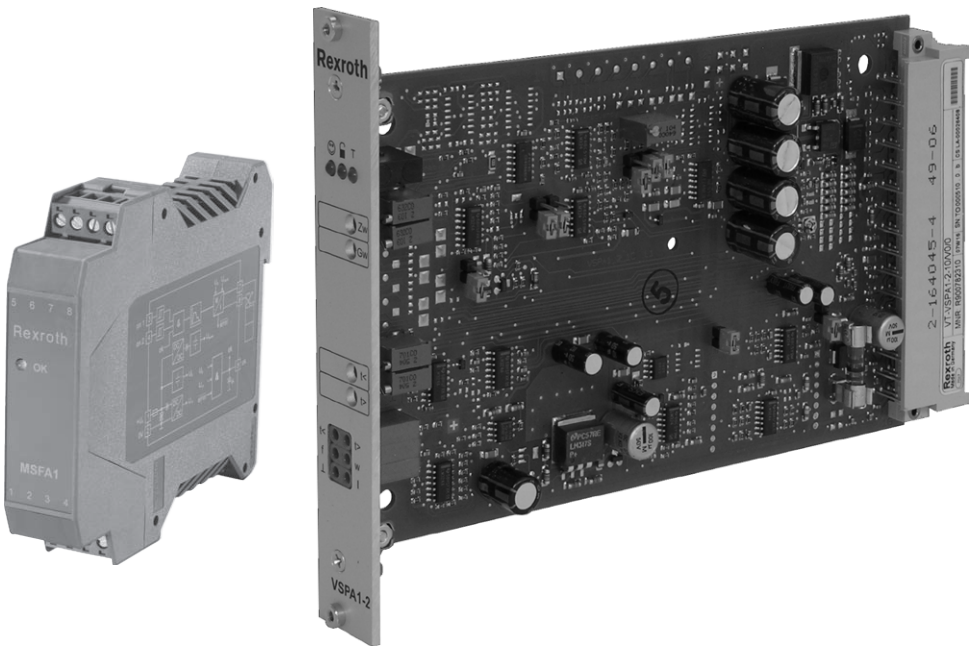
The Drive & Control Company

Rexroth
Bosch Group

Electronics for industrial applications

Operating instructions
RE 07602-B/01.2015

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. 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.

An example configuration is shown on the title page. The delivered product may, therefore, differ from the product which is pictured.

The original operating instructions were created in the German language.

Contents

1 About this documentation

1.1 Validity of the documentation

This documentation is valid for valve amplifiers, command value conditioning cards and electronics in the field of industrial hydraulics from Bosch Rexroth.
This documentation is intended for fitters, operators, service technicians, system operators and machine manufacturers.
This documentation contains important information on the safe and appropriate installation, transport, commissioning, maintenance, operation, use, and removal of the product.

- Read this documentation thoroughly, especially Chapter 2 “Safety instructions“ and Chapter 3 “General notes on damage to material and the product“, before working with the electronics.

1.2 Required and supplementary documentation

- Only commission the product, when you have the documents marked with the book symbol 🕮 at hand and have understood and observed them.

Tabelle 1: Required and supplementary documentation

	Title	Document number	Type of document
🕮	Order confirmation		
🕮	Data sheet of the relevant component		Data sheet

1.3 Representation of information

In order that this documentation allows you to work directly and safely with your product, standardized safety notes, symbols, terms and abbreviations are used. For a better understanding, these are explained in the following sections.

1.1.1 Safety notes

This documentation contains safety notes in Chapter 2.6 “Product-specific safety instructions“ and Chapter 3 “General notes on damage to material and the product“ as well as before a sequence of activities or instructions for action, which involve the risk of personal injury or damage to equipment. The measures described for averting the hazard must be observed.

