006/42/EC - article 2.

The STO manifold must be commissioned only if it is integrated in the machine/system for which it is designed, and only if this machine/system fully complies with the basic safety and health requirements of Directive 2006/42/EC.

2.2.3 Information on the use of hydraulic fluids

STO manifolds from Rexroth are usually developed and approved for operation with hydraulic fluids of category HLP.



When using flame-resistant, water-free hydraulic fluids, for example, of the HFDU categorie, the application notes and application requirements contained in data sheet 90222 must be observed.

For the release of the specific STO manifolds for the application with corresponding hydraulic fluids, refer to data sheet 62340, see chapter 1.2 "Required and additional documentation".

2.3 Improper use

Any use deviating from the intended use is improper and thus not admissible.

Improper use of the product includes:

- Use in potentially explosive environments
- Use under aggressive or corrosive environmental conditions

Use in safety applications other than those specified in chapter 2.2.1 is not permitted and must be tested separately.

Bosch Rexroth AG does not assume any liability for damage caused by improper use. The user assumes all risks involved with improper use.

2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of mechanics, electrics 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 expert knowledge.

Expert knowledge means for example for hydraulic products:

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

The installation of STO manifolds requires additional expertise for the assembly of screw connections in pressurized systems in critical applications according to EN 1591-4.



Bosch Rexroth offers training measures in specific fields. An overview over the training contents can be found online 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 be under the influence of alcohol, drugs or pharmaceuticals that may affect their ability to react.
- Only use accessories and spare parts approved by the manufacturer in order to exclude hazards to persons due to unsuitable spare parts.
- Comply with the technical data and environmental conditions specified in the product documentation.
- The installation or use of inappropriate products in safety-relevant applications could result in unintended operating conditions when being used 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, for example, 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 or system) in which the Rexroth product is installed complies with the country-specific provisions, safety regulations and standards of application.
- Never remove or damage lead seals that have been fitted at the factory.
- Ensure that all safety equipment included in the scope of delivery is present, has been installed properly and is functional. You must not suppress or disable position switches on the valve.

2.6 Product- and technology-dependent safety instructions

The following safety instructions apply to chapters 6 to 16.

WARNING

Pressurized machine/system parts, e.g. accumulator, cylinder!

Danger to life and risk of serious injury when working on machines/systems that have not been shut down! Damage to property!

- ▶ Only use authorized specialist personnel for maintenance and troubleshooting.
- ▶ Before working on the hydraulic product, ensure that all parts of the machine/system are depressurized and that the electrical control is de-energized.
- ▶ Do not disconnect, open, or cut any pressurized lines or dismantle any pressurized components.
- ▶ Protect the machine/system against unintended re-activation.

Leakage of (pressurized) hydraulic fluid and oil mist!

Danger to life! Risk of injury! Explosion hazard! Risk of fire! Environmental pollution! Damage to property!

- ▶ Switch the machine/system off immediately (emergency stop switch).
- ▶ Identify and eliminate the leakage (cracks or fractures on the STO manifold or on assembled components).
- ▶ Never try to stop or seal the leakage or the oil jet using a cloth.
- ▶ Avoid direct contact with the leaking hydraulic fluid.
- ▶ Carry out regular visual inspections for leak-tightness of the STO manifold and the oil-carrying components.
- ▶ Wear your personal protective equipment, see chapter 2.7.
- ▶ Keep open fire and ignition sources away from the STO manifold.
- ▶ Do not use STO manifolds in areas with open fire and use them only at a sufficient distance to hot heat sources.
- ▶ When dealing with hydraulic fluids, you must imperatively observe the manufacturer's information.

Ejection of parts due to component failure caused by impermissibly high pressure in the machine/system!

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

- ▶ Use an overpressure element, e.g. a pressure relief valve, to limit the maximum admissible pressure in the machine/system.
- ▶ Ensure that these pressure relief valves are correctly set and verify reliable pressure relief before commissioning the machine/system.
- ▶ Lead the tank line to the tank freely, without reduction of the cross-section and blocking.
- ▶ Use hydraulic lines and connections in accordance with the maximum operating pressure.


WARNING
High electrical voltage for STO manifolds with add-on components with a supply voltage!

Danger to life! Risk of injury caused by electric shock!

- ▶ STO manifolds must be electrically connected only by a specialized electrician or under their supervision.
- ▶ Observe the requirements of the Low-Voltage Directive and other relevant standards, e.g. IEC 61140, NFPA.
- ▶ Observe the country-specific requirements.
- ▶ For connection, observe the data sheets for the associated surface-mounted and add-on components.
- ▶ Use suitable plug-in connectors and cables.
- ▶ Switch off the voltage supply before all maintenance, repair or installation works and secure it against restarting.
- ▶ Provide for proper, safe PE connection.
- ▶ Only use power supply units with safe voltage separation.
Safe isolation can be achieved with isolation transformers, safe optocouplers or mains-free battery operation.

Incorrect control or unexpected startup when safety functions are bypassed or functional safety is not observed or in the event of mechanical and electric faults, e.g. failure of the energy supply!

Danger to life! Risk of injury! Danger of entanglement, ejection or crushing of persons!

- ▶ When setting up your circuit, observe functional safety according to EN ISO 13849 as well as any relevant product standards.
- ▶ Mount emergency stop devices, safety doors, optical safety equipment such as light barriers, light grids, light curtains and/or a two-hand control device.
- ▶ Immediately replace defective safety-related components.

Malfunctions or uncontrolled machine movements due to lack of equipotential bonding!

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

- ▶ Provide for correct grounding and proper equipotential bonding.

Valve malfunction and/or unexpected machine/system movement due to ingress of water and humidity!

Risk of injury! Damage to property!

- ▶ Use the STO manifold only within the intended IP protection class or lower.
- ▶ Before assembly, ensure that all seals and caps of the plug-in connections are tight and intact.

 **WARNING****Malfunctions, e.g. overheating of the valve solenoids, and/or unexpected machine/system movements if the maximum temperatures are exceeded!**

Risk of injury!

- ▶ Use the hydraulic valves only within the specified ambient and hydraulic fluid temperatures.

Incorrect or faulty input/output signals of the safety-relevant valves (functional safety)!

Danger to life! Risk of injury!

- ▶ Use only EMC-compliant components throughout the machine/system.
- ▶ Observe the requirements for EMC-compliant wiring (screening, etc.).

Leakage at the hydraulic valves in case of incorrect working temperatures!

Risk of injury from escaping hydraulic fluid jet! Damage to property!

- ▶ Use the STO manifolds only within the specified ambient and hydraulic fluid temperatures.
- ▶ In case of leakage, immediately exchange damaged seal rings and/or the hydraulic valve.

 **CAUTION****Leaked hydraulic fluid, oily surfaces!**

Risk of injury! Slip hazard! Environmental pollution! Damage to property!

- ▶ Secure and mark the danger zone.
- ▶ Immediately remove leaked hydraulic fluid and dispose of it properly.
- ▶ Do not remove the non-pressure-resistant closure elements of the hydraulic connections until shortly before installation.
- ▶ After disassembly, fit the hydraulic connections with suitable closure elements, see Table 5.
- ▶ Wear the personal protective equipment prescribed for your activity.
- ▶ Carry out a visual inspection for leakage.

Contact with hydraulic fluid!

Health hazard/impairment of health, e.g. eye injuries, skin lesions, intoxication upon inhalation or due to swallowing, sensitization!

- ▶ Avoid contact with hydraulic fluids.
- ▶ When working with hydraulic fluids, it is imperative to observe the safety instructions of the hydraulic fluid manufacturer.
- ▶ Wear your personal protective equipment, see chapter 2.7.
- ▶ If hydraulic fluid nevertheless comes into contact with the eyes or gets into the bloodstream or is swallowed, consult a doctor immediately.

 **CAUTION**

High noise pollution due to resonance or fluid noise!

Danger of hearing damage (temporary/permanent), stress/loss of attention!
Disturbance of voice communication and acoustic signals!

- ▶ Wear your ear protection.
- ▶ Consult the machine/system manufacturer or Bosch Rexroth to establish whether a malfunction exists.

Uncontrolled movement or malfunction of the actuated cylinder or motor due to ingress of dirt, foreign particles, contamination and metal particles!

Risk of injury!

- ▶ Install the STO manifold only in a clean environment.
- ▶ Do not remove the non-pressure-resistant closure elements until shortly before assembly.
- ▶ Make sure that no dirt gets into the hydraulic system.

Hot surfaces on hydraulic valves and valve solenoids of an STO manifold!

Risk of injury! Risk of burning!

- ▶ Avoid contact with the hydraulic valves and their solenoids during operation. During or after operation, temperatures may rise to values higher than 70 °C, depending on the operating conditions.
- ▶ Allow hydraulic valves to cool down before touching them or wear heat-resistant protective gloves.
- ▶ If necessary, attach protective covers.

Unexpected machine/system movements due to malfunctions, e.g. sticking or clogging of nozzles or components on the STO manifold due to contaminated hydraulic fluid!

Risk of injury!

- ▶ Ensure adequate hydraulic fluid cleanliness according to the cleanliness classes of the hydraulic valve over the entire operating range.
- ▶ Replace the filter elements according to the maintenance schedule or as required.
- ▶ If necessary, flush the machine/system.

Improperly laid lines and cables!

Risk of stumbling!

- ▶ Lay cables and lines so that nobody can trip over them.
- ▶ Fasten cables and lines in order to prevent them from getting loose during vibrations.

2.7 Personal protective equipment

The following personal protective equipment must be worn for all work on the product, e.g. installation, commissioning, operating and maintenance work as well as when installing and removing the STO manifolds:

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

2.8 Information of the machine/system manufacturer

The machine/system manufacturer must provide the following information:

- The intended use for which the machine/system is designed
- The frequency of inspection and functional testing of the protective devices and the indicators
- The necessary maintenance of the safety devices
- The procedures required for maintenance and/or repair, especially if safety equipment has been rendered ineffective
- A list of safety-relevant components, which must not be modified or replaced by the machine end-user
- The intervals for the replacement of safety-relevant components
- The frequency of checking for external leakage
- The frequency and procedure for testing the function of the hydraulic system to detect internal leakages

2.9 Obligations of the machine end-user

In order to ensure safety when handling the STO manifold and its components, the end-user of the machine/system must:

- Safeguard the intended use of the STO manifold and its components according to 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 operating data (admissible operating temperature, maximum operating pressure).

