

Mating connectors for valves and sensors in hydraulics

Type Z4, Z14, Z45

Operating instructions
RE08080-B/06.2023

English



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

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The cover shows an example application. The product 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:

- Mating connectors (type Z4, Z14, Z45) for valves and sensors in hydraulics

This documentation is intended for assemblers, operators, service engineers, system end-users and machine manufacturers.

This documentation contains important information on the safe and proper assembly, transport, commissioning, operation, use, maintenance and disassembly.

- Read this documentation completely and particularly chapter 2 "Safety instructions" and chapter 3 "General information on damage to property and damage to product" before working with the product.

1.2 Required and amending documentation

- The product must not be commissioned until you have been provided with the documentation marked with the book symbol  and you have understood and observed it. These documents can be found in the media directory at www.boschrexroth.com/mediadirectory

Table 1: Required and amending documentation

	Title	Document number	Document type
	Mating connectors and cable sets for valves and sensors in hydraulics	08006	Data sheet
	Electronics for industrial applications	07602	Operating instructions
	Hydraulic valves and hydrostatic pressure switches for industrial applications	07600	Operating instructions
	Information about the mating connector	-	See print on packaging
	EU declaration of conformity according to Low-Voltage Directive 2014/35/EU	Upon request	Certificate

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. For a better understanding, they are explained in the following sections.

1.3.1 Safety instructions

In this documentation, safety instructions are given in chapter 2.6 "Product-specific safety instructions" and chapter 3 "General information on damage to property and damage to product" and whenever sequences of actions or instructions are explained which bear the danger of personal injury or damage to property. The described hazard avoidance measures must be observed.

Safety instructions are set out as follows:

 SIGNAL WORD
Type and source of danger! Consequences in case of non-compliance ▶ Hazard avoidance measures ▶ <Enumeration>

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

Table 2: Risk classes according to ANSI Z535.6-2011

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 personal injuries if not avoided.
 CAUTION	Indicates a dangerous situation which may cause minor or medium personal injuries 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:
2.	The numbers indicate that the actions must be carried out one after the other.
3.	

1.3.3 Abbreviations

The following abbreviations are used in this documentation:

Table 4: Abbreviations

Abbreviation	Meaning
ANSI	American National Standards Institute
DIN	German Institute for Standardization
EU	European Union
ISO	International Organization for Standardization

Abbreviation	Meaning
UV	Ultraviolet radiation
IEC	International Electrotechnical Commission
IP	International Protection

2 Safety instructions

2.1 About this chapter

Bosch Rexroth mating connectors are manufactured according to the generally accepted code 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 product.
- ▶ Keep this documentation in a location where it is accessible to all users at all times.
- ▶ Always include the required documentation when passing the product on to third parties.

2.2 Intended use

The product is an electric component.

You may use the product as follows:

- Electrical connection between connection line and valve solenoids (hydraulic valves) or pressure switch from Bosch Rexroth
- The mating connector is used to establish a detachable electrical connection with the fixed wiring of a machine. Electrical equipment of the machine is carried out in accordance with the provisions of the Low-Voltage Directive and DIN EN 60204-1.
- Use within the specified limits for the operating parameters (voltage, current rating, temperature, connection line, environmental conditions, torques...), completely and correctly installed
- Use in the original condition, without damage.
- Repair by customers is not admissible.

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

Intended use includes having read and understood this documentation completely, especially the chapter 2 "Safety instructions".

2.3 Improper use

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

Also improper:

- For connection of actuators other than hydraulic valves/pressure switches
- Use in potentially explosive environments

2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of electrics, electronics and hydraulics as well as knowledge of the appropriate technical terms. 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 are able to 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 or electric components:

- Reading and completely understanding circuit diagrams,
- in particular, completely understanding the relationships regarding the safety equipment and
- having knowledge of the function, set-up and installation of hydraulic, electrical and electronic components.



Bosch Rexroth offers measures supporting training in specific fields.

An overview over the training contents can be found online at:

<http://www.boschrexroth.com>

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 original Rexroth accessories and spare parts in order to prevent 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 states 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, e.g. in explosion protection zones 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) where the Bosch Rexroth products are installed complies with the country-specific provisions, safety regulations and standards of the application.