Safety notes are structured as follows:

⚠ SIGNAL WORD

Type and source of hazard!
Consequences in the case of non-observance

- Measures to avert the hazard
- <List>

- **Warning symbol:** draws attention to a hazard
- **Signal word:** identifies the degree of hazard
- **Type and source of hazard:** identifies the type or source of the hazard
- **Consequences:** describes the consequences in the case of non-observance

• **Precautions:** states, how the hazard can be avoided

Tabelle 2: Hazard classes according to ANSI Z535.6-2006

Warning sign, signal word	Meaning
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will certainly result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Damage to property: The product or the environment can be damaged.

1.1.2 Symbols

The following symbols refer to notes, which are not relevant to safety, but increase the legibility of the documentation.

Tabelle 3: Meaning of symbols

Symbol	Meaning
	If this information is disregarded, the product cannot be used or operated in an optimum manner.
▶	Individual, independent step of action
1. 2. 3.	Numbered instructions for action: The numbers indicate that the activities are to be carried out consecutively.

1.1.3 Terms used

The following terms are used in this documentation:

Tabelle 4: Terms used

Designation	Meaning
Electronics	Command value cards, amplifiers, and controls manufactured by Rexroth

1.1.4 Abbreviations used

The following abbreviations are used in this documentation:

Tabelle 5: Abbreviations used

Abbreviation	Meaning
ANSI	American National Standards Institute
EMC	Electromagnetic compatibility
FC	Frequency converter
PELV	Protective Extra Low Voltage

2 Safety instructions

2.1 About this chapter

Electronic devices from Bosch Rexroth are manufactured according to the generally accepted rules of technology. There is, however, still a risk of personal injury or damage to equipment if you do not observe this Chapter and the safety instructions contained in this documentation.

- ▶ Read these instructions 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 pass the product together with the required documentation to third parties.

2.2 Intended use

The products are electrical and electronic components.
You may use the product as follows:
- For applications as specified in the technical data sheet
- While adhering to the operating and ambient conditions according to the data sheet
- While adhering to the given performance limits
- In the original condition, without damage
- Repairs by customers are not permitted

The product is intended exclusively for professional use and not for private usage. Operation according to the intended use also implies that you have read and understood this documentation completely, especially Chapter 2 “Safety instructions“.

2.3 Improper use

Any use other than described in the section “Intended use” is considered as improper and is therefore not permitted.
For damage resulting from improper use, Bosch Rexroth AG will not bear liability.
The risks arising from improper use lie exclusively with the user.
Improper use includes, but is not limited to:
- operating the electronics outside the specified performance limits and operating conditions, especially the prescribed ambient conditions;
- the use as safety-related part of controls in the sense of DIN EN ISO 13849. Functional safety must be realized by means of appropriate, additional components.
- use in potentially explosive atmospheres
- improper transport
- improper storing
- insufficient cleanliness for storing and installation
- incorrect installation

2.4 Personnel qualifications

The activities described in this documentation require basic knowledge of electrics, electronics, and hydraulics as well as knowledge of the associated technical terms. To ensure safe usage, these activities may therefore only be carried out by qualified personnel or under the direction and supervision of qualified personnel.
Qualified personnel are those who can recognize possible hazards and institute the appropriate safety measures due to their professional training, knowledge and experience, as well as their understanding of the relevant conditions pertaining to the work to be done. Qualified personnel must observe the rules relevant to the subject area and have the required expertise in this field.
With regard to hydraulic products, expertise means, for example:

- Ability to read and completely understand circuit diagrams,
- the complete understanding in particular of interrelationships with regard to safety equipment and
- knowledge of the function and structure of hydraulic, electrical and electronic components.

Bosch Rexroth offers qualifying training courses in specific fields. You can find an overview of training contents on the Internet at:
`http://www.boschrexroth.com`

2.5 General safety instructions

- Observe valid regulations for accident prevention and environmental protection.
- Observe the safety regulations and rules of the country where the product is used/ operated.
- Use Rexroth products only in technically perfect condition.
- Observe all notes given on the product.
- Persons who install, commission, operate, demount or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.
- Only use accessory and spare parts approved by the manufacturer in order to rule out personnel hazards arising from unsuitable spare parts.
- Adhere to the technical data and ambient conditions provided in the product documentation.
- If unsuitable products are installed or used in safety-relevant applications, unintended operational states may occur in the application that can cause personal injury and/or damage to property. Therefore, use the product only in safety-relevant applications such as in explosion protection areas or in safety-related parts of a control (functional safety), if this use is expressly specified and permitted in the documentation.
- You may commission the product only when it has been established that the final product (for example, a machine or system), in which the Rexroth products are installed, complies with national regulations, safety regulations and standards relevant for the application.