The machine end-user of the Bosch Rexroth STO manifold is obliged to provide personnel training on a regular basis regarding the following subjects:

- Observation and use of the operating instructions and the legal regulations
- Intended operation of the Rexroth product
- Observation of the instructions of factory security officers and of the operating instructions of the machine end-user
- Behavior in case of emergency

The operation of installations, systems and machines fundamentally requires the implementation of a holistic IT security concept representing the latest state of the art. Accordingly, Bosch 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, Bosch Rexroth products are designed for operation in local, physically and logically secured networks with access restrictions for authorized persons, and they are not classified according to IEC 62443-4-2.

3 General information on damage to property and damage to product

The following safety instructions apply to chapters 6 to 16.

NOTICE

Danger due to improper handling!

Damage to property!

- ▶ Use the STO manifold only in accordance with chapter 2.2 "Intended use".
- ▶ Do not expose the STO manifold to any inadmissible mechanical load under any circumstances.
- ▶ Do not place/lay the STO manifold on the assembled parts.
- ▶ Never use the assembled parts as a handle or step. Do not place/lay any objects on top of it.

Contamination by fluids and foreign particles!

Premature wear and malfunctions!

- ▶ During assembly, ensure utmost cleanliness in order to prevent foreign particles such as welding beads or metal chips from getting into the hydraulic lines.
- ▶ Check before commissioning whether all hydraulic connections are tight and that all the seals and caps of the plug-in connections are correctly installed and undamaged.
- ▶ Ensure that no cleaning agents are able to enter the hydraulic system.
- ▶ Use residue-free industrial wipes for cleaning.

Mixing hydraulic fluids!

Damage to property!

- ▶ Generally avoid any mixing of hydraulic fluids of different manufacturers and/or of different types of the same manufacturer. Mixing of hydraulic fluids may occur, for example, due to hydraulic fluid residues in the STO manifold.
- ▶ Drain any oil residue from the STO manifold before installation.
- ▶ Check the compatibility of the various hydraulic fluids with one another as well as with the components and seals.

Contact with saltwater!

Damage to property!

- ▶ Take suitable corrosion protection measures.

NOTICE

Uncontrolled disconnection and connection of plug-in connectors!

Damage to property!

- ▶ Before carrying out installation work, disconnect the STO manifold from the mains or the voltage source or de-energize it safely.
- ▶ Do not plug in or pull off the electric plug-in connector as long as the voltage supply is activated.

4 Scope of delivery

Included within the scope of delivery:

- STO manifold



For additional information on your STO manifold and accessories, refer to the installation drawing, the hydraulic circuit diagram and data sheet 62340, see chapter 1.2 "Required and additional documentation".

For further information on the attached and installed components, please refer to the related data sheets at: www.boschrexroth.com

- ▶ Check the scope of delivery for completeness.
 - To unpack, proceed as described in chapter 8.1.
- ▶ Check the scope of delivery for possible transport damage, see chapter 8 "Assembly".



In case of complaints, please contact Bosch Rexroth AG, see chapter 18.1 "List of addresses".



The warranty applies only to the delivered configuration. The warranty entitlement expires in the event of incorrect assembly, commissioning and operation, component replacement (see also chapter 11.7) as well as in the event of improper use and/or improper handling.

5 Product information

5.1 STO manifolds STOM-20 and STOM-30 (with SL valve)

5.1.1 Component overview

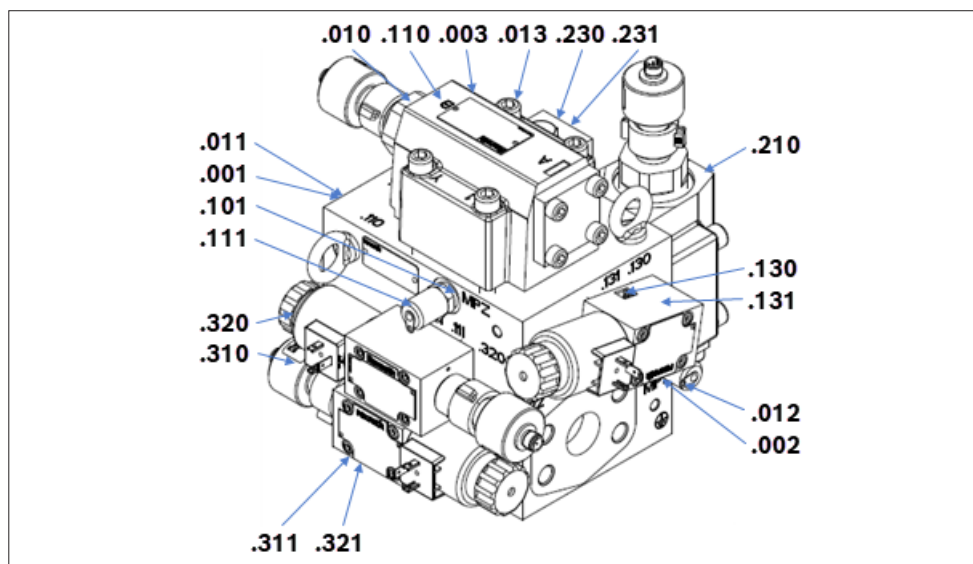


Fig. 1: Component overview using STOM-20B4E as an example

Table 6: Functions of the STO manifolds STOM-20 and STOM-30 (with SL Valve)

Techn. item	Version	Denomination	Function	Features
.001		Nozzle	Pressure gauge protection	
.002		Nozzle	Pressure gauge protection	
.003	B3D, B4E, N4E	Nozzle	Pressure gauge protection	
.010		Check valve	Hydraulic separation of X and P1	
.011		Measuring connection MP1	Pressure measurement P1	
.012	B4E, N4E	Measuring connection MP2	Pressure measurement P2	
	Alternative: B3D	Pressure switch	Spool position monitoring	
.013		Measuring connection MX	Pressure measurement X	
.101		Nozzle	Pressure gauge protection	
.110		Check valve, pilot-operated	Shut-off valve (main stage 1)	Safety-relevant: Channel 1
.111		Measuring connection MPZ	Pressure measurement MPZ	
.130	B3D, B4E, N4E	Directional seat valve, electrically operated	Pilot valve (main stage 1)	Safety-relevant: Channel 1
		Nozzle	Flow limitation	
.131		Nozzle	Flow limitation	
.210		Check valve, pilot-operated	Shut-off valve (main stage 2)	Safety-relevant: Channel 2
.230		Directional spool valve, electrically operated	Pilot valve (main stage 2)	Safety-relevant: Channel 2
.231		Nozzle	Flow limitation	

Techn. item	Version	Denomination	Function	Features
.310	B3D, B4E	Directional seat valve, electrically operated	Pre-fill and safety valve 1	Safety-relevant: Channel 1
	Alternative: N4E	Cover plate	Without prefilling and unloading	
.311	B3D, B4E	Nozzle	Flow limitation	Safety-relevant: SLS and SDE - channel 1
.320	B3D, B4E	Directional spool valve, electrically operated	Pre-fill and safety valve 2	Safety-relevant: Channel 2
	Alternative: N4E	Cover plate	Without prefilling and unloading	
.321	B3D, B4E	Nozzle	Flow limitation	Safety-relevant: SLS and SDE - channel 2

5.1.2 Product description

The shut-off blocks type STOM-20 and STOM-30 with pilot-operated check valves (type SL) are designed for the safe blocking of a hydraulic system (port P2) from its pressure supply (port P1) in emergency situations, e.g. in metallurgical plants. They are suitable for new plants as well as for retrofitting in existing installations with a maximum flow of 100 l/min to 500 l/min.

Main function

The main function is realized by two pilot-operated check valves (main valves, item 110 and 210, with corresponding pilot valves, item 130 and 230) that are arranged in series. When one or both shut-off valves are closed (pilot valves in rest position), the P1 -> P2 connection is interrupted. Faults in the main and pilot valves can be detected by evaluating the limit switches of the main valves in a suitable electric control system. Thus, an STO safety function up to PLe/category 4 according to EN ISO 13849 can be realized. Blocking in the direction P2 -> P1 is not possible.

Bypass function (optional)

Port P1 can be connected to port P2 via two size NG6 switching valves, item 310 and 320, acting in series. Both valves must be switched in order to connect P1 with P2 and to build up pressure. The flow is limited by the nozzles, item 311 and 321. This bypass function can be used for pressure equalization before the main valves are opened or for an SLS safety function. Faults in the valves can be detected by evaluating the limit switches of these valves (variant B4E) in a suitable electric control system. Thus, up to PLe/category 4 according to EN ISO 13849 can be achieved for the SLS safety function.



For variant B3D, the function of the two bypass valves can be monitored via the additional pressure switch, item 012, instead of with limit switches. Thus, up to PLe/category 3 according to EN ISO 13849 can be achieved for the SLS safety function.

SDE safety function When the optional bypass valves, item 310 and 320, are in the rest position, port P2 is connected to port Y and thus unloaded via the nozzle, item 321, or the nozzles, item 311 and 321. Regarding connection P2 → Y, the valves, item 310 and 320, are arranged in parallel, meaning that unloading takes place when one or both valves are in the rest position. This allows an SDE safety function to be realized. By evaluating the limit switches of these valves or of the pressure switch, item 012, in a suitable electric control system, faults in the valves can be detected and up to PLe/category 4 or PLd/category 3 according to EN ISO 13849 can be achieved for the SDE safety function.

