

Operating instructions

Hydraulic power unit

CytroPac



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

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The cover shows an example configuration. The product supplied may therefore differ from the figure shown.

The original operating instructions were prepared in German.

Contents

1	About this documentation	5
1.1	Validity of the documentation	5
1.2	Required and amending documentation	5
1.3	Representation of information	6
1.3.1	Safety instructions	6
1.3.2	Symbols	7
1.3.3	Abbreviations	7
2	Safety instructions	8
2.1	About this chapter	8
2.2	Intended use	8
2.3	Improper use	9
2.4	Qualification of personnel	9
2.5	General safety instructions	10
2.6	Product- and technology-dependent safety instructions	11
2.7	Personal protective equipment	14
2.8	Obligations of the machine end-user	14
3	General information on damage to property and damage to product	15
4	Scope of delivery	17
5	Product information	18
5.1	Performance description	18
5.2	Product description	19
5.3	Component overview	20
5.4	Circuit diagram, hydraulic	20
5.5	Product identification	21
6	Transport and storage	22
6.1	Transporting the hydraulic power unit	22
6.1.1	Preparing for transport	23
6.1.2	Transport using forklifts and similar floor conveyors	23
6.1.3	Transport using lifting gear	24
6.2	Storing the hydraulic power unit	25
7	Assembly	26
7.1	Unpacking the hydraulic power unit	26
7.2	Installing the hydraulic power unit	26
7.2.1	Dimensions of the hydraulic power unit	27
7.2.2	Fixing the hydraulic power unit in place	27
7.3	Connecting the hydraulic supply	31
7.3.1	Connecting the hydraulic supply with the standard version	32
7.3.2	Connecting the hydraulic supply in master/slave operation	33
7.4	Connecting the water supply	35
7.5	Overview of the electrical interfaces	36
7.5.1	"Basic" sensor technology version	36
7.5.2	"Premium" and "Premium M12" sensor technology versions	36
7.6	Description of the electrical interfaces	37
7.6.1	General information	37
7.6.2	All configurations	37
7.6.3	"Basic" configuration	41
7.6.4	"Premium" and "Premium M12" configurations	46

7.7	Electrical interface connection	50
7.7.1	"Basic" configuration	50
7.7.2	"Premium" and "Premium M12" configurations	51
7.7.3	All configurations	52
8	Commissioning	53
8.1	First commissioning	54
8.1.1	Before commissioning	54
8.1.2	Filling the hydraulic power unit	54
8.2	Re-commissioning after longer standstill	55
9	Operation	56
10	Maintenance and repair	57
10.1	Cleaning and care	57
10.2	Inspection	58
10.3	Warning devices	58
10.4	Maintenance schedule	59
10.5	Maintenance	59
10.5.1	Checking the electric components/installation	59
10.5.2	Monitoring the filling level	60
10.5.3	Monitoring the oil temperature	60
10.5.4	Filter element contamination monitoring (return flow filter)	60
10.5.5	Visual inspection of the filling and breathing filter	62
10.5.6	Checking the pressure value	62
10.5.7	Hydraulic fluid care	62
10.5.8	Visual inspection for leakage, cracking, force effects and corrosion	63
10.5.9	Checking the heat exchanger	63
10.6	Spare and wear parts	64
11	Decommissioning	66
11.1	Preparing for decommissioning	66
11.2	Decommissioning the system	66
12	Disassembly and exchange	67
12.1	Preparing for disassembly	67
12.2	Disassembly process	67
13	Disposal	68
13.1	Environmental protection	68
14	Extension and modification	68
15	Troubleshooting	69
15.1	How to proceed for troubleshooting	69
15.2	Overview of the impact of defects	70
16	Technical data	72
17	Appendix	72
17.1	List of addresses	72
17.2	Declaration of incorporation	73
17.2.1	Annex to the declaration of incorporation	74
17.3	Prohibited substances - REACH, RoHS, WEEE	75
17.4	Additional document for UL listing	76
18	Alphabetical index	78

1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following product:

- Hydraulic power unit CytroPac (for material numbers, refer to data sheet 51055)

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

This documentation contains important information on the safe and proper transport, assembly, commissioning, operation, use, maintenance, disassembly and simple troubleshooting of the hydraulic power unit.

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

1.2 Required and amending documentation

- Also observe the operating instructions and documentation of the overall machinery/system.
- The hydraulic power unit must not be commissioned until you have been provided with the documentation marked with the book symbol  and you have understood and observed it.

Table 1: Required and amending documentation

Title	Document number	Document type
 CytroPac hydraulic power unit Includes technical data, operating conditions, performance limits and project planning information	51055	Data sheet
 CytroPac hydraulic power unit Contains information on the commissioning of the hydraulic power unit, such as the installation of IndraWorks DS, the switching sequence, connection establishment, the IndraWorks DS, CytroPac and protection functions, as well as diagnosis and troubleshooting.	51055-IB	Commissioning instructions
 Hydraulic Fluids Based on Mineral Oils and Related Hydrocarbons Describes the requirements on hydraulic fluids on mineral oil basis and related hydrocarbons for operation with Rexroth hydraulic components and helps you to select a hydraulic fluid for your hydraulic system	90220	Data sheet
 Environmentally compatible hydraulic fluids Application notes and requirements for Rexroth hydraulic components.	90221	Data sheet
 General product information on hydraulic products General information on hydraulic products.	07008	Operating instructions
 Assembly, commissioning and maintenance of hydraulic systems General information on assembly, commissioning and maintenance of hydraulic systems.	07900	Data sheet
 External gear pump SILENCE, AZPS Includes technical data, operating conditions, performance limits and project planning information	10095	Data sheet

	Sytronix, FcP 5020, frequency-controlled pump drive system Describes the functions of the frequency-controlled pump drive system FcP 5020.	R911378635	Quick start guide
	Frequency converters series EFC x610 and EFC 3610 / EFC 5610 Describes the assembly, commissioning, use, maintenance, diagnosis and troubleshooting of the frequency converters.	R911369847	Operating instructions
	Frequency converters, multi-Ethernet card Contains the data, information and descriptions required in connection with the MEP extension card (Multi-Ethernet Platform). This extension card is part of the accessories of the fieldbus communication module of the EFC x610 series frequency converter.	R911378491	Operating instructions

1.3 Representation of information

Uniform safety instructions, symbols, terms and abbreviations are used so that you can quickly and safely work with your product using this documentation. For a better understanding, they are explained in the following sections.

1.3.1 Safety instructions

In this documentation, safety instructions are indicated whenever sequences of actions are explained which bear the risk of personal injury or damage to property. The measures described for hazard avoidance must be observed. Safety instructions are structured as follows:

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

- Warning sign: Draws attention to the danger
- Signal word: Identifies the degree of danger
- Type and source of danger: Specifies the type and source of danger
- Consequences: Describes the consequences of non-compliance
- Precaution: Specifies how the danger can be prevented

Table 2: Risk classes according to ANSI Z535.6-2006

Warning sign, signal word	Meaning
 DANGER	Indicates a dangerous situation which will cause death or severe injury if not avoided.
 WARNING	Indicates a dangerous situation which may cause death or severe injury if not avoided.
 CAUTION	Indicates a dangerous situation which may cause minor or medium personal injury if not avoided.
NOTICE	Damage to property: The product or the environment could be damaged.

1.3.2 Symbols

The following symbols indicate notes which are not safety-relevant but increase the comprehensibility of the documentation.

Table 3: Meaning of the symbols

Symbol	Meaning
	If this information is not observed, the product cannot be optimally used and/or operated.
►	Individual, independent action
1. 2. 3.	Numbered instruction: The numbers indicate that the actions must be carried out one after the other.

1.3.3 Abbreviations

The following abbreviations are used in this documentation:

Table 4: Abbreviations

Abbreviation	Meaning
AB	Power unit construction
BR	Bosch Rexroth
DBV	Pressure relief valve
MEP	Multi-Ethernet platform
NG	Size
PE	Protective Earth
RE	Rexroth document in English language
REXXXXXX-B	Rexroth operating instructions

2 Safety instructions

2.1 About this chapter

The hydraulic power unit was designed and manufactured according to the generally accepted code of practice. However, there is still the danger of personal injury and damage to property if you do not observe this chapter and the safety instructions in this documentation.

- ▶ Read this documentation completely and thoroughly before working with the hydraulic power unit.
- ▶ Keep this documentation in a location where it is accessible to all users at all times.
- ▶ Always include the required documentation when you pass the hydraulic power unit on to third parties.

Due to the interaction between the hydraulic power unit and the complete machine, the installation of the hydraulic power unit into the overall machinery/system will result in additional potential hazards. This applies in particular to the influence of hydraulic and electric controls on hydraulic drives generating mechanical movements. It is therefore essential for the manufacturer of the overall machinery/system to have undertaken an independent risk assessment. Furthermore, the manufacturer must on this basis have prepared operating instructions for the overall machine/system.



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

2.2 Intended use

The hydraulic power unit is a hydraulic system component. You may use the product as follows:

The hydraulic power unit constitutes partly completed machinery in the sense of the EC Machinery Directive 2006/42/EC and is respectively not usable.

The hydraulic power unit is exclusively intended for integration into a machine or system or for assembly with other components to form a machine or a system.

The hydraulic power unit may be commissioned only if it has been integrated into the machine or system for which it is designed and if the machine or system fully complies with the requirements of the EC Machinery Directive.

The hydraulic power unit serves for controlled or regulated generation of hydraulic flow and hydraulic pressure.



The hydraulic power unit is not considered to be a safety component in the sense of the EC Machinery Directive 2006/42/EC.

The hydraulic power unit must not exceed the operating conditions and performance limits specified in the technical data.

The hydraulic power unit is technical equipment exclusively intended for professional and not for private use.

Intended use includes having read and understood this documentation, especially chapters 2 "Safety instructions" and 3 "General information on damage to property and damage to product".

2.3 Improper use

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

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

The hydraulic power unit is not suitable for operation in explosive environments.

Improper use of the hydraulic power unit includes:

- Non-compliance with the technical data, operating conditions, performance limits and environmental conditions specified in the data sheet.
- Operation of the hydraulic power unit with hydraulic fluid not complying with the specifications in the data sheet.
- Use of spare parts that are not approved by the manufacturer.
- Mechanical modification of the hydraulic power unit.
- Welding or soldering works at the hydraulic power unit.

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 hydraulic power unit, 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 a corresponding expert or an instructed person under the direction and supervision of an expert.

Experts are those who can assess the work to be undertaken, recognize potential hazards and apply the appropriate safety measures due to their professional training, knowledge and experience, as well as their understanding of the relevant regulations pertaining to the work to be undertaken. An expert must observe the relevant specific professional rules and have the necessary hydraulic and electrical expert knowledge.



Bosch Rexroth offers measures supporting training in specific fields.

Please find an overview of the training contents online at:

www.boschrexroth.com/de/de/academy.

2.5 General safety instructions

- Observe the valid regulations on accident prevention and environmental protection.
- Observe the safety regulations and provisions of the country in which the product is used/applied.
- Only use Rexroth products in technically perfect condition.
- Observe all notes on the product.
- Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to react.
- Only use accessories and spare parts approved by the manufacturer in order to exclude hazards to persons due to unsuitable spare parts.
- Comply with the technical data and environmental conditions specified in the product documentation.
- The installation or use of inappropriate products in safety-relevant applications could result in unintended operating conditions when being used which in turn could cause personal injuries and/or damage to property.
Therefore, only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product, or if the safe suitability of the product in the application is confirmed by a separate conformity assessment procedure for the end product, 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 Rexroth product is installed complies with the country-specific provisions, safety regulations and standards of the application.
- Only persons who have been authorized by the machine end-user may be granted access to the direct operating range of the machine/system. This also applies during any standstill of the machine/system.

2.6 Product- and technology-dependent safety instructions

WARNING

Pressurized hydraulic power unit, pressurized machine/system!

Danger to life and risk of serious injuries when working on non-decommissioned machines/systems, burns, environmental pollution, damage to property!

- ▶ Ensure that all relevant components of the hydraulic system are depressurized and that the electrical control is de-energized. For doing so, observe the specifications of the machine/system manufacturer and/or end-user.
- ▶ Do not disconnect line connections, connections or components as long as the hydraulic system is pressurized.
- ▶ Make sure that appropriate safety measures are implemented to prevent any dangerous situations for personnel and real assets if commissioning or maintenance work requires decommissioning of safeguard like fuses, pressure relief valves or covers (frequency converter).
- ▶ Make sure that all safeguards like fuses, pressure relief valves or covers (frequency converter) of the hydraulic power unit are in place, properly installed and functional on re-commissioning.

High electrical voltage!

Danger to life and risk of injury caused by electric shock!

- ▶ Make sure the relevant system part is de-energized when working at the system.
- ▶ Secure the system against restarting.
- ▶ Operate the hydraulic power unit only with a permanently installed protective grounding conductor.
- ▶ Observe the discharge time (at least 30 minutes) of capacitors.

Leakage of (pressurized) hydraulic fluid and oil mist!

Danger to life! Risk of injury! Explosion hazard! Risk of fire!

Environmental pollution! Damage to property!

- ▶ Switch the system off immediately (emergency off switch).
- ▶ Identify and remedy the leakage.
- ▶ Never try to stop or seal the leakage or the oil jet using a cloth.
- ▶ Avoid direct contact with the leaking hydraulic fluid.
- ▶ Carry out visual inspections for leak-tightness of the hydraulic power unit and the oil-containing components on a regular basis.
- ▶ Wear your personal protective equipment.
- ▶ Keep open fire and ignition sources away from the hydraulic power unit.
- ▶ When dealing with hydraulic fluids, you must imperatively observe the manufacturer's information.
- ▶ Make sure that the grounding (electric welding circuit) during welding works at the system is not lead via the hydraulic power unit.

 WARNING**Unexpected start-up due to malfunctions/incorrect operation!**

Danger to life! Risk of injury!

- ▶ Ensure that the hydraulic power unit is secured against unexpected start-up.
- ▶ Regularly check the hardware and software.
- ▶ Make sure that required measures for decommissioning are implemented by the machine manufacturer as the hydraulic power unit is not equipped with direct measures (e.g. switches) for decommissioning of the product.

Direct contact with live components in case of fault, e.g. loose terminals, insulation defects, missing grounding, malfunction of fuses or damaged lines, components or terminals!

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

- ▶ Before any maintenance work, de-energize the relevant system part.
- ▶ Ensure continuous connection of the protective grounding conductor.
- ▶ Observe the operating conditions and performance limits specified in the technical data.
- ▶ Work at electric equipment may only be performed by specialized electricians.
- ▶ Comply with the recommended inspection and maintenance intervals.

Overheating of the hydraulic power unit (electric motor, frequency converter, hydraulic components and central plate) and pressure line!

Danger to life! Risk of injury! Explosion hazard!

- ▶ De-energize the relevant system part immediately.
- ▶ Correct the cause of overheating.
- ▶ Do not use the hydraulic power unit in potentially explosive atmospheres.

Functional restrictions of the hydraulic power unit due to EMC irradiation!

Danger due to uncontrolled machine movements due to electro-magnetic radiation of unshielded connection lines.

- ▶ Observe the EMC limit values.
- ▶ Only use recommended electrical connection lines according to the EMC Directive and shield the electronics from the source of interference, if necessary.
- ▶ Keep the recommended distance to the source of interference.
- ▶ Provide for proper, safe PE connection.

Overheating of electric lines and components or short-circuit!

Danger to life! Risk of injury! Risk of fire!

- ▶ Observe the operating conditions and performance limits and safeguards specified in the technical data.



CAUTION

Hydraulic power unit has hot surfaces!

Risk of injury! Risk of burning!

- ▶ Allow the hydraulic power unit to cool down sufficiently before touching it.
- ▶ Wear heat-resistant gloves or protective clothing. During or after the operation, temperatures may rise to values higher than 60 °C, depending on the operating conditions.
- ▶ Observe the protective measures of the machine/system manufacturer and/or operator.

Leaked hydraulic fluid, oily surfaces!

Risk of injury! Slip hazard!

- ▶ Protect and mark the danger zone.
- ▶ Immediately remove hydraulic fluid that has leaked out.
- ▶ Use an oil binding agent in order to bind the leaked hydraulic fluid.
- ▶ Remove and dispose of the contaminated oil binding agent, see chapter 13 "Disposal".
- ▶ Wear the personal protective equipment prescribed for your activity.
- ▶ Perform a leak test.

Contact with hydraulic fluid!

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

- ▶ Avoid contact with hydraulic fluids.
- ▶ When dealing with hydraulic fluids, you must imperatively observe the safety instructions of the hydraulic fluid manufacturer.
- ▶ Use your personal protective equipment (like e.g. safety goggles, protective gloves, suitable working clothes, safety shoes).
- ▶ If nevertheless hydraulic fluid comes into contact with the eyes or gets into the bloodstream or is swallowed, please consult a doctor immediately.