2.6 Product-specific safety instructions

⚠ WARNING

Hazardous movements!

Risk of injury due to incorrect connection or incorrect activation of electrical and electronic devices and resulting unforeseeable machine movements.

- Observe safety in accordance with EN 13849 or IEC 62061.
- If persons have to enter the hazard zone while the control is active, provide superordinate monitoring functions or measurers for personal safety. The plant manufacturer/user must rate and dimension these measures on the basis of a risk and failure analysis according to the specific situation on site. The safety regulations valid for the system must be taken into account for this.
- Failures and defects in the control current or the energy supply can result in uncontrolled machine movements.
- Electronics emit interference to other electronics within the permitted limit values and also react to interference. This can cause malfunction in the control process. Only use electronics below EMC limit values or provide appropriate shielding.
- Electrostatic processes, an inadequate grounding concept or missing equipotential bonding can lead to damage to the electronics and hence cause malfunction or uncontrolled movements of the machine. Ensure proper grounding and provide equipotential bonding.
- Using the product outside the specified IP protection class can result in short-circuit and malfunction and hence in uncontrolled machine movements. Therefore, use the product only within the IP protection class and in environments as specified in the data sheet.
- Provide safety functions for personal safety separately. Amplifiers, command value processing cards and control electronics themselves do not include safety functions for personal safety and are no safety-related components.
- Avoid contact with salt-laden environments and adhere to the ambient temperature given in the data sheet.
- In the event of an emergency, fault or other abnormalities, switch the system off and secure it against being switched on again.

High electric voltage through incorrect connection!

Danger to life, risk of injury due to electric shock.

- When carrying out any work, disconnect the relevant machine section from the power supply and protect it against being switched on again.
- Only connect devices, electrical components and lines which feature protective extra low voltage (PELV) to connections or terminals having voltages from 0 to 50 Volt.
- Only connect voltages and power circuits that feature safe isolation from dangerous voltages. Safe electrical isolation can be achieved with, for example, isolating transformers, safe optocouplers or mains-free battery operation.
- Always connect all cables to the provided connections. Avoid open cables or contacts.

⚠ WARNING

High pressure!
Risk of injury.
- Before working on electronics, depressurize the relevant system section and make sure that the system is depressurized.

Lightning!
Risk of uncontrolled machine movements.
- An inadequate grounding concept or missing equipotential bonding can lead to damage to the electronics. Provide for equipotential bonding of the device.

⚠ CAUTION

Fault currents and short-circuits!
Impairment of safety and malfunction.
- Keep the surroundings free from electrically conductive contamination (acids, bases, corrosive agents, salts, metal vapors, etc.) and do not expose the device to these substances. Generally rule out any deposits according to protection class IP.

2.7 Personal protective equipment

Check determined personal protective equipment for completeness and protective effect and wear it (observe customer regulations and list of personal protective equipment).

3 General notes on damage to material and the product

The warranty is valid exclusively for the configuration delivered.

- Warranty claims will be rejected in the case of improper installation, commissioning and operation as well as in the case of use not in accordance with the intended purpose and/or improper handling.

NOTICE

High voltage!
The electronics may be damaged.
- ▶ Wire electronics from Bosch Rexroth only when these are disconnected from the power supply.

Wrong cables! Power loss, scorching of cable!
Risk of damage to the product!
- ▶ Only use the cables specified in the data sheet with the respective cable cross-sections for electronic devices from Bosch Rexroth!

