

# Compact Hydraulic Power Unit innoCube



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 Chinese.

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# 1. About this documentation

## 1.1 Validity of this documentation

This documentation applies to the following products:

- Compact hydraulic power unit innoCube (for material numbers, refer to data sheet 51045)

This documentation is intended for assemblers, operators, service engineers, 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 operating 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
 <b>Compact hydraulic power unit innoCube</b> Includes technical data, operating conditions, performance limits, and project planning information.	51045	Data sheet
 <b>Compact hydraulic power unit innoCube</b> Contains information on the commissioning of the hydraulic power unit, such as the installation of IndraWorks DS, the switching sequence, connection establishment, IndraWorks DS, innoCube and protection functions, as well as diagnosis and troubleshooting.	51045-IB	Commissioning instructions
 <b>Hydraulic fluids based on mineral oils and related hydrocarbons</b> Describes the requirements on hydraulic fluids based 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
 <b>General product information on hydraulic products</b> General information on hydraulic products.	07008	Operating Instructions
 <b>Assembly, commissioning and maintenance of hydraulic systems</b> General information on assembly, commissioning and maintenance of hydraulic systems.	07900	Data sheet
 <b>External gear pump AZPF</b> Includes technical data, operating conditions, performance limits, and project planning information.	10089	Data sheet
 <b>Sytronix, FcP 5020, frequency-controlled pump drive system</b> Describes the functions of the frequency-controlled pump drive system FcP 5020.	R912008034	User's manual

Title	Document number	Document type
 <b>Frequency converters series VFC 5615</b> Describes the assembly, commissioning, use, maintenance, diagnosis and troubleshooting of frequency converters.	R912009378	Operating Instructions
 <b>Frequency converters, multi-Ethernet card</b> 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 x 610 series frequency converter, and is also applicable to the VFC x 615 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:

 <b>SIGNAL WORD</b>
<b>Type and source of danger</b> Consequences in case of non-compliance <ul style="list-style-type: none"> <li>▶ Hazard avoidance measures</li> <li>▶ &lt;Enumeration&gt;</li> </ul>

- 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
 <b>DANGER</b>	Indicates a dangerous situation which will cause death or severe injury if not avoided.
 <b>WARNING</b>	Indicates a dangerous situation which may cause death or severe injury if not avoided.
 <b>CAUTION</b>	Indicates a dangerous situation which may cause minor or medium personal injury if not avoided.
<b>NOTICE</b>	Damage to property: The product or the environment could be damaged.

### 1.3.2 Symbols

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

**Table 3: Meaning of the symbols**

Symbol	Meaning
	If this information is not observed, the product cannot be optimally used and/or operated.
▶	Individual, independent action
1.	Numbered instructions:
2.	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	Hydraulic power unit construction
BR	Bosch Rexroth
DBV	Pressure relief valve
EP	Ethernet Platform
NG	Size
PE	Protective Earth
RE	Rexroth documentation in English Language
REXXXXX-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 overall machine, the installation of the hydraulic power unit into the overall machine/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 machine/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 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 chapter 2 "Safety instructions" and chapter 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 fluids 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:

<http://rbrexrothmewx.macrod.com/weixin/site/training1.html>

## **2.5 General safety instructions**

- Observe the valid regulations on accident prevention and environmental protection.
- Observe the safety regulations and provisions of the country/region 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 Bosch 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/region-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 safeguards (like fuses, pressure relief valves or frequency converters).
- ▶ Make sure that all safeguards (like fuses, pressure relief valves or frequency converters) 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 hydraulic power unit.
- ▶ 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 components.
- ▶ Ensure continuous connection of the protective grounding conductor.
- ▶ Observe the operating conditions and performance limits specified in the technical data.
- ▶ Work at electrical 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 components 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 the 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 (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 XXXXX-IB, see chapter 1.2 "Required and amending documentation".
- ▶ Coordinate 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 fluids during operation according to the 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 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.

### **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 or region.
- ▶ 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:

- Compact hydraulic power unit innoCube
- Operating instructions (this documentation),



For further information on optionally available components, see the data sheet 51045, and chapter 1.2 "Required and amending documentation".

## 5. Product information

### 5.1 Performance description

<b>Fields of application</b>	innoCube is a compact drive system (smaller oil tank and cooling system) for hydraulic equipment and particularly machine or equipment under limited installation space conditions.
<b>Low noise level</b>	Due to the sheet metal enclosure of all noise sources, the innoCube is significantly quieter than the conventional hydraulic power unit.
<b>Cost-effective operation</b>	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.
<b>Various configurations</b>	<p>In the "basic" configuration, the frequency converters is used as a sensor node and bundles the measured values of the pressure, filling level, and temperature sensor. The relevant information can be queried through the control panel, or by connecting with the indraworks DS software via the USB interface.</p> <p>In the "premium" configuration, all the functions of the basic configuration are covered, and values can be forwarded to the host computer via the Ethernet interface (using Modbus TCP, PROFINET, EtherNet/IP, and optionally Ethercat as a port station). The innoCube can thus be easily integrated in Industry 4.0 applications. The status of the hydraulic power unit is also indicated via the frequency converters operation panel and LED strip.</p>
	<div data-bbox="418 1217 497 1298" data-label="Image"> </div> <p>For information on the meaning of the LED signals, see chapter 10.3 "Warning devices".</p>
<b>Parameter adjustment during running time</b>	In the "basic" configuration, the relevant command value can be changed through the frequency converters operation panel on the hydraulic power unit, or by sending an analog signal through the host computer. In the "premium" configuration, in addition to control panel, and analog quantity, the control value can also be changed during running time via communication.
<b>Space-saving installation</b>	<p>Only the following interfaces need to be connected at the hydraulic power unit:</p> <ul style="list-style-type: none"> <li>• Interface for power supply (12X1)</li> <li>• Interface for 24 VDC power supply, signal and analog interface, and enable signal and starting of functions (15X1)</li> <li>• Hydraulic circuit connection</li> <li>• Connection to the cooling water supply system (water-cooled version)</li> </ul>

**More functions**

- Ethernet interface ("premium" only, 21X1)

The product provides the following features relevant to innoCube:

- 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 analog quantity possible
  - Command value setting via communication possible
- ("premium" 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
  - Protective functions
    - Actual pressure monitoring
    - Limit value for pressure and flow command value
    - LED failure pattern to indicate the frequency converters status on the control panel

