rexroth
A Bosch Company

Instruction manual

CHC controller

RE 18324-41/2022-11-29, EN

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remembered that our products are subject to
a natural process of wear and aging.

The cover shows an example application.
The product delivered may differ from the
image on the cover.

Contents

1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- CH controller CHC 12-1/20

This documentation is intended for machine/system manufacturers, assemblers and service engineers.
This documentation contains important information on the safe and proper transport, installation, commissioning, operation, maintenance, disassembly and simple troubleshooting of the product.

- ▶ Read this documentation completely, in particular chapter 2 "Safety instructions" and chapter 3 "General instructions on property damage and product damage" before you start working with the product.

1.2 Required and supplementary documentation

- ▶ Only commission the product if the documentation marked with the book symbol 🕮 is available to you and you have understood and observed it.

Table 1: Required and supplementary documentation

	Title	Document number	Document type
🕮	CHC 12-1/20 controller	RE18324-40	Data sheet

1.3 Representation of information

Uniform safety instructions, symbols, terms and abbreviations are used throughout this documentation to ensure safe and proper use of the product. For clarification, they are explained in the sections below.

1.3.1 Safety instructions

This documentation contains safety instructions in chapter 2.6 "Product-specific safety instructions" and in chapter 3 "General instructions on property damage and product damage", as well as before a sequence of actions or an instruction for action involving a risk of personal injury and property damage. Always follow the measures for danger prevention associated with the use of this product.

Safety instructions are set out as follows:

⚠ SIGNAL WORD

Type and source of danger!
Consequences of noncompliance
▶ Danger prevention measures

- **Warning sign:** draws attention to the danger
- **Signal word:** identifies the degree of the danger
- **Type and source of danger:** indicates the type and source of the danger
- **Consequences:** describes the consequences of non-compliance
- **Precautions:** states how the danger can be avoided

Table 2: Hazard classes as defined in ANSI Z535.6

Warning sign, signal word	Meaning
⚠ DANGER	Identifies a dangerous situation that will result in death or serious injury if it is not avoided.
⚠ WARNING	Identifies a dangerous situation that may result in death or serious injury if it is not avoided.
⚠ CAUTION	Identifies a dangerous situation that may result in minor to moderate injury if it is not avoided.
NOTICE	Property damage: The product or surrounding area may be damaged.

1.3.2 Symbols

The following symbols indicate notices that are not safety-relevant but increase understanding of the documentation.

Table 3: Meaning of symbols

Symbol	Meaning
	If this information is disregarded, the product cannot be used and/or operated to its full extent.
▶	Single, independent action
1. **2.** **3.**	Numbered instruction: The numbers indicate that the actions must be completed in order.

1.3.3 Designations

This documentation uses the following designations:

Table 4: Designations

Designation	Meaning
CH	CHC 12-1/20 controller

The designation "product" or "control unit" will be used as a generic term for the "CHC controller".

1.3.4 Abbreviations

This documentation uses the following abbreviations:

Table 5: Abbreviations

Abbreviation	Meaning
ANSI	**A**merican **N**ational **S**tandards **I**nstitute is an organization that coordinates the development of voluntary standards in the United States
Codesys	**Co**ntroller **De**velopment **Sys**tem
DIN	**D**eutsches **I**nstitut für **N**ormung (German Institute for Standardization)
EMC	**E**lectro**m**agnetic **c**ompatibility
ISO	**I**nternational **O**rganization for **S**tandardization
RE	**R**exroth document in the **E**nglish language (English)

2 Safety instructions

2.1 About this chapter

The product has been manufactured in accordance with generally accepted engineering standards. There is still, however, a danger of personal injury or property damage if this chapter and the safety instructions in this documentation are not observed.

- 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 control unit is designed for use in mobile working machines provided no limitations / restrictions are made to certain application areas in data sheet RE18324-40.

- Operation of the control unit must generally occur within the operating ranges specified and released in data sheets RE18324-40.
  This applies in particular to voltage, current, temperature, vibration, shock and other described environmental influences.
- Its use outside of these specified and approved boundary conditions may result in danger to life and/or cause damage to components which could result in sequential damage to the mobile working machine.

2.3 Improper use

Any use other than that described as intended use is considered improper.
Bosch Rexroth Oil Control S.p.A. is not liable for damage resulting from improper use. The user is solely responsible for any risks arising from improper use.