Radiated interference!
Risk of malfunction.
- ▶ The distance to radio sources must be sufficiently large (>> 1 m).
- ▶ In the case of strongly fluctuating operating voltage, it may be necessary to use an external smoothing capacitor in individual cases.

Emitted interference!
Risk of affecting other devices.
- ▶ Use shielded signal and solenoids cables in order that EMC requirements are fulfilled.

Overloading!
Risk of overloading and damage of the supply cable in the case of insufficient dimensioning and/or operation with several electrical devices.
- ▶ Provide current limitation by overload protection.
- ▶ Select an appropriate rating of power supply units and cables.

Short-circuit!
Risk of overloading and damage of the supply cable in the case of defects of the electrical device.
- ▶ Provide current limitation by overload protection.

Impermissible temperature range!
Risk of overheating. The devices can be thermally destroyed.
- ▶ Adhere to the specification in the data sheet.

Cables lying around!
Risk of stumbling!
- ▶ Lay the cables and lines so that they cannot be damaged and no one can stumble over them.

4 Scope of delivery

Information on the scope of delivery can be found in the shipping documents and the data sheet of your Rexroth product:

- Inspect the scope of delivery for completeness and possible damage in transit.

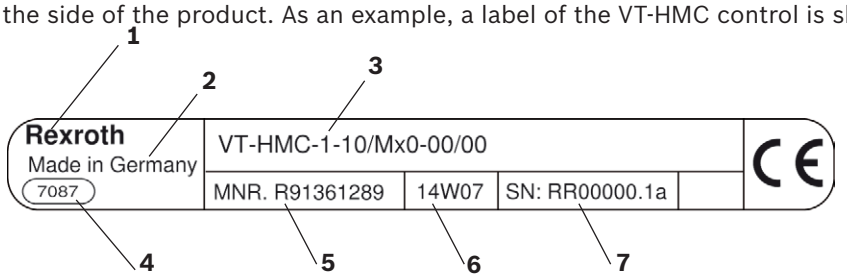
In the case of complaints, please contact Bosch Rexroth AG, see section 16.1 ”Address directory“ on page 23.

5 About this product

You can find information on the product and its performance in the data sheet of your electronics. The data sheet is available in the Media Directory at www.boschrexroth.com.

5.1 Identification of the product

The most important data of the product are given on a label or are printed directly at the side of the product. As an example, a label of the VT-HMC control is shown here.



1 Word mark
2 Country of origin
3 Material short text
4 Plant
5 Material number
6 Date of production
7 Serial number

6 Transport and storage

There are no special instructions for transporting electronic products. You must, however, observe the notes in Chapter 2 “General safety instructions” and comply with the ambient conditions for storage and transport which are detailed in the technical data sheet.

In the case of electronics in Euro-card format, please note that these have to be transported in the antistatic packaging, in which they are delivered.

6.1 Storing electronic products

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

- Whenever possible, use the original packaging for storage.
- Observe the permissible storage temperature range specified in the data sheet.
- Protect the electronics from dust and humidity.

7 Installation

NOTICE

Risk of short-circuit!
In the case of electronics with housing, water may condense within the housing!
- Let the electronics acclimate itself for several hours, as otherwise water may condense in the housing.

Some electronics are provided with cooling slots. Depending on the specified protection class, dirt and fluids may easily enter and cause malfunction and short-circuit! Reliable operation is thus no longer ensured.
- When working on the electronics, observe strictest cleanliness and make sure that no fluids will enter the housing.

Major differences in potentials!
Risk of destruction of electronics by plugging or unplugging connectors under voltage.
- Switch off power supply to the relevant system part before installing the products or plugging or unplugging connectors.

Electrostatic discharge!
Risk of destruction of electronics in Euro-card format.
- Keep the electronics in their antistatic packaging until they are installed and observe the notes on top of the packaging when unpacking the electronics.

Radiated interference!
Risk of malfunction.
- The distance to radio sources must be sufficiently large (>> 1 m).
- Do not lay solenoid or signal cables near power cables.
- Shield command and actual value cables. Leave the shield open at one end and connect it to system ground on the card side.