## 5.2 Product description

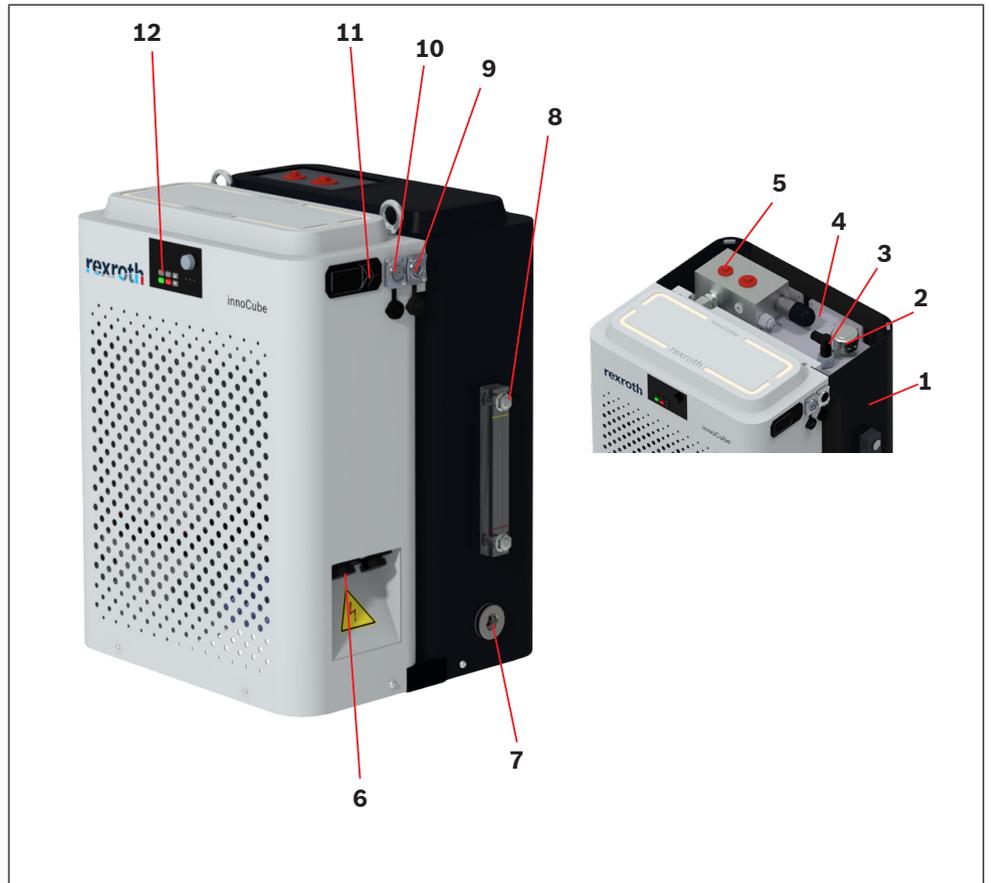
The innoCube is a frequency-controlled hydraulic power unit consisting of a frequency converter, electric motor, hydraulic pump, oil tank, cooling system and sensor technology. The cooling system is used for hydraulic fluid return cooling, with optional air-cooled or water-cooled coolers.

The cooling power can be selected according to the data sheet 51045. See 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 18 liters. The cooling system integrated in the oil tank extracts heat energy from the hydraulic fluid return and transfers it to air (cooling water). The motor pump unit is arranged inside the sheet metal enclosure, reducing the operating noise. The hydraulic power unit can be used in applications that require controlled or flow or pressure variations.

### 5.3 Component overview

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



**Fig. 1: Component Overview**

- 1** Oil tank
- 2** Breathing filter
- 3** Filling level and temperature sensor (already connected to innoCube, requiring no additional wiring by the customer)
- 4** Cooler
- 5** Pressure protection module (optional PSB valve group)
- 6** Electrical connections
- 7** Oil drain plug
- 8** Visual level gauge
- 9** Network port connection (premium)
- 10** USB port connection
- 11** Thermostat
- 12** Control panel

### 5.4 Hydraulic circuit diagram



The hydraulic circuit diagram can be found in the data sheet 51045, 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.

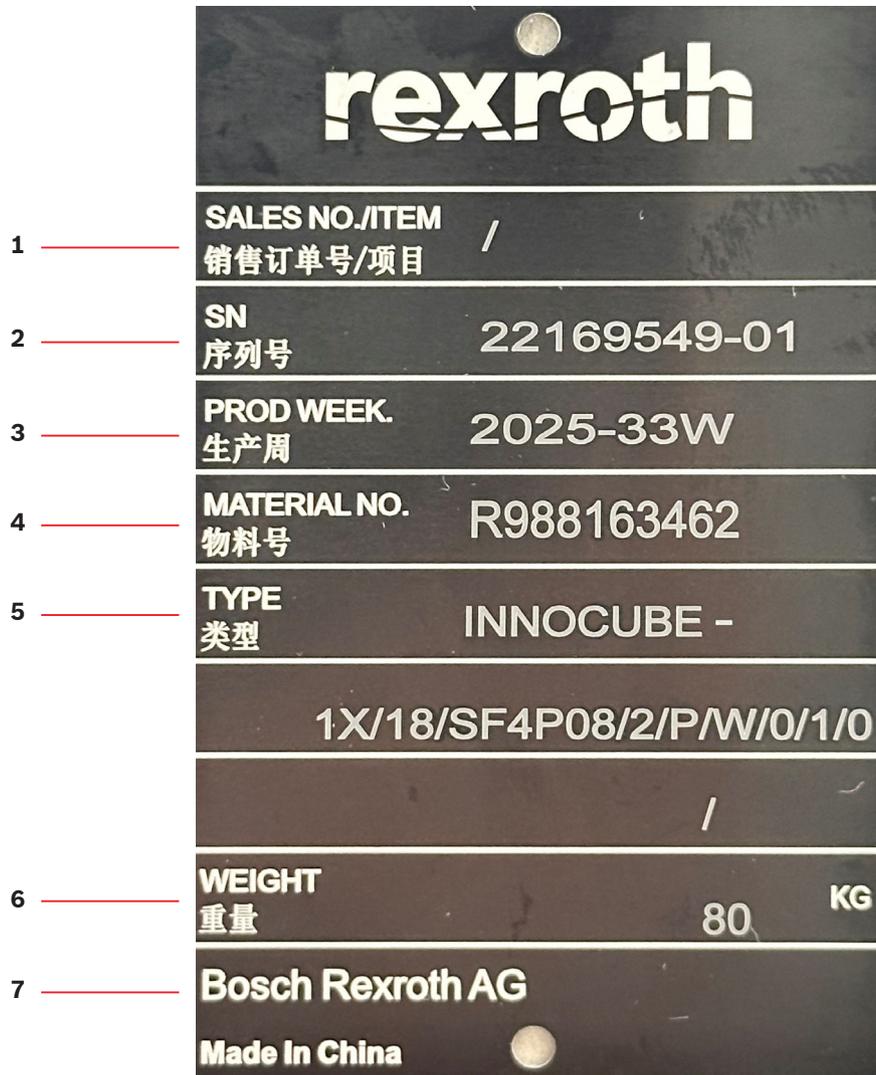


Fig. 2: Name plate

- 1 Sales order or project number
- 2 Production order, serial number
- 3 Date of production
- 4 Material number
- 5 Model
- 6 Equipment weight
- 7 Country / region of origin