2.6 Product-specific safety instructions

WARNING

Dangerous movement!

Risk of injury due to incorrect connection and plugging or unplugging under voltage.

- ▶ Comply with safety instructions according to EN ISO 13849 or IEC 62061.
- ▶ If persons must access the danger zone during active control, monitoring or measures must be provided for personal safety which are superior to the system. These measures must be provided according to the specific data of the system and on the basis of the risk and failure analysis of the system manufacturer/user. In this connection, the safety provisions applied for the system must be taken into account.
- ▶ Breakdowns and faults in the control circuits or the energy supply can lead to uncontrolled machine movements.
- ▶ If the product is used outside the specified IP protection class, short-circuits and malfunctions and thus uncontrolled machine movements may result. You may therefore only use the product within the IP protection class and environment specified in the data sheet.
- ▶ Avoid contact with salt-containing and corrosive environments (e.g. chemicals, corrosive media and salts) and maintain the ambient temperature specified in the data sheet.
- ▶ In case of emergency, an error, or in case of other irregularities, switch off the system and secure it against restarting.



WARNING

High electrical voltage!

Danger to life, risk of injury caused by electric shock.

- ▶ De-energize the relevant system part for all works and secure it against restarting.
- ▶ Consistently follow the 5 safety rules when working on electrical equipment.
- ▶ The mating connector is used to establish a detachable electrical connection with the fixed wiring of a machine. Electrical equipment of the machine must be carried out in accordance with the provisions of the Low-Voltage Directive and DIN EN 60204-1.
- ▶ Always connect all lines and the PE connection at the designated points. Avoid open lines or contacts.

High pressure!

Risk of injury!

- ▶ Before carrying out any work on the mating connectors and the associated valves/pressure switches, depressurize the relevant system part and ensure that the system is depressurized.

Hot surface!

Risk of burning from hot surfaces at the valve solenoid!

- ▶ Provide a suitable touch guard.
- ▶ Allow the components to cool down to room temperature before touching them directly with your hands during maintenance works.

Short-circuit!

Danger of overload, overheating and damage to the mating connector!

- ▶ Observe the current carrying capacity and derating, see data sheet.
- ▶ The electric circuit must be protected with a fuse of max. 10 A. If required by actuators (e.g. valve) or the connection line, this value must be reduced.

CAUTION

Fault currents and short-circuits!

Impairment of safety and malfunctions.

- ▶ The environment must be free from electrically conductive contamination (acids, bases, corrosive agents, salts, metal vapors, etc.) and the mating connector must not be exposed to these substances.
- ▶ The device may only be used at the specified ambient temperature and at humidity without condensation.
- ▶ Select the site of installation so that the climatic limit values specified in the technical data are complied with.

High electrical voltage!

According to DIN EN 61984, the mating connector is a "connector without switching capacity". There is a risk of destruction of electronics by connecting or disconnecting the mating connector under voltage.

- ▶ The mating connector must not be disconnected from or plugged into the valve/pressure switch while under voltage. The mating connector is not a connector with switching capacity (for disconnection/connection under load). The mating connector is intended for fixed installation only.

2.7 Personal protective equipment

Check specified personal protection for completeness and protective effect and have it available (please observe customer specification and list of personal protection!).

2.8 Obligations of the machine end-user

The operation of installations, systems and machines basically requires the implementation of a holistic IT security concept which is state-of-the-art in terms of technology. Accordingly, 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 warranty only applies to the delivered configuration.

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

NOTICE

Incorrect connection line! Malfunction! Risk of fire!

Use of connection lines outside the approved data can lead to malfunctions and even fire.

- For the Bosch Rexroth mating connector, use only connection lines with suitable diameters and line cross-sections specified in the data sheet, or use the line cross-sections specified on the packaging.

Short-circuit!

Risk of overload and damage to the supply line in case of defects at the electric device.

- Provide for current limitation by overload protection.

Cables lying around!

Risk of stumbling.

- Lay lines in such a way that they cannot be damaged and no one can trip over them.

Inadmissible mechanical load!