2.4 Personnel qualifications

The activities described in this documentation require basic mechanical, electronical/electrical and hydraulic knowledge, as well as knowledge of the associated technical terms. In order to ensure safe use, these activities should only be performed by skilled personnel or an instructed person under the direction and supervision of skilled personnel.
Skilled personnel refers to persons who possess the professional training, knowledge and experience, as well as the understanding of the regulations relevant to the work to be done that are necessary to recognize possible dangers and take the appropriate safety measures. Skilled personnel must follow the rules relevant to their field and have the necessary expert knowledge of mechatronics, electronics and hydraulics, if applicable.
Expert knowledge means, for instance:

- Being able to read and fully understand electrical circuit diagrams and hydraulic diagrams, if applicable,
- in particular, fully understanding the relationships with regard to safety devices,
- as well as to carry out the wiring of electronic components correctly and
- to have knowledge of the function and interaction of electronic, mechanical and hydraulic components.

Only trained and experienced specialists who are adequately familiar with both the components used and the complete system should implement system developments or install and commission electronic systems for controlling hydraulic drives.

Bosch Rexroth offers training support for specialized fields. You can find an overview of the training contents on the Internet at: www.boschrexroth.com/training.

2.5 General safety instructions

- Reliable operation cannot be guaranteed if samples or prototypes are used in series production machines.
- The possible circuits for the system do not imply any technical liability for Bosch Rexroth.
- Incorrect connections could cause unexpected signals at the outputs of the control unit.
- Incorrect programming or parameterization of the control unit may lead to dangers when operating the machine. It is the responsibility of the machine manufacturer to identify this type of hazard within the scope of a hazard analysis and to bring them to the attention of the end user. Rexroth is not liable for any hazards of this kind.
- The component firmware/software must be installed and removed by Bosch Rexroth or the responsible authorized partner in order to ensure that the warranty does not expire.
- It is not permissible to open, modify or repair the control unit. Modifications or repairs to the wiring could result in dangerous malfunctions. Repairs to the control unit may only be performed by Bosch Rexroth or by an authorized partner.
- The stop switch (two-channel deactivation) can be used for deactivation in emergency situations. The switch must be installed in an easily accessible position for the operator. The system must be designed in such a way that safe braking is ensured when the outputs are switched off.
- Make sure no pins are charged with a voltage source when the electronics are not receiving power.
- Make sure that the control unit's configuration does not lead to safety-critical malfunctions of the complete system in the event of failure or malfunction. Such system behavior could result in death or serious property damage.
- Only trained and experienced specialists who are adequately familiar with both the components used and the complete system should implement system developments or install and commission electronic systems for controlling hydraulic drives.
- The machine may cause unforeseen hazards during control unit start-up and maintenance. The vehicle and hydraulic system must therefore be in a safe state during such work.
- Therefore, make sure that nobody is in the machine's danger zone.
- Do not use defective components or components which are configured incorrectly. Failed or incorrectly operating components must be repaired immediately.
- Control units used to develop software must not be installed in series production machines as the number of flash cycles is limited and may have been reached or exceeded.

2.6 Product-specific safety instructions

The following safety instructions apply to chapters 6 to 14.

⚠ WARNING

System/machine under pressure!

Risk of death or serious injury when working on unsecured machines/systems! Property damage!

- Switch off the relevant machine/system part and secure it against reactivation according to the parameters by the machine/system manufacturer.

⚠ CAUTION

Inappropriate routing of cables and lines!

Risk of stumbling and property damage! Improper routing of cables and lines can cause a risk of stumbling as well as damage to equipment and components, e.g. due to lines and connectors being torn off.

- Always install cables and lines in a way that nobody can fall over them, that they are not bend or twisted, do not chafe on edges and are not guided through ducts with sharp edges without sufficient protection.

Danger due to malfunctions!

Risk of injury and property damage as well as machine damage due to malfunctions of the controller!

- Carry out a risk assessment of your machine and determine the possible safety-relevant functions.
- Take suitable measures to ensure safety in applications relevant to safety, e.g. sensor redundancy, plausibility check, emergency switch, etc.
- Product data that is required for the safety assessment of the machine is included in data sheet RE18324-40.

2.7 Personal protective equipment

The personal protective equipment is the responsibility of the user of the product. Observe the safety regulations in your country.
All pieces of personal protective equipment should be intact.

3 General instructions on property damage and product damage

The following notices apply to chapters 6 to 14.

NOTICE

Environmental pollution due to incorrect disposal!
Careless disposal of the product and the packaging material could lead to environmental pollution!

- Dispose of the product and packaging in accordance with the national regulations in your country.

Electrical voltage!
Property damage due to electrical voltage!