7.1 Unpacking

NOTICE

Electrostatic discharge!
Risk of destruction of electronics in Euro-card format.
- Take the card out of the packaging at a protected workplace only.
- Handle electronics in Euro-card format at the front panel and do not touch any electrical components.

7.2 Required tools

For installing the product, no special tools are required.

7.3 Installation conditions

- When installing the products, strictly adhere to the ambient conditions specified in the data sheet.
- Keep the surroundings free from electrically conductive contamination (acids, bases, corrosive agents, salts, metal vapors, etc.) and do not expose the device to these substances. Generally rule out any deposits according to protection class IP 20. Avoid contact with the hydraulic fluid.

1.1.5 Place of installation

Electronics from Bosch Rexroth are intended for installation in control cabinets. Outdoor installation is not permitted.

7.4 Installing electronics

Electronics in housings and modules

The dimensions of the individual electronics are given in the respective data sheet. Observe the required clearance for installation and possible demands made on air circulation and cooling.

Electronics in Euro-card format

Electronics in Euro-card format are intended for installation in racks or suitable card holders. The relevant suitable holders and racks are listed in the data sheet of the individual products.

- Before installing the card, make sure that all jumpers of the card are correctly plugged.
- For mounting, observe the notes on applicable standards and operating conditions in the data sheet.
- Use low-capacitance cables.
- Whenever possible, execute cable connections without intermediate terminals.
- Install sensor cables separately.
- Observe a distance of at least 1 m between the place of installation of the card and aerial lines, radio sources and radar equipment.
- Do not lay solenoid or signal cables near power cables.
- Do not use connectors with free-wheeling diodes or LED indicator lamps for connecting solenoid cables to valves!
- Always shield command value cables. Connect the shield to “PE” on the card side.
- The system ground is an essential part of EMC protection of the card. It is provided to bleed off interference that comes in via the data and supply voltage cables. This is, however, only possible, if the system ground itself does not inject interference into the card. Recommendation: Also shield solenoid cables!
- Lay the cables and lines so that they cannot be damaged and no one can stumble over them.
- Do not use any silicone-containing sealants, adhesives or insulating agents.
- See to it that the installation position provides ease of maintenance, i.e. unhindered access to connection lines. Ensure free access to the connection side.
- Before installing the device, note the details given on the nameplate. If nameplates are no longer visible or legible after installation you will have the data at hand at any time.

Electronic cards are designed as printed-circuit boards in Euro-card format 100 x 160 and suitable for installation in a rack.

Suitable card holders are open card holders VT3002-1-2X/... (see RE 29928)

Proceed as follows to install electronics:

1. Disconnect the rack or card holder to be used from the voltage supply.
2. Take the card out of the packaging at a protected workplace only.
3. Open the packaging of the electronic card and pull it out by the front panel.
4. Insert the electronic card into the guide rails of the rack without using force.
5. Let the electronic card lock in place by gently pressing on the front panel.
6. Tighten the two fixing screws on the front panel.

   The electronic card is now correctly installed.

Electronics in the form of modules

Electronic modules are offered in various forms, which are intended for DIN rail mounting in control cabinets with vertical installation position. The dimensions are given in the respective data sheet.

- Make sure that the minimum clearance given in the data sheet is adhered to in order to ensure sufficient circulation of air to the ventilation slots.

On modules of types VT-MUXA, VT-MSFA1 and VT-MRMA1 foot catches with spring are provided for fixation of the module housing.
By snapping the housing of the these modules on a conductive mounting rail, the earth connection is established. This constitutes the HF grounding of the electronic modules.

- Let the electronic module snap in on the mounting rail. The foot catch (spring-applied) prevents the module housing from loosening from the mounting rail.
- To loosen the module, push the foot catch downwards.

All other electronic modules can be snapped onto the mounting rail without any tools and can be removed in the same way.