Electro-magnetic/magnetic fields!

Health hazard for persons with cardiac pacemakers, metal implants or hearing aids!

- ▶ Make sure that the personnel specified above is prevented from accessing areas where drive components are installed and operated or arrange consultation with a doctor for approval.

Sharp edges!

Risk of injury!

- ▶ Wear your personal protective equipment.

**CAUTION****Loud noise due to high sound pressure level (in case of malfunction)!**

Danger of hearing damage (temporary/permanent), stress/loss of attention!

Fault in voice communication and acoustic signals!

- ▶ Wear your ear protection.
- ▶ Consult the machine manufacturer or Bosch Rexroth to identify any malfunction if applicable.

2.7 Personal protective equipment

During operation and maintenance work as well as during installation and removal of the hydraulic power unit, always wear the following personal protective equipment:

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

2.8 Obligations of the machine end-user

In order to ensure safety when handling the hydraulic power unit and its components, the machine end-user of the system must:

- guarantee the intended use of the hydraulic power unit and its components according to chapter 2.2 "Intended use".
- instruct the operating personnel regularly in all items of the operating instructions and make sure that they are observed.
- ensure compliance with the instructions on occupational safety and with the operating instructions.
- ensure compliance with operating data (admissible operating temperature, maximum operating pressure).

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

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

The operation of installations, systems and machines basically requires the implementation of a holistic IT security concept which is state-of-the-art in terms of technology. Accordingly, Bosch Rexroth products and their properties have to be considered as components of installations, systems and machines for their holistic IT security concept.

Unless otherwise documented, Bosch Rexroth products are designed for operation in local, physically and logically secured networks with access restrictions for authorized persons, and they are not classified according to IEC 62443-4-2.

3 General information on damage to property and damage to product



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

NOTICE

Danger due to improper handling!

Damage to property!

- ▶ You may only use the hydraulic power unit according to chapter 2.2 "Intended use".
- ▶ Do not expose the hydraulic power unit to any mechanical loads under any circumstances.
- ▶ Do not place/put any objects on top of the hydraulic power unit.
- ▶ Never use the hydraulic power unit as a handle or step.
- ▶ Do not apply any external loads on the hydraulic power unit.

Unauthorized changes to the frequency converter parameters!

Damage to property!

- ▶ Only change parameters in accordance with the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".
- ▶ Coordinate the any changes of other parameters with the Bosch Rexroth customer service.

Operation with insufficient hydraulic fluid!

Damage to property!

- ▶ When commissioning or re-commissioning the machine/system, the oil tank as well as the suction and working lines of the hydraulic power unit and the components must be filled and remain filled with hydraulic fluid during operation according to manufacturer's specifications.
- ▶ Observe the machine/system manufacturer's specifications regarding the point "Control of the hydraulic fluid" and the prescribed remedial measures for the control result.

Leaking or spilled hydraulic fluid!

Environmental pollution and contamination of the ground water!

- ▶ Use an oil binding agent in order to bind the leaked hydraulic fluid.
- ▶ When filling and draining the hydraulic fluid, always put a drip pan under the hydraulic power unit.
- ▶ Observe the information in the safety data sheet of the hydraulic fluid and the machine/system manufacturer's regulations.

NOTICE

Mixing hydraulic fluids!

Damage to property!

- ▶ Generally avoid any mixing of hydraulic fluids of different manufacturers and/or of different types of the same manufacturer.
- ▶ Check the compatibility of the various hydraulic fluids and their compatibility with the components and seals. Mixing of hydraulic fluids may occur, for example, due to hydraulic fluid residues in a component.

Contamination by fluids and foreign particles!

Early wear and malfunctions!

Take the following measures to protect the hydraulic power unit:

- ▶ During assembly, provide for cleanliness in order to prevent foreign particles e.g. welding beads or metal chips from getting into the hydraulic lines and causing wear or malfunctions in the hydraulic power unit.
- ▶ Make sure that all connections, hydraulic lines and attachment parts (e.g. measuring devices) are clean and free of chips.
- ▶ For removing lubricants or any other contamination, use industrial residue-free wipes.
- ▶ Only complete cleaning processes at the hydraulic power unit if the hydraulic connections are closed.
- ▶ Before commissioning, ensure that all hydraulic and mechanical connections have been made.
- ▶ Ensure that no pollutants are able to penetrate when sealing the measuring ports.

Improper cleaning!

Damage to property!

- ▶ Cover all openings with the appropriate protective threads in order to prevent cleaning agents from penetrating the system.
- ▶ Check that all seals and electric plug-in connections are firmly fitted to prevent the penetration of cleaning agents.
- ▶ Do not use aggressive cleaning agents for cleaning. Clean the hydraulic power unit using a suitable cleaning liquid.
- ▶ Do not use a high-pressure washer.
- ▶ Do not use compressed air for the cleaning at functional interfaces.
- ▶ Make sure that the cover is turned to the "closed position" after cleaning. See also Fig. 1, left view.

Environmental pollution caused by incorrect disposal!

Environmental pollution! Damage to property!

- ▶ Dispose of the hydraulic power unit, the hydraulic fluid and the packaging in accordance with the applicable national regulations in your country.
- ▶ Dispose of the hydraulic fluid according to the applicable safety data sheet of the hydraulic fluid.

4 Scope of delivery

Included within the scope of delivery:

- CytroPac hydraulic power unit
- Operating instructions (this document) including EC declaration of incorporation and additional document for UL listing



For further information on optionally available components, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

5 Product information

5.1 Performance description

Fields of application The CytroPac is a compact drive system (smaller oil tank, cooling system) for hydraulic machines and particularly machine tools and assembly lines under limited space conditions.

Low noise level The CytroPac is particularly quiet due to plastic enclosure of all noise sources.

Cost-effective operation The frequency converter of the variable speed pump drive ensures dynamic adjustment of the power/speed and the flow to current requirements to reduce the operating costs.

Various configurations In "Basic" configuration, the filling level, temperature and filter contamination sensors must be wired by the customer for evaluation via the customer-side machine control system.

In the "Premium" and "Premium M12" configurations, the frequency converter serves as sensor node and bundles all measured values of filling level, temperature and filter contamination sensors and forwards these values via a multi-Ethernet interface, e.g. Sercos or PROFINET, to the machine control system. This ensures reading of all parameters required for condition monitoring. The CytroPac can thus be easily integrated in Industry 4.0 applications. The status of the hydraulic power unit is also indicated via the integrated LED strip.



For information on the meaning of the LED signals, see chapter 10.3 "Warning devices".

Parameter adjustment during running time In the "Premium" and "Premium M12" configuration stages, the higher-level machine control unit can change the pressure command value during the running time. The new settings are automatically implemented by the hydraulic power unit via the frequency converter.

Space-saving installation In "Premium" and "Premium M12" configurations, all sensors and the motor in the hydraulic power unit are wired to the frequency converter. For this reason, only the following interfaces are required at the hydraulic power unit:

- Interface for feed-in/voltage supply (12X1)
- Interface for 24 VDC power supply, messages, if necessary enable signal and starting of functions (15X1)
- Hydraulic connection/oil drain
- Connection to the cooling water supply
- Multi-Ethernet interface ("Premium" and "Premium M12" only, 21X1, 21X2)

More functions

The product provides the following features relevant to CytroPac:

- Pressure/flow rate setting
 - Easy setting of the command value (internal command values and 4 switchable parameters for the pressure command value)
 - Command value setting via communication possible ("Premium" and "Premium M12" only)
- p/Q-PID control
 - p/Q control with automatic switch-over between pressure and volume flow control mode
 - Flow control
 - Pressure control
 - Two switchable sets of controller parameters
- Extension functions
 - Hydraulic soft start and separate acceleration ramp
 - Sleep/wake-up function
 - Pressure drop/excessive pressure compensation
 - Pump power limitation
 - Master/slave control (only "Premium" and "Premium M12" only)
- Protective function
 - Actual pressure monitoring
 - Limit value for pressure and flow command value
 - Oil exchange warning/fault
 - Thermal pump monitoring
 - CytroPac sensor monitor ("Premium" and "Premium M12" only)
 - LED flashing pattern to indicate the converter status ("Premium" and "Premium M12" only)

5.2 Product description

The CytroPac is a frequency-controlled hydraulic power unit consisting of a frequency converter, electric motor, hydraulic pump, oil tank, cooling system and sensor technology. The cooling system consists of the heat exchanger for motor and frequency converter cooling as well as optional cooling packages for hydraulic fluid cooling.

The cooling power can be selected by the number of cooling packages in the oil tank according to data sheet 51055. Refer to chapter 1.2 "Required and amending documentation".

Thanks to the flow-optimized design of the oil tank, the required hydraulic fluid volume was reduced to 20 liters. The cooling system integrated in the oil tank extracts heat energy from the hydraulic fluid and transfers it to the cooling water. The ring-shaped oil tank includes the motor-pump group and additionally reduces the operating noise.

The hydraulic power unit serves for controlled or regulated generation of hydraulic flow and hydraulic pressure.

5.3 Component overview

The CytroPac hydraulic power unit basically consists of the following components:

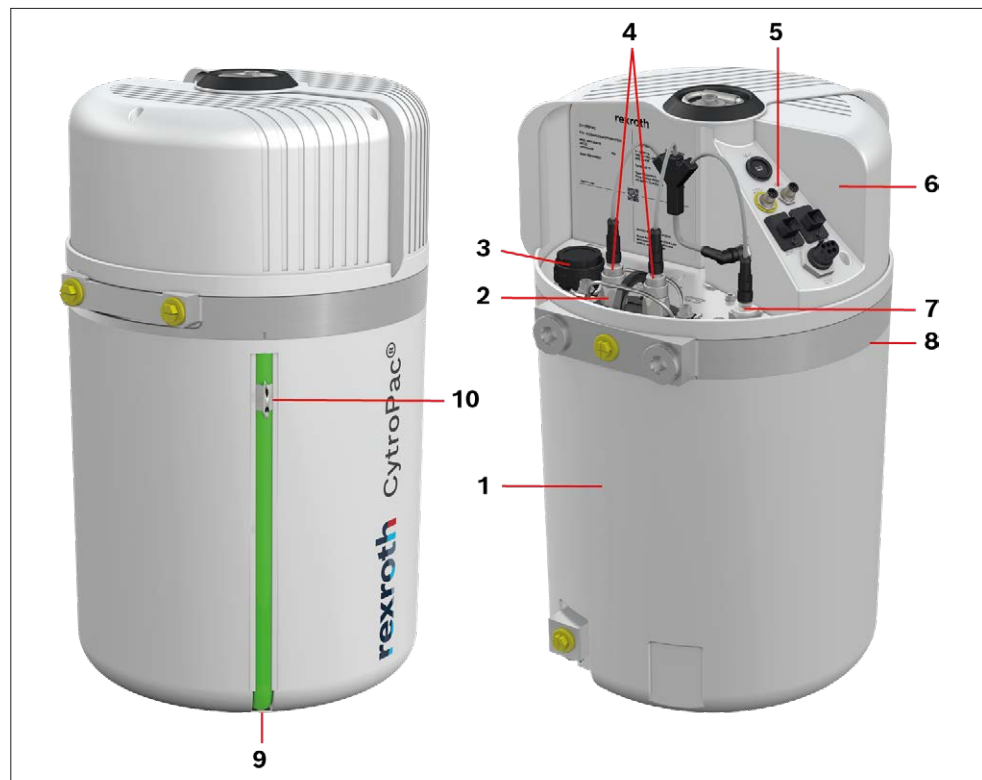


Fig. 1: Component overview

- 1** Oil tank with motor-pump group (optional cooling packages)
- 2** Return flow filter
- 3** Filler and breathing filters
- 4** Filter contamination sensors
- 5** Electrical connections (see Fig. 15)
- 6** Cover with frequency converter below
- 7** Filling level and temperature sensor
- 8** Central plate (integrated heat exchanger)
- 9** Visual oil level check and hydraulic fluid draining
Hydraulic fluid hose with LED strip behind it for status display (for the meaning of the LED signals, see chapter 10.3 "Warning devices", only in the "Premium" and "Premium M12 versions")
- 10** Clip (for removal of the hydraulic fluid hose for hydraulic fluid draining)

5.4 Circuit diagram, hydraulic



The hydraulic circuit diagram can be found in data sheet 51055, see chapter 1.2 "Required and amending documentation".

5.5 Product identification

The hydraulic power unit can be identified by its name plate.

The following figure shows an exemplary representation:

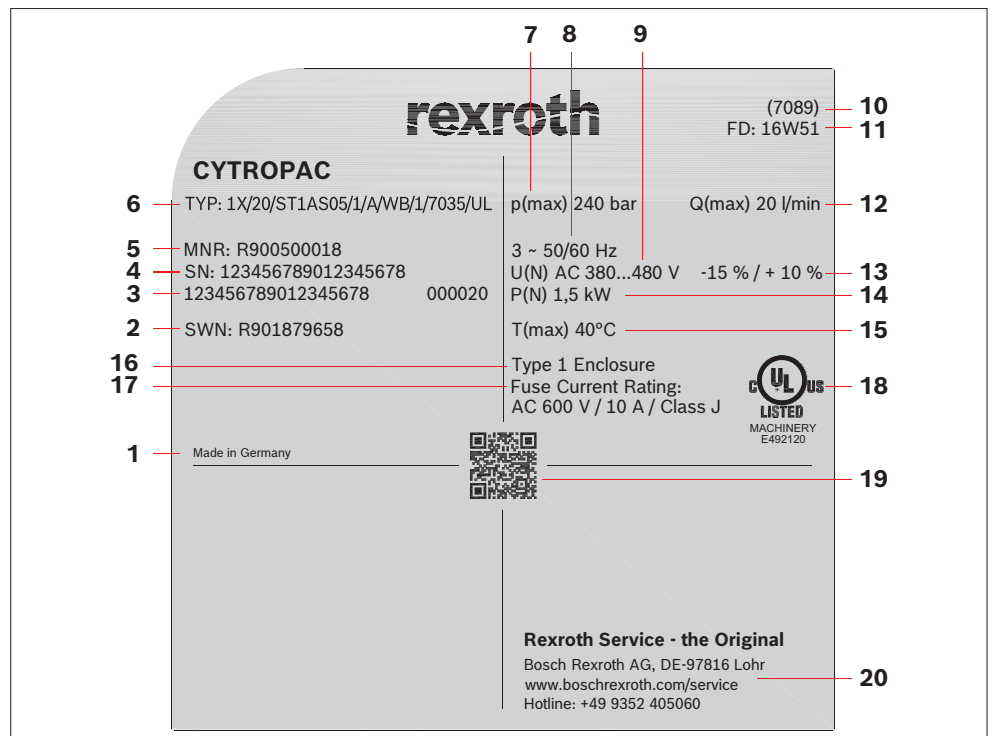


Fig. 2: Name plate

- | | |
|---|---|
| 1 Country of origin | 12 Maximum flow |
| 2 Software material number | 13 Rated voltage tolerance range |
| 3 Customer, production, repair order or project number | 14 Rated power |
| 4 Serial number | 15 Maximum temperature |
| 5 Material number | 16 UL protection class |
| 6 Type designation | 17 UL text |
| 7 Maximum rated pressure | 18 UL mark |
| 8 Power supply | (Underwriter Laboratories Inc.) |
| 9 Rated voltage | 19 QR code |
| 10 Plant | 20 Company data |
| 11 Date of production | |

6 Transport and storage

- ▶ Observe the transport instructions on the packaging.
- ▶ During storage and transport, the environmental conditions specified in data sheet 51055 must be observed, see chapter 1.2 "Required and amending documentation".
- ▶ If the packaging has to be opened e.g. for inspection purposes, you should reseal the packaging to the condition in which it was supplied.
- ▶ Ensure that the hydraulic power unit is only transported in an upright position.

6.1 Transporting the hydraulic power unit



WARNING

Falling, tumbling or uncontrolled position change of the hydraulic power unit!

Risk of injury! Damage to property!

- ▶ Use the original packaging of the hydraulic power unit for transport.
- ▶ Check the weight of the hydraulic power unit.
- ▶ Make sure that the hydraulic power unit cannot fall due to its decentralized center of gravity.
- ▶ Transport the hydraulic power unit using a floor conveyor or suitable lifting gear.
- ▶ For fixation and lifting of the hydraulic power unit with lifting gear, only use the intended eyebolt.
- ▶ Transport the hydraulic power unit in an upright position using a floor conveyor.
- ▶ Observe the maximum load-bearing capacity of the attachment devices and floor conveyors.
- ▶ Never step or reach below suspended loads.
- ▶ Wear personal protective equipment, e.g. safety shoes.
- ▶ Ensure that no unauthorized persons are within the danger zone.
- ▶ Comply with the national laws and regulations regarding occupational health and safety and transport.