Impact or shock forces on the valve or the pressure switch and the connected mating connector can damage or even destroy them.

- Never use the components as handle or step. Do not place/put any objects on top of it.

4 Scope of delivery

Included in the scope of delivery of the mating connector:

- Mating connector with seal and central screw M3
 - Polybag with printed information on the mating connector, see also chapter 5.1 "Product identification".
-
- Check the scope of delivery for completeness and possible transport damage.



In case of complaints, please contact Bosch Rexroth AG, see section 16.1 "List of addresses" on page 22.

5 Product information



For information on the product, refer to the data sheet and these operating instructions. These documents can be found in the media directory at

www.boschrexroth.com/mediadirectory

5.1 Product identification

The mating connector does not have a name plate.

The most important data (e.g. material number, installation information, technical data) of the product are printed directly on the packaging.

Further technical data can be found in the data sheet or in these operating instructions.



Observe the information on the packaging.

6 Transport and storage

There are no special transport instructions for the mating connector. However, always observe chapter 2 "General safety instructions" and comply with the environmental conditions specified in chapter 6.1 "Storing the mating connector" for storage and transport.

6.1 Storing the mating connector

Proceed as follows in order to prepare the mating connector from Bosch Rexroth for storage and further use:

- ▶ Ensure a storage temperature range of 5...40 °C.
- ▶ The relative air humidity must not exceed 65%.
- ▶ The storage rooms must provide 100% UV protection.
- ▶ Protect the mating connector from dust, humidity and UV radiation.
There must not be any formation of condensation.
- ▶ No ozone formation may occur near the storage facility.
- ▶ Only use the original packaging for storage.

7 Assembly

NOTICE

Risk of short-circuit!

Condensation can form inside the housing of the mating connector!

- ▶ Let the mating connector acclimate itself for several hours, as otherwise water may condense in the housing.
- ▶ Whenever working on the mating connector, ensure maximum cleanliness and that no liquids can penetrate it.

7.1 Required tools

The following tools are required for connection of the mating connector:

- Screwdriver
- Crimping pliers
- Torque tool

7.2 Installation conditions

- ▶ For installing the product always observe the environmental conditions or the climatic limit values specified in the data sheet.
- ▶ The environment must be free from electrically conductive contamination (acids, bases, corrosive agents, salts, metal vapors, etc.) and the product must not be exposed to these substances. Avoid contact with liquids of any kind.
- ▶ The environment must be free of dirt and dust.

7.3 Assembling the mating connector

- ▶ When selecting the connection line, please observe the requirements regarding the temperature rating and/or avoid contact of the connection line with the surface of the solenoid coil or the sensor technology.
- ▶ Ensure that there are no bends in the connection line and braided wires to avoid short-circuits and interruptions.
- ▶ Route the connection line in a strain-relieved form. The first mounting point must be within 15 cm of the mating connector.
- ▶ Make sure you choose the right tool for all work on the mating connector.
- ▶ Observe the max. torque of the central screw, see chapter 7.3.1. "Assembly".
- ▶ It is not permissible to use the mating connector without a seal or without an interlock.
- ▶ Loss of leak-tightness: Replacing the pressure screw on the line entry with a cable and line entry is not admissible.
- ▶ Observe the admissible range of line cross-sections of 0.5...1.5 mm².
- ▶ The terminals of the mating connector are only suitable for holding a single conductor at a time.

7.3.1 Assembly

1. De-energize and depressurize the relevant system part.
2. Connection line preparation:
 - Strip the sheath
 - Cut individual conductor to length
 - Remove insulation of individual conductor
 - Mount wire end ferrules and shorten if necessary

