rexroth
A Bosch Company

Operating Instructions

Self-contained axis

Type CytroMotion

RE62290-B, 05.22

Liability

The specified data is intended for product description purposes only and shall not be deemed to be a guaranteed characteristic unless expressly stipulated in the contract. All rights are reserved with respect to the content of this documentation and the availability of the product.

Table of contents

1 About this documentation

1.1 About this documentation

This documentation applies to the following products:

- Self-contained axis “CytroMotion”

For a detailed product description, please refer to: ➦ Chapter 5.1 Product description on page 19. For the exact scope of delivery of the self-contained axis ordered, please refer to the order confirmation.

This documentation is intended for assemblers, operators, service engineers, developers and system end-users. This documentation contains important information on the safe and proper assembly, transport, commissioning, operation, use, maintenance, disassembly and simple troubleshooting of the axis. Read this documentation completely and thoroughly, particularly ➦ Chapter 2 Safety instructions on page 9, before working with the product.

1.2 Required and amending documentation

Only commission the product once you have been provided with the documentation marked with the book symbol 🕮 and you have understood and observed it.

	Title	Document number	Document type
🕮	System documentation from the manufacturer		General information on the overall system
🕮	Order confirmation		Contains the scope of delivery
🕮	Declaration of incorporation of the self-contained axis	Document	DCTC 31000-211
🕮	Self-contained axis type CytroMotion	R.62290	➦ Data sheet
🕮	Hydraulic valves for industrial applications	R. 07600-B	➦ Operating instructions
🕮	Mating connectors and cable sets for valves and sensors	R. 08006	➦ Data sheet
🕮	Pressure transducer for hydraulic applications type HM20	R.30272/R.30272-MON	➦ Data sheet ➦ Assembly instructions
🕮	Directional spool valves, direct operated, with solenoid actuation, type WE	R.23178	➦ Data sheet
🕮	Mounting elements for hydraulic cylinders	R.17042	➦ Data sheet

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.

Safety instructions

In this documentation, safety instructions are contained in chapter ➦ Chapter 2 Safety instructions on page 9 and in chapter ➦ Chapter 3 General information on damage to property and damage to the product on page 15 and before sequences of actions or instructions where there is a danger of personal injury or damage to property. Observe the hazard avoidance measures described.

Safety instructions are structured as follows:

⚠ WARNING	**Type and source of danger! or consequences of non-compliance** – Hazard avoidance measures

- **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
- **Precautions**: specifies how the danger can be prevented

⚠ DANGER	In the case of non-compliance with these safety instructions, death or severe injury **will occur**.
⚠ WARNING	In the case of non-compliance with these safety instructions, death or severe injury **may occur**.
⚠ CAUTION	In the case of non-compliance with these safety instructions, minor or moderate injury **may occur**.
NOTICE	In the case of non-compliance with these safety instructions, damage to property **may occur**.

Designations

The following designations are used in this documentation:

Table 1: Designations

Designation	Meaning
CytroMotion	Self-contained axis

Conventions for symbols

The following symbols are used in these operating instructions and/or on the linear drive. The used symbols have the meanings described below:

Table 2: Warnings according to DIN EN ISO 7010

Designation	Meaning
	Warning: dangerous, electrical voltage
	Warning: hot surface
	Warning: suspended load
	Warning: slip hazard

Abbreviations

The following designations are used in this documentation:

Table 3: Abbreviations

Designation	Meaning
4Q	4 quadrant operation
EN	European Standard
EC	European Community
EU	European Union
Ex	Explosion protection
IEC	*International Electrotechnical Commission*

Designation	Meaning
ISO	*International Organization for Standardization*

2 Safety instructions

2.1 General information on this chapter

Observe the general safety instructions in this chapter and the safety instructions and instructions for action in this documentation. This helps avoid personal hazards, damage to property and faults.

- 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 self-contained axis is a drive unit consisting of a cylinder (including connection tubes), motor-pump group, compensator , valve block (optionally with a hood) and an optional position measurement system. The exact scope of delivery is indicated in the order confirmation.

The self-contained axis is an electric and hydraulic system component. According to directive 2006/42/EC by the EU and EN 982, the self-contained axis is a component that is not ready for use. Only use the axis for installation into systems! According to the Pressure Equipment Directive 97/23/EC (article 1 / section 3.10), the axis is not to be classified as a pressure vessel but as hydraulic controlling equipment as the pressure is not the decisive factor for the construction but rigidity, dimensional stability and stability against static and dynamic operating loads.

The self-contained axis is intended for use in production machines.

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

Intended use includes having read and understood this documentation and especially this chapter.

The commissioning of the self-contained axis may only take place after the necessary safety requirements have been fulfilled by the machinery and/or system.

Operation is only permitted with the system in its original state, and when undamaged and completely assembled.

The self-contained axis may only be operated within its specified performance/limit data. Overloading the system leads to a failure of the proper function. Observe the performance/limit data in the technical ➦ data sheet of the self-contained axis.

Installation and expansion of the machinery as well as replacing components in the scope set down in the operating instructions may only be performed by Bosch Rexroth or by authorized and trained personnel from a specialist company authorized by Bosch Rexroth (see ➦ Chapter 2.4 Qualification of personnel on page 10). Other repairs may only be carried out by the manufacturer.

2.3 Improper use

Any use deviating from the intended use is improper and thus inadmissible.

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

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, please only use a product for

safety-relevant applications if this use is expressly specified and permitted in the documentation of the product. For example, in explosion-protected areas or in safety-related control components (functional safety).

Improper use of the product includes:

- Non-compliance with the technical data, operating conditions and performance limits according to operating instructions and order confirmation
- Incorrect installation
- Incorrect storage
- Incorrect transport
- Lack of cleanliness during storage, assembly and operation
- Non-compliance with the prescribed maintenance intervals
- Implementation of impermissible modification, maintenance and repair work

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 has to observe the relevant specific professional rules and have the necessary expert knowledge. Expert knowledge means for example:

- Being able to read and completely understand hydraulic and electric circuit diagrams
- Being able to understand completely the correlations regarding the safety equipment
- Having knowledge of the function and set-up of electro-hydraulic components and converter technology
- Having basic knowledge of control technology
- Having knowledge of the function, set-up and work on self-contained axes. This knowledge can be obtained in training which is offered specifically for this purpose.

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 information on the product.
- Persons assembling, operating, disassembling or maintaining Rexroth products may not be under the influence of alcohol, other drugs or medication influencing the ability to react.
- Only use original Bosch Rexroth accessories and spare parts in order to prevent any hazard to persons due to unsuitable spare parts.

- Comply with the technical data and ambient 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

The following safety instructions apply to chapters 6 to 14.

⚠ WARNING	**Exceeding of maximum temperatures! Use of the self-contained axis outside the approved temperature ranges may lead to functional failures or raised surface temperatures.** Only use the self-contained axis within the intended environmental and hydraulic fluid temperature range.
⚠ WARNING	**Danger of damage to property and personal injuries!** Modifications to the self-contained axis, e.g. replacing piping, opening fittings which are not described in these operating instructions or which have not been agreed upon with Bosch Rexroth, may lead to damage to persons and property! – Components of the self-contained axis may only be replaced if they are described in these operating instructions. – Any modifications may only be performed by Bosch Rexroth or by authorized and trained personnel from a specialist company authorized by Bosch Rexroth. – The assembly and installation information and assembly instructions have to be observed. – The bleed valve is used to fill the self-contained axis at the factory and may not be utilized, unscrewed or modified in any way. – The pressure relief valves are set to the maximum admissible operating pressure and may not be adjusted. The lead seals affixed to the valves may not be destroyed.
⚠ WARNING	**Non-compliance with functional safety! In case of mechanical and electric faults, e.g. failure of the energy supply, persons may be caught by the system, kicked away or pinched.** When setting up the circuit, observe the requirements for functional safety according to ISO 13849 or IEC 61508.