## 6. Transport and storage

- ▶ Observe the transport instructions on the packaging.
- ▶ During storage and transport, the environmental conditions specified in the data sheet 51045 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! 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 transport 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 oil 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/region 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 assembly aid is correctly fixed.

##### **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 the data sheet 51045, and 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.

### 7.2.1 Dimensions of the hydraulic power unit



The dimensions of the hydraulic power unit can be found in the data sheet 51045, 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:

- 7.2.2.1 Fixed bolt M8\*16 on both sides
- 7.2.2.2 Fixed bolt M8\* (L+10) at the bottom, with the bolt length rounded according to the base thickness L
- 7.2.2.3 Caster at the bottom
- 7.2.2.4 Shock absorber pad at the bottom



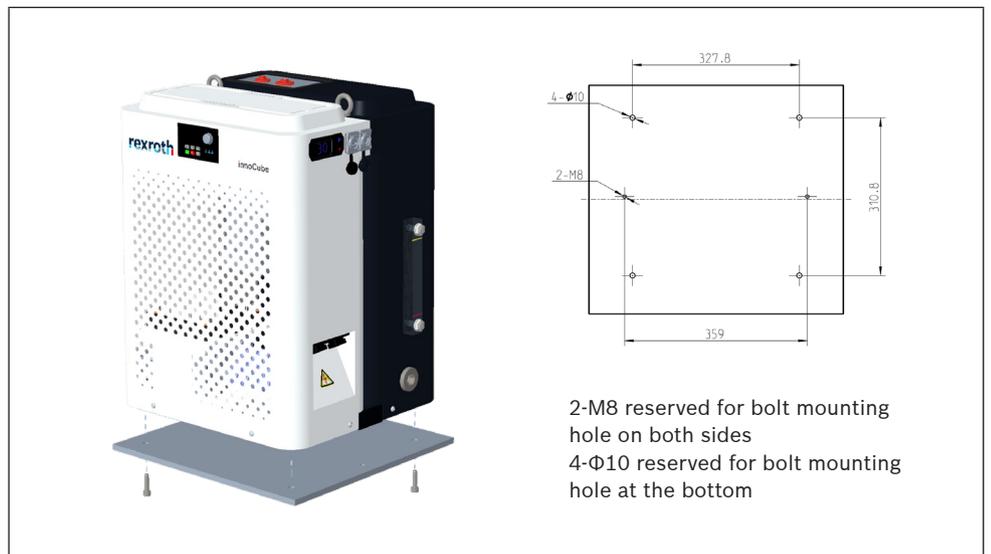
These component are not included in the scope of delivery.

**1. Install the fixed hole on bracket sides.**

When the fixed bolt is installed with the limited upper space, move the equipment to the fixed position first, align with the fixed hole position and screw in the fixed bolt. When the equipment can be hoisted from above, screw in the bolt first, hoist the equipment, put it in place using the slotted hole on both sides of the bottom, and fix the bolt.



**2. Install the threaded hole at bracket base.**



### 3. Bottom caster fixing



After the equipment is in place, enable the caster locking mechanism in time to prevent the equipment from shifting.

### 4. Bottom shock absorber pad



For the shock absorber with set screw, refer to "2. Install the threaded hole at bracket base" 4-Φ10 for the reserved hole size at the bottom.

### 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 away 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 pipeline accessories with the equipment

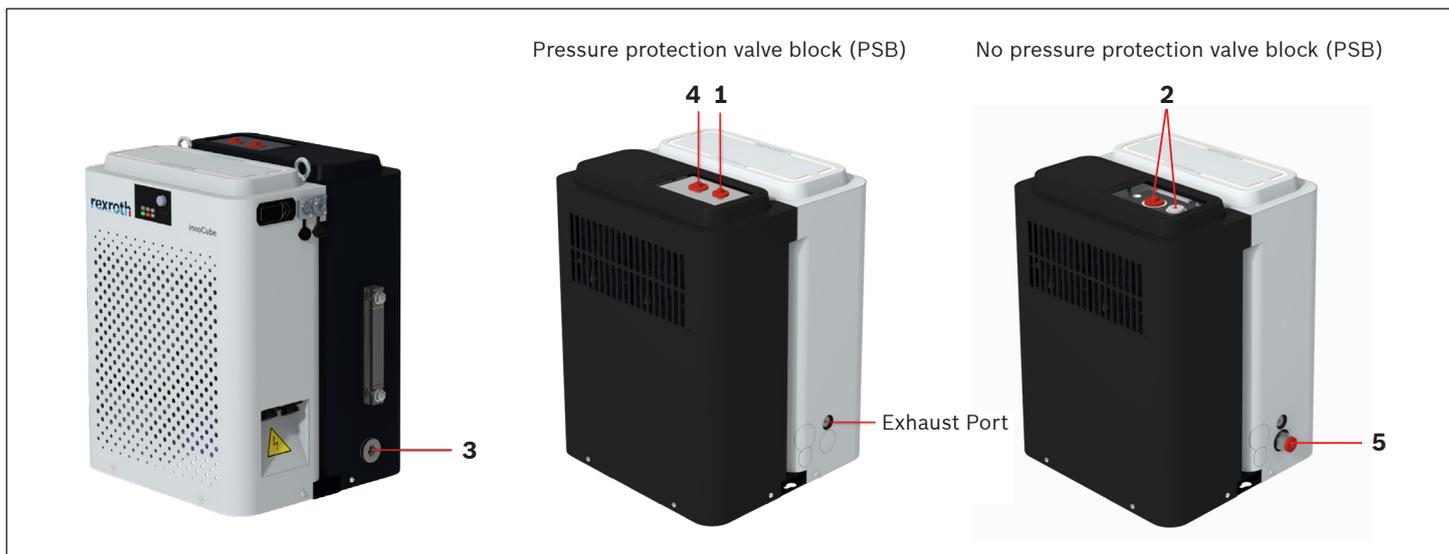


Fig. 10: Connection lines on the standard version

**Label Port name**

- 1 Pressure port Safety valve block P: G1/2 (pressure protection valve block)
- 2 Oil tank connection port Return valve block T: G1/2, G3/4 (no pressure protection valve block)
- 3 Oil tank connection port Drain port T: G1 (below the visual level gauge)
- 4 Oil tank connection port Safety valve block T: G3/4 (pressure protection valve block)
- 5 Pressure port Pump outlet valve block P: G1/2 (no pressure protection valve block)

**Pressure line P**

- ▶ Connect the pressure port 1 (pressure protection valve block) or pressure port 5 (no pressure protection valve block) using G1/2 line accessories.
- ▶ Install a pressure relief valve in the pressure line (no pressure protection valve block).