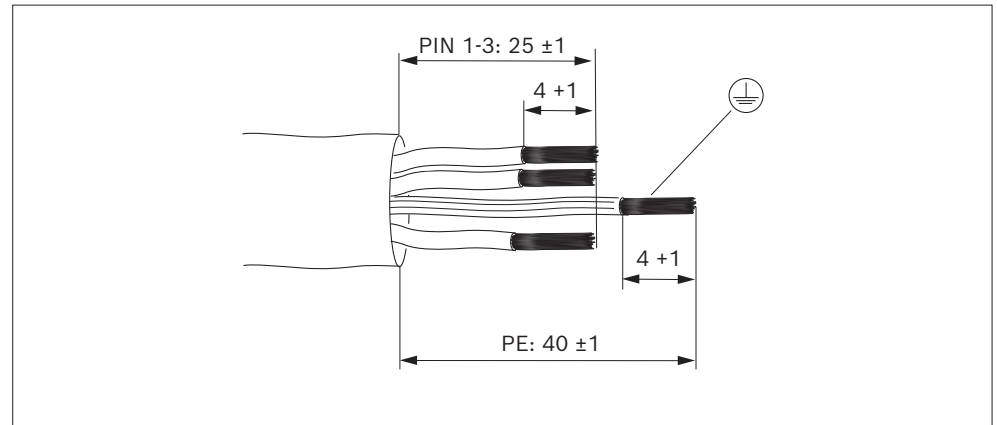


Fig. 1: Stripping lengths

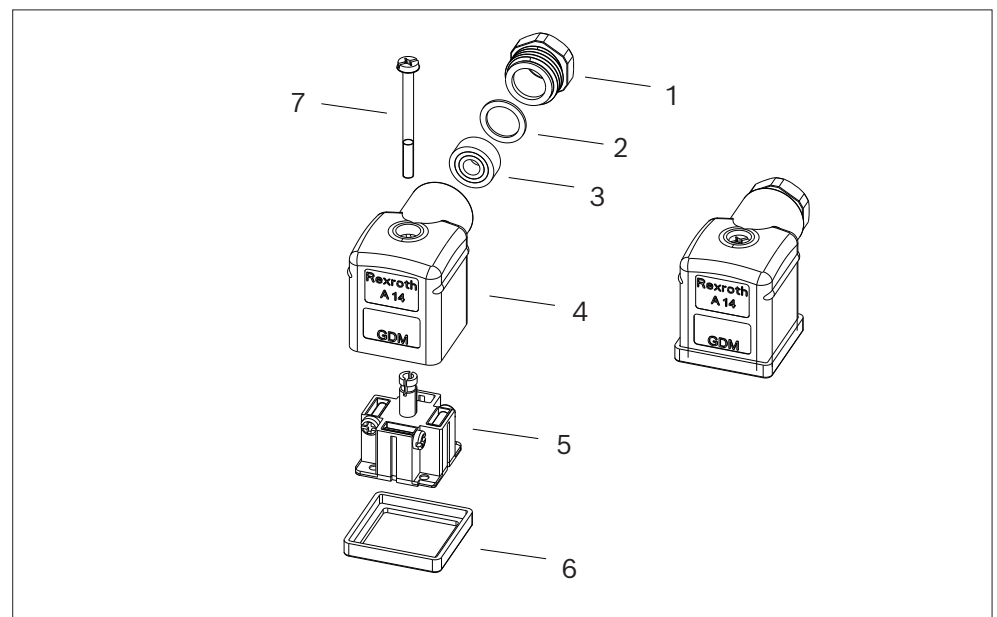


Fig. 2: Assembly of Z4 and Z14 (fitting M16x1.5)