⚠ WARNING	**High electrical voltage above 50 V! Danger to life and risk of injury caused by electric shock.** – De-energize the self-contained axis before installation, pulling and connecting connectors and all other work. – Secure the electrical equipment against restarting. Verify that there is no voltage using tested measuring equipment. – Before switch on, check whether the protective grounding conductor of all electric devices is firmly connected according to the connection diagram. – Measure the electrical voltage of live parts before beginning the work in order to avoid hazards caused by contact. – Do not touch the electrical connection points of the components if the system is switched on.
⚠ WARNING	**Danger due to pressurized hydraulic fluid! Danger of poisoning and risk of injury (e.g. eye injuries, skin lesions, poisoning due to inhalation and ingestion)** – Check the piping for wear and damages before any commissioning. – Use personal protective equipment (e.g. safety goggles, protective gloves, suitable working clothes, safety shoes, etc.). – If nevertheless hydraulic fluid comes into contact with the eyes or penetrates the skin, please consult a doctor immediately. – When dealing with hydraulic fluids, it is imperative to observe the safety instructions of the hydraulic fluid manufacturer.
⚠ WARNING	**Hot surfaces! Risk of burning. The self-contained axis heats up considerably during operation. Individual components of the self-contained axis can get so hot during operation that they may cause burns.** – Allow the self-contained axis to cool down sufficiently before touching it. – Wear heat-resistant protective clothing, e.g. gloves.
⚠ WARNING	**Flammable hydraulic fluid! Risk of fire.** – Keep open fire and ignition sources away from the self-contained axis. – Ensure sufficient ventilation. – Do not carry out welding works at or in the vicinity of pressurized self-contained axes.
⚠ WARNING	**Danger due to pressurized self-contained axes! Risk of injury! Severe injury when working at systems that have not been stopped! Damage to property! Even once the self-contained axis has been disconnected from the electrical power supply, the system is still pressurized (accumulator pressure max. 10 bar)!** – Observe the specifications of the system manufacturer and the system end-user! – Do not disconnect lines, connections or components as long as the self-contained axis is under pressure.

⚠ WARNING	**Danger due to magnetic and electro-magnetic fields in the area of the self-contained axis! Magnetic and electro-magnetic fields existing in the direct vicinity of electric equipment may represent a serious danger to persons with heart pacemakers, metal implants and hearing aids.** – If it is necessary for somebody with a pacemaker to enter such an area, a doctor must be consulted prior to doing so. The interference resistance of implanted heart pacemakers can vary greatly; there are consequently no generally valid rules. – Persons with metal implants or metal splinters, as well as with hearing aids, must consult a doctor before they enter these kinds of areas.
⚠ CAUTION	**Uncontrolled system behavior! Risk of injury! The malfunction of individual components may lead to malfunctions of the assembly which results in unexpected behavior!** – Immediately have defective components exchanged.
⚠ CAUTION	**Improperly laid lines and cables! Risk of injury!** – Lay cables and lines so that no-one can trip over them. – Lay cables and lines so that they cannot be damaged by inflection or shearing. – Lay cables and lines so that their insulation cannot be damaged by severe heat.

2.7 Personal protective equipment

Use suitable protective equipment (e.g. safety goggles, safety shoes, protective gloves) during any work (e.g. installation, repair, maintenance) on the self-contained axis.

All parts of the protective equipment have to be fully functional.

2.8 Obligations of the machine end-user

The machine end-user of the self-contained axis is responsible for ensuring that

- the self-contained axis is only used according to the intended use as defined in these operating instructions.
- the self-contained axis is only stored, operated and maintained according to the specified operating and ambient conditions, in particular that the stated limit values are not exceeded.
- the operating personnel are instructed at regular intervals.
- a danger zone is marked, if required.
- the safety measures for the specific area of application of the self-contained axis are complied with.
- the maintenance activities according to the maintenance schedule are adhered to.
- there is no increased levels of EMC interference at the place of use in accordance with EMC directive 2014/30/EU.

IT security

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 the product

The warranty only applies to the delivered configuration.

- The claim to warranty expires if the product is assembled, commissioned and operated incorrectly, not used as intended and/or handled improperly.
- The following safety instructions apply to chapters 6 to 14.

NOTICE	**Welding and painting work! Risk of damage! Electrostatic charging can destroy electronics.** – Avoid electrostatic charging of electronic components.
NOTICE	**Painting work! Risk of damage! Contact surfaces may be damaged. Risk of overheating due to insufficient heat radiation and impaired functionality of measurement systems.** – Never paint measurement systems, cooling and contact surfaces.
NOTICE	**Inadmissible mechanical load! Risk of damage! Any mechanical load, particularly sudden impact or similar forces, may damage or even destroy the self-contained axis.** – Avoid impacts against the attachment parts of the self-contained axis. – Do not put or place the self-contained axis onto the attachment parts. – Never use the self-contained axis to sit or step on. Do not place/put any objects on top of it.
NOTICE	**Foreign particles and dirt in the system! Risk of damage, wear and malfunctions due to ingress of dirt and foreign particles. Contamination and metal particles may damage the self-contained axis and cause leakage.** – 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 penetrate the hydraulic system. – Do not use cotton waste or linting cleaning cloths for cleaning.
NOTICE	**Wear! Wear may lead to malfunctions.** – Perform the prescribed maintenance work at the intervals specified in the operating instructions.
NOTICE	**Hydraulic fluids harmful to the environment! Leaking hydraulic fluid leads to environmental pollution.** – Immediately remedy possible leakage. Use an oil binding agent in order to bind the leaked hydraulic fluid. – Dispose of the hydraulic fluid in accordance with the currently applicable national regulations in your country. – Please immediately contact Bosch Rexroth Service, see ➦ Chapter 16.1 Service and support on page 55.

NOTICE	**Mixing hydraulic fluids! It is not admissible to mix hydraulic fluids of different manufacturers and/or different types of hydraulic fluid from the same manufacturer!** – Observe the manufacturer information for the hydraulic fluids used.

4 Scope of delivery

The scope of delivery of the self-contained axis includes the following:

- One servo-hydraulic drive unit, consisting of a cylinder (including connection tubes), motor-pump group, compensator, valve block (optionally with a hood) and an optional position measurement system.

For the exact scope of delivery of the self-contained axis ordered, please refer to the order confirmation.

- Check the scope of delivery for completeness.
- Check the scope of delivery for possible transport damage, see ➦ Chapter 6 Transport and storage on page 23.

In case of complaints, please contact Bosch Rexroth AG, see ➦ Chapter 16.1 Service and support on page 55.

5 Product information

5.1 Product description

5.1.1 General information

The CytroMotion is a compact, energy-efficient self-sustaining axis that converts electrical energy into a precise, controllable movement of a hydraulic cylinder. The pre-tested overall system can be installed easily and independently of position, the integration is purely electric.

It is possible to generate forces of up to 110 kN. It is also possible to switch on a rapid traverse with reduced force in order to increase the speed of the cylinder during extension to up to 740 mm/s (regenerative mode, version “R”).

The CytroMotion basically consists of a synchronous motor with a rotary encoder, a 4Q-capable and low-noise internal gear pump, a cylinder unit, a compensator for the compensation of differential volume, a valve block and an optional position measurement system.

5.1.2 Types

The various versions of the self-contained axis are indicated by the type code, see the ➦data sheet of the self-contained axis (chapter: “Order information”)

5.1.3 Set-up

The essential main components are described in the following.

Main components

– The following figure may deviate from the ordered axis in its configuration.