For versions with no pressure protection valve block, the pressure relief valve must be installed directly on 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 51045, see chapter 1.2 "Required and amending documentation".

- ▶ Set the pressure relief valve to 10 % over the operating pressure, however, to a maximum of 270 bar.

**Return Line T**

- ▶ Connect the return line via the return flow filter to the oil tank connection T:G3/4, see Fig. 10, Port Identification Number 1 and Port Identification Number 2.
- ▶ Seal any unused ports with an appropriate plug.

**Connect oil tank T.**

- ▶ Alternatively, the oil tank drain port T:G1 may be utilized, as illustrated in Fig. 10, Port Identification Number 3, for instances such as no back pressure return oil.
- ▶ Seal any unused ports with an appropriate plug.

### 7.3.2 Connecting the hydraulic supply in master/slave operation

The oil tank connection port of the master-slave Hydraulic power unit is located below the Visual Level Gauge and is sealed with a plastic plug upon delivery.

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

1. Connect the oil tank via the Oil Tank Drain Port T(Fig. 10, 3): The G1 port of the two hydraulic power units is connected using a hose to ensure fluid balance.  
– Please utilize the designated Pipeline Connector.



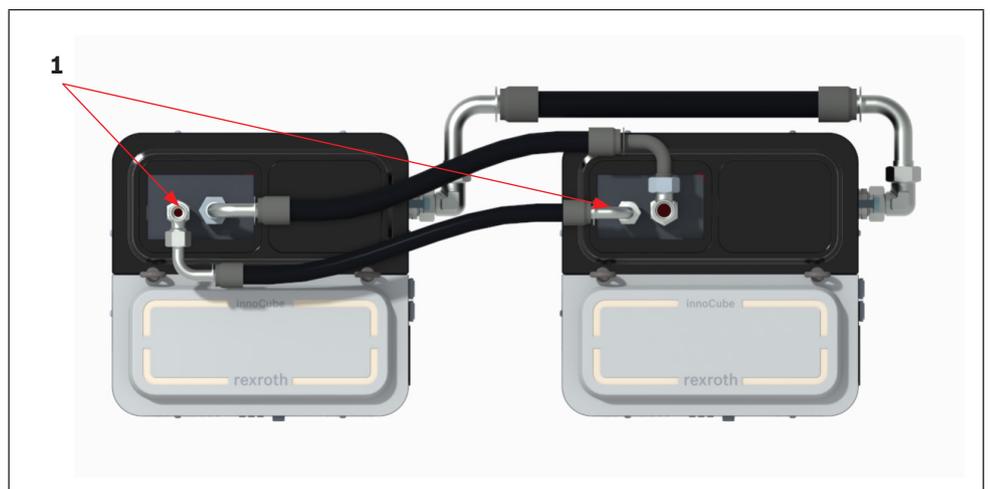
**Fig. 11: Illustration of the Balanced Hose (depicted with the Pump Safety Valve Block; the configuration of the Balanced Hose remains identical in the absence of the Pump Safety Valve Assembly).**

2. Utilize a hose line to connect the Return port of the two Hydraulic Power Units (Fig. 10, 4, oil tank connection port T: G3/4).
  - 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 (depicting the pressure protection valve block version, which is similar with the return oil pipe connections without the pressure protection valve block).**

3. Connect the pressure ports P (Fig. 10, 1): G1/2 with a hose line, if possible, also symmetrically with each other.



**Fig. 13: Representation of the pressure line (depicting the pressure protection valve block version; pressure pipe connection without the pressure protection valve block should be arranged in accordance with the pressure port).**

## 7.4 Connecting the water supply

To facilitate the cooling of hydraulic fluids, the Water-cooled version hydraulic power unit must be connected to the cooling water supply.



**Fig. 14: Cooling Water Connections**

**1. Cooling Water Port K: 2 x G1/2 (DIN EN ISO 1179-2)**

- ▶ Connect the lines to the intended cooling water ports, as illustrated in Fig. 14, Item 1.
- ▶ Connect the cooling water interface K:G1/2 (with an extended short pipe, subject to installation based on the actual circumstances).
- ▶ Tighten the fittings in accordance with the specified requirements.
- ▶ Make sure that the cooling water supply temperature does not fall below the dew point of the ambient air around the hydraulic power unit.
- ▶ Observe the following requirements:
  - Cooling water input temperature: 15<sup>1)</sup>–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.

<sup>1)</sup> Please pay close attention to the dew point.

## 7.5 Overview of the electrical interfaces



**Fig. 15: Overview of the electrical interfaces**

1. 12x1: Power Supply Interface
2. 15X1: 24 VDC and Signal Interface
3. Temperature Display Controller
4. 14X1: USB Service Interface
5. 21X1: Ethernet Interface
6. Level and Temperature Sensors

### 7.5.1 "Basic" sensor technology version

The "Basic" sensor technology model is equipped with the following interfaces:

- Port 12X1: Power Supply Interface
- Port 15X1: 24 VDC with Signal Interface
- Port 14X1: USB Service Interface

### 7.5.2 "Premium" sensor technology version

The Premium Sensor Technology Model is additionally equipped with the following interfaces:

- Port 21X1: Ethernet Interface

## 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: Power Supply Interface
- 15x1:24 VDC with a signal interface

### 7.6.2 All configurations

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

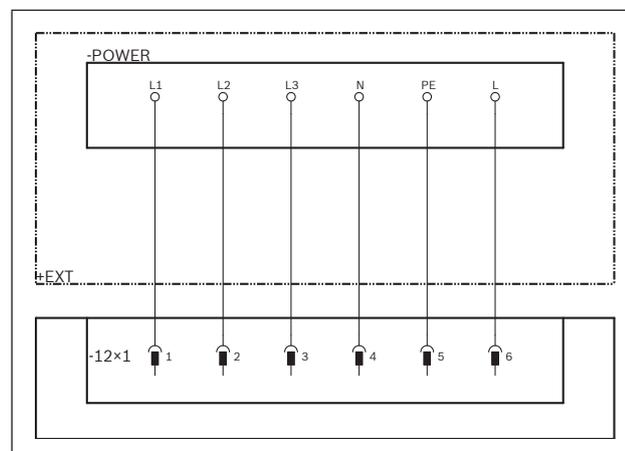


Customers are required to provide their own electricity supply, including spare fuses and a power contactor. L1, L2, and L3 serve as the drive power supply for the innoCube, while L and N function as the power supply for the innoCube cooling unit. In cases where a neutral line is present in the external power supply system, L may be connected to one of the phases in L1, L2, or L3. Conversely, if the three-phase system lacks a neutral line, L and N should be connected to a 220V single-phase power source, with PE serving as the grounding connection.



To ensure a seamless connection to the Power Supply, it is imperative to utilize the mating connector, either with or without a cable, as provided by Bosch Rexroth. For a complete list of accessories, see the data sheet 51045, and chapter 1.2 "Required and amending documentation".

- ▶ Attach the corresponding mating connector to the Power Supply, as illustrated in Fig. 16.



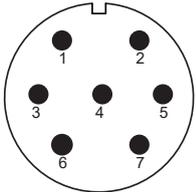
**Fig. 16: Assignment of 12X1 Port: Power Supply Interface**

► Ensure that the power supply complies with the following requirements.

<b>Voltage</b>	3P 380 V ...480 VAC (-15% / +10%)
<b>Frequency</b>	50/60Hz
<b>Assignment</b>	L1/L2/L3/N/PE/L
<b>Rotating Field</b>	Right-hand rotation
<b>Fuse Client</b>	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
<b>Fuse (220 VAC) Client</b>	Maximum 1A

The Port 12X1 is configured on the component side as outlined below:

**Table 5: Pin Assignment of the Device Connector: Port 12X1**

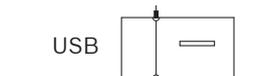
	Pin	Functions
	1	L1
	2	L2
	3	L3
	4	N
	5	PE
	6	L
	7	NC (not utilized)

**Port 14X1: USB Frequency Converters Service Interface**

The port serves as an interface for connecting the hydraulic power unit to an external PC. A USB cable (USB 2.0 A to USB 2.0 A) is necessary.



Bosch Rexroth recommends using a shielded cable with ferrite core, as this is less sensitive to interference. Bosch Rexroth offers a suitable USB cable. For a complete list of accessories, see the data sheet 51045, and chapter 1.2 "Required and amending documentation".



**Fig. 17: USB Service Interface**

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.

**Port 15X1: 24 VDC and Signal Interface**

For a detailed description of the functions and the associated parameters, please refer to the chapter titled "innoCube Functions" in the commissioning instructions 51045-IB. Additionally, consult chapter 1.2, "Required Documentation and Amending Documentation," for further information.

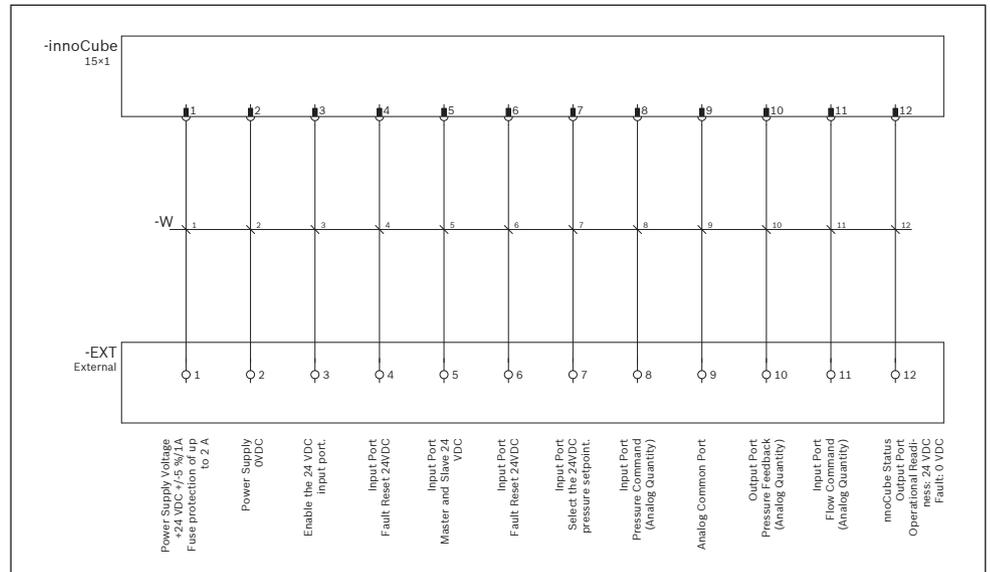


The product is accompanied by a loose parts plug, requiring the customer to independently install the cable. If a plug accompanied by a cable is required, it may be purchased separately.

For a comprehensive list of attachments, please refer to data sheet 51045-IB and consult Chapter 1.2, titled "Required Documents and Amending Documentation."



- Utilize the mating connector as the interface for the higher-level machine control unit, as illustrated in Figure 20:



**Fig. 20: Assignment of Port 15X1: 24 VDC and Signal Interface**

\* 15x1 connector pin,

A 24 V voltage is supplied to the pressure sensor HM20 (operating range: 0–315 bar), LED strips, and the liquid level and temperature sensor via Pin 1 and Pin 2. The readiness status is communicated back through the relay.

Pin 3: To start operation, apply a high-level input of 24VDC, and to stop operation, apply 0V (this applies when using Port Control). In the Premium version, the start-up process is determined by the Control Word within the availability status. However, altering the Start source can also be accomplished through Digital Input, as illustrated in Table 16.

Pin 4 input: Apply 24VDC at a High level to activate the Fault Reset Signal (applicable when utilizing the Port Control).

Pin 5: The validity of this configuration is established when designated as the master-slave mode Port Input Selection. When a 24VDC high level is input, the innoCube switches to Slave Mode, specifically the Flow Control Mode. This functionality is relevant when multiple innoCubes are in operation. The Digital Input function (24 V/0 V) is activated, while the other functions of this pin can be configured through Parameter [F2.21].