External pilot oil supply If no pressure is available at port P1, it is possible to connect a separate hydraulic oil supply with check valve to port X, thus enabling testing of the two main valves, item 110 and 210, and the two pilot valves, item 130 and 230 (see Fig. 2). The application of pressure at port X and switching of the two pilot valves, item 130 and 230, results in the opening of the two main valves, item 110 and 210, which is indicated by the two limit switches. Thus, a DC value of 99% can be ensured for the indirect monitoring of the pilot valves, item 130 and 230, via the limit switches of the main valves, item 110 or 210.

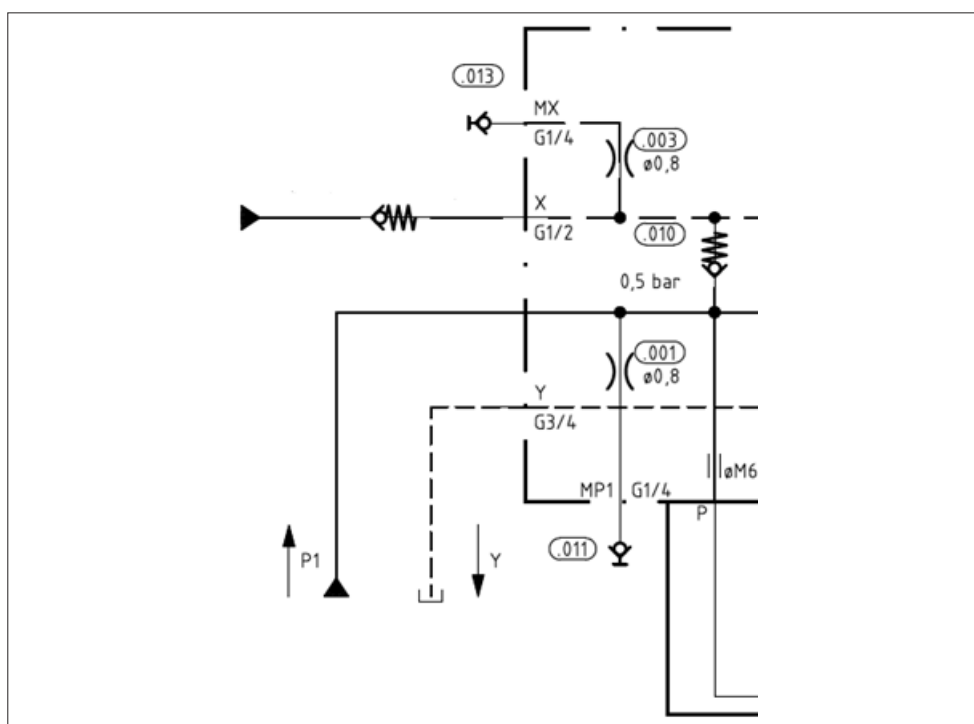


Fig. 2: Circuit diagram example for external pilot oil supply

5.2 STO manifolds STOM-32 and STOM-40 (with LC valve)

5.2.1 Component overview

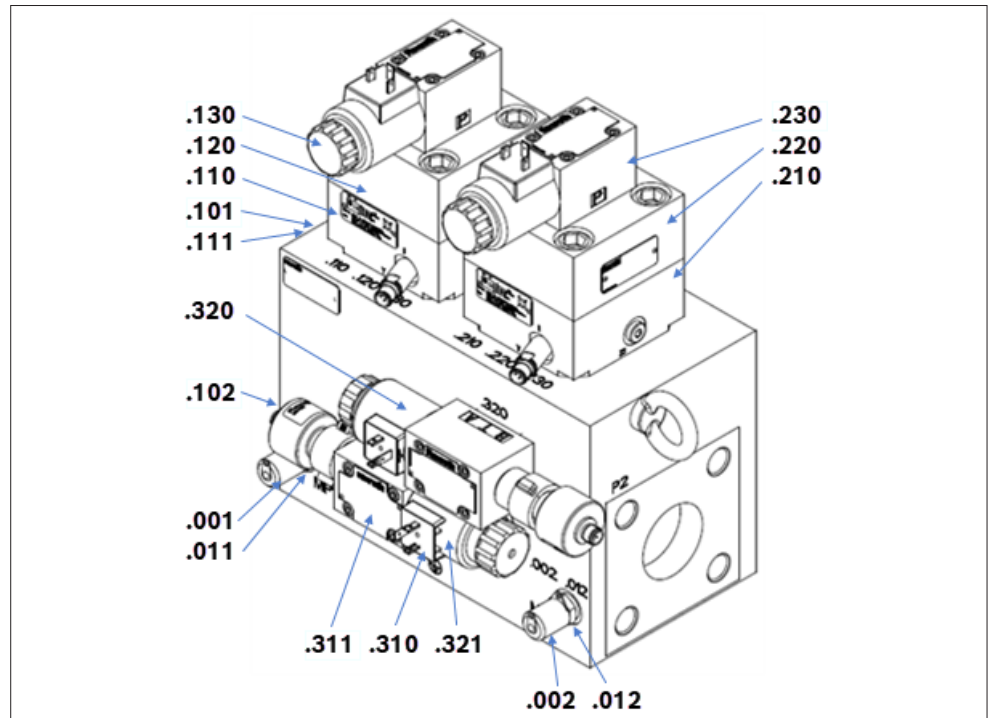


Fig. 3: Component overview using STOM-32B4E as an example

Table 7: Functions of the STO manifolds STOM-32 and STOM-40 (with LC Valve)

Techn. item	Version	Denomination	Function	Features
.001		Nozzle	Pressure gauge protection	
.002	B3D, B4E, N4E	Nozzle	Pressure gauge protection	
.011		Measuring connection MP1	Pressure measurement P1	
.012	B4E, N4E	Measuring connection MP2	Pressure measurement P2	
	Alternative: B3D	Pressure switch	Spool position monitoring	
.101		Nozzle	Pressure gauge protection	
.102		Nozzle	Flow limitation	
.111		Measuring connection MPZ	Pressure measurement MPZ	
.110		Logic cartridge valve	Shut-off valve (main stage 1)	Safety-relevant: Channel 1
.120		Logic cover		
.130	B3D, B4E, N4E	Directional spool valve, electrically operated	Pilot valve (main stage 1)	Safety-relevant: Channel 1
.210		Logic cartridge valve	Shut-off valve (main stage 2)	Safety-relevant: Channel 2
.220		Logic cover		
.230		Directional spool valve, electrically operated	Pilot valve (main stage 2)	Safety-relevant: Channel 2
.310	B3D, B4E	Directional seat valve, electrically operated	Pre-fill and safety valve 1	Safety-relevant: Channel 1
	Alternative: N4E	Cover plate	Without prefilling and unloading	

Techn. item	Version	Denomination	Function	Features
.311	B3D, B4E	Nozzle	Flow limitation	Safety-relevant: SLS and SDE - channel 1
.320	B3D, B4E	Directional spool valve, electrically operated	Pre-fill and safety valve 2	Safety-relevant: Channel 2
	Alternative: N4E	Cover plate	Without prefilling and unloading	
.321	B3D, B4E	Nozzle	Flow limitation	Safety-relevant: SLS and SDE - channel 2

5.2.2 Product description

The shut-off blocks type STOM-32 and STOM 40 with active logic valves (type LC2A) are designed for the safe blocking of a hydraulic system (port P2) from its pressure supply (port P1) in emergency situations, e.g. in metallurgical plants. They are suitable for new plants as well as for retrofitting in existing installations with a maximum flow of 500 l/min to 1500 l/min.

Main function The main function is realized by two active logic valves (main valves, item 110 and 210, with corresponding pilot valves, item 130 and 230) that are arranged in series. When one or both shut-off valves are closed (pilot valves in rest position), the P1 -> P2 connection is interrupted. Faults in the main and pilot valves can be detected by evaluating the limit switches of the main valves in a suitable electric control system. Thus, an STO safety function up to PLe/category 4 according to EN ISO 13849 can be realized. Blocking in the direction P2 -> P1 is not possible.

Bypass function (optional) Port P1 can be connected to port P2 via two size NG6 switching valves, item 310 and 320, acting in series. Both valves must be switched in order to connect P1 with P2 and to build up pressure. The flow is limited by the nozzles, item 311 and 321. This bypass function can be used for pressure equalization before the main valves are opened or for an SLS safety function. Faults in the valves can be detected by evaluating the limit switches of these valves (variant B4E) in a suitable electric control system. Thus, up to PLe/category 4 according to EN ISO 13849 can be achieved for the SLS safety function.



For variant B3D, the function of the two bypass valves can be monitored via the additional pressure switch, item 012, instead of with limit switches. Thus, up to PLe/category 3 according to EN ISO 13849 can be achieved for the SLS safety function.

SDE safety function When the optional bypass valves, item 310 and 320, are in the rest position, port P2 is connected to port Y and thus unloaded via the nozzle, item 321, or the nozzles, item 311 and 321. Regarding connection P2 -> Y, the valves, item 310 and 320, are arranged in parallel, meaning that unloading takes place when one or both valves are in the rest position. This allows an SDE safety function to be realized. By evaluating the limit switches of these valves or of the pressure switch, item 012, in a suitable electric control system, faults in the valves can be detected and up to PLe/category 4 or PLd/category 3 according to EN ISO 13849 can be achieved for the SDE safety function.

External pilot oil supply Should it be necessary to control the switching position of the valves, item 110 and 130 as well as item 210 and 230, when there is no pressure in P1, additional valves are needed to realize an external pilot oil supply at port P1.1.



We would like to point out that this circuit design requires a new safety-related assessment in accordance with ISO 13849 and is outside the scope of delivery of Bosch Rexroth.

5.3 Safety functions

If the STO manifold is used in conjunction with a corresponding electric control system, as described in these operating instructions and in data sheet 62340, the following safety functions can be realized:

- SF1: STO safety function, PLe/category 4 for B4E and N4E and PLd/category 3 for B3D according to EN ISO 13849
- SF2: SLS safety function, PLe/category 4 for B4E and PLd/category 3 for B3D according to EN ISO 13849
- SF3: SDE safety function, PLe/category 4 for B4E and PLd/category 3 for B3D according to EN ISO 13849



The electric control system, piping and safety devices must also satisfy the requirements of EN ISO 13849 and other relevant standards.