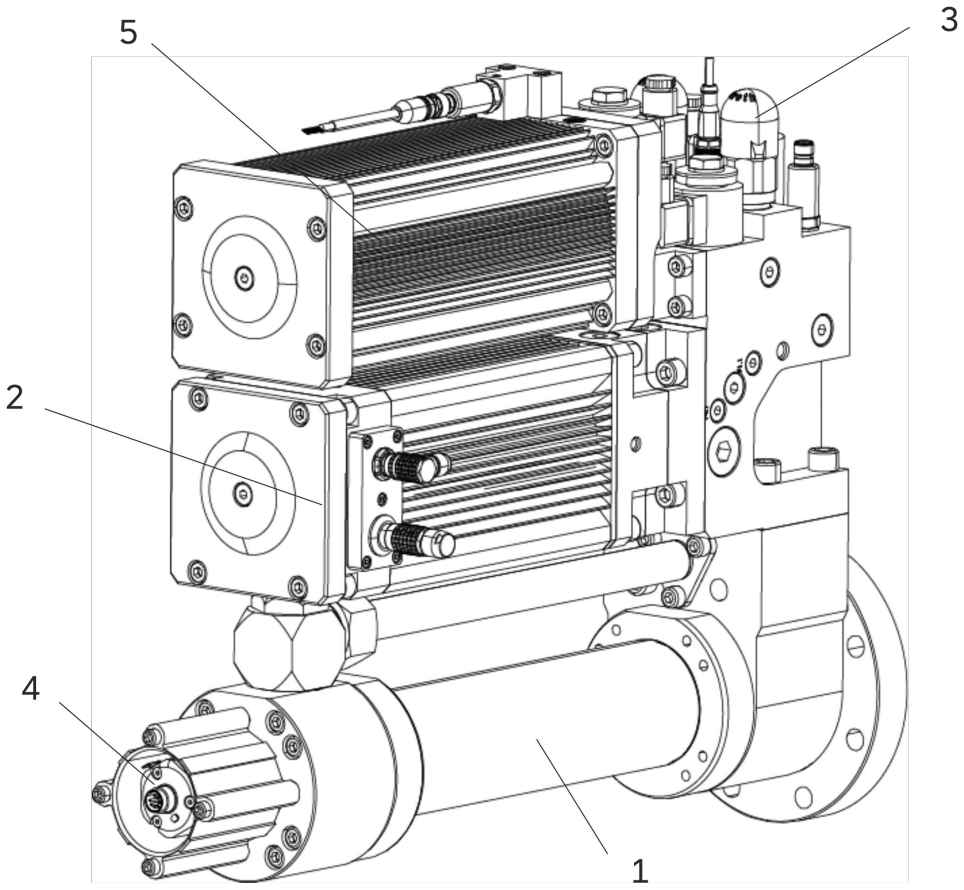

Fig. 1: Self-contained axis (without hood)
1 Cylinder unit / actuator
2 Motor-pump group
3 Control block
4 Position measurement system (optional)
5 Compensator (low-pressure accumulator)

Cylinder unit / actuator

The cylinder unit of the compact axis converts flow and pressure into a linear movement with force.

Motor-pump group

The motor-pump group provides hydraulic power as required.

Valve block

Switching the 2/2 directional seat valves (VA, VB, VE and VR) used allows for the implementation of various functions such as retraction and extension of the cylinder and holding the cylinder in place; it also provides the option of switching on the rapid traverse, see ➥ Chapter 9.1 Modes of operation on page 39). The pressure transducers SA, SB and SK used monitor the working pressures and the compensator pressure. In addition, the pressures are limited by the pressure relief valves used.

Position measurement system (optional, cylinder version “S”)

The piston position is detected by an installed absolute position measurement system.

Compensator (low-pressure accumulator)

The servo-hydraulic actuator is a hydraulically closed system. The compensator is used to receive differential volume of the retracting and extending piston rod and also temperature variations.

Motor encoder and power cable

For information on the motor power and motor encoder cable and the electrical interfaces, see the ➦ data sheet of the self-contained axis (chapter: “electrical connection”), see also ➦ Chapter 1.2 Required and amending documentation on page 5.

5.2 Product identification

5.2.1 Name plate of the self-contained axis

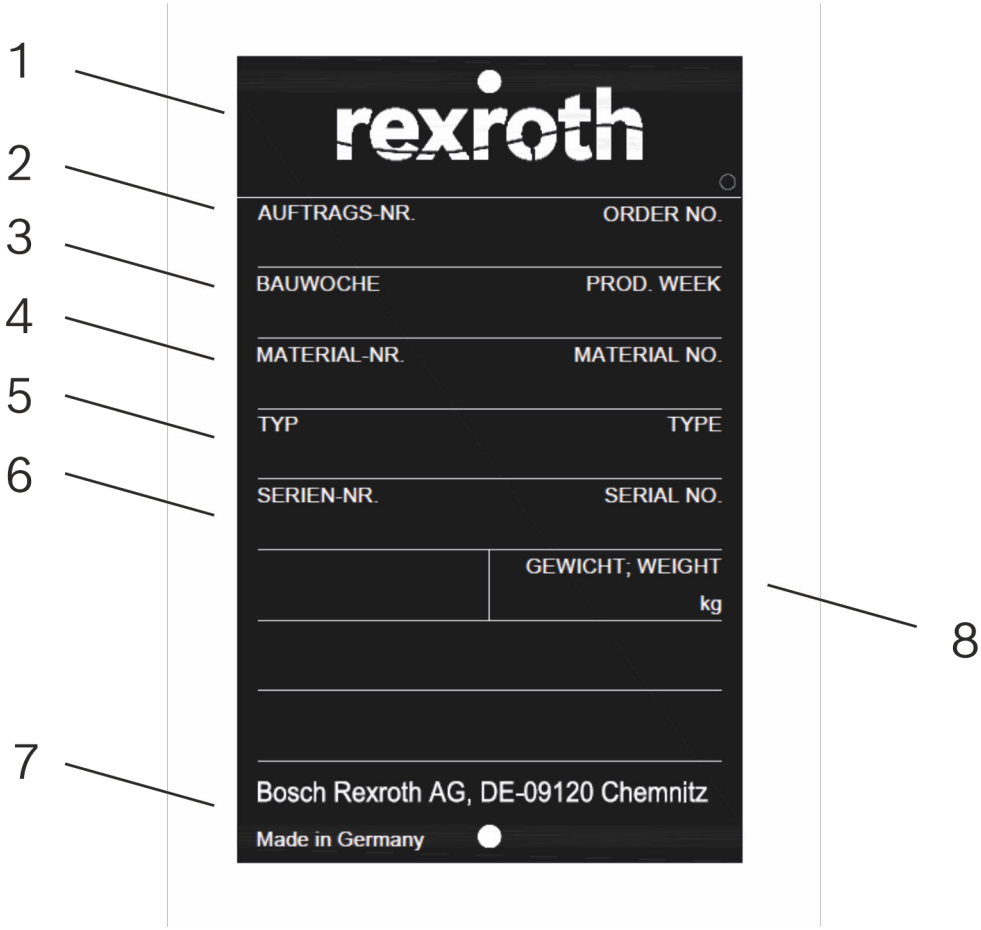

Fig. 2: CytroMotion_Name plate

No.	Type of information
1	Manufacturer's logo
2	Order number
3	Date of production
4	Material number
5	Type designation
6	Serial number
7	Name and address of the manufacturer

No.	Type of information
8	Weight

Queries regarding the self-contained axis and its main components are to indicate the material numbers and the fabrication numbers. Preferably, take pictures of the nameplates and send these to Bosch Rexroth.

5.3 Technical interfaces

5.3.1 Mechanical interfaces

The mechanical interfaces of the self-contained axis are the coupling of the cylinder piston to the processing tool as well as the coupling to the installation surface of the complete production machine, see ➦ Chapter 7.5.2 Mechanical installation on page 29. The interfaces can also be found in the ➦ data sheet of the self-contained axis.

5.3.2 Electrical interfaces

See the ➦ data sheet of the self-contained axis (chapter “Electrical connections, assignment”)

5.3.3 Hydraulic interfaces

All works (e.g. assembly, maintenance) at the hydraulic interfaces may only be carried out by Bosch Rexroth of by authorized and trained personnel, see ➦ Chapter 2.4 Qualification of personnel on page 10.

6 Transport and storage

6.1 Transport

⚠ WARNING	**Heavy weight and sharp edges of the self-contained axis! The components are heavy (> 100 kg). If handled improperly, they may fall down and cause serious injuries and/or crushing injuries as the components may e.g. have sharp edges, be heavy, oily, loose or bulky.** – Transport the components to their intended locations using suitable lifting gear. – All lifting gear has to be subjected to a visual inspection before every use. – Only authorized and instructed personnel may use and apply the lifting gear and load lifting devices. – Provide for a stable position during transport to the place of installation. – Wear personal protective equipment when transporting the components. – Comply with the national laws and regulations regarding occupational health and safety for the transport. – Do not stand or walk under lifted loads.