Damage to pressurized and functional components!

Risk of injury! Damage to property!

- ▶ During transport, make sure that these components do not come into contact with attachment devices and lifting gear.
- ▶ Ensure that the hydraulic power unit is not attached or lifted at these components.

! **CAUTION**

Heavy loads with a weight of more than 15 kg!

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

- ▶ Use a forklift or suitable lifting gear e.g. lifting slings or lifting straps to transport the hydraulic power unit.
- ▶ During transport, secure the hydraulic power unit against falling.
- ▶ Carefully position the hydraulic power unit on the contact surface to prevent any damage.

6.1.1 Preparing for transport

Prior to transport, make the following preparations:

- ▶ Check the space required for installation of the hydraulic power unit at the place of use.
- ▶ Check the transport route.
- ▶ Depending on the type of transport, ensure additional space besides and above the hydraulic power unit.

Transport after previous operation



- ▶ For transportation after operation, drain the hydraulic fluid from the oil tank.

To prevent air in the suction line, a low level of hydraulic fluid is always inside the tank.

6.1.2 Transport using forklifts and similar floor conveyors

To transport the hydraulic power unit using a forklift, proceed as follows:

- 1.** Move the fork of the forklift under the packaging of the hydraulic power unit or under the hydraulic power unit secured for transport.
- 2.** Carefully lift the load for checking the center of gravity position.
Ensure a stable center of gravity position.
- 3.** Make sure that the hydraulic power unit cannot move out of the intended position.
- 4.** Secure the hydraulic power unit against the occurring acceleration forces and the related undesired motion of the hydraulic power unit.
- 5.** During transport, only lift the hydraulic power unit as far off the floor as necessary for transport.

6.1.3 Transport using lifting gear

For transport, the hydraulic power unit can be connected to lifting gear.

For lifting and transport of the hydraulic power unit, proceed as follows:

1. Make sure that the lifting gear's lifting capacity is sufficiently dimensioned in order to safely bear the weight of the hydraulic power unit.
2. Use the pre-assembled eyebolt at the hydraulic power unit for transport, see Fig. 3.
3. Make sure that the eyebolt is securely tightened.
4. Make sure that the cover is closed during transport. See Fig. 3.
5. Attach a suitable lifting gear to the eyebolt.
6. Attach the lifting gear to a crane hook.
7. Slowly and carefully lift the hydraulic power unit in order to avoid swinging.



Fig. 3: Eyebolt

6.2 Storing the hydraulic power unit

- Storage conditions**
- ▶ Store the hydraulic power unit in a dry location at constant temperature and in its original packaging if possible.
Ideal storage temperature: +5 °C to +25 °C
 - ▶ Provide for 100 % UV protection.
 - ▶ Store the hydraulic power unit protected against shocks.
 - ▶ Store the hydraulic power unit in an upright position.
 - ▶ Make sure that the cover of the hydraulic power unit is closed during storage.

Maximum storage time The maximum storage time of the hydraulic power unit is 12 months.



If the storage time exceeds 12 months, check the function of the hydraulic power unit and flush it with suitable cleaning liquid prior to commissioning.

7 Assembly

7.1 Unpacking the hydraulic power unit

- ▶ Only open the packaging from the top.
- ▶ Before opening the packaging and/or loosening the tension belts, make sure that the hydraulic power unit cannot fall over.
- ▶ Remove the packaging of the hydraulic power unit.
- ▶ Check the hydraulic power unit for obvious defects, for example transport damage, leakage or other external damage, and for completeness. see chapter 4 "Scope of delivery".
- ▶ Use the hydraulic power unit only in technically perfect condition.
- ▶ Dispose of the packaging material in accordance with the national regulations in your country and/or your company-internal specifications/procedures.

7.2 Installing the hydraulic power unit

WARNING

Falling, tumbling or uncontrolled position change of the hydraulic power unit!

Risk of injury! Damage to property!

- ▶ Make sure that the hydraulic power unit is only installed and assembled by qualified personnel. See chapter 2.4 "Qualification of personnel".
- ▶ Observe the information on handling the product in chapter 6 "Transport and storage".
- ▶ Position the hydraulic power unit on a suitable foundation.
- ▶ Observe the specifications on the total weight.

NOTICE

Damage to the surface/oil tank due to rough handling and incorrect positioning!

Damage to property!

- ▶ Make sure that the hydraulic power unit is correctly positioned.
- ▶ Make sure that the clip of the assembly aid is correctly positioned.
See also Fig. 9 and 10.

Vibrations in the environment!

Damage to property!

- ▶ Use vibration dampers like damping mats.
- ▶ Connect the hydraulic power unit to the machine via hydraulic hoses.
Do not use any rigid pipelines.

To install the hydraulic power unit, you should proceed as follows:

- ▶ Set the hydraulic power unit down on even ground and align it so that its longitudinal and transverse axes are horizontal.



Bosch Rexroth recommends the use of the optionally available mounting kit. For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

- ▶ If the mounting kit is not used, ensure that the hydraulic power unit is secured against falling over and is insulated against vibration, e.g. by means of a damping mat.

7.2.1 Dimensions of the hydraulic power unit



The dimensions of the hydraulic power unit can be found in data sheet 51055, see chapter 1.2 "Required and amending documentation".

7.2.2 Fixing the hydraulic power unit in place

Bosch Rexroth offers an optional mounting kit for fixing the hydraulic power unit in place.

The mounting kit consists of the following components:

- Installation plate
- Hexagon socket head cap screw M6 x 430 mm for fastening the hydraulic power unit to the installation plate
- Edge protection for clip
- Damping mat



Furthermore, 4 hexagon socket head cap screws are required for fastening the installation plate to the base, for example M8 x 20 mm. These are not included in the scope of delivery.

The following figure shows a schematic illustration of the installation plate:

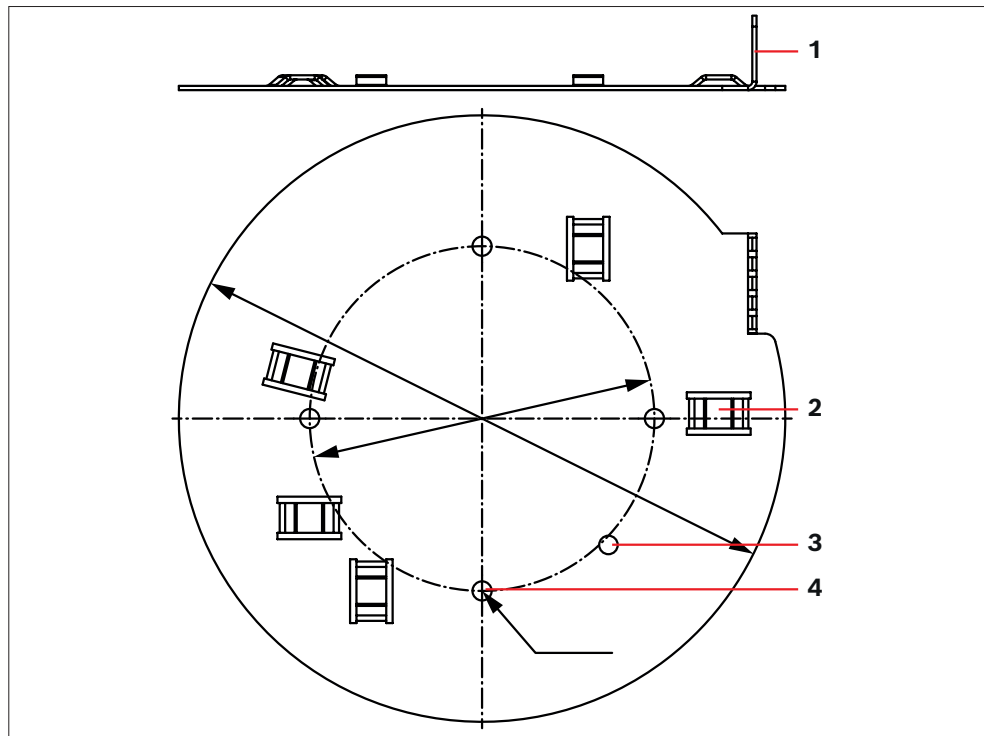


Fig. 4: Installation plate (optional)

- 1** Clip
- 2** Locking mechanism
- 3** Tapped hole for hexagon socket head cap screw M6 x 430 mm
- 4** 4 x $\varnothing 9$ through hole for hexagon socket head cap screw, e.g. M8 x 20 mm

To fix the hydraulic unit in place using the mounting kit, proceed as follows:

- 1.** Bend the clip by 90° as illustrated Fig. 5.
- 2.** Attach the edge protector provided to this clip.

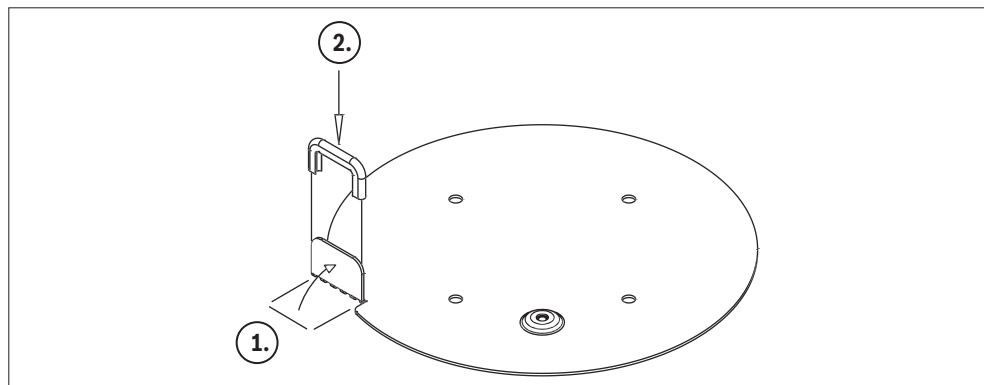


Fig. 5: Assembly steps 1 and 2

- 3.** Place the installation plate in correct position on a level surface.

This defines the arrangement of the hydraulic power unit.

4. Prepare appropriate mounting bores.

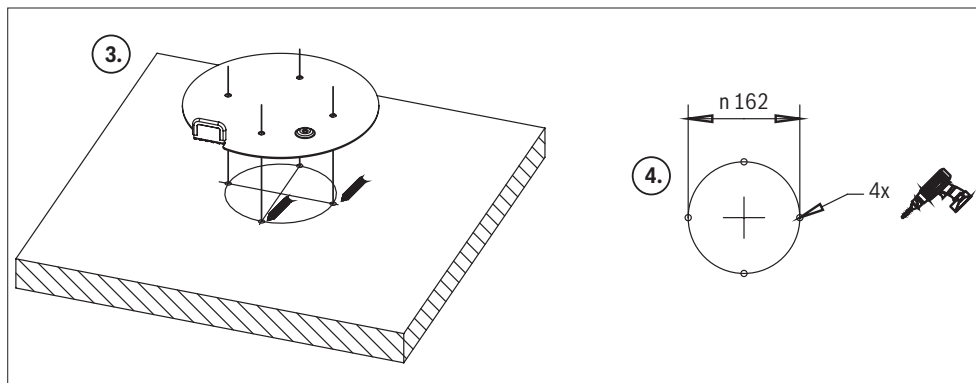


Fig. 6: Assembly steps 3 and 4

5. Attach the installation plate with four mounting screws, e.g. M8 x 20 mm (not included in the scope of delivery) at the contact area.

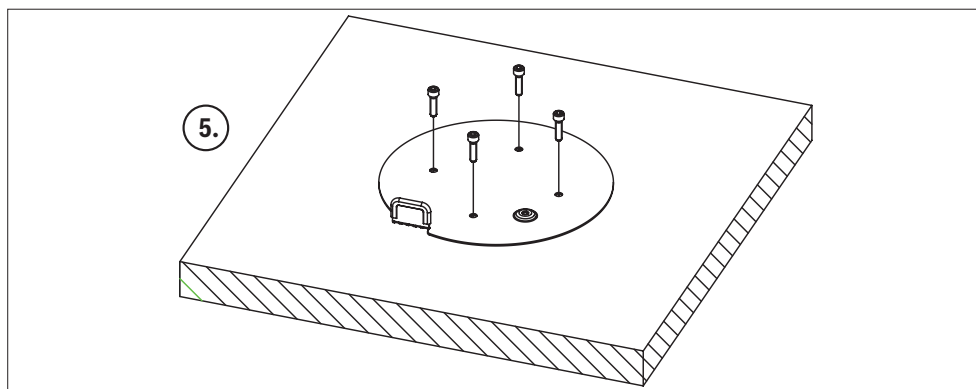


Fig. 7: Assembly step 5

6. Place the damping mat supplied on the installation plate and place the hydraulic power unit on the installation plate. Thanks to the embossed locking mechanisms, the hydraulic power unit slides on the installation plate.



If the hydraulic power unit is not positioned completely on the installation plate but on the locking mechanisms, the hydraulic power unit can be slightly rotated into the correct position.

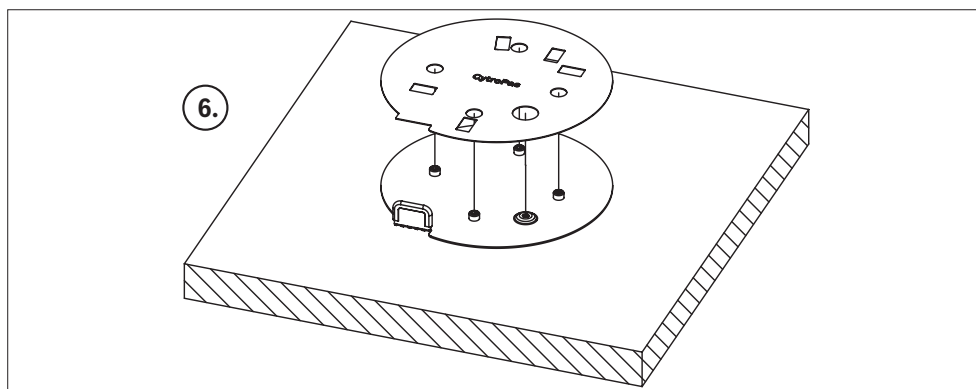


Fig. 8: Assembly step 6

7. With the M6 x 430 mm hexagon socket head cap screw, fit the hydraulic power unit to the installation plate.



If space is limited, it is useful to insert the hexagon socket head cap screw M6 x 430 into the bore before positioning the unit.

- Tighten the hexagon socket head cap screw with a maximum of 2 Nm and a thread locker.

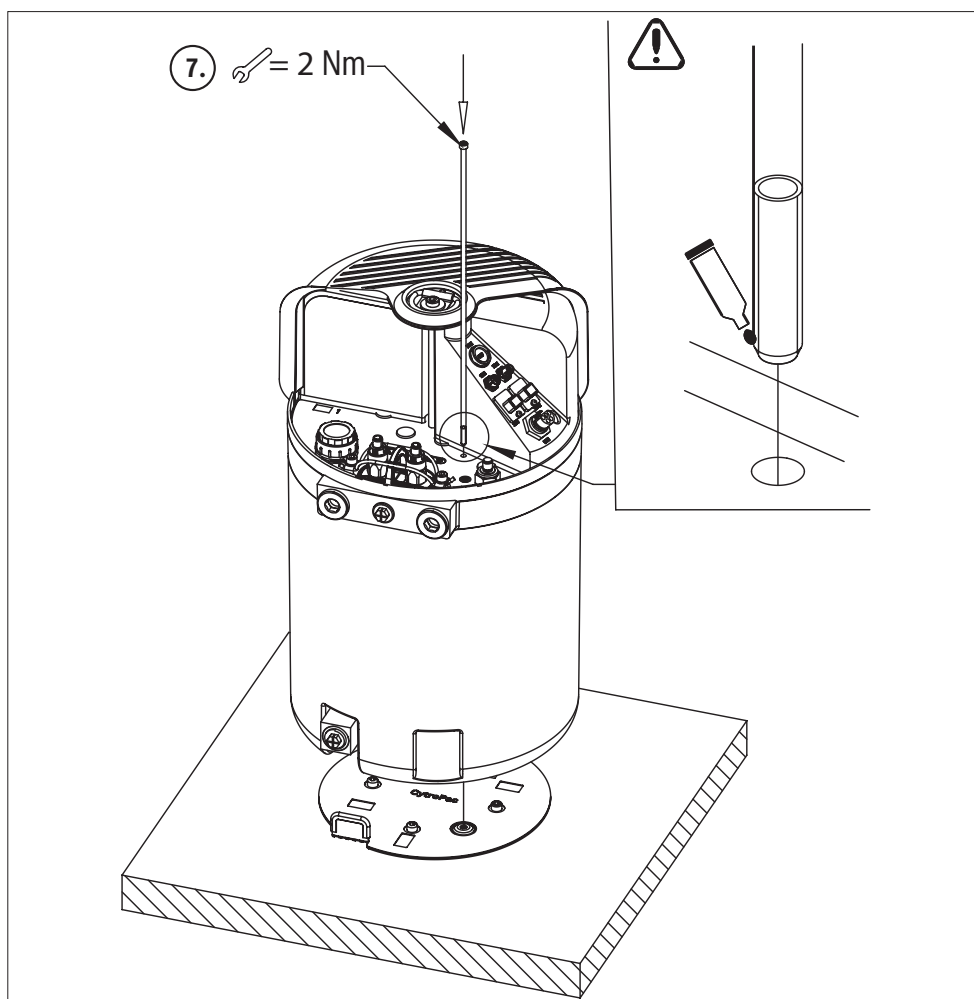


Fig. 9: Assembly step 7

7.3 Connecting the hydraulic supply



WARNING

Pressurized system!