Pin 6 is utilized for switching the Pressure Command when the Fixed Value Control mode is employed. Specifically, when the pin receives a 24VDC low-level input, the Pressure Command is set to F1.05. Conversely, when a 24VDC high level input is received, the Pressure Command is set to F1.06. The Digital Input function (24 V/0 V) is activated, while the other functions of this pin can be configured through Parameter [F2.21].

Pin 7 serves as the Pressure Command and is utilized in scenarios where Analog Control is employed. The analog signal can be of the Current type 0-20mA/4-20mA or the Voltage type (0-10V/0-5V). The corresponding pressure range can be configured using IndraWorks DS or through parameter settings. Detailed instructions for the configuration process are provided in the Commissioning Manual.

Pin 8 serves as the Analog Signal Common Port.

Pin 9 serves as the pressure feedback, and the method for setting the corresponding signal output type is detailed in the Commissioning Manual under the section titled "Analog Channel Output Configuration."

Pin 10 serves as the Flow Command and is utilized in scenarios where Analog Control is employed. The analog signal can be of the Current type 0-20mA/4-20mA or the Voltage type (0-10V/0-5V). The corresponding pressure range can be configured using IndraWorks DS or through parameter settings. Detailed instructions for the configuration process are provided in the Commissioning Manual.

Pin 11 serves as the Flow Feedback, and the method for setting the corresponding signal output type is detailed in the Commissioning Manual under the section titled "Analog Channel Output Configuration."

Pin 12 serves as the innoCube Ready Signal, representing the output for the "Ready" message (24 V) or the "Error" message (0 V) (Not Ready = Fault). This output corresponds to the Expansion Card Relay Output (EDO2) and can also be configured through Parameter [H8.22] to deliver supplementary signals.

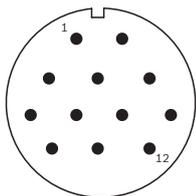


Regarding to the relevant parameters for the above terminals/analog control, and further details of function inputs and Output Allocation, please consult the chapter titled "innoCube Functions" in the commissioning instructions 51045-IB.

The design of the 15X1 plug (basic type, Premium type) on the component side is as follows:

**Table 14: Pin Assignment for Device Connector: Port 15X1**

Pin	Functions
1	24 VDC Power Supply ( $\pm 5\%$ / 1A - Maximum Fuse Current: 1A)
2	0 VDC (Reference Potential for 24 VDC Power Supply)
3	Enable (Input: 24 V -> Start / Pressure build-up, 0 V -> Stop)
4	Acknowledge faults (= reset) (input: 24 V impulse $\geq 10$ ms)
5	Master-Slave Function (Digital Input: The 24 V/0 V function is activated; additional functions of this pin can be configured through Parameter [F2.21]).
6	Pressure Command Fixed Value Selection Bit (Digital Input: 24 V/0 V function enabled; alternative functions for this pin can be configured via Parameter [F2.22]).
7	Analog Pressure Command
8	Analog Common Port
9	Analog Pressure Feedback
10	Analog Flow Command
11	Analog flow feedback
12	Ready for operation (output: 24 V -> ready to operate, 0 V -> error)



M12x1; 8-pole, A-coded  
(Device Connector)

**Table 16: Release Source Adjustment Options**

Parameter	Name	Range of Settings	Standard
E0.01	First run command source	Panel 1: Digital Input 2: Communication	Begin directly at the Control Panel. 1.(Operation without control communication) 2.(Premium)



For further details, please consult the operating instructions for the VFC5615 series frequency converters, specifically Chapter 1.2 "Required Documentation and Amending Documentation."

**Port 21X1:** The Ethernet interface port 21X1 for RJ45 networks. Through this interface, the hydraulic power unit is capable of operating via the control communication of the higher-level control unit. It can connect to the gateway, establish a connection with the PC (analogous to a USB connection), and facilitate firmware updates for the network card. When not in use, please close the connection to ensure interface protection.

#### Ethernet Interface for "Premium" Configuration



**Fig. 22: RJ45 Device Jack (Push-Pull Type)**



Plugs for self-assembled cables are available from Bosch Rexroth for the "Premium" configuration.

For a comprehensive list of attachments, please refer to data sheet 51045, specifically Chapter 1.2, titled "Required Documents and Amending Documentation."

## 7.7 Electrical interface connection

### ! WARNING

#### High voltage!

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

- ▶ Ensure that all tasks involving electrical equipment are performed exclusively by certified electrical technicians.
- ▶ Appropriate insulated tools must be utilized for any work involving electrical operating equipment, in accordance with the Germany Social Accident Insurance DGUV Regulation 3.
- ▶ Prior to assembling the hydraulic power unit, ensure that all components of the relevant systems are fully de-energized. Adhere to the five safety rules (in accordance with DIN VDE 0105-100).
- ▶ Ensure that only appropriate fuses are utilized.
- ▶ After establishing the power supply interface and before connecting the Protective grounding conductor of the Hydraulic power unit, it is necessary to specially check the central plate (according to DIN EN 60204-1 VDE 0113-1, verify the Port-to-Port connection of the Protective grounding conductor system through test records. Alternatively, conduct a protective grounding conductor inspection in accordance with DIN VDE 0701-0702.

### 7.7.1 "Basic" configuration

The Port 21X1 is excluded from the Basic Configuration.