⚠ CAUTION	**No stability! Danger of injuries and crushing by a self-contained axis toppling over.** – Transport and store the components only in appropriate packaging. – Only lift the component by the lifting/attachment points provided for that purpose. – Always use **several** attachment devices for transporting the self-contained axis.

In transport, consider the following aspects:

- Properties of the load (e.g. weight, center of gravity, mounting and attachment points).
- Type of attachment or pick-up of the load.

The system may only be transported if the requirements listed in this chapter are observed. Only the attachment points shown in the ➦ data sheet of the self-contained axis may be used.

To ensure proper and safe transportation, only use attachment devices which are appropriate for the weight.

The position of the tapped holes for the attachment devices is shown in the ➦ data sheet of the self-contained axis.

6.2 Storage

The self-contained axis should preferably be stored in the unopened original packaging.

Comply with the storage times, see the following table.

Table 4: Storage times

Storage conditions	Packaging	Protective agent	Max. storage time in months	
			Test with protective agent	Filling with protective agent

Storage conditions	Packaging	Protective agent	Max. storage time in months	
Storage in dry rooms at constant temperature	For carriage overseas	Mineral oil	12	24
	Not for carriage overseas	Mineral oil	9	24
Outdoor storage	For carriage overseas	Mineral oil	6	12
	Not for carriage overseas	Mineral oil	-	12

Outdoor storage: Protect against damage, exposure to sunlight and water ingress

Requirement

- Do not store the self-contained axis outdoors but in a well-ventilated room.
- Ensure for 100% UV protection.
- Pay attention to the storage temperature, see the ➦ data sheet of the self-contained axis.
- Protect the self-contained axis against humidity, particularly ground humidity. Store the self-contained axis on a shelf or on a pallet.
- Ensure that no ozone formation takes place near the storage location.
- Self-contained axes filled with oil may not be exposed to direct solar radiation or other heat sources as the increase in the ambient temperature raises the hydraulic pressure in the cylinder.
- Store the self-contained axis in packaging in order to protect it from dust and dirt.
- Store the self-contained axis so that it is safe from impacts and slipping.
- After opening the transport packaging, it has to be closed properly again for storage. Use the original packaging for storage.

Procedure after expiration of maximum storage time

- Check the self-contained axis for damage and corrosion prior to installation.
- Do a test run to check the self-contained axis for correct function and leak-tightness.

Contact Bosch Rexroth for the preservation and later commissioning of the self-contained axis if it is to be stored for a period of time exceeding the durations in the table “Storage times”.

After disassembly

If the self-contained axis is to be stored, it is to be preserved for the time of storage to protect it against corrosion.

Bosch Rexroth recommends the following procedure:

1. Clean the self-contained axis, see ➦ Chapter 10.2 Cleaning and care on page 41.
2. Close all connections so that they are airtight.
3. Unprotected parts like fitting surfaces or mechanical interfaces have to be protected with suitable corrosion protection agents.
4. Protect the fitting surfaces against humidity
5. As deformations at the seals cannot be excluded, renew the seals. In this connection, observe ➦ Chapter 11 Disassembly and removal on page 45. In case of questions in this regard, please contact the Bosch Rexroth service.

6. Pack the self-contained axis in corrosion protection film together with a desiccant in an air-tight manner.
7. Store the self-contained axis so that it is safe from impacts.

In each case, please observe any applicable provisions and laws regarding the handling of substances hazardous to water or to health.

7 Assembly

7.1 General information

⚠ CAUTION	**Leaking hydraulic fluid! Slip hazard due to oily surfaces or leaking hydraulic fluid. Damage to the self-contained axis!** – Immediately remove leaking hydraulic fluid. – Secure and mark the danger zone. – Use an oil binding agent in order to bind the leaking hydraulic fluid. – Wear personal protective equipment such as safety shoes and gloves. – Contact Bosch Rexroth for proper refilling of the self-contained axis.
NOTICE	**Incorrect connection of electric components. Risk of short-circuit and damage!** – Connect the electric components according to the overview circuit diagram and the pin assignment.
NOTICE	**Missing seals and caps! Liquids and foreign particles may penetrate and damage the product.** – Ensure before the assembly that all seals and caps of the connections are tight.
NOTICE	**Insufficient assembly space! Danger of component damage! Insufficient accessibility may make the installation or the exchange of components more difficult or impossible. Components, e.g. safety-related piping, cannot be properly mounted or might be damaged.** – Make sure that the assembly space is sufficient. The dimensions can be found in the ➦ data sheet of the self-contained axis. – At no point (e.g. transport assembly etc.) may the self-contained axis be exposed to impermissible mechanical loads.
NOTICE	**Condensed water in electrical components! Risk of short-circuit!** – Let the electrical components acclimatize themselves for several hours as otherwise, condensed water may form.
NOTICE	**Major potential differences! Danger of destruction of electrical components by connecting or disconnecting connectors under voltage.** – De-energize the relevant system part before assembling electrical components or when connecting and disconnecting connectors.

7.2 Unpacking

⚠ CAUTION	**Parts falling out! Risk of injury! If the packaging is opened improperly, parts may fall out and cause injuries or damage of the parts.** – Put the packaging on level, bearing ground. – Only open the packaging from the top.

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

7.3 Installation conditions

7.3.1 Drive unit

- The components mounted to the drive unit are not to be subjected to any mechanical load (e.g. impact). The connectors and cable sockets are to be protected against such loads.
- Make sure that the drive unit and particularly the attached components are not damaged during installation.
- When installing the drive unit, always observe the environmental conditions specified in the technical data, see the ➦ data sheet of the self-contained axis.
- The dimensions can be found in the ➦ data sheet of the self-contained axis. When determining the space required, the installation position has to be observed.
- Please ensure during installation that in later operation, sufficient air exchange will be provided to prevent overheating.
- The drive unit is to be installed on bearing ground.

7.3.2 Cable set

Information about the installation conditions of the motor power and motor encoder cable can be found in ➦ Chapter Installation of signal/control and power cables on page 33.

The length of the cable set between the motor, resolver and motor temperature may not exceed 50 m.

7.3.3 Installation position

The self-contained axis may be installed in any position.

7.4 Accessories

The following accessories are recommended. They are not included in the scope of delivery and can be ordered separately from Bosch Rexroth:

Table 5: Cable set for motor

Designation	Version	Material number	Data sheet / standard
ASSEMBLY CBL-1X/MOT-10W4X02,5	4-pole, angled, 10.0 m	R901559242	For dimensions, see ➦ data sheet

Table 6: Cable set for resolver and motor temperature

Designation	Version	Material number	Data sheet / standard
ASSEMBLY CBL-1X/CRT-10W8XSPEZ	8-pole, angled, 10.0 m	R901559243	For dimensions, see ➦ data sheet

Table 7: Mating connectors for 2/2 directional seat valves

Designation	Version	Material number	Data sheet / standard
Mating connector; for valves with device connectors, 2-pole + PE, design A	Without circuitry, M16 x 1.5, 12 ... 240 V, "b"	R901017011	08006
	With indicator light, M16 x 1.5, 12 ... 240 V	R901017022	

Table 8: Cable sets and mating connectors for pressure transducers

Designation	Version	Material number	Data sheet / standard
Cable sets, 4-pole	M12 x 1, straight, 2.0 m	R900773031	08006
	M12 x 1, straight, 5.0 m	R900779498	
Mating connectors, 4-pole	M12 x 1, straight, PG 7	R900773042	

Table 9: Mating connector for position measurement system

Designation	Version	Material number	Data sheet / standard
MATING CONNECTOR 7P STC09131D07	M16, 7-pole, straight	R900079551	For dimensions, see ➦ data sheet

Table 10: Mounting kit [1)]

Designation	Version	Material number	Data sheet / standard
ASSEMBLY MKT-1X/ 040M10/10.9ZN	for “040/028” version 8x M10x40/120-10.9-FLZN/NC/ 480H/C	R901564086	ISO4762
ASSEMBLY MKT-1X/ 050M120/10.9ZN	for “050/036” version 8x M12x40/120-10.9-FLZN/NC/ 480H/C	R901564085	
ASSEMBLY MKT-1X/ 063M12/10.9ZN	for “063/045” version 8x M12x45/125-10.9-FLZN/NC/ 480H/C	R901564084	
ASSEMBLY MKT-1X/ 080M16/10.9ZN	for “080/056” version 8x M16x55/135-10.9-FLZN/NC/ 480H/C	R901564083	

[1)] Screw length for minimum screw-in depth 1.2 x d

7.5 Assembling the self-contained axis

7.5.1 Preparation for assembly

1. Check the scope of delivery for completeness and transport damage.
2. Compare the material number with the details in the order confirmation.