Danger to life, risk of injury, damage to property!

- ▶ Before assembling the hydraulic power unit, depressurize all relevant system components.

Exceeded nominal pressure of a component!

Danger to life, risk of injury, damage to property!

- ▶ Ensure that the respective maximum operating pressure is not exceeded.
- ▶ Dimension the hose lines according to the maximum operating pressure.
- ▶ Only use components, e.g. fittings, that are approved for the required operating pressure.
- ▶ Make sure that only fittings with threads measured in inches are used.

NOTICE

Damage to the hydraulic power unit!

Damage to property!

- ▶ Make sure that the connection between the hydraulic power unit and the machine is only realized via hose lines. Do not use any rigid pipelines.
- ▶ Assemble the hose lines without any tension stress.

Preparation

- ▶ Remove the blanking plugs (plastic) and replace them with pressure-resistant fittings.
- ▶ Observe the installation information of the fitting manufacturers to prevent any external leakage.



Bosch Rexroth recommends fittings with elastic seals.

Hose lines

- ▶ Install the hose lines in such a way that
 - buckling and tensile load at the hose is prevented during operation.
 - the hose is not twisted.
 - the outer layer of the hose is not subject to abrasion or impacts.
 - the weight of the hose line does not lead to inadmissible loads.



If failure of a hose line may cause hazards caused by whipping, Bosch Rexroth recommends mounting a hose safety catch. If the hose lines are equipped with tear-proof fittings, a hose safety catch is not required.

7.3.1 Connecting the hydraulic supply with the standard version

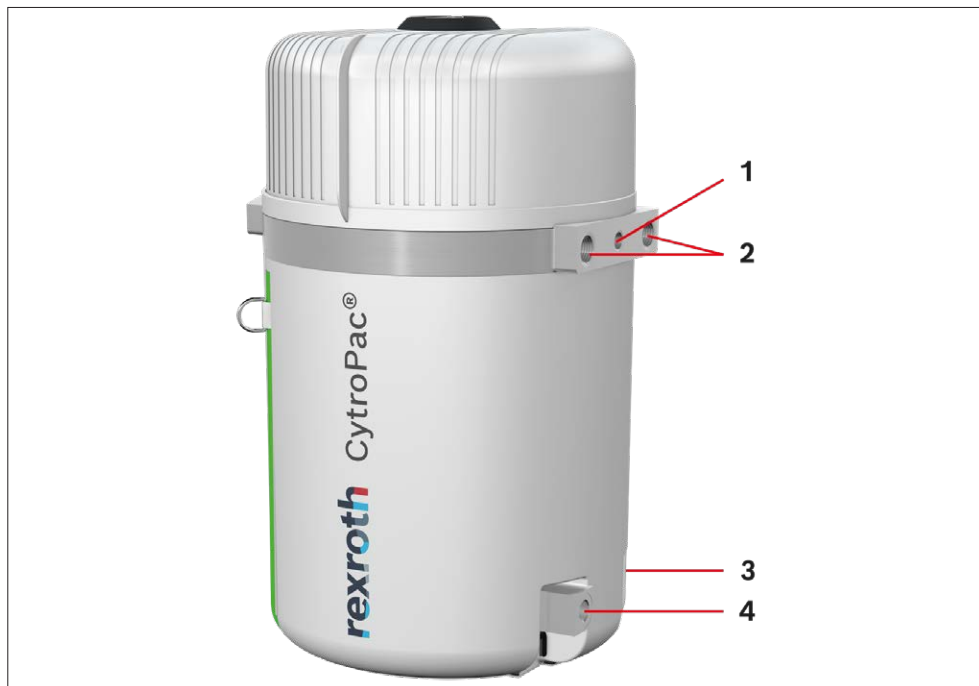


Fig. 10: Connection lines on the standard version

- 1** Oil tank connection T: G1/2
- 2** Oil tank connections T: 2 x G1
- 3** Oil tank connection T: G1 (option A1)
- 4** Pressure port P: G1/2

Pressure line P

- ▶ Close the pressure line with a G1/2 fitting via pressure port P: G1/2, see Fig. 10, item 4.
- ▶ Install a pressure relief valve in the pressure line.



The pressure relief valve must be installed directly at the pressure output. No valves or similar components may be installed between the pressure output and the pressure relief valve.

For further information, refer to data sheet 51055, see chapter 1.2 "Required and amending documentation".

- ▶ Set the pressure relief valve to 10 % over the operating pressure, however, **to a maximum of 260 bar**.

Return line T

- ▶ Connect the return line via the return flow filter to the oil tank connection T: G1/2, see Fig. 10, item 1.
- ▶ Close unused ports with plug screws.

Back-pressure protected oil tank connections T

- ▶ Optionally, you can use the non-return oil tank connections T: G1, see Fig. 10, item 2 and item 3, e.g. for a rotary transmission leadthrough.
- ▶ Close unused ports with plug screws.

7.3.2 Connecting the hydraulic supply in master/slave operation

Hydraulic power units, which have been ordered as version with option A1, have an additional oil tank connection T: G1, see Fig. 10, item 3. This oil tank connection is located next to pressure port P and is delivered closed with a plug screw including centering ring.

To connect two hydraulic power units for master/slave operation, proceed as follows:

1. Connect the oil tanks via the oil tank connections T: G1 of the two hydraulic power units with a hose line so that the oil level can be compensated.
 - Use suitable screw-in connections for this purpose.



Fig. 11: Representation of the balancing hose

2. Connect the return flow connectors (oil tank connectors T: G1/2) of the two hydraulic power units with a hose line.
 - Divide the return flow hose line symmetrically.
 - Use the same hose lengths and fittings in any case. Otherwise, an uneven oil level may develop, which may lead to an undesired shut-off of the hydraulic power units.



Fig. 12: Representation of the return line

3. Connect the pressure ports P: G1/2 with a hose line, if possible, also symmetrically with each other.



Fig. 13: Representation of the pressure line

7.4 Connecting the water supply

For motor and frequency converter cooling, the hydraulic power unit must be connected to a cooling water supply.



Fig. 14: Cooling water connections

- 1** Cooling water ports K: 2 x G1/2 (DIN EN ISO 1179-2)
- ▶ Connect the lines to the intended cooling water ports, see Fig. 14, item 1, and close the connections according to the circuit diagram.
- ▶ Route the cooling water connections K: G1/2 with cylindrical fittings.
- ▶ Tighten the fittings according to manufacturer specifications.
- ▶ Make sure that the cooling water supply temperature does not fall below the dewpoint of the ambient air around the hydraulic power unit.
- ▶ Observe the following requirements:
 - Cooling water input temperature: 15¹⁾ ... 30 °C
 - Minimum cooling water flow: 8 l/min
 - Maximum cooling water pressure 10 bar
 - Maximum glycol content: 30 %

Master/slave operation ▶ Connect both hydraulic power units in parallel to the water cooling.

¹⁾ Note the dewpoint.

7.5 Overview of the electrical interfaces



Fig. 15: Overview of the electrical interfaces

- | | |
|---|--|
| 1 Filling level and temperature sensor | 6 21X1 ¹⁾ : Multi-Ethernet interface |
| 2 Filter contamination sensor 100 % | 7 21X2 ²⁾ : Multi-Ethernet interface |
| 3 Filter contamination sensor 75 % | 8 22X1 ³⁾ : STO interface |
| 4 16X1 ¹⁾ : (M12 x 1) sensor evaluation, wired at the plant | 9 15X1: 24 V interface (M12 x 1, 8-pole) |
| 5 12X1: Feed-in/voltage supply | 10 14X1: Mini USB service interface |

7.5.1 "Basic" sensor technology version

The "Basic" sensor technology version is equipped with the following connections:

- Port 12X1: Feed-in/voltage supply
- Port 15X1: 24 V interface (M12 x 1, 8-pole)
- Port 14X1: Mini USB service interface
- Port 22X1³⁾: STO interface

7.5.2 "Premium" and "Premium M12" sensor technology versions

The "Premium" and "Premium M12" sensor technology versions are also equipped with the following connections:

- Port 16X1¹⁾: (M12 x 1) sensor evaluation, wired at the plant
- Port 21X1²⁾: Multi-Ethernet interface, network input
- Port 21X2²⁾: Multi-Ethernet interface, network input

¹⁾ For the "Premium" and "Premium M12" expansion stages, the sensors are factory-wired and connected via a cable set to port 16X1.

²⁾ The "Premium" and "Premium M12" configurations differ only in the device socket used, see Fig. 25.

³⁾ Optionally available

7.6 Description of the electrical interfaces

7.6.1 General information

- ▶ For electric installation of the interfaces, proceed according to applicable regulations for electrical engineering.
- ▶ You must ensure that the power supply is disconnected and also safeguarded against being switched on unintentionally.
- ▶ Unintended activation should be prevented by means of a warning sign indicating that work is carried out at the electrical system.

For operation of the hydraulic power unit, at least the following electrical connections are required:

- 12X1: Feed-in/voltage supply
- 15X1: 24 V interface

7.6.2 All configurations

Port 12X1: Feed-in/ voltage supply

The power supply to the CytroPac is provided via port 12X1.



The power supply including fuse and mains contactor is to be implemented by the customer.



To ensure a smooth connection to the power supply, it is imperative to use one of the mating connectors offered by Bosch Rexroth without or with cables. For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

- ▶ Assign the mating connector to the power supply as shown in Fig. 16.

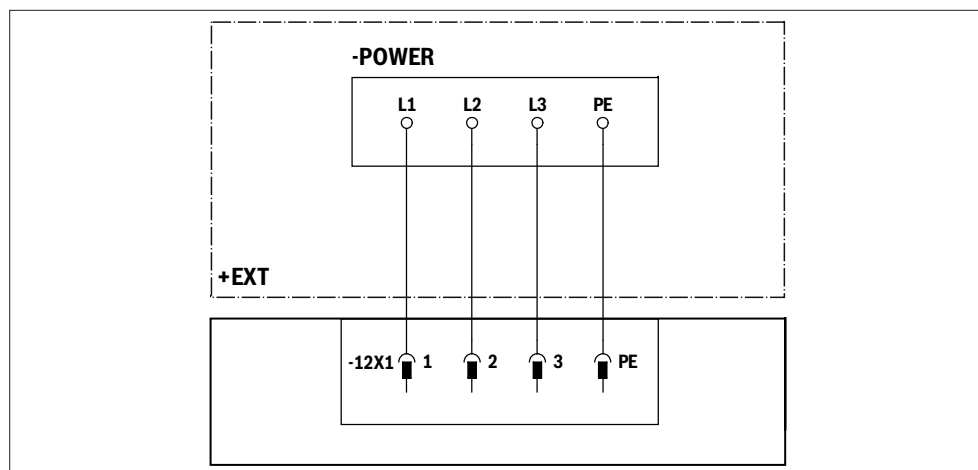


Fig. 16: Assignment of port 12X1: Feed-in/voltage supply

- Ensure that the feed-in / power supply meets the following requirements:
- Voltage:

3P 380 V ... 480 VAC (-15 % / +10 %)
- Frequency:

50/60 Hz
- Assignment:

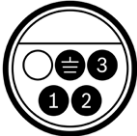
L1/L2/L3/PE
- Rotating field:

Clockwise
- Pre-fuse, on the customer side:

Power 1.5 kW → maximum 10 A
- Power 2.2 kW → maximum 16 A
- Power 3.0 kW → maximum 20 A
- Power 4.0 kW → maximum 20 A

Port 12X1 is designed as follows on the component side:

Table 5: Pin assignment of the device connector: Port 12X1

	Pin	Function
	1	L1
	2	L2
	3	L3
		PE, protective ground

Port 14X1: Mini-USB service interface to the frequency converter



This port serves as an interface for connecting the hydraulic power unit to an external PC. This requires a mini USB cable (USB 2.0 A to USB 2.0 Mini-B).

Bosch Rexroth recommends using a shielded cable with ferrite core, as this is less sensitive to interference. Bosch Rexroth offers a suitable mini USB cable. For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".



Fig. 17: Mini USB service interface

Port 22X1:
STO interface (optional)

The STO interface is optional and must be specified explicitly with the order.

The safety function "Safe Torque Off" is used if separation from the mains is required to prevent an unexpected start-up. By means of this function, the energy supply of the motor can be safely interrupted. In this case, the drive cannot generate any torque / force and thus no dangerous movements.



The safety function "Safe Torque Off" corresponds to stop category 0 according to IEC 60204-1.

For the use of the STO function there are several connection possibilities with different safety levels. Please also refer to chapter 14.2.3 of the operating instructions for frequency converters, series EFC x610, see chapter 1.2 "Required and amending documentation".



Bosch Rexroth offers suitable cables in different lengths.

For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

- Assign the mating connector for the "Safe Torque Off" safety function as shown in Fig. 18.

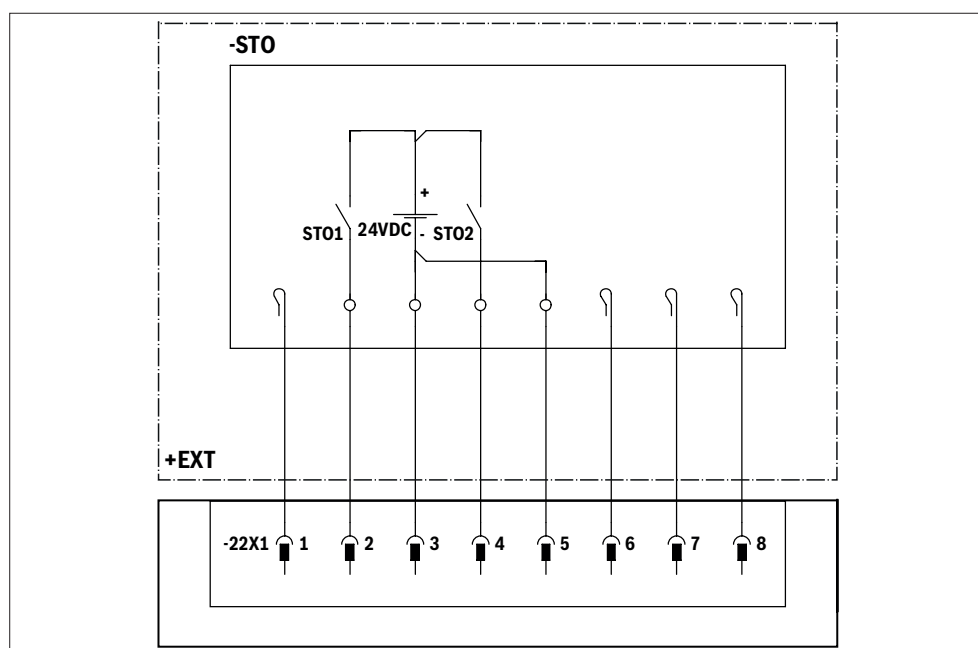


Fig. 18: Assignment of port 22X1: STO interface

Port 22X1 is designed as follows on the component side:

Table 6: Pin assignment of the device connector: Port 22X1

	Pin	Function
 M12x1; 8-pole, A-coded (device connector)	1	Not used (NC)
	2	STO 1 +
	3	STO 1 -
	4	STO 2 +
	5	STO 2 -
	6	Not used (NC)
	7	Not used (NC)
	8	Not used (NC)



Pin 1, 6, 7, 8 must be isolated, since they are connected internally.

- In any case, use two input channels because using only one input channel would reduce the safety integrity level.

Table 7: STO function: Diagnosis and state display

Display	STO event	Description	Input channel logic	
			Channel 1	Channel 2
StO-A	STO alarm	STO function is activated correctly in stop mode; once the input channels have been re-energized, the device goes to normal state.	0	0
StO-r	STO request	STO function is activated correctly in operating mode; once the input channels have been re-energized, the device goes to normal state.	0	0
StO-E	STO error	STO function is activated incorrectly, this happens if one channel is energized but the other is de-energized.	1	0
			0	1



Hardware damage of the channel may also cause "StO-E" error.

The parameter [H0.03] is used to monitor the status of the STO function.