5.4 Product identification

The following figure shows a schematic name plate as an example:

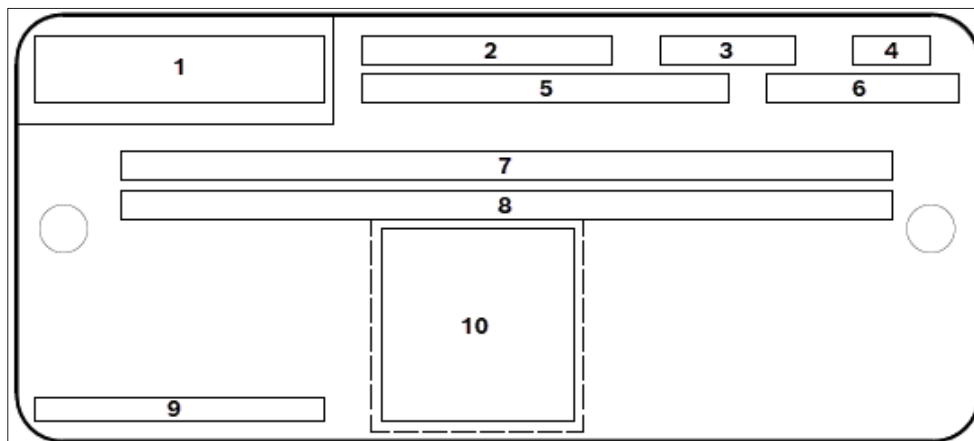


Fig. 4: Name plate

- | | |
|---|---|
| 1 Rexroth logo | 7 Type designation (SAP short text) |
| 2 Material number | 8 Customer's material number or additional information |
| 3 Date of production | 9 Designation of origin |
| 4 Producing plant | 10 QR code |
| 5 Serial number | |
| 6 Customer, production, repair order or project number | |



In case of questions regarding your STO manifold, always specify the material number and the serial number. You should preferably take a picture of the name plate and transmit it to Bosch Rexroth.

6 Transport and storage

- ▶ When transporting and storing the product, always observe the environmental conditions specified in the technical data contained in data sheet 62340, see chapter 1.2 "Required and additional documentation".

6.1 Transporting the STO manifold

WARNING

Unsecured STO manifolds may topple over or fall down!

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

- ▶ If possible, use the original packaging of the STO manifold for transport.
- ▶ Check the weight of the STO manifold.
- ▶ Provide for a stable position during transport to the place of installation.
- ▶ Transport the STO manifold using a forklift truck or sufficiently dimensioned lifting gear.
- ▶ Transport the STO manifold by the lifting eyes and lifting points provided and not by parts with low stability, e.g. valves, solenoids, connectors and cables.
- ▶ Secure the STO manifold by the lifting eyes and attachment points provided until it is fully assembled.
- ▶ Never step or reach below suspended loads.
- ▶ Wear your personal protective equipment, see chapter 2.7.
- ▶ Ensure that no unauthorized persons are within the danger zone.
- ▶ Comply with the national laws and regulations regarding occupational health and safety and transport.

CAUTION

Heavy loads with a weight of more than 15 kg!

Risk of injury! Risk of health hazards! Damage to property!

- ▶ Use a suitable lifting, putting down and moving technique.
- ▶ Use suitable lifting gear for transporting heavy STO manifolds.
- ▶ During transport, secure the STO manifold against toppling over.
- ▶ Place the STO manifold carefully onto the contact surface in order not to damage it.



Bosch Rexroth STO manifolds are high-quality products. In order to prevent damage to these products, transport the STO manifolds in the original packaging or with equivalent transport protection.

6.1.1 Transport using forklifts and similar floor conveyors

To transport the STO manifold using a forklift truck, proceed as follows:

1. Guide the fork of the forklift truck under the packaging of the STO manifold or under the STO manifold secured for transport and into the recesses provided.
2. Carefully lift the load to check the center of gravity position. Ensure a stable center of gravity position.
3. Make sure that the STO manifold cannot move out of the intended position.
4. Secure the STO manifold against the resulting acceleration forces and the associated undesired movements of the STO manifold.
5. During transport, lift the STO manifold only as far off the ground as is necessary for transport.

6.1.2 Transport using lifting gear

For transport, consider the following aspects:

- Properties of the load (e.g. weight, center of gravity, mounting and attachment points).
 - Method of attachment or picking up the load.
- ▶ Ensure that the lifting capacity of the lifting gear is sufficient to transport the STO manifold safely.
 - ▶ Use textile attachment devices according to DIN EN 1492-2.
 - ▶ Use the pre-assembled eyebolts in pairs as attachment points.

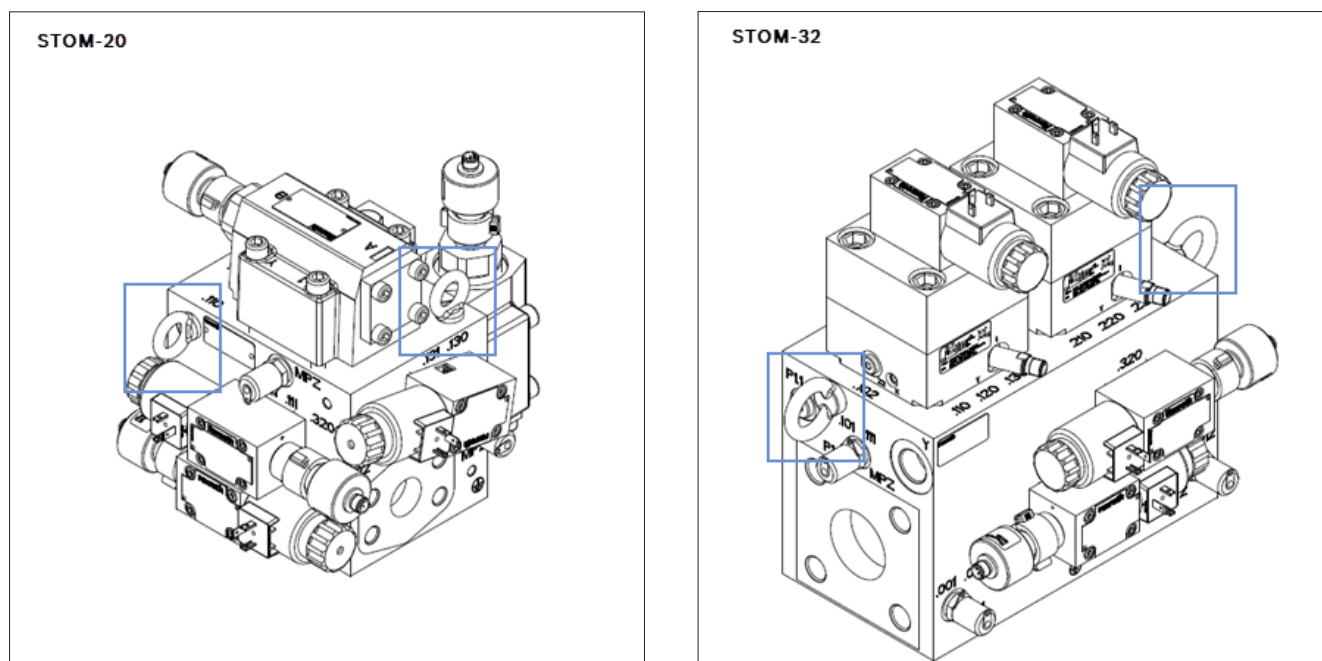


Fig. 5: Lifting the STO manifold (exemplary representation)

6.2 Storing the STO manifold

STO manifolds are suitable for storage for up to six months under the following conditions:

- ▶ Store the STO manifold in the original or comparable packaging to protect it from dust and dirt.
Ideal storage temperature: +5 °C to +40 °C
- ▶ Do not store the STO manifold outdoors, but in a well-ventilated room. Avoid high light irradiation.
- ▶ Protect the STO manifold against moisture, particularly ground humidity. Store the STO manifold on a shelf or on a pallet.
- ▶ STO manifolds can be very heavy. Therefore, observe the admissible load-bearing capacity of your storage system.
- ▶ All ports on the STO manifold must be closed with closure elements, see Table 5.
- ▶ After opening the transport packaging, it has to be closed properly again for storage. Use the original packaging for storage.
- ▶ Do not remove any non-pressure-resistant closure elements from the hydraulic ports on the STO manifold until installation.



If the storage period exceeds six months or if sea transport is necessary, please contact Bosch Rexroth.



After expiry of the maximum storage time, Bosch Rexroth recommends having the STO manifold checked by your competent Rexroth service.

7 System design



For information regarding the integration into the machinery/system, particularly regarding its overall function and logical mode of operation, please refer to the operating instructions of the machine/system manufacturer.

7.1 Safety equipment

Emergency stop devices, safety doors, optical safety devices such as light barriers, light grids, light curtains and/or a two-hand control device, as well as a safe electric control system are required to realize the necessary safety-related functions. The safety equipment and the electrical control system must also comply with the requirements of the relevant standards, such as EN ISO 13849, and any other applicable standards.

7.2 System design

7.2.1 Limitation of the operating pressure

- ▶ Provide a separate external limitation of the maximum operating pressure in machine/system.

7.2.2 Reaction time (response time) of stop function

- ▶ Measure the reaction time (response time) of the stop function on the machine/system and calculate the minimum safety distances on this basis.

7.2.3 Protection class

- ▶ Configure your system / electrical connections for the IP65 protection class.

7.2.4 Interaction with other functions

- ▶ Consider possible interactions with other functions.

7.3 Electrical control system

To realize the required safety functions, a safe electrical control system is also required. The safe electrical control system must meet the requirements of EN ISO 13849 as well as any other applicable standards. The safe electrical control system must ensure the functions described in the following sections.

7.3.1 Safe separation from the energy supply

- ▶ Ensure that the solenoids of the valves, item 130 and 230 (as well as item 310 and 320 with bypass function), are safely separated from the energy supply when the safety equipment allowing access to the danger zone is open/disabled.