If the material numbers or designations of the self-contained axis do not match those on the order confirmation, contact Bosch Rexroth Service for clarification, see ➦ Chapter 16.1 Service and support on page 55.

7.5.2 Mechanical installation

⚠ WARNING

Incorrect mounting! Insufficient fixation or insufficient stability may cause the self-contained axis to become loose and fall down. Consequently, hydraulic fluid may leak and lead to personal injuries and/or damage to property. Very heavy self-contained axes may bruise or kill persons.

- Completely assemble the self-contained axis according to the assembly specifications using suitable assembly aids.

⚠ WARNING	**Unintended motion of the self-contained axis during the assembly! Risk of injury! Danger of crushing! Damage to property!** – Keep the self-contained axis in a stable and secured position until it is fixedly mounted on the customer's installation surface. – Be careful when assembling the hydraulic cylinder.

NOTICE	**Faulty installation of the self-contained axis with the customer's tool! Damage to property!** – Assemble the self-contained axis so that the cylinder piston rod which is connected to the customer tool is aligned and so that there is no axial offset. – Avoid radial forces on the cylinder piston rod as well as on the customer tool.

The self-contained axis has to be installed so that it is free of radial forces, if possible. Possible radial forces have to be eliminated on the customer side by means of guides and corresponding adjustment.

Cylinder piston rod and customer fitting have to be mounted in an aligned position.

Stroke length, load and mounting have to be observed in order to keep bending and buckling in every stroke position to a minimum.

- Fasten the self-contained axis so that the load acts axially on the center line of the cylinder.
- The mounting surfaces and elements at the customer fitting have to be able to absorb the occurring forces.

The self-contained axis is to be assembled in compliance with the assembly and setting instructions of the customer.

- Work carefully.
- Check that the machine element to which the self-contained axis has been mounted is stable and protected against tilting or tipping over.
- Check whether the connection bores fit.

Assembly of the self-contained axis on the installation surface of the production machine

⚠ WARNING	**Risk of injury due to heavy components! Due to the weight and the size of the self-contained axis, it may fall off the installation surface and lead to injuries or damage at the components.** – Provide for a stable position of the self-contained axis during the assembly. – During the installation, use the intended lifting eyes and suitable lifting gear.

1. Lift the self-contained axis onto the installation surface where it will be installed later, constantly ensuring compliance with the ➦ Chapter 6.1 Transport on page 23 while doing so. The installation surfaces have to be clean and free of dirt.
2. Use suitable mounting screws. The requirements of the mounting screws depend on the application and have to be checked or determined by the customer. Details about the dimensions and tightening torques of the mounting screws can be found in the ➦ data sheet of the self-contained axis (chapter “Dimensions”).

3. Ensure that the mounting screws are tightened using the corresponding tightening torque. Tighten them crosswise using a suitable manual torque wrench. The tightening torque depends on the application and has to be checked or determined by the customer.

Assembly of the piston rod at the processing tool

1. Fasten the piston rod in place taking into account the information and assembly notes for the processing tool provided in this chapter. The installation surfaces have to be clean and free of dirt.
2. Use suitable mounting screws. The requirements of the mounting screws depend on the application and have to be checked or determined by the customer.
3. Ensure that the mounting screws are tightened using the corresponding tightening torque. Tighten them crosswise using a suitable manual torque wrench. The tightening torque depends on the application and has to be checked or determined by the customer.
4. Detailed installation information and details about dimensions and tightening torques for the swivel head CGKD can be found in the data sheet R. 17042 “Mounting elements for hydraulic cylinders” on pages 16 and 17.

7.5.3 Hydraulic assembly

⚠ WARNING	**Danger of damage to property and personal injuries! Modifications to or work on the hydraulic system, e.g. replacing piping, opening fittings which are not described in these operating instructions or which have not been agreed upon with Bosch Rexroth, may lead to damage to persons and property!** – Components of the self-contained axis may only be replaced if they are described in these operating instructions. – Any modifications may only be performed by Bosch Rexroth or by qualified and trained personnel from a specialist company authorized by Bosch Rexroth. – The assembly and installation information and assembly instructions have to be observed.

The self-contained axis is a self-sustaining system. A service interface to the service kit is present and also required. All work (adjustment work, leak-tightness check, etc.) is performed prior to delivery by Bosch Rexroth.

7.5.4 Electrical assembly

General information

⚠ WARNING	**High electrical voltage! Touching parts with voltages greater than 50 V can be dangerous to people and lead to electric shock. There are certain parts that are inevitably under voltage while the self-contained axis is in operation.** – Assembly, operation, maintenance and/or repair of components of the self-contained axis may only be performed by Bosch Rexroth or by authorized and trained personnel from a specialist company authorized by Bosch Rexroth, see ➦ Chapter 2.4 Qualification of personnel on page 10. – Please observe the general installation and safety regulations when working at high-voltage systems. – Before switching on the system check whether the protective grounding conductor at all electrical components is firmly connected according to the connection diagram. – Do not operate electrical equipment at any time, even for short-time measurements or tests, if the protective grounding conductor is not permanently connected to the mounting points of the components provided for this purpose. – Regularly check the protective grounding and other electrical safeguards according to the Ordinance on Industrial Safety and Health BSV § 10 and the accident prevention regulations. – Disconnect the electrical components from the mains or from the voltage source before accessing parts with voltages exceeding 50 V. Secure electrical components against restarting. – Before switch-on, attach the covers and protective devices provided for contact protection. – Do not touch the electrical connection points of the components if the system is activated. – Do not disconnect or connect the connectors under voltage.
⚠ WARNING	**High housing voltage and high working current! Due to the high housing voltage and the high working current, touching can lead to electric shocks and severe injuries.** – Always connect the protective grounding conductor of the components fixedly and permanently to the supply network. – Observe the minimum cross-section of the protective grounding connection.

Installation of signal/control and power cables

General information

⚠ CAUTION	**Interference emissions! Risk of injury due to malfunctions and uncontrolled motions!** – Eliminate sources of interference in the area of the signal and control lines! – Ensure assembly according to EMC.

The achievable life cycle of the cables is largely determined by the type of installation and environmental influences at the place of use. Due to the variety of application conditions, the listed basic recommendations for the handling of cables can, however, only serve as an aid to ensure a long and fault-free operation of the cables.

- Lay cables and lines so that they cannot be damaged and no one can trip over them.
- Never subject cables to stress due to pulling or torsion. Mechanically fix the cable ends in place after no more than approx. 30 cm (e.g. cable clip, cable tie, etc.)
- Do not inflect cables. Do not fall below the bending radii. The value of the bending radius are to be 5-6 times the diameter of the line.
- Do not subject cables to large temperature differences and extreme weather influences. Always store cables in a dry place.
- Always unroll cables completely.
- Never use damaged cables (e.g. by pressure, clamping or crushing). In case of damage, decommission the system and exchange the cables.
- Check the connection cables at regular intervals for damage and exchange them, if necessary.
- Check the connections for the protective grounding conductor at regular intervals for proper condition and tight seat.
- Do not use silicone-containing sealing, adhesive, or insulating agents.
- Ensure a maintenance-friendly installation, i.e. simple access to the connection lines. Free access to the connection side has to be guaranteed.
- Before installation note down the information on the name plates. If name plates are not visible or readable any more after the installation, this data will be available at any time.

Cable routing

- Install signal and control lines with a minimum clearance of at least 200 mm or use a grounded separating plate to separate them from the power cables. Installation in separate cable channels is the optimum.
- Replace cable markings and warnings on cable connections which have become illegible or are missing.