For further information on the parameters used, see the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

- If you want to operate the CytroPac without the STO function, the following contacts of the mating connector must be bridged as shown in Fig. 19.

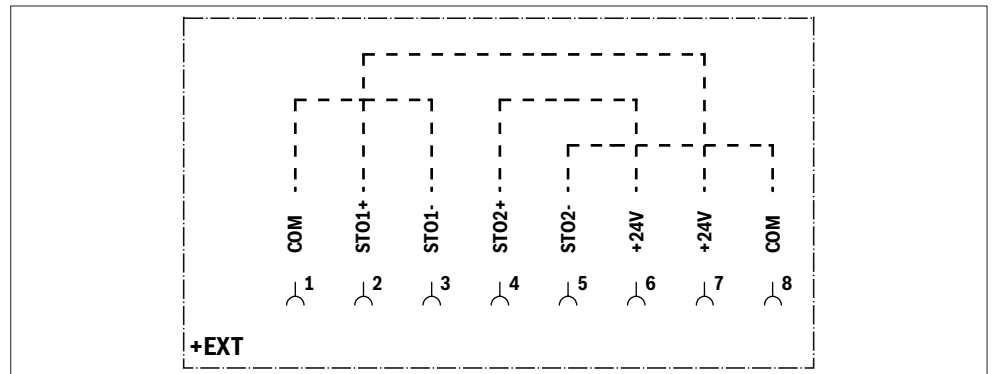


Fig. 19: Bridged contacts when STO function is disabled



Alternatively, a contact bridge for deactivating the STO function is available as an accessory for operating the CytroPac without STO functionality. For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

7.6.3 "Basic" configuration

In the **"Basic" configuration**, the filling level and temperature sensor, see Fig. 15, item 1, as well as the filter contamination sensors, see Fig. 15, item 2 and 3 must be wired and evaluated with the higher-level machine control.



Make sure that the switch-off signals of the oil temperature, filling level and filter contamination initiate deactivation of the hydraulic power unit in the **"Basic" configuration**, for example, by means of deactivation of the 24 VDC release or the electric power supply.



Bosch Rexroth offers a suitable cable set to connect the sensors with just one supply line.

For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

Filling level and temperature sensor

► Wire the filling level and temperature sensor with the higher-level machine control as shown in Table 8.

Table 8: Circuit diagram and function: Filling level and temperature sensor

Circuit diagram	Switching elements	Function
-16B1	A2	Early warning level Opens when the level rises (with sufficient oil open)
	B4	Shut-off level Opens on falling level (closed with sufficient oil)
	T1	Warning temperature Normally open contact at 60 °C
	T2	Shut-off temperature Normally closed contact at 65 °C

Notice:
 The circuit diagram shown relates to a CytroPac filled with sufficient hydraulic fluid and a temperature of < 60 °C.

The filling level and temperature sensor are designed on the component side as follows:

Table 9: Pin assignment of the device connector: Filling level and temperature sensor

Pin	Function
1	Power supply 24 VDC
2	Early warning level
3	Shut-off level and temperature
4	Pre-warning temperature

M12x1; 4-pole, A-coded
(device connector)

Filter contamination sensor 75 %

► Wire the filter contamination sensor 75 % to the higher-level machine control as shown in Table 10.

Table 10: Circuit diagram and function: Filter contamination sensor 75 %

Circuit diagram	Function
-16B3	Pre-warning filter contamination Opens at 1.6 bar

The filter contamination sensor 75 % is designed on the component side as follows:

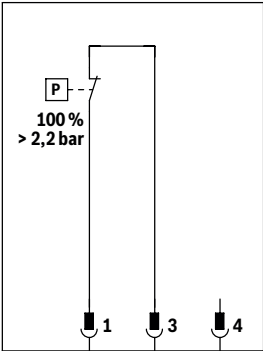
Table 11: Pin assignment of the device connector: Filter contamination sensor 75 %

	Pin	Function
	1	Power supply 24 VDC
	2	Pre-warning 75 % at 1.6 bar

M12x1; 4-pole, A-coded
(device connector)

- Filter contamination sensor 100 %**
- Wire the filter contamination sensor 100 % to the higher-level machine control as shown in Table 12.

Table 12: Circuit diagram and function: Filter contamination sensor 100 %

Circuit diagram	Function
-16B2 	Shut-off filter contamination Opening contact at 2.2 bar

The filter contamination sensor 100 % is designed on the component side as follows:

Table 13: Pin assignment of the device connector: Filter contamination sensor 100 %

	Pin	Function
	1	Power supply 24 VDC
	3	Pre-warning 100 % at 2.2 bar

M12x1; 4-pole, A-coded
(device connector)

Port 15X1:
24 V interface
(M12 x 1, customer side)

This connection serves as an interface to the higher-level machine control, i.e. to supply the hydraulic power unit with control voltage, to set the release, to acknowledge errors, to signal the readiness for operation and to start special functions, such as a pressure/volume flow changeover.



For a description of the functions and the associated parameters, see chapter "CytroPac functions" of the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".



Bosch Rexroth offers suitable cables in different lengths.
 For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

- Use the mating connector as an interface to the higher-level machine control as shown in Fig. 20:

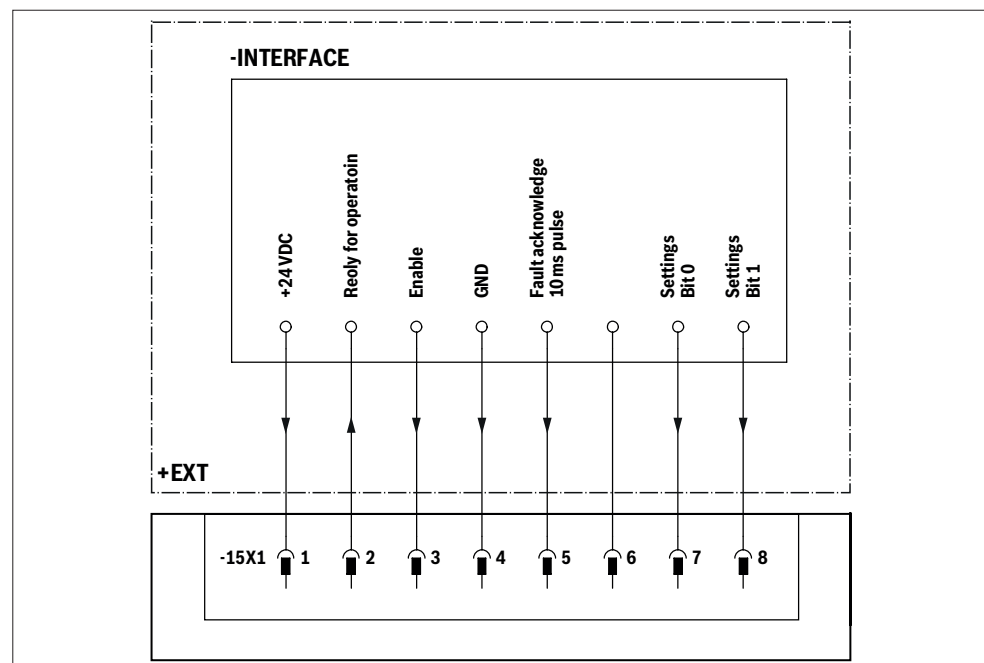


Fig. 20: Assignment of port 15X1: 24 V interface

Port 15X1 is designed as follows on the component side:

Table 14: Pin assignment of the device connector: Port 15X1

 M12x1; 8-pole, A-coded (device connector)	Pin	Function
	1	24 VDC power supply ($\pm 5\%$ / 1A - fuse max. 1A)
	2	Ready for operation (output: 24 V -> ready to operate, 0 V -> error)
	3	Enable (input: 24 V -> start/pressure build-up, 0 V -> stop)
	4	0 VDC (reference potential to 24 VDC power supply)
	5	Acknowledge faults (= reset) (input: 24 V impulse ≥ 10 ms)
	6	Not used (NC)
	7	Parameter set bit 1 (= parameter input 1) (digital input: 24 V/0 V selection or starting of functions; assignment via parameter [F2.19])
	8	Parameter set bit 2 (= parameter input 2) (digital input: 24 V/0 V selection or starting of functions - assignment via parameter [F2.20])

Pin 1 and Pin 4 Via pin 1 and pin 4, the pressure sensor HM20 is supplied with 24 V voltage and the feedback of the ready-to-operate state and warning state is realized via a relay.

Pin 2 Pin 2 provides the output of the "Ready-to-operate" message (24 V) or the "Error" message (0 V) (not ready-to-operate = fault). This output is a relay output (relay output 1) and can also be set via parameter [E2.15 or F2.40] to provide other signals.



For further information on the allocation of inputs and outputs with functions, see the chapter "CytroPac functions" of the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

Pin 3 The digital input (input X1) of pin 3 is used to issue the release (24 V: Release, 0 V: Stop).

Pin 5 The digital input (input X2) of pin 5 is used to acknowledge errors (24 V: Reset).

Pin 7 and Pin 8 Functions can be executed via the digital inputs of pin 7 (parameter input 1 - input X4) and pin 8 (parameter input 2 - input X5). These inputs can be set via parameters [F2.19/F2.20] for hydraulic functions or [E1.03/E1.04] for converter functions.



For further information on the allocation of inputs and outputs with functions, see the chapter "CytroPac functions" of the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

7.6.4 "Premium" and "Premium M12" configurations

In the "Premium" and "Premium M12" configurations, the filling level and temperature sensors as well as the filter contamination sensors are already wired and are evaluated via the integral frequency converter. The sensors and port 16X1 are connected with a suitable cable set at the plant.

In addition, these versions have an LED strip that indicates the status of the hydraulic power unit.

Port 15X1:
24 V interface
(M12 x 1, customer side)

This connection serves as an interface to the higher-level machine control, i.e. to supply the hydraulic power unit with control voltage, to set the release, to acknowledge errors, to signal the readiness for operation and to start special functions, such as a pressure/volume flow changeover.



For a description of the functions and the associated parameters, see chapter "CytroPac functions" of the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".



Bosch Rexroth offers suitable cables in different lengths. For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

- Use the mating connector as an interface to the higher-level machine control as shown in Fig. 21:

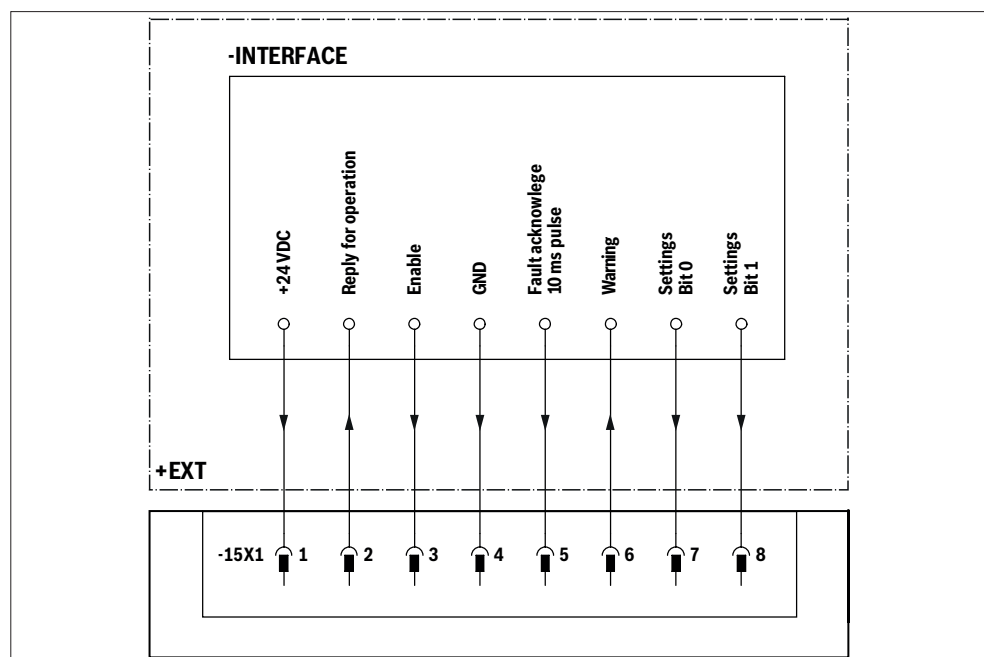


Fig. 21: Assignment of port 15X1: 24 V interface

Port 15X1 is designed as follows on the component side:

Table 15: Pin assignment of the device connector: Port 15X1

 M12x1; 8-pole, A-coded (device connector)	Pin	Function
	1	24 VDC power supply ($\pm 5\%$ / 1A - fuse max. 1A)
	2	Ready for operation (output: 24 V -> ready to operate, 0 V -> error)
	3	Enable (input: 24 V -> start/pressure build-up, 0 V -> stop)
	4	0 VDC (reference potential to 24 VDC power supply)
	5	Acknowledge faults (= reset) (input: 24 V impulse ≥ 10 ms)
	6	Warning (output: 24 V -> warning, 0 V -> no warning)
	7	Parameter set bit 1 (= parameter input 1) (digital input: 24 V/0 V selection or starting of functions; assignment via parameter [F2.19])
	8	Parameter set bit 2 (= parameter input 2) (digital input: 24 V/0 V selection or starting of functions - assignment via parameter [F2.20])

Pin 1 and Pin 4 Via pin 1 and pin 4, the pressure sensor HM20 is supplied with 24 V voltage and the feedback of the ready-to-operate state and warning state is realized via a relay.

Pin 2 Pin 2 provides the output of the "Ready-to-operate" message (24 V) or the "Error" message (0 V) (not ready-to-operate = fault). This output is a relay output (relay output 1) and can also be set via parameter [E2.15 or F2.40] to provide other signals.



For further information on the allocation of inputs and outputs with functions, see the chapter "CytroPac functions" of the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

Pin 3 The digital input (input X1) of pin 3 is used to issue the release (24 V: Release, 0 V: Stop). In the premium version, the release is set via the control word in the condition as supplied. However, this can be done via the digital input if you change the release source, as shown in Table 16.

Table 16: Release source adjustment option

Parameter	Name	Setting range	Standard
E0.01	First run command source	1: Digital input 2: Communication	1 (Operation without control communication) 2 (Premium)



For further information, see the operating instructions for the frequency converter, series EFC x610, see chapter 1.2 "Required and amending documentation".

- Pin 5**

The digital input (input X2) of pin 5 is used to acknowledge errors (24 V: Reset). In the premium version, this can be done either via the control word or via the digital input. Nothing has to be changed for this. Alternatively, the error acknowledgment (for commissioning) can be performed via the IndraWorks Ds remote control.
- Pin 6**

The message warning (24 V) respectively no warning (0 V) is issued via pin 6. This output is a relay output (extended relay output selection) and can also be set via parameter [H8.21 or F2.41] to output other messages.



For further information on the allocation of inputs and outputs with functions, see the chapter "CytroPac functions" of the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

- Pin 7 and Pin 8**

Functions can be executed via the digital inputs of pin 7 (parameter input 1 - input X4) and pin 8 (parameter input 2 - input X5). These inputs can be set via parameters [F2.19/F2.20] for hydraulic functions or [E1.03/E1.04] for converter functions.



For further information on the allocation of inputs and outputs with functions, see the chapter "CytroPac functions" of the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

Ports 21X1 and 21X2:
Multi-Ethernet interfaces

NOTICE Non-compliance with IP protection class when using standard RJ45 connectors! Pushing the socket insert or jamming the connector! Damage to the device socket and the hydraulic power unit! ► Use only suitable connectors for self-assembly or pre-assembled cables with push-pull connector IP67 to standard RJ45 to ensure the IP protection class and to prevent damage to the device socket.
--

The 21X1 and 21X2 multi-Ethernet interfaces are two RJ45 network ports. With the aid of these interfaces, the hydraulic power unit can be operated via a control communication via a higher-level control, connected to the IoT gateway, established a connection to the PC (similar to the connection via mini-USB) and a firmware update of the integrated network card can be installed.

The interface 21X1 (network input) is always connected. The interface 21X2 (network output) is used to connect further devices. When not in use, close the connection to maintain the degree of protection.

Multi-Ethernet interfaces of the "Premium" configuration

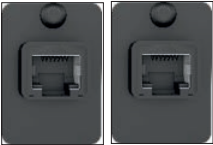


Fig. 22: Device socket RJ45 Push-Pull



Bosch Rexroth offers a suitable plug for self-assembly or pre-assembled cables with a push-pull plug IP67 to standard RJ45 in different lengths for the "Premium" configuration.
For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

Multi-Ethernet interfaces of the "Premium M12" configuration

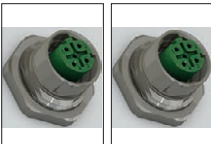


Fig. 23: Device sockets M12 D-coded

The connections 21X1 and 21X2 are designed as follows on the component side:

Table 17: Pin assignment port 21X1 and 21X2

	Pin	Function
	1	TxD +
	2	RxD +
	3	TxD -
	4	RxD -
	5	Not used



For the "Premium M12" configuration, Bosch Rexroth offers pre-assembled cables in different lengths.
For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

7.7 Electrical interface connection

WARNING

High electrical voltage!