7.3.2 Emergency stop**During operation**

- ▶ Ensure that the solenoids of the valves, item 130 and 230 (as well as item 310 and 320 with bypass function), are safely separated from the energy supply.

In case of loss of the energy supply

- ▶ Ensure that an emergency stop is triggered when the energy supply is lost (electrical voltage supply, control voltage, hydraulic pressure supply or pilot oil supply).

This prevents an unexpected start-up when the energy supply is switched on again.

7.3.3 Evaluation of the limit switch signals of the monitored valves

- ▶ Ensure that the electric control system evaluates the limit switch signals of the monitored valves, item 130 und 230 (as well as item 310 and 320 with PLe/cat. 4 bypass function) to detect faults. This includes:
 - Testing the correct function depending on the application at least once per cycle or immediately when the safety function is requested (but at least once per shift)
 - Triggering an emergency stop in the event of a fault

Please also refer to chapter 7.4 "Fault detection during operation".

**7.3.4 Evaluation of the pressure sensor signals for PLd/cat. 3 bypass function**

- ▶ Ensure that the electric control system evaluates the pressure sensor signals to detect faults on the valves, item 310 and 320. This includes:
 - Testing the correct function depending on the application at least once per cycle or immediately when the safety function is requested (but at least once per shift)
 - Triggering an emergency stop in the event of a fault

Please also refer to chapter 7.4 "Fault detection during operation".



7.3.5 Safety signals

- ▶ Ensure that safety signals are separate from other signals.



Separating the safety signals from one another is required as protection against "common cause failure (CCF)".

7.4 Fault detection during operation

7.4.1 Control and evaluation of the limit switch and pressure sensor signals



The machine/system manufacturer is responsible for providing appropriate control and evaluation so that all safety-relevant faults are detected in good time.

- ▶ Ensure that the limit switch signals and, if applicable, the pressure sensor signals are controlled and evaluated during the working cycle to detect safety-relevant faults in good time.



For further information, see chapters 7.3.3 and 7.3.4 as well as 7.4.2, 7.4.3, 7.4.4 and 7.4.5.

- ▶ Ensure that no new cycle or no access in the danger zone is possible and that no dangerous motion can be initiated if one or more limit switch signals or the pressure switch signal deviate from the expected state.
- ▶ Discontinue machine/system operation until all faults have been corrected.
- ▶ Ensure that all safety-relevant valves are in the safe position during standstill and that this is confirmed by the corresponding limit switch signals and, if applicable, pressure sensor signals.

7.4.2 Fault detection on the valves, item 110, 130, 210 and 230

Main valve item 110 and 210

The main valves, item 110 and 210, are directly monitored with limit switches. When the solenoids of these valves are switched, the limit switch signals must be "low", and when they are not switched, the signals must be "high". The signal change must take place within the expected time after the solenoid is switched on or off.

Pilot valves item 130 and 230

The pilot valves, item 130 and 230, are indirectly monitored. By evaluating the limit switches of the corresponding main valves, item 110 or 210, faults are also detected on the pilot valves.



For applications with cyclic switching of the STO manifold, you can find further information on fault detection in data sheet 62340, section "Switching sequence", see chapter 1.2 "Required and additional documentation".

For applications without cyclic switching of the STO manifold, proceed according to Table 8 for fault detection, immediately when the safety function is requested (at least once per shift).



For the fault detection tests, pressure is required in ports P1/P1.1 (main and bypass valve test) or X (main valve test only).

Table 8: Fault detection: Valves, item 110, 130, 210 and 230

Operation	Bypass valves (if present)				Pilot valves		Main valves			Comments	
	Valve		Limit switch		Valve		Valve		Limit switch		
	.310	.320	S31	S32	.130	.230	.110	.210	S11 S21		
Off	0	0	1	1	0	0	0	0	1	1	Safe (both main stages closed)
Test 110	0	0	1	1	1	0	1	0	0	1	Still safe (1st main stage open)
Off	0	0	1	1	0	0	0	0	1	1	Safe (both main stages closed)
Test 210	0	0	1	1	0	1	0	1	1	0	Still safe (2nd main stage open)
Off	0	0	1	1	0	0	0	0	1	1	Safe (both main stages closed)

7.4.3 Fault detection on the bypass valves with limit switches (version B4E), item 310 and 320

The bypass valves, item 310 and 320, are directly monitored with limit switches. When the solenoids of these valves are switched, the limit switch signals must be "low", and when they are not switched, the signals must be "high". The signal change must take place within the expected time after the solenoid is switched on or off.



For applications with cyclic switching of the STO manifold, you can find further information on fault detection in data sheet 62340, section "Switching sequence", see chapter 1.2 "Required and additional documentation".

For applications without cyclic switching of the STO manifold, proceed according to Table 9 for fault detection, immediately when the safety function is requested (at least once per shift).

Table 9: Fault detection: Bypass valves with limit switches (B4E), item 310 and 320

Operation	Bypass valves (if present)				Pilot valves		Main valves				Comments
	Valve		Limit switch		Valve		Valve		Limit switch		
	.310	.320	S31	S32	.130	.230	.110	.210	S11	S21	
Off	0	0	1	1	0	0	0	0	1	1	Safe (both main stages closed)
Test 320	1	0	0	1	0	0	0	0	1	1	Safe (both main stages closed; item 320 unloaded to tank)
Off	0	0	1	1	0	0	0	0	1	1	Safe (both main stages closed)
Test 310	0	1	1	0	0	0	0	0	1	1	Safe (both main stages closed; item 310 unloaded to tank)
Off	0	0	1	1	0	0	0	0	1	1	Safe (both main stages closed)

7.4.4 Fault detection on the bypass valves with pressure sensors (version B3D), item 310 and 320

The bypass valves, item 310 and 320, can be monitored indirectly via the pressure sensor, item 012.



A suggested test sequence can be found in Table 10.

The test is permitted only if a pressure increase in P2 cannot cause a hazard, e.g. with the safety equipment active/closed.



For the fault detection tests with pressure sensor, pressure is required in ports P1/P1.1.

Proceed according to Table 10 for fault detection:

Table 10: Fault detection: Valves with pressure sensors (B3D), item 310 and 320

Operation	Bypass valves		Pilot valves		Main valves				Pressure P2/MP2	Comments
	Valve		Valve		Valve		Limit switch			
	.310	.320	.130	.230	.110	.210	S11	S21		
Off	0	0	0	0	0	0	1	1	0 bar	Safe (both main valves closed)
Test 320	1	0	0	0	0	0	1	1	> 3 bar = fault	Safe (both main valves closed)
Test 310	0	1	0	0	0	0	1	1	> 2 bar = fault	Safe (both main valves closed)
Off	0	0	0	0	0	0	1	1	0 bar	Safe (both main valves closed)

7.4.5 Testing without pressure in P1

The monitoring of the valves, item 110, 130, 210 and 230, does not work when port P1 is depressurized. By using an external pilot oil supply at port P1.1 (NG32 and 40) or X (NG 20 and 30), the function of these valves can also be tested without pressure in port P1.



For further information, see chapters 5.1.2 (NG20 and 30) and 5.2.2 (NG32 und 40).

8 Assembly

8.1 Unpacking



Parts falling out!

Risk of injury! Damage to property!

- ▶ Put the packaging on level, stable ground.
- ▶ Only open the packaging from the top.

The STO manifold is delivered in suitable protective packaging.

- ▶ Dispose of the packaging in accordance with the currently applicable national provisions in your country.

8.2 Before assembly

1. Before assembling the STO manifold, check that the type designation on the name plate matches your order or order number.
2. Pay attention to the maximum operating pressure specified in data sheet 62340, see chapter 1.2 "Required and additional documentation".



If the material number of the STO manifold does not match the number in the order confirmation, contact Bosch Rexroth service (see chapter 18.1 "List of addresses" for the relevant address).

3. Check the scope of delivery for completeness and transport damage.
4. Make sure that all required seals are available and have been properly installed.

8.3 Installation conditions and position

- ▶ During installation, always observe the environmental conditions such as the temperature range and operating parameters (e.g. hydraulic fluid, filtration, voltage and operating pressure), as specified in data sheet 62340, see chapter 1.2 "Required and additional documentation".
- ▶ It is imperative to ensure absolute cleanliness. Contamination of the hydraulic fluid may considerably impair the service life of the hydraulic component.
- ▶ Take measures to prevent slipping on leaking hydraulic fluid, e.g. non-slip floor, drip tray.
- ▶ Select the installation position so that the assembly, repair, disassembly and adjustment of valves can be completed without problems.
- ▶ Position or house the STO manifold such that hazards due to liquids spraying out under high pressure are avoided.
- ▶ Note the installation positions specified in data sheet 62340, see chapter 1.2 "Required and additional documentation".

8.4 Required tools

The STO manifold can be assembled using standard tools.

8.5 Assembling the STO manifold

WARNING

Faulty mounting at the place of use!

Risk of injury! Damage to property!

- ▶ Completely assemble the STO manifold according to the assembly specifications using suitable assembly aids.
- ▶ Assemble the STO manifold only on the specified mounting surfaces.
- ▶ Use mounting screws with appropriate dimensions and property classes.
- ▶ Comply with tightening torques and screw stabilities.

Faulty installation of closure elements and cables!

Danger to life! Risk of injury!

- ▶ Do not pressurize your machine/system until all closure elements, see Table 5, and lines have been completely and properly installed according to the specifications.
- ▶ Ensure that the STO manifold is not pressurized with the non-pressure-resistant closure elements for protection against dust, dirt and leakage.

CAUTION

Insufficient assembly space!

Risk of injury! Danger of jamming and bruising!

- ▶ Ensure that the installation space is sufficient and that plug-in connectors, actuating, operating and adjustment elements as well as display and mounting elements are easily accessible.

Incorrect connection of electric components!

Risk of injury! Risk of short-circuit and damage!

- ▶ Ensure that electrical components are connected by a specialized electrician according to the electrical wiring diagram and pin assignment.