- Always disconnect the voltage supply to the relevant machine/system part before installing the product and/or connecting or disconnecting the connector. Protect the machine/system against being re-energized.

The warranty exclusively applies to the delivered configuration.
The warranty will be voided if the product is incorrectly installed, commissioned or operated, or if it is used or handled improperly.

4 Scope of delivery

Only the control unit is included in the scope of delivery. In Fig. 1,

Fig. 1:

5 About this product

5.1 Product description

The CHC controllers are designed as a drive control unit for CH valves. The control units are used for the programmable control of proportional and switching solenoid and of additional electrical switching functions. Typical applications are electro-hydraulically actuated work functions, travel drives and transmission controls. The microcontroller, all input and output circuits, communication interfaces, voltage supplies for the sensors and a power supply unit for operation with 12 or 24 V supply voltages are integrated in a compact housing. The control units have several power outputs, which are partially current-controlled. CAN bus interface is available in the CHC controllers. The CHC controllers were developed specifically for use in mobile working machines and satisfy corresponding protection requirements regarding ambient temperatures, leak-tightness, shock and vibration as well as electromagnetic compatibility (EMC). CHC controllers and corresponding software in combination with pumps, motors, valves, sensors, input devices and actuators from Bosch Rexroth make for complete system solutions.

5.2 Product identification

The product can be identified using the material number on the label of the packaging unit.

In addition, the material number (**1**) and the designation of the control unit (**2**) can be found on the name plate. The following example shows a CHC 12-1/20 name plate:

Fig. 2: RC5-6/40 name plate

Table 6: Material number of the control units

Designation	Material number
CHC 12-1/40	R930080235

6 Transport and storage

Check the control unit for transport damage. If there are obvious signs of damage, please inform the transport company and Bosch Rexroth immediately.
If the control unit is dropped, continued use is not permissible because unseen damage may affect its reliability.

6.1 Storing the control unit

Requirement

- Store control units at an average relative humidity of 60% and at a temperature between -10°C and +30°C. Momentary, a storage temperature of -40 °C to +90 °C is permissible for up to 100 hours.
- After a storage time of more than 5 years, the control unit must be checked by the manufacturer before use.

7 Installation

Prior to installation, the following documents should be to hand:
- Product-specific data sheet (contains the permissible technical data, main dimensions and circuit diagrams of standard versions), see Table 1 "Required and supplementary documentation".

7.1 Unpacking

NOTICE! Danger due to electrostatic discharge!
When unpacking the control unit, there is a danger of damage to the electronic components of the control unit due to electrostatic discharge.

▶ During unpacking, the control unit is to be protected against electrostatic discharge.

▶ Remove the packaging from the control unit.
▶ Check the control unit for transport damage and completeness, see chapter 4 "Scope of delivery" on page 11.
▶ Dispose of the packaging in accordance with the regulations in your country.

7.2 Installation conditions

▶ Do not install the control unit near parts which generate considerable heat (e.g. exhaust).
▶ Radio equipment and mobile telephones must not be used in the driver's cab without a suitable antenna or near the control electronics.
▶ A sufficiently large distance to radio transmission systems must be maintained.
▶ All connectors must be unplugged from the electronics during electrical welding or painting operations.
▶ Cables/wires must be sealed individually to prevent water from entering the control unit.
▶ The control unit must not be electrostatically charged, e.g. during painting.
▶ The control unit will heat up beyond normal ambient temperature during operation. To avoid danger caused by high temperatures, it should be protected against contact.
▶ Install the controller in such a way that the electrical connector is not facing upwards. This ensures that any condensation water is drained.
▶ Standing and permanently running water are not permitted anywhere near the circumferential groove (lid/base connector).

7.3 Mounting the control unit

- The CHC controller must be mounted in the vehicle so that it does not bounce against other vehicle parts and additional mounting elements of the control unit.
- This tightening torque applies for fitting without washer. The equivalent tightening torque must be calculated when using washers. For recommended screw sizes and tightening torques, refer to the following table.

Table 7: Screw size and tightening torques

Designation	Recommended screw size	Maximum tightening torques
CHC 12-1/20 controller	M6	From 2 to 4 Nm (without washer)

- Rexroth's consent is required if mounting is different from above.
- The minimum distance between the underside and the mounting surface of the vehicle is 1 mm.
- The wiring harness should be fixated in the area in which the control unit is installed (spacing < 50 mm) in such a way that the in-phase excitation with the control unit occurs (e.g. at the control unit tightening point).
- The wiring harness should be mounted in such a way that there is enough space for the mating connector to be unplugged without having too much force acting on the mating connector.
- If the mounting surface is not sufficiently even, place flexible compensating elements between the mounting points of the CHC controller and the mounting surface.