Danger to life, risk of injury, damage to property!

- ▶ Make sure that any work at the electrical equipment is only carried out by a specialized electrician.
- ▶ For any work at the electric operating equipment, only use suitable insulated tools (German Social Accident Insurance DGUV regulation 3).
- ▶ Before assembling the hydraulic power unit, de-energize all relevant system components. Observe the five safety rules (according to DIN VDE 0105-100).
- ▶ Make sure that only suitable fuses are used.
- ▶ After establishing the feed-in connection and prior to switching on the protective grounding conductor connection to the power unit, particularly check the central plate (verification by means of test records according to DIN EN 60204-1 VDE 0113-1, end-to-end connection of the protective grounding conductor system, or DIN VDE 0701-0702, protective grounding conductor inspection).

7.7.1 "Basic" configuration

In the "Basic" configuration, the ports 16X1, 21X1 and 21X2 are not included.



Fig. 24: "Basic" configuration electrical connections

- | | |
|---|---|
| 1 Filling level and temperature sensor ¹⁾ | 8 22X1: STO interface ²⁾
(not shown in figure) |
| 2 Filter contamination sensor 100 % ¹⁾ | 9 15X1: 24 V interface
(M12 x 1, 8-pole) |
| 3 Filter contamination sensor 75 % ¹⁾ | 10 14X1: Mini USB service interface |
| 5 12X1: Feed-in/voltage supply | |

¹⁾ To be wired by the customer

²⁾ Optionally available

To connect the power supply, proceed as follows:

- ▶ Connect the filling level and temperature sensors, see Fig. 24 item, 1 and the filter contamination sensors, see Fig. 24 item 2 and 3, (customer side).
- ▶ Connect the connector plug for the 24 V interface to the higher-level machine control via port 15X1, see Fig. 24, item 9.
- ▶ Connect the connector plug for the feed-in / power supply to connection 12X1, see Fig. 24, item 5.

7.7.2 "Premium" and "Premium M12" configurations

All ports are included in the "Premium" and "Premium M12" configurations.

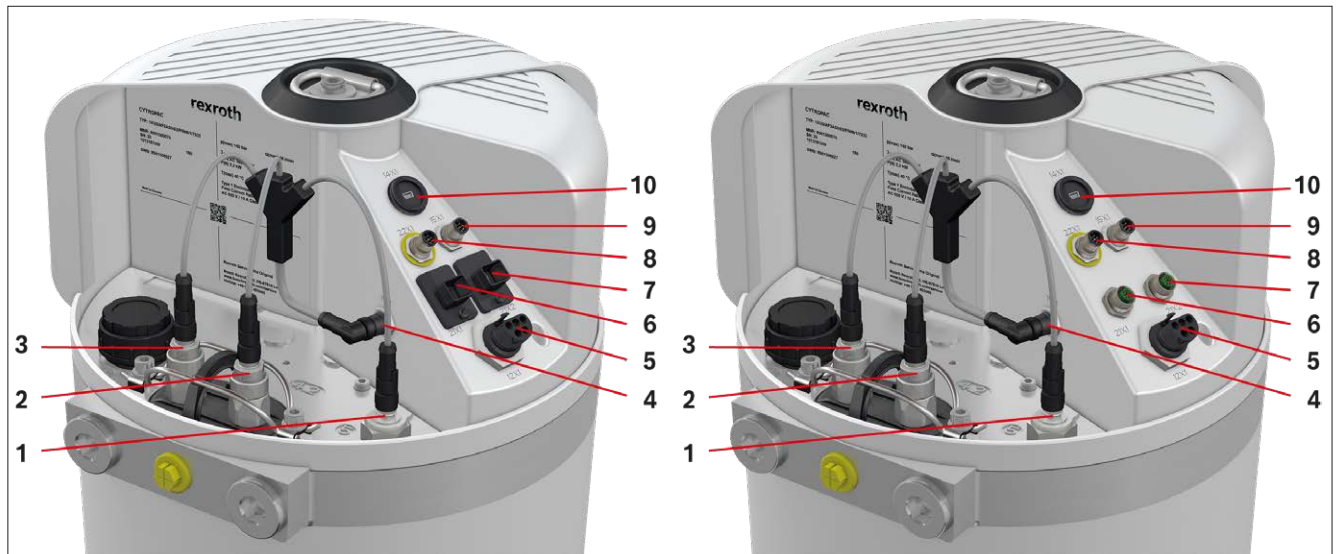


Fig. 25: "Premium" (left) / "Premium M12" (right) configuration electrical connections

- | | |
|--|---|
| 1 Filling level and temperature sensor ¹⁾ | 6 21X1: Multi-Ethernet interface |
| 2 Filter contamination sensor 100 % ¹⁾ | 7 21X2: Multi-Ethernet interface |
| 3 Filter contamination sensor 75 % ¹⁾ | 8 22X1: STO interface ²⁾ |
| 4 16X1: (M12 x 1) sensor evaluation, wired at the plant | 9 15X1: 24 V interface (M12 x 1, 8-pole) |
| 5 12X1: Feed-in/voltage supply | 10 14X1: Mini USB service interface |

¹⁾ The sensors are factory-wired and connected via a set of cables to the port 16X1.

²⁾ Optionally available

To connect the power supply, proceed as follows:

- ▶ Connect the connector plug for the 24 V interface to the higher-level machine control via port 15X1, see Fig. 25, item 9.
- ▶ Connect the connector plug for the feed-in / power supply to connection 12X1, see Fig. 25, item 5.
- ▶ Connect the connector plug for the multi-Ethernet interface to the higher-level machine control via port 21X1, see Fig. 25, item 6.
 - Only use connectors that ensure protection class IP67, see chapter 7.6.4, "Ports 21X1 and 21X2: Multi-Ethernet interfaces".



When using a standard Ethernet connector, the latching function is not provided and the IP67 rating is not reached.



In the "Premium" and "Premium M12" configurations, the warning and shutdown signals are internally wired and evaluated via port 16X1. The status is visualized via the flashing sequence and color of the integrated LED strip. For further information on the meaning of the LED signals, see chapter 10.3 "Warning devices".

- ▶ Close any unused interfaces with the respective protective cap.

7.7.3 All configurations

To connect the mini-USB service interface, proceed as follows:

- ▶ Connect the hydraulic power unit to an external PC via the mini-USB service interface using a mini USB cable.



Bosch Rexroth recommends using a shielded cable with ferrite core, as this is less sensitive to interference. Bosch Rexroth offers a suitable mini USB cable. For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

The EFC 5610 frequency converter from Rexroth is integrated into the hydraulic power unit. With the IndraWorks Ds software you can access the frequency converter and thus read out diagnostic messages of the frequency converter as well as set parameters, save, load and perform measurements.



You can download the IndraWorks Ds software from the website

www.boschrexroth.com/indraworks - Download.

For further information, see the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

8 Commissioning



WARNING

Activation of machine functions by means of commissioning!

Danger to life, risk of injury!

- ▶ Before commissioning of the hydraulic power unit, make sure that all electrical, mechanical and hydraulic connections are properly installed and connected as described in the superior instructions of the machine/system manufacturer.
- ▶ Make sure that the safeguards are activated.

Leakage of hydraulic fluid under high pressure due to faulty assembly of the hydraulic power unit!

Risk of injury, damage to property!

- ▶ Ensure that the hydraulic power unit has been mounted by an expert, see chapter 2.4 "Qualification of personnel", completely and without any tension stress before commissioning of the hydraulic power unit.



For commissioning, also take into account the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

There, you will find further information about installing IndraWorks DS, power-on sequence, connection establishment, and IndraWorks DS and CytroPac features.



According to EC Machinery Directive 2006/42/EC, commissioning must not be undertaken until it has been determined that the machine to be equipped with the hydraulic power unit complies with the provisions of all relevant directives. Combination of components may lead to additional/other types of hazards. For commissioning of the hydraulic power unit, always observe the operating instructions of the overall machinery/system.

This particularly applies to "Mechanical hazards" due to mechanical motions of the machine initiated by the hydraulic power units and drives (cylinder, motor).



Bosch Rexroth recommends bleeding and flushing the hydraulic system before connecting the CytroPac.

Please observe the operating instructions of the machinery/system.

8.1 First commissioning

8.1.1 Before commissioning

- ▶ Check the safe condition of electric and hydraulic lines.
- ▶ Make sure that the cooling water system is in operation.
- ▶ Make sure that the pressure relief valve is installed in the pressure line.



The hydraulic power unit is not equipped with an integrated pressure relief valve. Make sure that the pressure line is secured with a pressure relief valve set to the correct value (**10 %** over operating pressure).



Manual operation for mating connector R901460889 can be used for commissioning, however, must be removed in operation.



Jog mode is generally not permitted with the CytroPac.

8.1.2 Filling the hydraulic power unit



Recommendation: Experience has shown that the cleanliness class required for the operation of the machine/system is already exceeded with new hydraulic fluids in the original packing drum.

If you want to ensure the cleanliness class, carry out the filling of the hydraulic power unit using a special filling unit, or use a filter station with a 10 µm fine filter.

- ▶ Make sure that the maximum filling pressure does not exceed 2 bar.

The hydraulic power unit can be filled as follows, see Fig. 26:

1. Via the filling and breathing filter (standard)
2. Via an optionally available filling coupling (filling device), which is mounted on the return flow (G1/2)

To fill with the filling coupling, proceed as follows:

- ▶ Install the filling coupling at the hydraulic power unit as illustrated in Fig. 26.
- ▶ Replace the air filter in the assembly kit against the filling and breathing filter and ensure that filling is no longer realized via the air filter.



The filling level must be within the marking on the filling level indicator.



Fig. 26: Filling options

8.2 Re-commissioning after longer standstill

For re-commissioning after longer standstill, proceed as follows:

- ▶ Check:
 - the hydraulic fluid level
 - hydraulic components and line systems for tightness
- ▶ Switch on components with increased caution.
- ▶ Bleed the hydraulic system.



Observe the information in the operating instructions of the machine/system manufacturer.

9 Operation

The hydraulic power unit is intended as partly completed machinery for installation into a machine/system.

The hydraulic power unit has no direct function (e.g. switch) to put the product out of operation. Make sure that required measures for decommissioning are implemented by the machine/system manufacturer.

Information on operating the hydraulic power unit can only be provided in connection with the machine/system. For this information, please refer to the operating instructions of the machine/system manufacturer.

10 Maintenance and repair

Maintenance tasks (inspection, maintenance, repair) must be defined according to system-specific requirements, operating conditions (pressures, temperatures, environmental conditions) and the operating life (duty cycle, cycle times, shift operation).

The declarations made in this chapter are based on climate conditions in Central Europe and common environments in the metal-processing industry.

A negative trend of test parameters like hydraulic fluid temperature, short replacement intervals of filter elements or noise indicate changes. If necessary, the troubleshooting matrix, see chapter 15.2 "Overview of the impact of defects", provides support for the identification of the problem. Slow increase in temperature and/or shorter filter replacement intervals indicate potential wear at the pump, seals as well as aging of hydraulic fluid and should initiate inspection of all relevant components. Immediate strong increases in temperature are alarming and require immediate inspection of the machine/system.



For further information on the scope and time intervals for maintenance and repair of the overall machinery/system, please refer to the operating instructions of the machine/system manufacturer.

10.1 Cleaning and care

For cleaning and care of the hydraulic power unit, observe the following:

- ▶ Make sure that all seals and electric plug-in connections are firmly fitted to prevent the penetration of cleaning agents and/or humidity into the hydraulic power unit.
- ▶ Do not use aggressive cleaning agents for cleaning. Clean the hydraulic power unit using a suitable cleaning liquid.
- ▶ Do not use a high-pressure washer.
- ▶ Do not use compressed air for the cleaning at functional interfaces.
- ▶ Remove external coarse dirt and keep sensitive and important parts like electrical connections clean.
- ▶ For the cleaning, use a damp, non-linting cloth or residue-free industrial wipes.

10.2 Inspection

Bosch Rexroth recommends documenting the inspection results

- so that considering functionality and economy, the inspection and maintenance intervals can be adjusted to the actual operating conditions.
 - by comparing the documented values, you can identify faults at an early point in time.
-
- ▶ Before any inspection work, clean the hydraulic power unit as necessary.
 - ▶ Carry out the following visual inspections for clearly apparent defects:
 - Illegible notices or warning signs
 - Leakage
 - Loose and/or missing parts
 - Indications of external force effects

10.3 Warning devices

The hydraulic power unit is equipped with an LED strip for status indication in the "Premium" and "Premium M12" configurations:

- Normal operation: LED strip illuminated in green
- Standby: LED strip flashes green
- Warning: LED strip illuminated in green and flashing yellow
- Error: LED strip illuminated in red and flashing yellow



For a detailed description of the flashing codes, see the commissioning instructions 51055-IB in the chapter "Status LED".



The error message can be read out precisely via the Mini-USB service interface and IndraWorks Ds or the higher-level control.

10.4 Maintenance schedule



Observe the status display for oil filter, oil level, oil temperature and oil exchange of the LED strip at the hydraulic power unit.

Table 18: Maintenance schedule

Activity/maintenance interval	½ year	1 year	Alternative: Operating hours
Visual inspection External leakage, cracking, force effect, corrosion (oil tank, hose lines, fittings, central plate)	X		
Checking Electric components/installation		X	
Checking Pressure values	X		
Checking (oil sample) Quality control of the hydraulic fluid		X ¹	
Replacement Return flow filter element		X ¹	
Visual inspection/replacement Filler and breathing filters		X ¹	
Change Hydraulic fluid			10.000

¹ These components/substances or materials are subject to natural wear. It is therefore very important to permanently check the components' condition. If necessary, these components are to be replaced outside the maintenance intervals.

10.5 Maintenance

10.5.1 Checking the electric components/installation

- ▶ Have the entire electric installation regularly checked by a specialized electrician.
- ▶ In addition, carry out regular machine and system inspections in accordance with DIN EN 60204-1 (VDE 0113 Part 1) or DIN VDE 0701-0702.
- ▶ Check the power unit housings, cables and plug-in connections and connector contacts for damage.



Inadmissible damage includes breaks, cracks, abrasion, deformation or discoloration.

The hydraulic power unit may only be operated if the electric components are not damaged.

10.5.2 Monitoring the filling level

The filling level is monitored via the integrated filling level sensor with two switching points (warning and shut-off). In "Basic" configuration, it must be evaluated by the machine control system and shutdown of the hydraulic power unit must be ensured if the shutdown limit is fallen below.

Measures if the minimum filling level is fallen below:

- Identify and correct the cause of the leakage
- Afterwards, fill in hydraulic fluid to the correct filling level

10.5.3 Monitoring the oil temperature

The oil temperature is monitored via an integrated filling sensor with two switching points (warning and shutdown). In "Basic" configuration, it must be evaluated by the machine control system and switching off of the hydraulic power unit must be ensured if the shutdown temperature is exceeded.

Possible causes for temperature increase

Possible causes for temperature increase include:

- Heat exchanger malfunction
- Change in cooling water conditions
- Malfunction or incorrect setting of pressure valves (e.g. maximum pressure limit, pump control, pressure reducing valve)
- Error at the pump (wear, increased leakage)
- Changed environmental conditions (e.g. increased ambient temperature)
- Changed load conditions at drives



In case of inadmissible temperature increases, the causes must be determined and corrected.

10.5.4 Filter element contamination monitoring (return flow filter)

- Be critical if the filter contamination sensors do not indicate any change over multiple inspection intervals.

Of course, this may always be an indicator that the hydraulic fluid is clean.

However, it may also have the following causes:

- The contamination indicator is defective.
- The filter element is defective.

- Measures:**
- After the end of the shift, schedule and perform a change of the filter element.
 - If the intervals between the necessary renewal of the filter elements are shortened, identify the cause of the increased dirt input and eliminate it.

Replacing the return flow filter element:

Proceed as follows:

1. Before starting to work, provide receptacles for the hydraulic fluid and the filter element.
2. Depressurize the hydraulic power unit and secure it against unintentional start-up.



Fig. 27: Exchanging the filter element

3. Fold out the spring clip with a screwdriver or similar.
4. Remove the filter cover.
5. Pull the filter element out of the clip.
 - If possible, do not remove the cable set to prevent the cables from being swapped.
6. Insert a new filter element.



Bosch Rexroth offers a suitable filter element, see chapter 10.6

"Spare and wear parts".

For a complete list of accessories, see data sheet 51055, see chapter 1.2 "Required and amending documentation".