1 2 3

Fig. 3: Cable laying

1 Signal and control lines in the same cable channel
2 Power cables in the same cable channel
3 Joint installation in one cable channel using a metallic separating plate

- If signal lines and power cables cross, install them at an angle of 90° to prevent interference coupling.

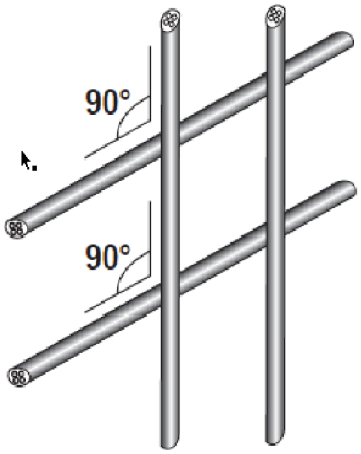

Fig. 4: 90 degree laying

- Ground unused and unconnected spare cables at both ends to prevent them from having an antenna effect.
- Avoid unnecessary line lengths and shorten the cables.
- Install the cables as close as possible on grounded metal surfaces (reference potential). Grounded and closed cable channels or metal pipes are the ideal solution.
- Avoid freely suspended lines and lines installed on plastic supports. They act as receiving antennas (interference resistance) and also as transmitting antennas (interference radiation).

Shielding

- Position the cable shield directly at the devices and ensure it is as short, direct and widespread as possible.
- Install an extensive shield for analog signal lines at one side, usually in the control cabinet. Ensure an extensive and short connection to the ground / housing.

- Install an extensive and short shield of digital signal lines on both sides. In the case of potential differences, install an additional equipotential bonding conductor in parallel between the beginning and the end of the line. These measures are to avoid compensation currents. The guideline for the cross-section is 10 mm2.
- Any connections that can be disconnected is to be equipped with connectors and couplings with grounded metal housing.
- Twist the conductor and return conductor of unshielded lines of an electric load circuit, e.g. in the case of the electrical connection of an external braking resistor.

Electric wiring

⚠ WARNING	**Hot surface! The surface temperatures at the self-contained axis may be high. Electric lines which were installed in close proximity to the axis can be overloaded, heated up beyond an admissible level and in the worst case suffer an insulation fault.** – Install lines at a sufficient distance to hot surfaces or prevent overheating by proper installation of the lines.
⚠ CAUTION	**Improper connection of electric components! If electric components are connected or wired improperly, short-circuits or severe damage to persons and property may result.** – Connect the electric components according to the circuit diagram. – The wiring or connection may only be carried out by personnel trained an instructed in the use and handling of electrical systems, or by Bosch Rexroth.

Before starting the electric wiring of the self-contained axis, perform the following work:

- Mechanical assembly of the self-contained axis.
- The control cabinet is fixedly installed at its place of installation or use. The position or distance of the individual components (self-contained axis, control cabinet) is significantly influenced by the length of the cable set.

Wire the individual components of the scope of delivery according to the ➦ data sheet of the self-contained axis (chapter “Electrical connections”).

8 Commissioning

8.1 General information

⚠ WARNING	**Working in the danger zone! Serious injury due to improper work.** – Pay attention to potential sources of danger and remove them before commissioning the self-contained axis. – No persons may be within the danger zone of the self-contained axis. – Do not touch the area of the cylinder unit. – The electrical commissioning has to be carried out or supervised by an specialized electrician.
⚠ WARNING	**Uncontrolled system behavior! Electrical connections which are not connected may cause malfunctions which may lead to injuries.** – Commission the self-contained axis only if it is completely installed.
NOTICE	**Condensed water in electrical components! Risk of short-circuit!** – Let the electrical components acclimatize themselves for several hours as otherwise, condensed water may lead to problems.

The individual partial steps for commissioning are:

1. Assessment of the mechanical and electrical assembly and wiring work
   - Carry out a visual inspection of the self-contained axis and the associated operating media in the control cabinet to check for obvious defects.
   - Correct any damage detected.
   - Determine whether the protection against direct contact with active parts is present and that the protective measures for indirect contact are not faulty. Check the cross section, installation, connection and marking of protective conductors, earth conductors and potential equalization conductors.
   - Check the interface control on the side of the self-contained axis and also on the customer system side.
2. Measurement / quality control of the supply voltages
3. Checking of the emergency off devices, insulation monitoring, safeguards and reporting and display features.
4. Controlled commissioning of the self-contained axis by switch-on or activation of switching circuits in the control cabinet
5. Checking for functionally and correct connection of valve technology, sensor technology, position measurement system, etc.

The stepped re-commissioning of the self-contained axis after a malfunction has been remedied is always to be agreed with Bosch Rexroth.

9 Operation

⚠ CAUTION	**Noise! Certain operating situations may cause increased noise emission by the self-contained axis. This may impair the wellbeing of persons in close proximity.** – If required, provide suitable structural noise protection measures. – Use suitable ear protection, if required.

No adjustments or modifications are required during operation of the self-contained axis. Only use the product within the performance range for which the self-contained axis is designed. The system manufacturer is responsible for the correct project planning of the system and its control.

9.1 Modes of operation

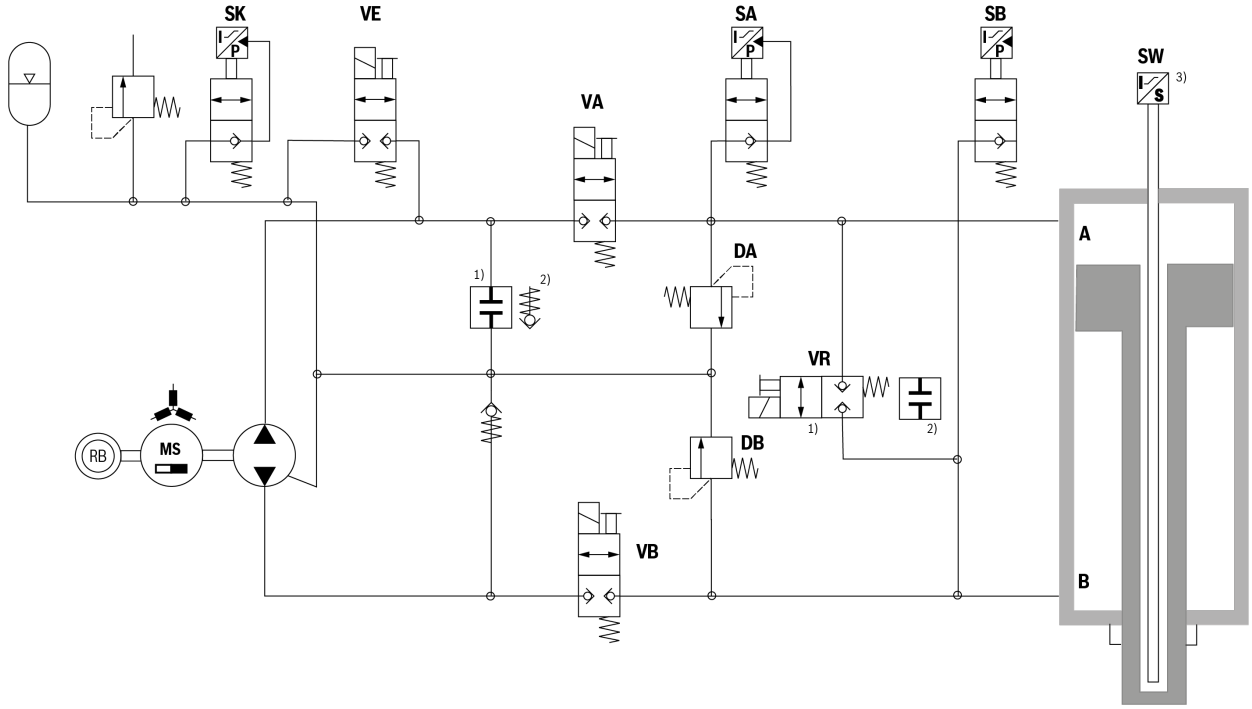

Fig. 5: CytroMotion_Circuit diagram

1) Fitting with version “R” (reduced-force rapid traverse – regenerative mode)
2) Fitting with version “S” (standard)
3) Only for cylinder version “S” (with position measurement system)

To avoid switching shocks, we recommend adjusting the motor speed before switching. The motor has to be energized before switching/energizing the 2/2 directional seat valve, otherwise the axis may drift.