Hydraulic lines and hoses installed under tension stress!

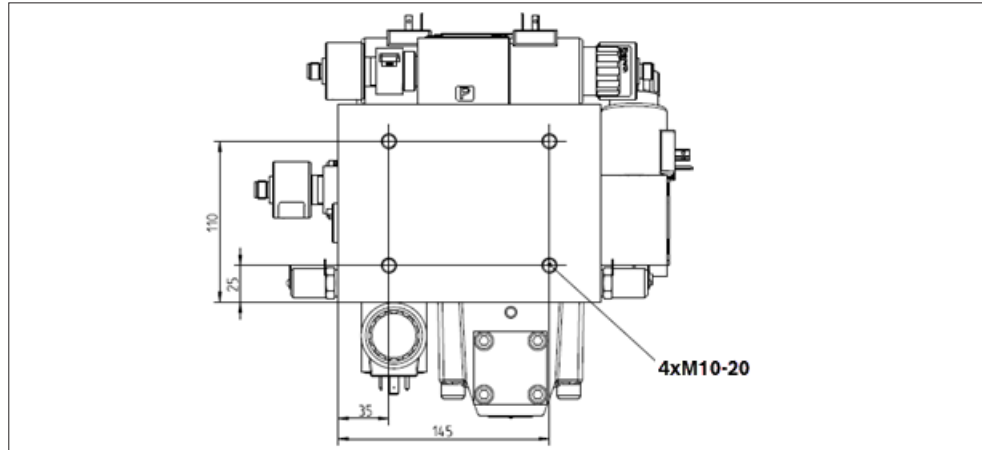
Risk of injury! Damage to property!

- ▶ Assemble lines and hoses without stress.

8.5.1 Mechanical assembly of the STO manifold

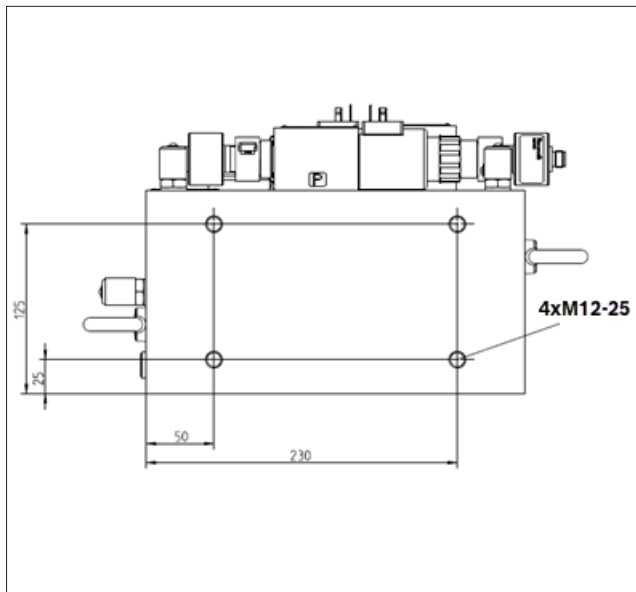


The mounting possibilities on the STO manifold are designed exclusively for fixing the STO manifold. Attachment parts such as pipes, hoses, etc. must be attached or secured separately.

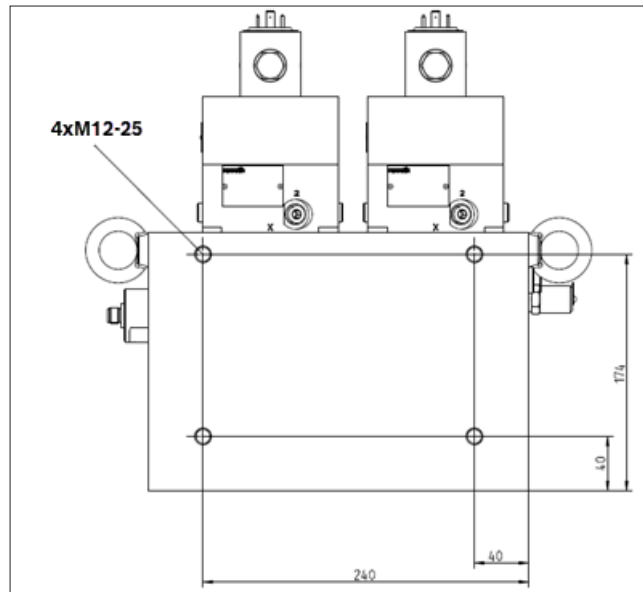


Lower mounting surface

Fig. 6: Mounting surfaces on the STO manifold with SL valves using STOM-20B4E as an example



Lower mounting surface



Rear mounting surface

Fig. 7: Mounting surfaces on the STO manifold with LC valves using STOM-32B4E as an example

Proceed as follows to assemble the STO manifold mechanically:

- ▶ Select a clean, stable, and flat installation surface for final assembly.
- ▶ Avoid external stresses, such as piping, and/or vibration.
- ▶ Use an appropriate substructure as a support for the STO manifold.
 - Ideally, attach the STO manifold horizontally to a console.



For further information, refer to data sheet 62340, see chapter 1.2 "Required and additional documentation".

- ▶ Fully attach the STO manifold to the designated fixing holes.



Bosch Rexroth recommends using property class 10.9 screws.

Bosch Rexroth recommends a screw-in depth of at least 1.5 x D for cast blocks and at least 1.0 x D for steel blocks (D = nominal diameter of the screw).

– When designing the fastening for wall or ceiling mounting, take into account that the mounting screws are not loaded evenly.

– Use all provided mounting possibilities such as threads or through holes for mounting.

- ▶ Select the necessary tightening torques taking into account the specifications in VDI 2230, e.g. coatings, frictional torques, selected tightening method.

8.5.2 Connecting the STO manifold hydraulically

To connect the STO manifold hydraulically, proceed as follows:

- 1.** Depressurize the relevant machine/system part.
- 2.** Connect all connections.
 - Note the hydraulic circuit diagram in data sheet 62340, see chapter 1.2 "Required and additional documentation", as well as the assembly instructions and technical specifications of the machine/system of the STO manifold used.
 - Use only the accessories specified in data sheet 62340, see chapter 1.2 "Required and additional documentation", such as flanges, screw connections, etc.
- 3.** Make sure that pipes or hoses are attached to all ports, or that ports and openings that are not required are closed with pressure-resistant closure elements, see Table 5.
- 4.** Carry out a special check to make sure that the cap nuts and flanges are correctly tightened at the pipe fittings and flanges.
- 5.** Make sure that all pipes and hose lines and every combination of connection pieces, couplings or connection points with hoses or pipes are checked for their operational safety by a person with appropriate knowledge and experience.

8.5.3 Connecting the STO manifold electrically

To connect the STO manifold electrically, proceed as follows:

- ▶ The STO manifold must be connected only by a specialized electrician.
- ▶ Make sure that the cables used are suitable for operating temperatures of -20 °C...+100 °C.
- ▶ De-energize the connection cable before assembly.
- ▶ Correctly connect the protective grounding conductor and the grounding.
- ▶ Ensure that there are no sharp bends in the connection cable and braided wires to avoid short-circuits and interruptions.
 - Only assemble the cable and line entries according to the assembly instructions.
- ▶ Before installation, check that all the individual components of the cable and line entry are present and that the sealing elements are undamaged.
- ▶ During installation, ensure that there are no leaks between the cable and the cable and line entry.
- ▶ Route the connection cable(s) in a strain-relieved form.



The first mounting point must be within 15 cm of the cable entry.

- ▶ Only use finely stranded cables with pressed-on wire end ferrules.



Solenoid coils can be connected in a polarity-independent way.

- ▶ Use only the mating connectors specified in data sheet 62340, see chapter 1.2 "Required and additional documentation", or mating connectors of the same type.
 - Observe the assembly instructions printed on the packaging of the mating connector and the tightening torques specified therein.
- ▶ For additional technical data, refer to the data sheet of the respective valve.

8.6 Painting the STO manifold

NOTICE

Restriction of functionality or overheating of the STO manifold due to coating!

Damage to property!

- ▶ Never paint measurement systems, cooling and contact surfaces.
- ▶ Protect the surface of valve solenoids against paint application.
- ▶ Close the hydraulic connections completely before the paint application.
- ▶ Protect the fixing holes and surfaces against paint application.
- ▶ Mask off the name plate and any information signs so that they remain legible after painting.
- ▶ Mask the connectors of the electrical connections with protective foil and make sure not to cause any damage to the connector.
- ▶ When removing the paint masking and the covers, make sure that no paint chips or other foreign particles enter the STO manifold.

STO manifolds are delivered unpainted or with standard paint on the valves.

9 Commissioning

WARNING

Incorrectly installed STO manifold!

Risk of injury from escaping hydraulic fluid jet!

- ▶ Commission your machine/system only after all hydraulic connections and the STO manifold have been completely and properly mounted according to the specifications.
- ▶ Look out for defective sealing points and exchange defective seal rings immediately.
- ▶ Wear your personal protective equipment during initial commissioning, see chapter 2.7.

Exceeding the maximum operating pressure!

Danger to life! Risk of injury! Danger of bursting!

- ▶ Before commissioning the machine/system, ensure that the maximum admissible pressure of the hydraulic components in the machine/system is not exceeded.
- ▶ Make sure that the maximum admissible operating pressure in your machine/system is protected by an overpressure element, e.g. a pressure relief valve.

- ▶ Make sure that all hydraulic connections are closed and pressure-tight and all electrical connections are connected.
- ▶ Immediately depressurize the machine/system if hydraulic fluid still leaks despite proper assembly.
- ▶ Commission hydraulic components only if they are completely installed.
- ▶ Have electrical connections checked for proper condition by a specialized electrician before initial operation or re-commissioning.
- ▶ Before switch-on, check whether the protective grounding conductor of all electric devices is firmly connected according to the connection diagram.



When commissioning the STO manifold on a machine/system, commission any electronics that may exist before commissioning the hydraulics. When commissioning the electronics, the hydraulics (power unit, valve etc.) must be switched off in order to prevent damage of the hydraulic components caused by incorrect wiring and malfunctions of the electronics.