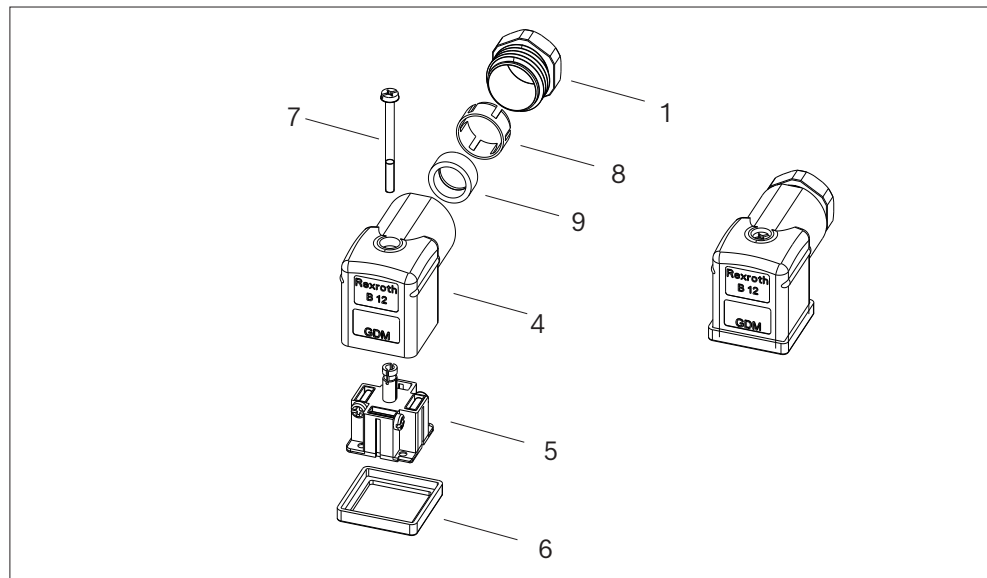


Fig. 3: Assembly of Z45 (fitting NPT 1/2")

- 1 Pressure screw
- 2 Washer
- 3 Multi-range sealing ring
- 4 Housing
- 5 Contact carrier
- 6 Profile seal
- 7 Central screw
- 8 Clamping cage
- 9 Seal

3. Remove the mating connector from the packaging.
4. Disassemble the pressure screw **(1)**, washer **(2)** and the multi-range sealing ring **(3)** (or pressure screw, clamping cage **(8)** and the seal **(9)** for type Z45).
5. Lever the contact carrier **(5)** out of the housing **(4)** of the mating connector with a slotted screwdriver. The lever point for this purpose is marked with "Lift".
6. Slide the pressure screw **(1)** onto the connection line in the correct position.
7. Slide the washer **(2)** (type Z4, Z14) or the clamping cage **(8)** (type Z45, note position) and the seal **(9)** onto the connection line.
8. Adjust the multi-range sealing ring **(3)** (type Z4, Z14) to the diameter of the connection line. Slide the multi-range sealing ring **(3)** onto the connection line.
9. Guide the connection line into the housing **(4)**. The required insertion depth should be approx. 100 mm.
10. Connect the individual conductors and the PE connection to the contact carrier **(5)**. The terminal assignment or the circuit diagram can be found in the data sheet. (Torque of the contact screws: 40...50 Ncm)
11. Perform a visual inspection for protruding individual conductors of the braided wires.
12. Remove the central screw **(7)** from the packaging and insert it into the housing **(4)** of the mating connector.

13. Insert the threaded end of the central screw **(7)** into the plastic sleeve of the contact carrier **(5)**.
14. Set the contact alignment of the contact carrier to the housing of the mating connector. The contact carrier can be plugged into the housing in 4 different positions
15. Carefully insert the contact carrier into the housing until the plastic sleeve of the contact carrier engages in the housing. Pull back the connection line in such a way that the connection line and the individual conductors cannot become jammed between the contact carrier and the housing.
16. Slide back the central screw **(7)** and check whether the plastic sleeve of the contact carrier is completely visible.
17. Tighten the pressure screw **(1)** of the line entry. (Torque: 150-250 Ncm)
18. Remove the profile seal **(6)** from the packaging and mount it in the correct position. The collar of the seal must face the mating connector.
19. Make sure that the mounting surface is free of dirt. This is the only way to ensure leak-tightness.
20. Screw the mating connector onto the valve or the pressure switch. (Torque: 50...60 Ncm)
21. Carry out a visual inspection for proper seat of the seal.
22. Establish the strain relief of the connection line. The first mounting point must be within 150 mm of the mating connector.

8 Commissioning

WARNING

Faulty assembly!

If the mating connector is not correctly mounted, persons might be injured and the valve, sensor technology or system could be damaged when commissioning the valve.

- The mating connector and the valve or sensor technology may only be installed and operated when fully assembled.

9 Operation

During normal operation, the user does not need to intervene.

10 Maintenance and repair

10.1 Cleaning and care

NOTICE

Penetrating dirt and humidity!

Operating failures and loss of function.