Valve	VA	VB	VE	VR	Motor rotation direction
Basic position	-1)	-	-	-	-
Extend force traverse	+2)	+	-	-	right
Extending reduced-force rapid traverse (regenerative mode)	+	-	-	+	right
Retraction	+	+	+	-	left
Hold force generated by pressure	-	+	-	-	-
Hold traction force	+	-	-	-	-

[1])- = 2/2 directional seat valve not energized

[2])- = 2/2 directional seat valve energized

Basic position

- The motor is off / de-energized and all valves are without current.
- The pressure medium is blocked by the 2/2 directional seat valves.

Extend force traverse

- Motor direction of rotation clockwise, the motor speed according to the speed requirement on the cylinder.
- The 2/2 directional seat valves VA and VB are switched/energized.
- The pressure medium is conveyed from the rod side of the cylinder B via the 2/2 directional seat valves VB and VA into the piston sides of the cylinder A.
- The additional differential volume is “sucked” out of the compensator via a check valve.
- The cylinder extends.

Extending reduced-force rapid traverse (regenerative mode)

Only possible with version “R”.

- Motor direction of rotation clockwise, the motor speed according to the speed requirement on the cylinder.
- The 2/2 directional seat valves VA and VR are switched/energized.
- The pressure medium is conveyed by the pump via the 2/2 directional seat valve VA into the piston side A of the cylinder.
- The displacement additionally conveys the pressure medium from the rod side B via the 2/2 directional seat valve VR into the piston side A.
- The additional differential volume is “sucked” out of the compensator via a check valve.
- This enables the travel velocity to be nearly doubled compared to the “extension of the force traverse”.
- As a result of the area ratios of the differential cylinder, the force generated by pressure is reduced by about half. (For gear ratio, see the ⮫ data sheet of the self-contained axis).
- The cylinder extends in a reduced-force rapid traverse.

Retraction

- Motor direction of rotation counterclockwise, the motor speed according to the speed requirement on the cylinder.
- The 2/2 directional seat valves VA, VB and VE are switched/energized.
- The pressure medium is conveyed from the piston side of the cylinder A via the 2/2 directional seat valves VA and VB into the rod sides of the cylinder B.
- The differential volume from the piston side A is conveyed via the valve VE into the compensator.
- The cylinder retracts.

Hold force generated by pressure

- The motor is off / de-energized.
- The 2/2 directional seat valve VB is switched/energized.
- Thus, the pressure in the rod side of the cylinder B is maintained by the pump via the 2/2 directional seat valve VB.

Hold traction force

- The motor is off / de-energized.
- The 2/2 directional seat valve VA is switched.
- Thus, the pressure in the piston side of the cylinder A is maintained by the pump via the 2/2 directional seat valve VA.

10 Maintenance and repair

10.1 General information

⚠ WARNING	**Dangerous voltage and risk of electrical accidents! To avoid serious injury when working on electrical systems, the following precautions are to be taken in the order listed:** – De-energize – Secure against restarting. – Verify that there is no voltage – Ground and short-circuit – Cover or shield adjacent live parts
⚠ WARNING	**Danger due to pressurized self-contained axis! Risk of injury! Severe injury when working at systems that have not been stopped! Damage to property! Even once the self-contained axis has been disconnected from the electrical power supply, the system is still pressurized and is permanently pre-stressed!** – Observe the specifications of the system manufacturer and the system end-user! – Do not disconnect lines, connections or components as long as the self-contained axis is under pressure. – The hydraulic circuit may only be opened by specifically trained personnel.
⚠ WARNING	**Systems that are still running! Risk of injury! The work described in this chapter may only be carried out after systems have been shut down. Before starting any work:** – Make sure that the drive motor cannot be activated. – Ensure that all force-transmitting components and ports (electric) are switched off and secured against restarting according to the manufacturer's specifications. If possible, remove the main fuse of the system. Verify that there is no voltage using tested measuring equipment.

10.2 Cleaning and care

NOTICE	**Solvents and aggressive cleaning agents! Aggressive cleaning agents may damage the seals of the drive unit and accelerate aging.** – Do not use solvents or aggressive cleaning agents.
NOTICE	**Penetrating dirt and liquids! The safe function of the self-contained axis is thus no longer ensured.** – Ensure absolute cleanliness in all work. – Do not use a high-pressure washer or hose water.

For cleaning and care, observe the following:

- Close all openings with appropriate protective caps/devices.
- Check that all seals and caps of the plug-in connections are firmly fitted so that no humidity can penetrate the drive unit during cleaning.
- Remove external coarse dirt and keep sensitive and important parts clean.
- Do not use linting cleaning cloths for cleaning.

10.3 Maintenance schedule

⚠ WARNING **Uncontrolled machine movements! Risk of injury due to maintenance work at an activated system.**

– Unless otherwise stipulated, ensure that during maintenance work, the self-contained axis is in a state in which no uncontrolled machine movement can occur.

⚠ WARNING **Improper maintenance or repair may lead to damage to property. Wear may lead to malfunctions.**

– Perform the prescribed maintenance work at the intervals specified in these operating instructions.

When used as intended, the self-contained axis is low maintenance.

Regular inspections are required to ensure that the self-contained axis runs reliably and for a long service life. The time intervals mainly depend on the operating conditions and the external ambient conditions (e.g. dirt, temperature, vibration). The individual maintenance steps are described in the following table.

	After commissioning	Continuously	Every 3 months or 1 million cycles	Every 12 months or 5 million cycles	After 5 years or 10 million cycles	After 10 years or 20 million cycles	Responsibility
Extended visual inspection (e.g. signs of wear on the piston rod, external leakage, pressure marks on connection lines, ...)	X		X	-	-	-	Machine end-user
Extended visual inspection (e.g. signs of wear on the piston rod, external leakage, pressure marks on connection lines, ...)	-	-	-	X	-	-	Bosch Rexroth Service
Check accumulator pressure	X	X	-	-	-	-	Specialist[1)]
Check the operating temperature	X	X	-	-	-	-	Specialist[1)]
Overhaul Replace fluid, scraper, cylinder guide belts	-	-	-	-	X	X	Bosch Rexroth Service[2)]
Complete assembly inspection and overhaul Check components and correct, if necessary	-	-	-	-	-	X	Bosch Rexroth Service[2)]

1) Bear in mind the threshold value in automation. Make the corresponding warnings visible.)

2) on site at Bosch Rexroth

- The self-contained axis has to be checked consistently for abnormalities or changes. This relates to leakages, changed noise development, loose screw fittings/connections, unusual heat development, damage to cables etc.
- In order to avoid electrostatic charging, clean any dust accumulation using a damp cloth
- The extended visual inspection includes checking that the mounting elements and fittings are seated tightly. This has to be done with the system switched off, depressurized and cooled down.

10.4 Repair

⚠ WARNING	**Improper repair!** – For repair, the self-contained axis may only be disassembled to the extent described in these operating instructions. – Defective parts may only be replaced by new, interchangeable, tested components in original equipment quality. – Only use original spare parts from Bosch Rexroth for repairing the self-contained axis. – The repair may only be carried out by authorized, trained and instructed specialists.

⚠ WARNING	**Danger due to pressurized self-contained axis! Risk of injury! Severe injury when working at systems that have not been stopped! Damage to property! Even once the self-contained axis has been disconnected from the electrical power supply, the system is still pressurized and is permanently pre-stressed!** – Observe the specifications of the system manufacturer and the system end-user! – Do not disconnect lines, connections or components as long as the self-contained axis is under pressure. – The hydraulic circuit may only be opened by specifically trained personnel.

Bosch Rexroth offers a wide range of repair services. For further information, please consult Bosch Rexroth Service, see ➦ Chapter 16.1 Service and support on page 55.

10.5 Spare parts

Please contact Bosch Rexroth Service for clarification regarding spare parts, see ➦ Chapter 16.1 Service and support on page 55. In addition, observe the safety instructions in these operating instructions when working with or on the self-contained axis.