The hydraulic circuit does not contain any adjustable components. If the switching times of the valves and/or the pressure build-up/reduction times are not correct, please contact Bosch Rexroth (see chapter 18.1 "List of addresses" for the relevant address).



For operation with flame-resistant hydraulic fluids such as HFC or HFDU, Bosch Rexroth recommends a slightly longer flushing procedure of the machinery/system, a subsequent test and, if necessary, a replacement of the filter.

9.1 Bleeding the hydraulic system

- ▶ For bleeding the overall system, observe the operating instructions of the machine/system into which the STO manifold is installed.
- ▶ Switch the STO manifold several times under 50% operating pressure before placing it into full operation so that air that has remained in the STO manifold can escape.

Mechanical damage due to impermissibly high acceleration of the hydraulic fluid and the valve spool is thus avoided and the service life of the STO manifold is increased.

9.2 Note on the nozzles



The nozzles, item 102, 131, 231, 311 and 321 influence the safety functions. Therefore, permission from Bosch Rexroth is required before changing these valves.

9.3 Testing

9.3.1 Leakage test for valve, item 110 (NG32, NG40)

- ▶ Make sure that the valves, item 130, 230, 310 and 320, are in the basic position.
- ▶ Apply pressure to port P1 (e.g. 200 bar).
- ▶ Check the pressure at measuring connection MPZ.



The pressure at measuring connection MPZ must not exceed 2 bar.

9.3.2 Leakage test for valve, item 110 (NG20, NG30)

- ▶ Close the valves, item 130, 230, 310 and 320 (basic position), at low pressure (e.g. 50 bar).
- ▶ Increase the pressure at port P1 compared to the pressure at measuring connection MPZ (e.g. 200 bar).
- ▶ Check the pressure at measuring connection MPZ.



The pressure at measuring connection MPZ must not increase.

9.3.3 Leakage test for valve, item 210

- ▶ Make sure that the valves, item 130 and 320, are switched.
- ▶ Make sure that the valves, item 230 and 310, are in the basic position.
- ▶ Verify that the actuator at port P2 is closed.
- ▶ Apply pressure to port P1 (e.g. 200 bar).
- ▶ Check the pressure at measuring connection MP2.



The pressure at measuring connection MP2 must not exceed 2-3 bar.

9.3.4 Leakage test for valve, item 310 (version with bypass only)

- ▶ Make sure that the valves, item 110, 210 and 310, are in the basic position.
- ▶ Make sure that the valve, item 320, is switched.
- ▶ Verify that the actuator at port P2 is closed.
- ▶ Apply pressure to port P1 (e.g. 200 bar).
- ▶ Check the pressure at measuring connection MP2.



The pressure at measuring connection MP2 must not increase.

10 Operation



For details on operation, refer to the operating instructions for the machinery/system in which the STO manifold is installed.

10.1 Maintenance and repair of the machinery/system, downstream of the STO manifold (port P2)

With regard to maintenance activities on the machinery/system, downstream of the STO manifold (port P2), you must observe the following points from EN ISO 13849-1:2023:

- 5.2.2.10 Safety function(s) for maintenance tasks
- 5.2.3 Minimizing motivation to defeat safety functions

11 Maintenance and repair



WARNING

Sudden movement of machine/system parts and storage of potential energy in elastic parts, fluids or gases!

Danger to life! Risk of injury!

- ▶ De-energize all valves of the STO manifold before carrying out maintenance work.

STO manifolds require minimal maintenance.

- ▶ Regularly check the product and connection surfaces for leak-tightness.



Seals of attached and installed hydraulic components are subject to a natural process of wear and aging. Therefore, Bosch Rexroth recommends replacing them at appropriate time intervals. The intervals are mainly determined by the operating conditions and the cleanliness of the hydraulic fluid.



Preventive maintenance (e.g. hydraulic fluid care) and compliance with pressure and temperature specifications extend the service life of the system or STO manifold.

11.1 Cleaning and care

NOTICE

Damage to surfaces and seals caused by solvents and aggressive cleaning agents!

Damage to property!

- ▶ Do not use solvents or aggressive cleaning agents.

Penetrating dirt and liquids!

Damage to property!

- ▶ Do not use high-pressure washers.
- ▶ Do not use compressed air for cleaning at functional interfaces.

For cleaning and care of the STO manifold, observe the following:

- ▶ Check that all seals and caps of the plug-in connections are firmly fitted so that no humidity can penetrate the STO manifold during cleaning.
- ▶ Remove external coarse dirt and keep sensitive and important parts like solenoids, valves and indicators clean.
- ▶ Use residue-free industrial wipes for cleaning.

11.2 Inspection



Inspection of the STO manifold must be carried out in connection with the machinery/system.

- ▶ Document mandatory or unscheduled inspection work clearly and retain this documentation for verification purposes.
- ▶ For the scope and time intervals of inspection of the machinery/system, refer to the operating instructions of the machine/system manufacturer.

The following inspection work is required for the STO manifold:

Table 11: "STO manifold" inspection

Inspection activity	Implementation	Inspection interval
Pressure measurement using suitable pressure gauge with suitable measurement range and with connection line and connection coupling	<ul style="list-style-type: none"> ▶ Check the command pressure. 	Regularly
Visual inspection	<ul style="list-style-type: none"> ▶ Check all components for tight fit, damage/corrosion, leakage (oil drop formation). ▶ Check the seals on the attached and mounted valves. ▶ Check for oil runs at connection surfaces of the valves, flanges or fittings. ▶ Check whether all warning and information signs are present. 	Regularly

11.3 Maintenance schedule

The following maintenance work is required for the STO manifold and must be included in the maintenance schedule of the machine/system manufacturer or machine end-user:

Table 12: "STO manifold" maintenance schedule

Maintenance activity	Implementation	Maintenance interval
Hydraulic system		
Control of the hydraulic fluid	<ul style="list-style-type: none"> ▶ Check the hydraulic fluid level in the tank. 	Electric monitoring
Hydraulic fluid samples or analyses	<ul style="list-style-type: none"> ▶ Take a hydraulic fluid sample. ▶ Observe the safety data sheet of the hydraulic fluid. ▶ Document the product name including batch number. 	<ul style="list-style-type: none"> • After flushing • 50 operating hours after flushing • 4 weeks after flushing • 12 weeks after flushing • Every 6 months
Hydraulic fluid change	<ul style="list-style-type: none"> ▶ Change the hydraulic fluid using a filter (5 µm). 	According to manufacturer's specifications and/or based on fluid analysis
Temperature control	<ul style="list-style-type: none"> ▶ Check the operating temperature (comparable load condition). 	Electric monitoring
Visual inspection	<ul style="list-style-type: none"> ▶ Check all components for secure fitting, damage, wear, leakage, and presence of all warning and information signs. 	At least once annually

Maintenance activity	Implementation	Maintenance interval
Acoustic check	▶ Check the running, flow and operating noise of the hydraulic system and the components.	Weekly
Tactile inspection	▶ Check for uncontrolled local vibrations.	Weekly
Pressure gauges	▶ Check for the specified pressure range, damage and leakage.	Weekly
Pipe and hose lines	▶ Check the hose lines for leakage and buckling.	Weekly
	▶ Replace the hose lines at regular intervals according to the manufacturer's specifications.	Every 3 years at the latest
	▶ Check the pipelines for leakage and corrosion.	Every 6 months
STO manifold		
Seals	▶ As a precaution, replace the seals at reasonable time intervals.	As required

11.4 Maintenance



Maintenance on the STO manifold must be carried out in connection with the machinery/system.

- ▶ For the scope and time intervals of maintenance of the machinery/system, refer to the maintenance schedule of the machine/system manufacturer.
- ▶ Document mandatory or unscheduled maintenance clearly and retain this documentation for verification purposes.

Replacement of seals

Since seals are subject to a natural process of wear and aging, they must be replaced as required. Oil stains between the base area of the valve and the manifold block are the first signs.



Bosch Rexroth recommends replacing seals during maintenance.

Replacement of wear parts

The intervals for the replacement of wear parts must be defined by the machine/system manufacturer.

11.5 Repair



The STO manifold must be repaired only by specialist personnel according to chapter 2.4 "Qualification of personnel".

Bosch Rexroth offers a wide range of repair services for components. Partly tested and pre-assembled original Rexroth assemblies allow for successful repair works requiring only little time.

- ▶ Use only original Rexroth spare parts for repairing STO manifolds.
- ▶ For questions regarding repair, contact your local Bosch Rexroth service, see chapter 18.1 "List of addresses".

You can find the addresses of our sales and service network at www.boschrexroth.com.

11.6 Spare parts

NOTICE

Malfunction of the STO manifold or machine due to the use of incorrect spare parts!

Damage to property!

- ▶ Only use components listed in the product-specific documentation (parts list).
- ▶ Only use new seals with the required media compatibility.
- ▶ As the sealing material may differ despite being of identical appearance, the material number should be checked.

Ordering spare parts

- ▶ Order spare parts in writing. In urgent cases you can also order by phone, but you are kindly requested to confirm your order in writing.
- ▶ Please provide the following information when ordering spare parts:
 - Material number and order number of the STO manifold (name plate)
 - Material number of the respective component
 - required quantity
 - The desired type of dispatch (e.g. as parcel, freight, air freight, by courier service, etc.)



The material number is usually indicated on a name plate or label or attached to the product.

- ▶ In case of questions regarding spare parts, please contact your local Bosch Rexroth service, see chapter 18.1 "List of addresses".

You can find the addresses of our sales and service network at www.boschrexroth.com.



Further information on available spare parts can be found at the following link: www.boschrexroth.com/ics/spc.

11.7 Replacement of valves

WARNING

Pressurized and energized machine/system parts!

Danger to life! Risk of injury caused by electric shock!

- ▶ Ensure that the machine/system is depressurized and the electrical control de-energized before disassembly.

CAUTION

Falling of not fully secured valves!

Risk of injury!