- ▶ Always provide for absolute cleanliness when working on the mating connector.
- ▶ Only use a dry and dust-free cloth for all cleaning works.

Solvents and aggressive cleaning agents!

Damage and faster aging of the mating connector.

- ▶ Do not use aggressive cleaning agents; only use a dry and dust-free cloth for all cleaning works.



Switch off your system, separate the electric voltage supply and protect the system against restarting before all work.

For cleaning and maintenance proceed as follows:

- ▶ Perform a visual inspection and check the tight fit of the connection line and the mounting screw M3.
- ▶ Check the lines for breaks and crushes. Replace damaged or defective lines immediately!
- ▶ Check the housing and the seal of the mating connector for cracks.
In case of cracks, please replace the mating connector.
- ▶ Clean the outer surfaces of the mating connector with a dry and dust-free cloth.

10.2 Inspection and maintenance

Maintenance of the mating connector is limited to the points mentioned under "Cleaning and care" above.

10.3 Repair

The mating connector may only be replaced as one whole unit. Unauthorized modifications to the mating connector are not admissible for safety reasons! Repair and maintenance works may only be performed by Bosch Rexroth AG. For repair and maintenance, return the mating connector to the service address specified in chapter 16.1.

Please send any devices for repair in its original packaging.

11 Disassembly and replacement

11.1 Required tools

See chapter 7.1 "Required tools"

11.2 Preparing for disassembly



WARNING

Risk of injury when disassembling under pressure and with electrical voltage applied!

If you do not de-pressurize and de-energize the system prior to the start of disassembly, you may get injured and the product or system parts may be damaged!

- ▶ Decommission the overall system as described in the overall system instructions.
- ▶ The system and all connected components must be brought into a safe state. In addition, the components must be switched off, depressurized, de-energized and secured against restarting.

11.3 Disassembly of the product

1. Switch off your system and separate the electric voltage supply and protect the system against restarting before all disassembly work.
2. Provide for a clean environment during the disassembly.
3. Remove the mating connector in the reverse order as described in chapter 7.3.1 "Assembly".



The mating connector is intended for single use only.

12 Disposal

12.1 Environmental protection

Careless disposal of the product may cause environmental pollution.

- ▶ Thus, dispose of the product and the packaging material in accordance with the national regulations in your country and recycle the material, if possible.
- ▶ Please observe the following notes for environmentally-friendly disposal of the product.

12.2 Return to Bosch Rexroth AG

The products manufactured by us can be returned to us for disposal purposes at no costs. There must be no inappropriate foreign substances or third-party components when products are returned. The components have to be sent free to the door to the following address:

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

12.3 Materials used

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

The mating connectors consist of:

- Plastics
- Metallic materials (copper alloy, steel)

13 Extension and modification

Modifications exceeding the extent described in these operating instructions are not permitted.

14 Troubleshooting

Mating connectors are generally not sensitive to faults, provided that prescribed operating and environmental conditions are observed.



Before troubleshooting, switch off your system, disconnect the electric voltage supply and secure the system against restarting.

14.1 How to proceed for troubleshooting

- ▶ Always work systematically and purposefully, even when under time pressure. Random, thoughtless disassembly and changing of settings might in the worst case result in the inability to restore the original cause of error.
- ▶ First get a general idea of how your product works in conjunction with the overall system.
- ▶ Try to find out whether the product has functioned properly in conjunction with the overall system before the error occurred first.
- ▶ Try to determine any changes of the overall system into 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 so: What were they?
 - Was the product or machine used as intended?
 - How did the fault become apparent?
- ▶ Try to get a clear idea of the cause of error. If necessary, ask the actual (machine) operator.

15 Technical data

The technical data of the product can be found in the data sheet.

16 Appendix

16.1 List of addresses

Contacts for service and spare parts

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

Phone +49 (0) 9352/40 50 60
Email service@boschrexroth.de

Headquarters

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

Phone +49 (0) 9352/18 0

For questions about the product

Bosch Rexroth AG
Phone +49 (0) 9352/40 30 20
Email my.support@boschrexroth.de

The addresses of our sales and service network and sales organizations can be found at www.boschrexroth.com/adressen

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