7.5 Connecting the electrical supply

1. Disconnect the relevant system part from the power supply.
2. Inspect all cables for intactness.
3. Connect the respective voltage supply and check the presence of voltage by switching on.

1.1.6 Shield

For signal cables, use only cables with a copper braid shield. Connect the cable shield on a large area to the metalized plug-in connector housing and one side to the electronics. This is achieved by pushing the shield back and clamping the cable under the strain relief.

1.1.7 General notes on shielding

- Install signal and power cables as far away from each other as possible and do not install them in parallel.
- Do not route signal cables through strong magnetic fields.
- Whenever possible, install signal cables without any interruptions. If intermediate terminals are required, the shield must be dealt with separately.
  Install power cables consisting of two individual wires (e.g. voltage supply) in parallel or twisted.

- Cables should only have the number of wires actually required. If this is impossible, connect the wires with each other and connect them to ground on one side in the control cabinet.

1.1.8 Suppressing interference of the system

Should interference occur in conjunction with signals of the electronics, inspect the interference suppression of other electrical components, e.g. as follows:

Switched inductance:	DC: anti-parallel free-wheeling diode across actuator winding AC: type-related R/C combination across actuator winding
Electric motors	R/C combinations from each motor winding to ground.
Frequency converter	Input filter in the voltage supply of the frequency converter. Motor control lines shielded and installed separately from other cables and/or output filter for motor cables. Extensive contact of the frequency converter housing to the rear wall of the control cabinet

8 Commissioning

NOTICE
Uncontrolled plugging and unplugging of connectors! The device might be destroyed. ▶ Before plugging or unplugging connectors into or from the device, disconnect the device from the power supply or de-energize it reliably! Damage to the device caused by incorrect handling is not covered by the warranty! ▶ Observe the protection class, the voltage supply and the environmental conditions according to the relevant data sheet.

- ▶ Before commissioning, make sure that all the seals and plugs of the plug-in connections are correctly installed to ensure that they are leak-proof and no fluids or foreign particles can enter the product.

For electronics that have to be parameterized by means of software for commissioning, separate operating instructions with detailed description are available.
For modules and cards that are to be set directly, the setting elements can be found in the respective data sheet.

9 Operation

During normal operation, the user needs not to intervene.
Should a fault occur during operation, e.g. a power failure, the electronics can simply be switched on again without further measures and it is then ready for operation again.

10 Maintenance and repair

Rexroth electronics are usually maintenance-free.

10.1 Cleaning and care

NOTICE

Ingress of contaminants and humidity!
Malfunction and loss of function.
- When working on electronics observe strictest cleanliness.
- Only use a dry and dust-free cloth for cleaning.

Solvents and aggressive detergents!
Damaged and rapid aging of electronics.
- Do not use aggressive detergents for cleaning, but only a dry and dust-free cloth.

Proceed as follow for cleaning and care:
- Carry out a visual inspection and check that all screws and cables are tightened properly.
- Check all plug-in and clamped connections at least once a year for correct fit and damage.
- Check cables for rupture and crushes. Have damaged or defective cables replaced immediately!
- Clean the parts of the housing using a dry and dust-free cloth.

10.2 Inspection and maintenance

Maintenance of Rexroth electronics is restricted to the points described under “Cleaning and care”.

10.3 Repair

Rexroth electronics can only be replaced as a complete unit. Unauthorized modifications to devices are not permitted for safety reasons! Repairs may only be carried out by Bosch Rexroth AG. For repairs send the device to the service address given in Chapter 16.1.
Please return the devices to us in their original packaging.
Repaired devices will be returned to you with default settings.
In the case of parameterized devices, user-specific settings are not maintained. The user must transmit the relevant user parameters and programs again.

11 Demounting and replacement

11.1 Required tools

For demounting the product, no special tools are required.

11.2 Preparing demounting

⚠ WARNING

Risk of injury by demounting parts under pressure and electric voltage!

If you do not switch off pressure and electric voltage before demounting the electronics, you can get injured and damage the product or parts of the system.