7. Apply the filter cover again.
 - Once you have removed the cable set, ensure that the cables are correctly connected to the hydraulic power unit. The cables are labeled as follows:
 - 16B1: Filling level and temperature sensor
 - 16B2: Filter contamination sensor 100 % (black)
 - 16B3: Filter contamination sensor 75 % (gray)
8. Slide the spring clip with a screwdriver into the locking position of the filter cover.
9. Dispose of the filter element in accordance with national or company-specific regulations.

10.5.5 Visual inspection of the filling and breathing filter

- ▶ Carry out an annual visual inspection and replace the filling and breathing filter as necessary, see Fig. 1, item 3.
- ▶ If the air filter is used as described in chapter 8.1.2 "Filling the hydraulic power unit", annually carry out a visual inspection and replace the air filter in case of contamination and/or damage.

10.5.6 Checking the pressure value

The pressure values need to be checked in case of any changes in drive behavior (e.g. increased cycle time, end product quality, etc.). Otherwise, semi-annual inspections are recommended.



Bosch Rexroth recommends documentation of pressure values in the maintenance documentation.

10.5.7 Hydraulic fluid care

The hydraulic fluid should be analyzed at least annually.

For analyzing the hydraulic fluid, a thorough hydraulic fluid sample must be taken. The hydraulic fluid sample must be checked in a qualified laboratory according to the applicable manufacturer's specifications for the hydraulic fluid.

- Measures:** Depending on the result, additional measures need to be taken, e.g.:
- Additional filtering measures
 - Dehydration
 - Replacement



The use of treated and recycled hydraulic fluid (secondary raffinate hydraulic fluid) is to be avoided.

For hydraulic fluid change, proceed as follows:

- ▶ Fully drain the hydraulic fluid, see also chapter 11.1 "Preparing for decommissioning".
- ▶ In this connection, ensure complete draining of the lines and actuators.
- ▶ If necessary, carry out bleeding measures.
- ▶ Fill the system as for initial filling with subsequent bleeding of the hydraulic system, see chapter 8.1.2 "Filling the hydraulic power unit".

10.5.8 Visual inspection for leakage, cracking, force effects and corrosion

External inspection is visual inspection and needs to be carried out at least semi-annually (or more often depending on operating conditions and use). Clean the system before visual inspection as necessary.

Visual inspection is carried out for:

- Leakage
- Cracking
- Corrosion
- Dents due to external force effects

Leakages: In case of leakage at screwed-in components, these must be tightened and documented. If leakage still occurs at this position, the contact must be thoroughly checked for the cause of leakage. Depending on the result, seals and/or the component must be replaced.

Cracking and resulting leakage: In case of cracking and resulting leakage, the cause must be identified and corrected. Afterwards, affected components must be replaced or thoroughly repaired.

External force effects: In case of indications of external force effects, the cause must be identified and corrected. Afterwards, the component and enclosing components must be checked for damage and assessed for further reliable use. As required, these components are to be replaced or thoroughly repaired.

Corrosion: In case of indications of corrosion, the component must be checked for damage and assessed for further reliable use. As required, this component is to be replaced or thoroughly repaired. In any case, corrosion protection must be ensured.

10.5.9 Checking the heat exchanger

The heat exchanger does not require specific maintenance. The set-up of the heat exchanger is robust and does not lead to any increased requirements for the cooling water unit.



Dirt particle must not exceed 1 mm.

10.6 Spare and wear parts

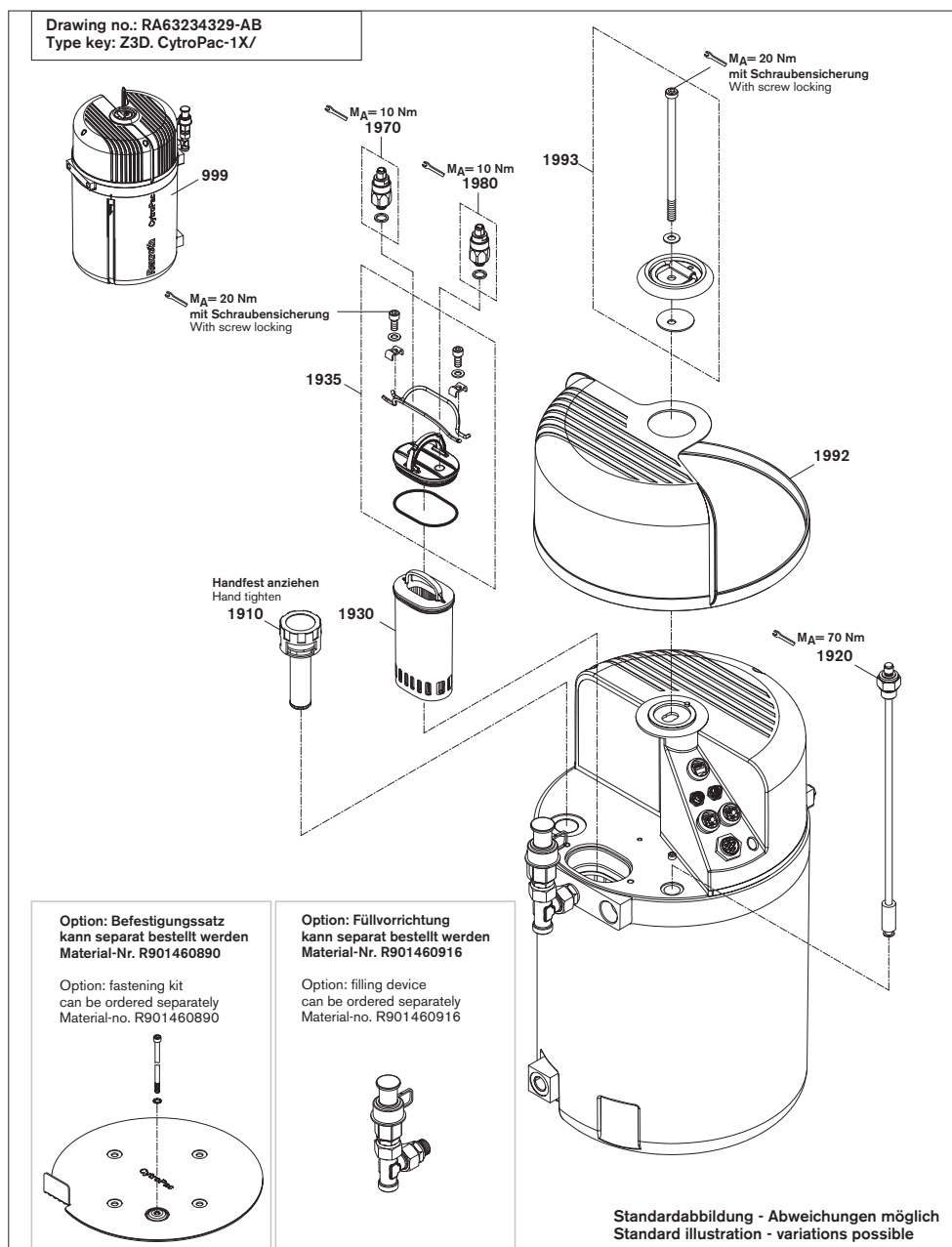


Fig. 28: Spare and wear parts

Table 19: Spare and wear parts

Material number	Denomination	Comment	Assembly
R928035258	FILTER ELEMENT 35.0035CP H10XL-R00-O-M	Filter element	1930
R901473309	ASSEMBLY KIT CYTROPAC LIFTING EYE	Lifting device service module	1993
R901473314	ASSEMBLY KIT CYTROPAC FILPOL 75 %	Filter pre-warning 75 % service module	1970
R901473317	ASSEMBLY KIT CYTROPAC FILTPOL 100 %	Filter shutdown 100 % service module	1980
R901473318	ASSEMBLY KIT CYTROPAC FILTER COVER	Filter cover service module	1935
R901451898	COVER CYTROPAC-DREH RAL7035	Rotatable cover RAL7035	1992
R901470062	AIR FILTER TMDF/1/BRC	Filler and breathing filters	1910
R901471242	AIR FILTER TMDF/1/BR	Air filter from filling device assembly kit	
R901456587	FLOAT SWITCH M60.1.A2.B4.270.320.&	Float switch	1920

- ▶ Please send any spare part orders to the nearest Bosch Rexroth service center or directly contact the headquarters.
For the addresses, please refer to www.boschrexroth.com.

Ordering of spare parts:

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

11 Decommissioning

11.1 Preparing for decommissioning

- ▶ Provide collecting containers that are large enough to accommodate the total hydraulic fluid volume.



The total volume of the hydraulic system comprises the volumes of the oil tank, the line system, the drives, etc.

- ▶ Always observe applicable instructions for the overall machinery/system.
- ▶ Unless these operating instructions provide different information, proceed as follows:
 - Prevent any hazards due to machinery in the vicinity.
 - Unauthorized personnel must not be allowed access to the working area.
 - Lower and securely support all loads.

11.2 Decommissioning the system

- ▶ Switch off the power supply and secure the system against restarting.
- ▶ Switch off the hydraulic pressure supply and secure it.
- ▶ Make sure that all relevant system parts are depressurized and de-energized.
- ▶ Using the clip, pull the hydraulic fluid drain hose, see Fig. 1, item 10, and discharge the hydraulic fluid into the provided collecting tank. Ensure that the lines and consumers are completely emptied. If necessary, carry out bleeding measures.
- ▶ Treat cooling water connections with a suitable corrosion protection agent.

Overall machinery/ system

Decommission the overall machinery/system as described in the overall machinery/system operating instructions.

12 Disassembly and exchange

- ▶ Only assemble device parts if it is required to carry out the necessary work.



In general, all disassembled parts should be reassembled properly at the intended position.

12.1 Preparing for disassembly

- ▶ Ensure sufficient stability of the hydraulic power unit.
- ▶ Observe the weight and the position of the center of gravity of the hydraulic power unit.
- ▶ Do not loosen the fixation of the hydraulic power unit before the stability of the machine is ensured.
- ▶ Prior to disassembly, drain the hydraulic fluid from the hydraulic power unit as described in chapter 11 "Decommissioning".
- ▶ Use the intended eyebolt, see Fig. 3.
- ▶ Check secure fitting of the eyebolt if the hydraulic power unit is to be transported after disassembly.
- ▶ Please note that the hydraulic power unit may be mounted on an optional installation plate, see Fig. 4.
- ▶ To remove the hydraulic power unit from the installation plate, loosen the screw. See Fig. 9.

Establishing safety:

- ▶ Always observe applicable instructions for the overall machinery/system.
- ▶ Unless these instructions provide different information, proceed as follows:
 - Carry out decommissioning as described in chapter 11 of these operating instructions.
 - Unauthorized personnel must not be allowed access to the working area.

12.2 Disassembly process

- ▶ For disassembly, carry out the work steps described in chapter 7 "Assembly" in reverse order.
- ▶ Hydraulic fluid will run out of the hydraulic line system of the hydraulic power unit or hydraulic system even after draining. For this reason, close all outlets of lines with suitable blanking plugs.



After disassembly, observe the information on safe transport of the product in chapter 6 "Transport and storage".

13 Disposal

13.1 Environmental protection

Careless disposal of the hydraulic power unit, its components, the hydraulic fluid and the packaging material can lead to environmental pollution.

Please therefore observe the following points:

- ▶ Fully drain the hydraulic power unit prior to disposal.
- ▶ Dispose of the hydraulic fluid in accordance with the currently applicable national regulations in your country. Also observe the applicable safety data sheets.
- ▶ Disassemble the hydraulic power unit into its individual components in order to recycle them.
- ▶ Separate:
 - Cast iron
 - Steel
 - Non-ferrous metal
 - Plastic
 - Seals

14 Extension and modification

You will be considered responsible for any extensions to or modifications of the product.

Any declarations shall become invalid

If you undertake any extensions to or modifications of the product marketed by Bosch Rexroth, this means you are changing the condition as supplied. Any statements made by Bosch Rexroth regarding this product will then become invalid.



For hydraulic power units, this has the following consequence:

Hydraulic power units are partly completed machinery in the sense of the EC Machinery Directive 2006/42/EC. For this product, a declaration of incorporation was received with the product-specific documentation.

In case of extension or modification of the hydraulic power unit, this declaration will become invalid. Please send any queries you may have to your nearest Bosch Rexroth service center or directly to the headquarters.

For the addresses, please refer to www.boschrexroth.com.

15 Troubleshooting



WARNING

Deactivated safeguards!

Danger to life! Risk of injury!

- ▶ Make sure that all safeguards, e.g. fuses, protective grounding conductor, pressure relief valves, covers (frequency converter) are active.
- ▶ Proceed with extreme caution if safeguards need to be deactivated or covers removed for troubleshooting.
- ▶ If possible, operate the machine/system with reduced performance data in set-up mode for identification of errors.

Successful troubleshooting within the hydraulic power unit requires precise knowledge on the set-up and the mode of operation of individual components. The combination of hydraulics with an electrical system and electronics makes troubleshooting very complex.

Circuit diagrams (hydraulic and electric), parts lists, functional diagrams as applicable and other documentation must be available for effective troubleshooting.



For descriptions and information on faults of the EFC 5610 frequency converter and the Sytronix FCP 5020 system, see the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

15.1 How to proceed for troubleshooting

- ▶ Always work systematically and purposefully, even when under time pressure. Random, thoughtless disassembly and changing of settings might in the worst case result in the inability to restore the original cause of error.
- ▶ First, get a general idea of the function of the hydraulic power unit in combination with the overall machinery/system.
- ▶ Try to find out whether the hydraulic power unit has worked properly in combination with the overall machinery/system before the error occurred first.
- ▶ Try to determine any changes of the overall machinery/system, in which the hydraulic power unit is integrated:

Control questions:

- Were there any changes to the application conditions or area of application of the hydraulic power unit?
- Have modifications (e.g. refittings) or repair works been carried out on the overall system (machine/system, electrical system, control) or on the hydraulic power unit?
- If yes: What were they?
- Was the hydraulic power unit or the machine/system used as intended?
- How did the fault become apparent?
- ▶ Try to get a clear idea of the cause of error.
- ▶ If necessary, ask the actual (machine) operator.

15.2 Overview of the impact of defects

Table 20: Impact of defects

Error	Possible cause	Remedy
Excessive noise level	Hydraulic fluid level in the oil tank is too low.	▶ Check the hydraulic fluid level. ▶ Check for and correct any leakage. ▶ As necessary, refill hydraulic fluid to ensure that the filling level is between the markings on the filling level indicator.
	Hydraulic power unit is positioned on a vibrating surface.	▶ Make sure that the hydraulic power unit is positioned on a secure and non-vibrating surface.
	The hydraulic power unit is connected to the machine via pipelines.	▶ Route out the hydraulic connections between the hydraulic power unit and the machine with hose lines.
Pressure fluctuations in the pressure line	Vibration of the control system, e.g. pressure controller	▶ Check the control settings. For further information, see "p/Q-PID control" in the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".
Incorrect operating pressure	Incorrect pressure command value presetting	▶ Check and adjust the pressure command value as applicable. For further information, see "Pressure command value" in the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".
	Excessive pressure loss due to incorrect dimensioning of hose lines	▶ Replace the hose lines against larger nominal widths.
Pressure command value is not reached or insufficient flow.	Speed limit too low	▶ As applicable, change the flow limitation parameter F1.12. For further information, see "Flow command value" in the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".
Overload of the frequency converter during operation	Drive insufficiently dimensioned	▶ Make sure that the operating point is within the continuous characteristic curves. For further information on continuous characteristic curves, refer to data sheet 51055, see chapter 1.2 "Required and amending documentation".
Frequency converter overload when disconnecting hydraulic actuators.	Pressure relief valve set too high.	▶ Make sure that the pressure relief valve is set 10 % over the operating pressure.
	Generator-based drive effect (due to rotor inertia).	▶ Extend the delay ramp. For further information, see "Acceleration limitation" in the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".
Frequency converter over-current when connecting hydraulic actuators.	Motor current during acceleration too high	▶ Extend the acceleration ramp. For further information, see "Acceleration limitation" in the commissioning instructions 51055-IB, see chapter 1.2 "Required and amending documentation".