Table 11: Lifting gear / attachment devices

Designation	Version	Material number	Data sheet / standard
RING BOLT DIN580-M10-C15E	M10	R900003438	DIN580

10.6 Exchange of components

To exchange defective components and in case of questions or doubt, please contact the Bosch Rexroth service, see ➦ Chapter 16.1 Service and support on page 55.

11 Disassembly and removal

11.1 General information

⚠ WARNING	**Systems that are still running! Risk of injury! The work described in this chapter may only be carried out after systems have been shut down. IMPORTANT: Even once the self-contained axis has been disconnected from the electrical power supply, the system is still pressurized (accumulator pressure max. 10 bar)! Before starting any work:** – Make sure that the drive motor cannot be activated. – Ensure that all force-transmitting components and ports (electric) are switched off and secured against restarting according to the manufacturer's specifications. If possible, remove the main fuse of the system. Verify that there is no voltage using tested measuring equipment.
⚠ WARNING	**Danger due to pressurized self-contained axis (accumulator pressure max. 10 bar)! Risk of injury! Severe injury when working at systems that have not been stopped! Damage to property!** – Observe the specifications of the system manufacturer and the system end-user! – Do not disconnect lines, connections or components as long as the self-contained axis is under pressure. – The hydraulic circuit may only be opened by specifically trained personnel.
⚠ WARNING	**A drive unit which is not completely disassembled may fall! An incompletely disassembled drive unit may fall and cause severe injuries.** – During the disassembly, secure the drive unit against falling down.
⚠ WARNING	**Dangerous voltage and risk of electrical accidents! To avoid serious injury when working on electrical systems, the following precautions are to be taken in the order listed:** – De-energize – Secure against restarting – Verify that there is no voltage – Ground and short-circuit – Cover or shield adjacent live parts
⚠ WARNING	**Preloaded system! Danger due to pressurized self-contained axis!** – When decommissioning or disassembling the self-contained axis, be sure to notify or contact Bosch Rexroth Service.

11.2 Preparing for disassembly

1. Decommission the overall system as described in the overall machine or system instructions.

2. Before starting work at live components: On the system side, disconnect the self-contained axis from the supply voltages and secure it against restarting.

11.3 Disassembly process

Proceed as follows to disassemble the self-contained axis:

1. Check whether the self-contained axis has cooled down sufficiently so that it can be disassembled in a risk-free manner.
2. Disconnect the electric lines according to the self-contained axis ➦ data sheet (chapter “Electrical connections”).
3. Remove the self-contained axis. Use suitable lifting gear to do so. Refer to the reverse order from ➦ Chapter 7.5 Assembling the self-contained axis on page 29.

Ensure during all these steps that no dirt gets into the openings.

11.4 Storage / further use

Proceed as described in ➦ Chapter 6.2 Storage on page 23.

11.5 Exchange of components

Generally speaking, the self-contained axis may not be opened. The hydraulic system has to remain closed. If components are defective and opening the hydraulic system is necessary to replace or repair them, Bosch Rexroth Service has to be called in.

The following components or tasks are not critical in this regard:

- The cover may be removed and replaced again.

For further information or in cases of uncertainty, please consult Bosch Rexroth Service.

12 Disposal

Environmental protection

Careless disposal of the self-contained axis 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 hydraulic fluid residues according to the applicable safety data sheets for these hydraulic fluids.
- Please observe the following notes for environmentally-friendly disposal.

Return to Bosch Rexroth

The hydraulic products manufactured by us can be returned to us for disposal purposes free of charge. There may 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

Bügermeister-Dr.-Nebel-Straße 8

97816 Lohr am Main

Germany

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. Due to ecological reasons, disposable packaging are not to be used for returning products to Bosch Rexroth.

Materials used

Hydraulic 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.

Recycling

Due to the high metal share, hydraulic products can mostly be recycled. In order to achieve an ideal metal recovery, disassembly into individual assemblies is required.

13 Extension and modification

⚠ WARNING	**Expiration of warranty! Personal injury and damage to property!** – Modifications exceeding the extent described in these operating instructions are not permitted.

14 Troubleshooting

14.1 General information

⚠ WARNING	**Dangerous movement! In the case of fault, dangerous movements of the self-contained axis may occur. This means that there is a risk of injury.** – Keep out of the range of motion of the self-contained axis and other moving system parts during troubleshooting. – Prevent the unintended access of persons (e.g. by blocking, covering). – Before accessing or entering the danger zone, bring the self-contained axis safely to a standstill.

- Before starting work at live parts: Disconnect the self-contained axis at the system side from the supply voltages and secure the shut-down device against unintended restarting.
- Check if the voltage has fallen below 50 V before touching live parts!

14.2 How to proceed for troubleshooting

- The troubleshooting may only be performed by Bosch Rexroth or by authorized and trained personnel from a specialist company authorized by Bosch Rexroth. Furthermore, training on self-contained axes is necessary.

Bosch Rexroth offers measures supporting training in specific fields. An overview over the training contents can be found online at: ➦ http://www.boschrexroth.com

- Always work systematically and purposefully, even when under time pressure. Random, thoughtless disassembly and changing of settings might result in the inability to determine 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 have repairs been carried out at the overall system (machine/system, electrical systems, control) or at the product? If yes: 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.
- If the occurred error could not be remedied, please contact one of the contact addresses provided at ➦ http://www.boschrexroth.com.

14.3 General error list

Table 12: General error list

Fault	Possible cause	Remedy
Thermal shutdown	Insufficient heat dissipation	Check whether mechanical engineering parts or the installation situation allows as much convection as possible
	The load cycle is outside the specifications, e.g. pause time was reduced or time in the force control was extended	Deactivate cycle
Low pressure warning [1)] Accumulator	High external leakage in the system, leakage gas pressure accumulator	Localize leakage Observe the footnote [1)]. Contact Bosch Rexroth Service.
	Defective components, increased noise development	Localize leakage Contact Bosch Rexroth Service.
Malfunction or destruction of electronic components	Incorrect wiring	Check the wiring and the electrical signals with the help of measuring devices Contact Bosch Rexroth Service.
Vibrations at the axis	Too high vibration at the axis	Comply with the admissible vibration load Contact Bosch Rexroth Service.
	Incorrect motor calibration	Check the settings.
Axis does not move or moves in an uncontrolled manner or vibrates	Wrong electronics installation and wiring	Use the overview circuit diagrams to check if installation and wiring are correct Contact Bosch Rexroth Service.
	Electrical signals are not received	Check the electronics installation and wiring Contact Bosch Rexroth Service.
	Programming error in the software / incorrect control of components	Check the control of the electric valves and motor and correct, if necessary.
	Electro-hydraulic positioning elements do not switch	Check the electronics installation and wiring. Contact Bosch Rexroth Service.
	Wrong gas pressure in the hydraulic accumulator	Check gas pressure Contact Bosch Rexroth Service.
Axis does not run smoothly	Faults in the system	Contact Bosch Rexroth Service.

1) in the case of the message “Warning mark”: It is still possible to operate the self-contained axis. Contact Bosch Rexroth Service.

in the case of the message “Shot-down mark”: It is **no longer** possible to continue to operate the self-contained axis. Contact Bosch Rexroth Service.

15 Technical data

For technical data, see the ➦ data sheet of the self-contained axis and the documentation from ➦ Chapter 1.2 Required and amending documentation on page 5.

16 Appendix

16.1 Service and support

Service in Germany

You can reach the **service helpdesk & hotline** via:

Table 13: Service in Germany

Phone	**+49 9352 405060**
Email	**service@boschrexroth.de**
Internet	➦ http://www.boschrexroth.com

On our website, you can find additional information about service, repair (e.g. delivery addresses) and training.

Global service

If you are outside of Germany, please get in touch with your contact person first. You can find the hotline phone numbers in the sales addresses on our website.

Preparation of information

We can help you in a fast and efficient way if you keep the following information available:

- Detailed description of the failure and the circumstances
- Information on the nameplate of the products concerned, particularly the type keys and serial numbers
- Your contact information (phone number, fax number and email address)

17 Index

rexroth
A Bosch Company

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