- Decommission the entire system as described in the general instructions for the system.
- The system and all connected components must be brought to a safe state. In addition, the components must be shut down, depressurized, disconnected from the power supply and secured against restarting.

11.3 Demounting

1. Before carrying out any demounting work, switch your system off, disconnect it from the power supply and secure the system against restarting.
2. Make sure that the surroundings are clean for demounting.
3. Loosen the electronics, that is the module or card, in the reverse order as described in the Chapter “Installation”.

11.4 Preparations for storage and further use

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

- Whenever possible, use the original packaging for storage.
- Observe the permitted storage temperature range, which is indicated in the data sheet.
- Protect the electronics from dust and humidity.

12 Disposal

12.1 Environmental protection

Careless disposal of the devices can lead to pollution of the environment.

- Therefore, dispose of the products according to the national regulations in your country.
- Observe the following notes for an environmentally friendly disposal of the devices.

12.2 Return to Bosch Rexroth AG

Products manufactured by us can be returned to us free of charge for disposal. When returned, the products must not contain any inappropriate foreign substances or third-party components. Send the components free domicile to the following address:

Bosch Rexroth AG
Service Industriehydraulik
Bürgermeister-Dr.-Nebel-Strasse 8
97816 Lohr am Main
Germany

12.3 Packaging

On request, reusable systems may be used for regular deliveries.
The materials used for one-way packaging are mainly cardboard, wood and Styrofoam. These can be disposed of without any problems. For ecological reasons, one-way packagings should not be used for returning products to us.

12.4 Materials used

Bosch Rexroth products doe not contain any hazardous substances that could be released during intended use. Normally, no adverse effects on human beings and the environment have to be expected.
Electronics from Bosch Rexroth mainly consist of:

- Plastics
- Electronic components and assemblies
- Copper

12.5 Recycling

Due to the high share of metals the material of the products can mostly be recycled. To achieve optimum metal recovery, the products have to be disassembled. The metals contained in electric and electronic assemblies can also be recycled with the help of special separation processes. As far as products contain batteries, these must be removed before the recycling process and recycled in a specific battery recycling process.

13 Extension and conversion

Electronics, cards and modules from Rexroth must neither be extended nor modified. If you convert the devices, the warranty becomes void.

14 Troubleshooting

The devices are usually not susceptible to faults, as far as prescribed operating and ambient conditions are complied with.

14.1 How to proceed for troubleshooting

- Always act systematically and focused, even under pressure of time. Random and imprudent disassembly and changing of settings might result in the inability to ascertain the original cause of fault.
- First obtain a general overview of how your device works in conjunction with the entire system.
- Try to determine whether the device worked properly in conjunction with the entire system before the troubles occurred.
- Try to determine any changes of the entire system in which the device is integrated:
  - Were there any changes to the product's operating conditions or operating range?
  - Were there any changes (e.g. retrofit) or repairs carried out on the complete system (machine/system, electrics, control) or on the device? If yes, which?
  - Was the device or machine used as intended?
  - How did the malfunction manifest itself?

- Try to get a clear idea of the error cause. If possible, ask the direct (machine) operator.

15 Technical data

You can find the technical data of your device in the data sheet.

16 Annex

16.1 Address directory

Contact in the case of in-transit damage, repairs and spare parts
Bosch Rexroth AG
Service Industriehydraulik
Bürgermeister-Dr.-Nebel-Straße 8
97816 Lohr am Main
Germany

Phone +49 (93 52) 40 50 60
E-mail: service@boschrexroth.de

Outside Germany you will find service subsidiaries in your vicinity on the Internet at
www.boschrexroth.com

Ordering address for accessories and orders of new parts
Headquarters:
Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

Phone +49 (9352) 18 - 0
E-mail info@boschrexroth.de

The addresses of our country units and responsible sales units can be found at
www.boschrexroth.com/addresses

17 Alphabetical index

The Drive & Control Company

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Subject to revision
Printed in Germany
RE 07602/01.2015