7.4 Information on wiring and circuitry

- Connections to systems with a different electrical ground or power source require galvanic isolation.
- Lines to the speed sensors are to be shielded and kept as short as possible and be shielded. The shielding must be connected to the electronics or to the device or vehicle ground via a low resistance connection (only on one side).
- Twisted pair cables are to be used for CAN and ISOBUS.
- The product may only be wired when it is de-energized.
- Lines to the electronics must not be routed close to other power-conducting lines in the device or vehicle.
- The wiring harness must be mechanically fastened in the area in which the control unit is installed (distance < 150 mm). The wiring harness must be mounted in such a way that an in-phase excitation with the control unit occurs (e.g. at the control unit fixing point).
- If possible, lines are to be routed inside the vehicle. If the lines are routed outside the vehicle, make sure that they are securely mounted.
- Lines must not be kinked or twisted, must not rub against edges and must not be routed through sharp-edged ducts without protection.
- Lines are to be routed with sufficient spacing to hot or moving vehicle parts.
- PWM outputs must not be connected to one another or bridged.
- The outputs must not be used to operate incandescent lamps due to the inrush current properties of these loads. Exceptions are permitted for signal lamps with low power if it is ensured that the inrush current does not exceed the limit values of this data sheet.
- The sensor supplies can be "pulled up" by an external connection, e.g., the application of a higher voltage, because they operate only as a voltage source but not as a voltage sink. Pulling up a sensor supply may result in unexpected malfunctions and damage the control unit in continuous operation.
- There are restrictions for the operation of LEDs with internal electronics at the outputs. The in-rush current must be below diagnosis thresholds.
- If LEDs are operated at power outputs, the diagnostic current may cause the LEDs to flash.
- The "high-side" outputs may not be externally connected to battery.

8 Commissioning

During all work for commissioning the control unit, observe the general safety instructions and intended use detailed in chapter 2 "Safety instructions".

- When commissioning the control unit, the machine may pose unforeseen dangers. Before commissioning the system, you must therefore ensure that the vehicle and the hydraulic system are in a safe condition.
- The control unit is generally commissioned via a software application.

9 Operation

Use the control unit only within the performance range specified in the technical data.

10 Maintenance and repair

10.1 Cleaning and care

For cleaning and care of the control unit, observe the following:

- Check whether all the seals and fittings on the plug-in connections are securely seated to ensure that no moisture can penetrate into the control unit and the installation space during cleaning.
- Use only very small amounts of water and, if necessary, a mild cleaning agent to clean the control unit. Never use solvents or aggressive cleaning agents.
- High-pressure cleaner can be directly towards the unit control.

10.2 Inspection and maintenance

No special activities are necessary.

10.3 Repair

The control unit cannot be repaired.

When replacing the control unit, make sure that no contamination can penetrate the mating connector.

- Only use an original spare control unit from Rexroth, otherwise the functional reliability cannot be guaranteed, and the warranty will be voided.
- Control units can be ordered by local Bosch Rexroth Business Unit.

Address all questions regarding repair to your responsible Bosch Rexroth service.

11 Removal and replacement

- Only remove the control unit when completely de-energized.

12 Disposal

Careless disposal of the control unit can lead to environmental pollution.

- The control unit and its packaging must be disposed of according to the national environmental regulations of the country in which the control unit is used.

13 Extension and conversion

The control unit must not be modified.

The warranty from Bosch Rexroth only applies to the configuration as delivered. The warranty will be voided if the unit is modified, opened or extended.

14 Troubleshooting

The most efficient troubleshooting is done with a service tool like a CHC-DT tool.

What type of errors are detected depends on the hardware of the control unit used and the software running on the control unit. The indication or display of an error, e.g. via a display or a diagnostic tool, depends on the machine concept.

15 Technical data

The permissible technical data of the control units can be found in data sheet: RE18324-40

The product-specific data sheets can be found in the online product catalog at: https://apps.boschrexroth.com/products/compact-hydraulics/CH-Catalog/ --> Control device

CHC controller	Data sheet	Link online product catalog
CHC 12-1/20	RE18324-40	https://apps.boschrexroth.com/products/compact-hydraulics/CH-Catalog/ --> Control device

More detailed information on the control units may be found at www.boschrexroth.com/mobile-electronics

16 Alphabetical index

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RE 18324-41/2022-11-29