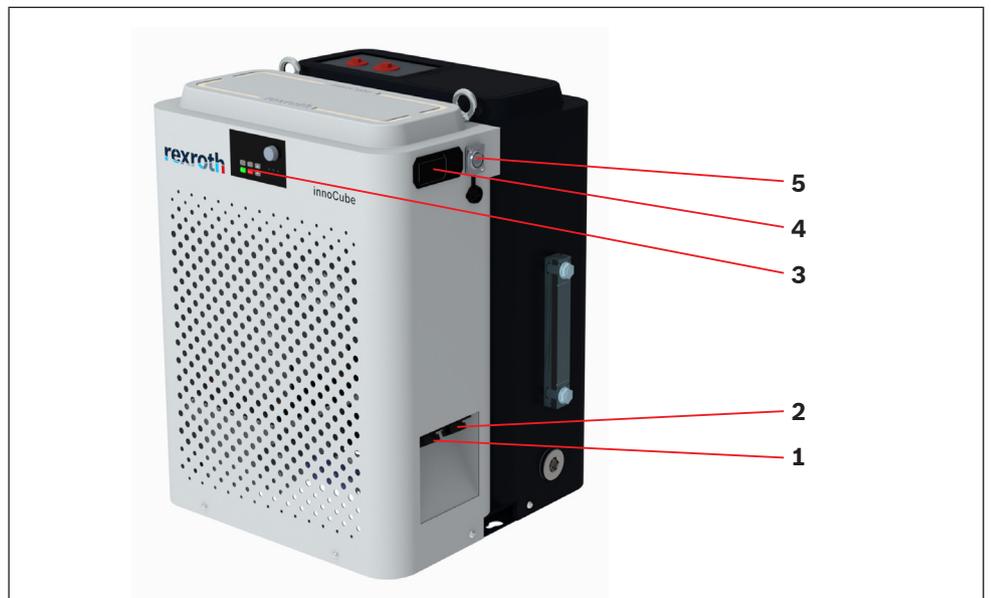


Fig. 24: "Basic" Configuration of Electrical Connection

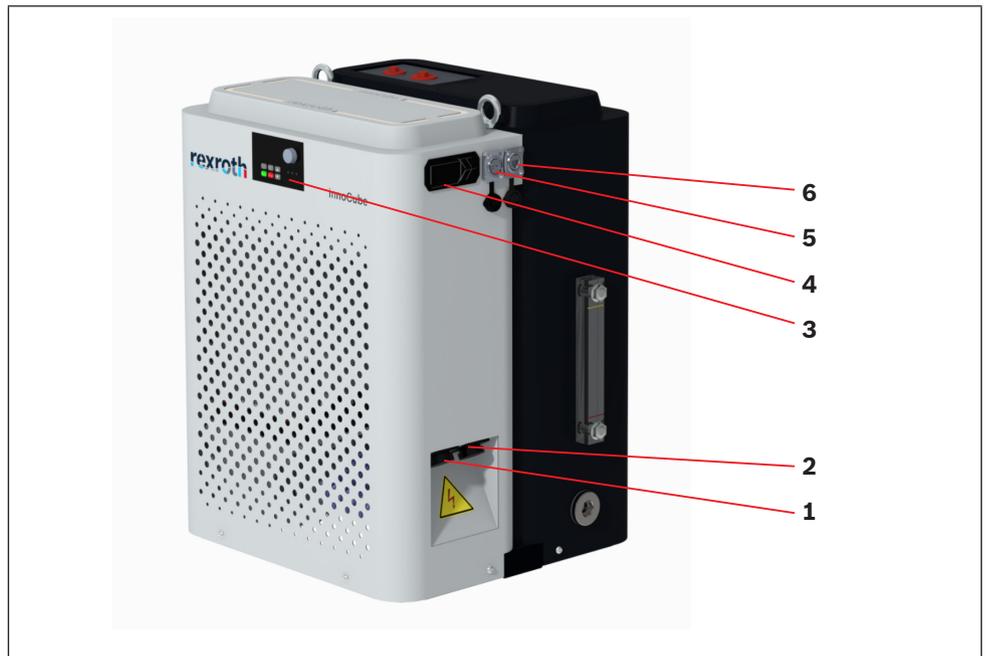
- 1 12x1: Power Supply Interface
- 2 15X1: 24VDC and Signal Interface
- 3 Frequency Converters Operation Panel
- 4 Temperature Display Controller
- 5 14X1: USB Service Interface

To establish a connection with a Power Supply, please adhere to the following steps:

- ▶ Connect the connector of the 24 V interface to the higher-level machine control unit through Port 15X1 (refer to Fig. 24, item 2).
- ▶ Connect the power supply interface connector to interface 12X1, as illustrated in Fig. 24, item 1.

### 7.7.2 "Premium" configuration

All ports are included in the Premium Configuration.



**Fig. 25: Electrical Connection of the Premium Configuration**

1. 12x1: Power Supply Interface
2. 15X1: 24 VDC and Signal Interface
3. Frequency Converters Operation Panel
4. Temperature Display Controller
5. 14X1: USB Service Interface
6. 21X1: Ethernet Interface

To establish a connection with a Power Supply, please adhere to the following steps:

- ▶ Connect the 24 VDC power supply through Port 15X1, along with the switching signal and analog signal, to the higher-level machine control unit. Refer to Fig. 25, item 2 for detailed guidance.
- ▶ Connect the power supply interface connector to interface 12X1, as illustrated in Fig. 25, item 1.
- ▶ Connect the Ethernet interface connector to the higher-level machine control unit through Port 21X1 (refer to Fig. 25, item 6).



Ensure that all unused connections are securely closed with the appropriate protective caps.

### 7.7.3 All configurations

To establish a connection with a USB Service Interface, please adhere to the following steps:

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



Bosch Rexroth recommends using a shielded cable with ferrite core, as this is less sensitive to interference. Bosch Rexroth offers a suitable USB cable. For a comprehensive list of attachments, please refer to data sheet 51045, specifically Chapter 1.2, titled "Required Documents and Amending Documentation."

The Rexroth VFC 5615 Frequency converters is incorporated into the hydraulic power unit. By utilizing the IndraWorks Ds software, users can access the Frequency converters to read diagnostic messages, configure parameters, and perform tasks such as saving, loading, and executing measurements of the Frequency converters.



You can download the IndraWorks Ds software from the following link: [www.boschrexroth.com/indraworks](http://www.boschrexroth.com/indraworks).

For further details, please consult the commissioning instructions 51045-IB, specifically Chapter 1.2, titled "Required Documents and Amending Documentation."

## 8. Commissioning

### **WARNING**

#### **Activate the machine function through the commissioning process.**

Danger to life and risk of injury.

- ▶ nger to life and risk of injury.
- ▶ Prior to commissioning the hydraulic power unit, ensure that all electrical, mechanical, and hydraulic connections have been accurately installed and connected in accordance with the superior directives provided by the machine or system manufacturer.
- ▶ Ensure that the Protective Device is properly activated.

#### **Improper assembly of the hydraulic power unit may result in the leakage of hydraulic fluids when subjected to high pressure.**

Risk of Injury and Damage to Property

- ▶ Ensure that the hydraulic power unit has been installed by a qualified specialist, as outlined in Chapter 2.4, "Qualification of Personnel," and verify that there is no tensile stress present before commissioning the hydraulic power unit.



For the commissioning process, please also consult the commissioning instructions 51045-IB, specifically Chapter 1.2 titled "Required Documents and Amending Documentation." In this chapter, further details are provided regarding the installation of IndraWorks DS, the power-up sequence, the Connection establishment, and the features of both IndraWorks DS and innoCube.



In accordance with the EC Machinery Directive 2006/42/EC, commissioning shall only be conducted after it has been verified that the machinery intended for assembly with the hydraulic power unit complies with all applicable directives. Additional or alternative types of hazards may arise from the assembly combination.