Error	Possible cause	Remedy
Drive overtemperature	Insufficient cooling water flow, cooling water temperature too high, insufficient cooling water in the system, inlet pressure too low or deposits in the heat exchanger	▶ Make sure that the coolant complies with the requirements of the technical specifications.
Hydraulic fluid temperature too high	Insufficient cooling power of hydraulic fluid.	▶ Calculate the heat introduction in the hydraulic system, e.g. by calculation of the hydraulic power loss of valves, rotary transmission leadthrough, etc. ▶ Compare the results with the selected oil cooling power of the hydraulic power unit. ▶ Increase the cooling water flow or replace the hydraulic power unit against a model with higher oil cooling power.
	Faulty and usually too low pressure valve setting; part of the pump delivery volume flows back to the oil tank via the pressure relief valves.	▶ Make sure that the pressure relief valve is set 10 % over the operating pressure.
	External heat input into the hydraulic fluid.	▶ Check whether external heat sources are positioned too close to the hydraulic system. ▶ If necessary, separate the heat sources from the hydraulic system.
	Insufficient cooling water flow, cooling water temperature too high, insufficient cooling water in the system, inlet pressure too low or deposits in the heat exchanger	▶ Make sure that the coolant complies with the requirements of the technical specifications.
	Increased efficiency losses due to changed conditions including wear.	▶ Carry out maintenance work and replace affected components as necessary.
Increased filter contamination	Deposition of dirt due to insufficient cleaning of components during installation.	▶ Flush the hydraulic system.
	Deposition of dirt during filling of hydraulic fluids.	▶ Fill the hydraulic system via a filling unit with integrated filter.
	Abrasion at components	▶ Make sure that all components are operated according to their specifications.
Filling and breathing filter contaminated	Contaminated ambient air	▶ Clean or replace breathing filter, see Table 19 "Spare and wear parts".
Filling level not in the specified range	Leakage	▶ Check and correct the cause for the loss of hydraulic fluid. ▶ If necessary, refill hydraulic fluid (also refer to the error "Pressure fluctuations in the pressure line").
	Oscillating volume too high	▶ Make sure that the sum of the required oscillating volume of the plunger or differential cylinder complies with the specifications of the hydraulic power unit.
	Water ingress	▶ Check the function of the externally installed heat exchanger.
Hydraulic fluid viscosity too high	Insufficient hydraulic fluid temperature or viscosity class too high	▶ Increase the temperature of the hydraulic power unit before starting the machine function. ▶ If necessary, use hydraulic fluid with a lower viscosity class.

16 Technical data



You can find the technical data in the data sheet RE 51055, see chapter 1.2 "Required and amending documentation".

17 Appendix

17.1 List of addresses

**Contacts for service and
spare parts:**

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

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

For service representatives in your area outside of Germany, please refer to
www.boschrexroth.com

Headquarters:

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

Phone: +49 (0) 9352/40 30 20
Email: my.support@boschrexroth.com

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

17.2 Declaration of incorporation

rexroth
A Bosch Company

Declaration of Incorporation (Translation of the original)

As defined by the EC Machinery Directive 2006/42/EC, Appendix II B

Doc.-No.: RE51055-EE

Date: July, 18th 2019

The manufacturer

Bosch Rexroth AG
Beckerstr. 31
09120 Chemnitz
GERMANY

Here by declares that the partly completed machinery

Name: Hydraulic power unit
Function: Hydraulic drive assembly for hydraulic work machine
Type code: CYTROPAC-1X/20/...

Satisfies the following essential requirements of Machinery Directive 2006/42/EC in accordance with the chapter numbers in Appendix I:

The requirements are fulfilled provided that the data in the product documentation (fitting instructions, operating instructions, project management and configuration documents) are implemented by the product user. The requirements of Appendix I to Machinery Directive 2006/42/EC not mentioned here are not applied and have no relevance for the product.

The special technical documentation for this partly completed machinery was issued according to annex VII part B and is communicated electronically on justified request of individual national bodies.

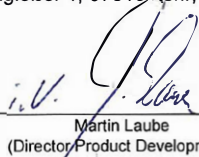
The partly completed machinery is applied to the following further EC-Directives and harmonised standards:

EN ISO 12100:2010
EN ISO 4413:2010

The partly completed machinery may only be put into operation when it has been established that the machine into which the partly completed machinery is incorporated conforms to the provisions of EC Machinery Directive 2006/42/EC, where relevant according to this directive.

The following person is authorized to compile the relevant technical documentation:

Name: Andreas Günder
Address: Bosch Rexroth AG, Zum Eisengießer 1, 97816 Lohr, GERMANY

	18.07.2019		
Place	Date	Martin Laube (Director Product Development)	Guilherme Capudi (Director Manufacturing)

Place/date/signature as indicated in the original declaration.

The contents of the Declaration of Incorporation are subject to change without notice. Currently valid edition on request.

17.2.1 Annex to the declaration of incorporation



Appendix to Declaration of Incorporation

Essential health and safety requirements in accordance with Machinery Directive 2006/42/EC, Appendix I

Notes:

- o "Applied" means that the requirement is used and relevant to the product ("X" identifier appears under "applied").
- o Requirements with identifier "-" under "applied" are not used and are not relevant to product.
- o The following identifiers under "fulfilled" mean: "X"= "yes, fulfilled" and "-" = "not fulfilled"

No.	Requirement	applied	fulfilled
1.	General principles		
1.	Risk assessment and risk reduction	X	---
1.1.	Essential health and safety requirements		
1.1.	GENERAL REMARKS		
1.1.1	Definitions		
1.1.2	Principles of safety integration	X	X
1.1.3	Materials and products	X	X
1.1.4	Lighting	---	---
1.1.5	Design of machinery to facilitate its handling	X	X
1.1.6	Ergonomics	---	---
1.1.7	Operating positions	---	---
1.1.8	Seating	---	---
1.2.	CONTROL SYSTEMS		
1.2.1	Safety and reliability of control systems	X	---
1.2.2	Control devices	---	---
1.2.3	Starting	---	---
1.2.4	Stopping		
1.2.4.1	Normal stop	---	---
1.2.4.2	Operational stop	---	---
1.2.4.3	Emergency stop	---	---
1.2.4.4	Assembly of machinery	---	---
1.2.5	Selection of control or operating modes	---	---
1.2.6	Failure of the power supply	---	---
1.3.	PROTECTION AGAINST MECHANICAL HAZARDS		
1.3.1	Risk of loss of stability	X	X
1.3.2	Risk of break-up during operation	X	X
1.3.3	Risks due to falling or ejected objects	X	X
1.3.4	Risks due to surfaces, edges or angles	X	X
1.3.5	Risks related to combined machinery	---	---
1.3.6	Risks related to variations in operating conditions	X	X
1.3.7	Risks related to moving parts	X	X
1.3.8	Choice of protection against risks arising from moving parts	X	X
1.3.8.1	Moving transmission parts	X	X
1.3.8.2	Moving parts involved in the process	---	---
1.3.9	Risks of uncontrolled movements	---	---
1.4.	REQUIRED CHARACTERISTICS OF GUARDS AND PROTECTIVE DEVICES		
1.4.1	General requirements	X	X
1.4.2	Special requirements for guards		
1.4.2.1	Fixed guards	X	X
1.4.2.2	Interlocking movable guards	---	---
1.4.2.3	Adjustable guards restricting access	---	---
1.4.3	Special requirements for protective devices	---	---
1.5.	RISKS DUE TO OTHER HAZARDS		
1.5.1	Electricity supply	X	---
1.5.2	Static electricity	X	X
1.5.3	Energy supply other than electricity	---	---
1.5.4	Errors of fitting	X	X
1.5.5	Extreme temperatures	X	---
1.5.6	Fire	X	---
1.5.7	Explosion	X	---
1.5.8	Noise	X	---
1.5.9	Vibrations	X	---
1.5.10	Radiation	X	---
1.5.11	External radiation	X	X
1.5.12	Laser radiation	---	---
1.5.13	Emissions of hazardous materials and substances	X	X
1.5.14	Risk of being trapped inside a machine	X	X
1.5.15	Risk of slipping, tripping or falling	X	---
1.5.16	Lightning	---	---
1.6.	MAINTENANCE		
1.6.1	Machinery maintenance	X	---
1.6.2	Access to operating positions and servicing points	X	---
1.6.3	Isolation of energy sources	X	---
1.6.4	Operator intervention	---	---
1.6.5	Cleaning of internal parts	X	X
1.7.	INFORMATION		
1.7.1	Information and warnings on the machine	X	X
1.7.1.1	Information and information devices	---	---
1.7.1.2	Warning devices	---	---
1.7.2	Warning of residual risks	X	X
1.7.3	Marking of machinery	---	---
1.7.4	Instructions	X	---
1.7.4.1	General principles for the drafting of instructions	X	X
1.7.4.2	Contents of the instructions	X	---
1.7.4.3	Sales literature	X	X

17.3 Prohibited substances - REACH, RoHS, WEEE

Our AB products such as power units, control blocks, AB assemblies and AB accessories are free of prohibited substances according to the current status and thus meet all EU requirements with regard to the above-mentioned directives. If, in exceptional cases, prohibited substances are used above the admissible concentration, we will endeavor to replace these substances or notify our customers of their use (REACH info information on the use of lead alloys >0.1 % on our homepage). Our products do not formally fall under the relevant substance prohibition directives (REACH, RoHS, WEEE), as they are intended as partly completed machinery, assemblies or components to be installed in machines by specialists. Our AB products do not provide a stand-alone function for end users. Therefore, they do not receive a CE mark due to the mentioned directives. As far as necessary in individual cases, we issue the required declarations of conformity, supplier's declarations for our products/product families for each order or make the LINK available for download. We regularly check our products for the use of hazardous substances (SVHC), buy our components exclusively from qualified suppliers and ensure with the compliance of the Bosch standard N2580 that our AB products do not pose any danger to people and the environment.

17.4 Additional document for UL listing



The additional document for UL listing is only relevant for CytroPac according to type code CytroPac-1X/.../UL

Additional Information required for CytroPac UL-Certification



A)

THE INTEGRAL DRIVE SOLID STATE SHORT CIRCUIT PROTECTION IN THESE UNITS DOES NOT PROVIDE BRANCH CIRCUIT PROTECTION. BRANCH CIRCUIT PROTECTION MUST BE PROVIDED EXTERNALLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, NATIONAL ELECTRICAL CODE OR THE CANADIAN ELECTRICAL CODE, PART I AS APPLICABLE, AND ANY ADDITIONAL LOCAL CODES.

B)

TRANSIENT SURGE SUPPRESSION SHALL BE INSTALLED ON THE LINE SIDE OF THIS EQUIPMENT AND SHALL BE RATED 480V (PHASE TO GROUND), 480 V (PHASE TO PHASE), SUITABLE FOR OVERVOLTAGE CATEGORY III, AND SHALL PROVIDE PROTECTION FOR A RATED IMPULSE WITHSTAND VOLTAGE PEAK OF 6kV.

C)

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5,000 AMPERES, 480 VOLTS AC MAXIMUM, WHEN PROTECTED BY LISTED (JDDZ/7) CLASS J FUSES.

DRIVE MODEL INCLUDED IN CYTROPAC:	FUSE CURRENT RATING:
EFC5610-1K50-3P4-M..	10 A/ 600 V
EFC5610-2K20-3P4-M..	15 A/ 600 V
EFC5610-3K00-3P4-M..	20 A/ 600 V
EFC5610-4K00-3P4-M..	20 A/ 600 V

D)

EXTERNAL CONTROL CIRCUIT OVERCURRENT PROTECTION SHALL BE PROVIDED IN THE END USE, MAX. 1A. USE UL LISTED OR UL RECOGNIZED OVERCURRENT PROTECTIVE DEVICES SUITABLE FOR INDUSTRIAL APPLICATIONS.

E)

FOR USE IN POLLUTION DEGREE 3 AND OVERVOLTAGE CATEGORY III IN ORDINARY LOCATION ENVIRONMENTS ONLY.

Informations complémentaires requise pour la certification UL Cytropac



A)

LA PROTECTION CONTRE LES COURT-CIRCUIT ELECTRIQUES N'EST PAS FOURNIE AVEC LA CENTRALE. LA PROTECTION CONTRE LES COURT-CIRCUIT DOIT-ETRE REALISEE EXTERIEUREMENT SUIVANT LES INSTRUCTIONS DU FABRICANT, « NATIONAL ELECTRICAL CODE » OU « CANADIAN ELECTRICAL CODE », LA PARTIE I EST APPLICABLE, ET TOUTE AUTRE REGLE EN VIGUEUR LOCALEMENT.

B)

UNE PROTECTION THERMIQUE DOIT-ETRE INSTALLEE SUR L'ALIMENTATION ELECTRIQUES DE L'EQUIPEMENT ET SERA DE 480V (DE LA PHASE A LA TERRE), 480 V (DE PHASE A PHASE), ADAPTEE A LA CATEGORIE DE SURTENSION III, ET FOURNIRA UNE PROTECTION CONTRE LES PIQUES DE COURANT DE 6KV.

C)

UTILISABLE SUR UN CIRCUIT NE DÉLIVRANT PAS PLUS DE 5 000 AMPÈRES, 480 VOLTS C.A. MAXIMUM, LORSQU'IL EST PROTÉGÉ PAR DES FUSIBLES DE CLASSE J RÉPERTORIÉS (JDDZ/7)

VARIATEUR INCLUS DANS LA CYTROPAC:	CALIBRE DES FUSIBLES:
EFC5610-1K50-3P4-M..	10 A/ 600 V
EFC5610-2K20-3P4-M..	15 A/ 600 V
EFC5610-3K00-3P4-M..	20 A/ 600 V
EFC5610-4K00-3P4-M..	20 A/ 600 V

D)

UNE PROTECTION CONTRE LES SURINTENSITES DU CIRCUIT DE COMMANDE DOIT ETRE PREVUES EN EXTERNE, COURANT MAX. 1A. UTILISER DES DISPOSITIFS DE PROTECTION CONTRE LES SURINTENSITES REPERTORIES OU RECONNUS PAR LA CERTIFICATION UL ET ADAPTES AUX APPLICATIONS INDUSTRIELLES.

E)

L'UTILISATION DANS UN ENVIRONNEMENT DE POLLUTION DE CATEGORIE 3 ET DE SURTENSION DE CATEGORIE III DOIT-ETRE DANS UN ENVIRONNEMENT ORDINAIRE.

18 Alphabetical index

Symbols

24 V interface 36, 44, 46

A

Abbreviations 7

Additional document for

UL listing 76

Assembly 26

C

Checking the electric

components/installation 59

Checking the heat exchanger 63

Checking the pressure value 62

Circuit diagram 20

Cleaning and care 57

Component overview 20

Connecting the hydraulic supply 31

Connecting the water supply 35

Connection lines 32

Cooling water connections 35

D

Damage to property 15

Damping mat 27

Declaration of incorporation 73

Decommissioning

- Implementation 66

- Preparing 66

Description of the electrical

interfaces 37

- All configurations 37

- "Basic" configuration 41

- Filling level and

temperature sensor 42

- Filter contamination

sensor 75 % 42

- Filter contamination

sensor 100 % 43

- Port 12X1 37

- Port 14X1 38

- Port 15X1 44, 46

- Port 22X1 39

- Ports 21X1 and 21X2 48

- "Premium" and "Premium M12"

configurations 46

Dimensions 27

Disassembly

- Implementation 67

- Preparing 67

Disposal 68

E

Edge protection for clip 27

Electrical interface connection

- "Basic" configuration 50

- "Premium" and "Premium M12"

configurations 51

Environmental protection 68

Extension and modification 68

F

Feed-in/

Power supply 37

Feed-in/voltage supply 36

Filling level and

temperature sensor 36, 42

Filling the hydraulic power unit .. 54

Filter contamination sensor

75 % 36, 42

Filter contamination sensor

100 % 36, 43

Filter element contamination

monitoring 60

First commissioning 54

Fixing 27

H

Hose lines 31

Hydraulic circuit diagram 20

Hydraulic fluid care 62

Hydraulic supply

- in master/slave operation 33

- Standard version 32

I

Impact of defects	70
Inspection	58
Installation plate	27
Installing	26
Intended use	8

L

List of addresses	72
-------------------------	----

M

Maintenance	59
Maintenance and repair	57
Maintenance schedule	59
Master/slave operation	35
Balancing hose	33
Pressure line	34
Return line	34
Maximum storage time	25
Mini USB service interface	36
Mini-USB service interface to the frequency converter	38
Monitoring the filling level	60
Monitoring the oil temperature ...	60
Mounting kit	27
Multi-Ethernet interface	36
Multi-Ethernet interfaces	48

N

Name plate	21
------------------	----

O

Overview of the electrical interfaces	36
--	----

P

Performance description	18
Product description	19
Product identification	21
Prohibited substances - REACH, RoHS, WEEE	75

Q

Qualification	9
---------------------	---

R

REACH	75
Required documentation	5
RoHS	75

S

Safety instructions	8
- General	10
- Product-dependent	11
Signal word	6
Scope of delivery	17
Spare and wear parts	64
STO interface	36, 39
Storage	25
Storage conditions	25
Symbols	7

T

Technical data	72
Transport	
- after previous operation	23
- Preparing	23
- using forklifts and similar floor conveyors	23
- Using lifting gear	24
Troubleshooting	69

U

Unpacking	26
-----------------	----

V

Visual inspection for leakage, cracking, force effects and corrosion	63
Visual inspection of the filling and breathing filter	62

W

Warning devices	58
WEEE	75

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