- ▶ Secure valves to be disassembled against falling down.

Leaking hydraulic fluid!

Risk of injury! Risk of falling!

- ▶ After disassembly, seal the hydraulic fluid bores with suitable cap elements.
- ▶ Immediately remove leaked hydraulic fluid and dispose of it properly.
- ▶ Have sufficiently dimensioned collecting containers, residue-free industrial wipes and hydraulic fluid binding materials ready in order to collect or bind leaking hydraulic fluid.



Use only components listed in the product-related documentation (parts list). In determining the achievable category and performance level, certain fault possibilities were excluded for the safety-relevant components. These fault exclusions are dependent on important design features of the components used. The safety-relevant components, see Table 6 or Table 7, must be replaced only with components of the same type.



Resin can occur in spare parts from stock that have not been filled or treated with corrosion protection fluid. Clean them with grease solvent and apply a new oil film.

Proceed as follows when replacing a valve:

- ▶ Check the hydraulic circuit diagram to see which pressure line is affected and what the effects of removing the valve are.
- ▶ Observe the data sheet of the valve to be replaced, which is specified in the parts list (e.g. tightening torque, material of the hexagon socket head cap screws, etc.).
- ▶ Make sure that the STO manifold is depressurized by connecting a suitable measuring device to the provided measuring points.
- ▶ Please note that some pipework of the STO manifold is still under pressure in the OFF operating mode.
- ▶ Check whether the affected valve has cooled down sufficiently so that you can disassemble it.
- ▶ Dispose of the defective valve, see chapter 14 "Disposal".
- ▶ Install the new valve.
- ▶ Check the reaction time of all safety-related valves after the replacement of a safety-relevant valve.

12 Decommissioning

- ▶ Decommission the machinery/system as described in the operating instructions for the machinery/system.
- ▶ Do not loosen any pipes/hoses, connections and components.
- ▶ Measure the pressure at the measuring points provided for this purpose.
- ▶ Provide collecting containers that are large enough to accommodate the total hydraulic fluid volume, including the pipework to the top oil tank.

Prepare the disassembly of the STO manifold as follows:

- ▶ Connect suitable measuring equipment to the measuring points Mxx and drain the hydraulic fluid into a suitable collecting container until the pressure has completely dissipated.
- ▶ Get the disassembly tools and suitable lifting devices ready. You can now start the disassembly.

13 Disassembly and replacement

WARNING

STO manifolds or assembled parts that are not fully secured may fall!

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

- ▶ Secure parts to be disassembled against falling down.
- ▶ Wear your personal protective equipment, see chapter 2.7.



Have sufficiently dimensioned collecting containers, residue-free industrial wipes and hydraulic fluid binding materials ready in order to collect or bind leaking hydraulic fluid.

13.1 Required tools

The disassembly can usually be carried out with standard tools.
Special tools are not required.

13.2 Preparing for disassembly

1. Decommission the machinery/system as described in the overall instructions for the machine/system.
2. Discharge the pressure of the hydraulic system according to the specifications of the machine/system manufacturer.

13.3 Performing disassembly

Proceed as follows to disassemble the STO manifold:

1. Observe the safety instructions applicable to the assembly.
2. Ensure that the hydraulic system is depressurized.
3. Check whether the STO manifold has cooled down sufficiently so that it can be disassembled in a risk-free manner.
4. De-energize the machine/system.
5. Loosen and/or separate the electric connectors and connections.

NOTICE! Spilt or leaked hydraulic fluid!

Environmental pollution and contamination of the ground water!

- ▶ When draining the hydraulic fluid, always place a collecting pan under the STO manifold.
 - ▶ Observe the information in the safety data sheet of the hydraulic fluid as well as the specifications of the machine/system manufacturer.
6. Disconnect the pipework and collect any escaping hydraulic fluid in the provided tank.
 7. Remove the STO manifold. If necessary, use suitable lifting gear.
 8. Fully drain the STO manifold.
 9. Close all openings.
- ▶ Ensure during all these steps that no dirt gets into the openings.

14 Disposal

14.1 Environmental protection

- ▶ Careless disposal of the hydraulic components and the hydraulic fluid could lead to environmental pollution.
- ▶ Thus, dispose of the product and the hydraulic fluid in accordance with the currently applicable national regulations in your country.
- ▶ Dispose of any remaining hydraulic fluid in accordance with the applicable safety data sheets for this hydraulic fluid.

14.2 Return to Bosch Rexroth

The hydraulic products manufactured by us can be returned to us for disposal purposes free of charge. There must be no inappropriate foreign substances or third-party components when products are returned. Hydraulic products must be drained before being returned. The components have to be delivered free to the following address:

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

14.3 Packaging

Upon request, reusable systems can be used for regular deliveries.

The materials for disposable packaging are mostly cardboard, wood, and expanded polystyrene. They can be recycled without any problems. For ecological reasons, disposable packaging should not be used for returning products to Bosch Rexroth.

14.4 Materials used

Bosch Rexroth hydraulic components do not contain any hazardous materials that could be released during intended use. Normally, no adverse effects on human beings and on the environment have to be expected.

The hydraulic valves essentially consist of:

- Cast iron
- Steel
- Aluminum
- Copper
- Plastics
- Electronics components and assemblies
- Elastomers

14.5 Recycling

Due to the high metal content, hydraulic products can mostly be recycled. In order to achieve an ideal metal recovery, disassembly into individual assemblies is required. The metals contained in electric and electronic assemblies can also be recovered by means of special separation procedures.

15 Extension and modification

Any extensions or modifications you make to the product are carried out at your own risk.



Modifications to safety-relevant components such as orifices must only be carried out after consultation with the manufacturer and by authorized, trained and instructed personnel.

Certifications and declarations shall become invalid

By making extensions or modifications to the product marketed by Bosch Rexroth, you are making changes to the condition as supplied. As a result, any certifications or declarations provided by Bosch Rexroth for these products are no longer valid.

- ▶ In case of questions, contact your local Bosch Rexroth service, see chapter 18.1 "List of addresses".

You can find the addresses of our sales and service network at www.boschrexroth.com.

15.1 Accessories



For further information on accessories, refer to data sheet 62340, see chapter 1.2 "Required and additional documentation".

16 Troubleshooting

16.1 How to proceed for troubleshooting

- ▶ Proceed systematically and purposefully, even under time pressure. Indiscriminate, ill-considered dismantling and changing of setting values can, in the worst case, lead to the inability to determine the original cause of the error.
- ▶ Gain an overview of how your product works in conjunction with the machinery/system.
- ▶ Try to find out whether the product has worked properly in conjunction with the machinery/system before the fault first occurred.
- ▶ Try to determine any changes of the machinery/system in which the product is integrated:
 - Were there any changes to the product's application conditions or area of application?
 - Have modifications (e.g. refittings) or repair works been carried out on the overall system (machine/system, electrical system, control) or on the product? If yes: What were they?
 - Was the product or machine/system used as intended?
 - How did the fault become apparent?
- ▶ Try to get a clear idea of the cause of fault.
- ▶ If you are unable to rectify the fault, please contact one of the contact addresses listed under: www.boschrexroth.com.

16.2 Fault table

STO manifolds are usually not sensitive to faults if the prescribed application conditions and hydraulic fluid quality are complied with.

Table 13: Fault table

Fault	Possible cause	Remedy
External leakage	Seals at connection surface damaged	▶ Disassemble the hydraulic component and replace the seals.
	Other leakage	▶ Replace the leaking hydraulic valves.
No function	Electrical connection interrupted	▶ Check whether the electrical plug-in connectors are correctly and completely mounted. ▶ Replace the plug-in connector if necessary.
	Cable break	▶ Replace the connection cable.
	Defective limit switch or no feedback information of position monitoring	▶ Replace the complete defective component. ▶ Return the component for repair. ▶ Have repair works of components with position monitoring type QM performed by authorized personnel only. The valve limit switch type Q7 can be replaced on site. The original spare part must be screwed in to the end stop.

Fault	Possible cause	Remedy
Switching shocks when opening	Pressure not equalized	<ul style="list-style-type: none"> ▶ Retrofit the bypass function. ▶ Check the function of the valves, item 310 and 320. ▶ Check the function of the nozzles, item 311 and 321.
	Valve/valves, item 110 and/or 210, switches/switch too fast.	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.
Switching shocks when closing	Valve/valves, item 110 and/or 210, switches/switch too fast.	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.
	Nozzle, item 321, too large	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.
Excessively fast pressure build-up at port P2	Nozzle/nozzles, item 311 and/or 321, too large	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.
Excessively slow pressure build-up at port P2	Nozzle/nozzles, item 311 and/or 321, too small	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.
Excessively fast pressure reduction at port P2	Nozzle/nozzles, item 311 and/or 321, too large	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.
Excessively slow pressure reduction at port P2	Nozzle/nozzles, item 311 and/or 321, too small	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.
Pressure reduction at port P2 not working	Nozzle/nozzles, item 311 and/or 321, blocked	<ul style="list-style-type: none"> ▶ Check the nozzles, item 311 and 321.
SLS safety function not working	Valve/valves, item 310 and/or 320, does/do not switch.	<ul style="list-style-type: none"> ▶ Check the function of the valves, item 310 and 320.
	Nozzle/nozzles, item 311 and/or 321, blocked	<ul style="list-style-type: none"> ▶ Check the nozzles, item 311 and 321.
SLS safety function too slow	Nozzle/nozzles, item 311 and/or 321, blocked	<ul style="list-style-type: none"> ▶ Check the nozzles, item 311 and 321.
SLS safety function too fast	Nozzle/nozzles, item 311 and/or 321, too large	<ul style="list-style-type: none"> ▶ Consult with Bosch Rexroth.

17 Technical data



You can find the technical data in the data sheet 62340, see chapter 1.2 "Required and additional documentation".

18 Appendix

18.1 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
E-mail: service@boschrexroth.de

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) 9352/40 30 20
E-mail: my.support@boschrexroth.com

You can find the addresses of our sales and service network and sales organizations at www.boschrexroth.com/adressen.

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