For the commissioning of the hydraulic power unit, it is imperative to adhere strictly to the operating instructions provided for the entire machine or system. This is particularly applicable to "mechanical hazards" arising from the machine mechanical motion induced by the hydraulic power unit and drive mechanisms, such as hydraulic cylinders and motors.



Bosch Rexroth advises that the hydraulic system be thoroughly vented and flushed prior to the installation of the innoCube. Please adhere to the operating instructions for the machine/system.

## 8.1 First commissioning

### 8.1.1 Before commissioning

- ▶ Verify the safety status of the electrical and Hydraulic line systems.
- ▶ Ensure that the Cooling Water System is operating correctly and efficiently (water-cooled version).
- ▶ Ensure that pressure relief valves (devices that are not pressure protection valve blocks) are installed on the pressure line.



Ensure that the pressure relief valve in the pressure line is properly installed and adjusted to an appropriate value, which should be more than 10% above the operating pressure, to ensure protection.

### 8.1.2 Filling the hydraulic power unit



Recommendation: It has been demonstrated through experience that the new hydraulic fluid, when contained in its original packaging drum, surpasses the Cleanliness level necessary for the operation of machinery and systems. To ensure the cleanliness level is achieved, special lubrication equipment or a filter station with a 10 µm fine filter should be used to oil the Hydraulic power unit.

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

The hydraulic power unit may be filled using the methods outlined below. Refer to Fig. 26 for further details:

1. Lubrication via Breathing Filters (Standard)
2. Introduce oil through the return line (G3/4) on the valve block and connect the corresponding pipe fitting (lubrication equipment).

To fill using an Oil Filling Connector, please adhere to the following steps:

- ▶ Please install the Oil Filling Connector onto the Hydraulic Power Unit as illustrated in Fig. 26.
- ▶ Open the breathing filters and ensure that, during the process of oil filling, the air within the oil tank does not pass through the breathing filters.



The oil filling level must remain within the designated range indicated by the Visual Oil Level Indicator.



Fig. 26: Lubrication Options

## 8.2 Re-commissioning after longer standstill

To perform a re-Commissioning after an extended shutdown, please adhere to the following steps:

- ▶ Inspection:
  - Hydraulic fluid level
  - Integrity of Hydraulic Components and Pipeline System
- ▶ Initiate the component with greater caution.
- ▶ Bleed the hydraulic system.



Please adhere to the operating instructions provided by the machine or system manufacturer.

## 9. Operation

The Hydraulic power unit, as semi-finished machinery, can be installed in the machine/system.

The hydraulic power unit lacks a dedicated mechanism (e.g., a switch) to deactivate or remove the product from service. Ensure that the necessary decommissioning measures are implemented by machine/system manufacturers.

Information regarding the operation of the hydraulic power unit is provided exclusively with the machine/system. Please consult the operating instructions supplied by the manufacturer of the machine or system for this information.

## 10. Maintenance and repair

Maintenance tasks, including inspection, maintenance, and repair, must be delineated in accordance with system-specific requirements, operational conditions—such as pressure, temperature, and environmental factors—and service life parameters, including duty cycle, cycle times, and shift operations.

The assertions presented in this chapter are founded upon the climatic conditions prevalent in Central Europe, as well as the overarching context of the metalworking industry.

Negative trends in test parameters (e.g., hydraulic fluid temperature), reduced replacement intervals for filter elements, or unusual noises may indicate the presence of potential issues.

The transformation. Should it be necessary, the Fault Diagnosis Matrix (refer to Chapter 15.2, "Overview of the Impact of Defects") can offer assistance in the identification of any arising issues. Gradual increases in temperature and/or brief replacement intervals for the filter suggest that the pump and seal may be worn, and that the hydraulic fluids are deteriorating. Consequently, an inspection of all relevant components should be initiated. A rapid escalation in temperature within a brief timeframe is a matter of concern and necessitates an immediate examination of the machine or system.



Please refer to the operating instructions provided by the machine or system manufacturer for detailed information regarding the scope and intervals of maintenance and repair for the complete machine or system.

### 10.1 Cleaning and care

When performing cleaning and maintenance on a hydraulic power unit, adhere to the following requirements:

- ▶ Ensure that all sealing and electrical connection components are properly and securely installed to prevent the ingress of cleaning agents and/or moisture 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 large particles of external dust, ensuring that sensitive components, such as electrical connections, remain clean.
- ▶ Clean using a damp, lint-free cloth or a residue-free industrial wiping paper.

## 10.2 Inspection

Bosch Rexroth: Record inspection results

- To ensure both functionality and cost-effectiveness, the inspection and maintenance intervals are calibrated in accordance with the actual operating conditions.
  - Detect faults promptly and at an early stage through the comparison of recorded values.
- 
- ▶ Prior to commencing any inspection procedures, ensure that the hydraulic power unit is thoroughly cleaned.
  - ▶ Conduct the following visual inspection to identify any apparent defects:
    - Indecipherable notes or warning signs
    - Leakage
    - Loose and/or missing components
    - Denotes an external force

## 10.3 Warning devices

The hydraulic power unit is equipped with an LED strip designed to indicate its operational status:

- Normal Operation: The LED illuminates in green.
- Standby: The LED indicator illuminates green.
- Warning: The LED indicator illuminates in yellow.
- ERROR: LED ILLUMINATED IN RED



Error messages can be precisely interpreted through the USB Service Interface and IndraWorks Ds or Premium control systems.

## 10.4 Maintenance schedule



Please observe the status indicators on the LED strip of the hydraulic power unit, specifically regarding oil quantity and oil temperature.

Table 18: Maintenance Plan

Operation/Maintenance Interval Time	Half a year	One year	Alternative: Operating Hours
<b>Visual inspection</b> External leakage, cracking, force effect, corrosion (oil tank, hose line, fittings, valves).	X		
<b>Checking</b> Electrical Components/Installation		X	
<b>Checking</b> Signal Switching	X		
<b>Checking (Oil Sample)</b> Quality Control of Hydraulic Fluids		X <sup>1</sup>	
<b>Visual Inspection/Replacement</b> breathing filters		X <sup>1</sup>	
<b>Change</b> Hydraulic fluids			10.000

<sup>1</sup> These components, substances, or materials are inherently subject to natural wear and degradation. Therefore, it is of utmost importance to consistently verify the condition of the components. If necessary, these components can be replaced during maintenance.

## 10.5 Maintenance

### 10.5.1 Checking the electrical components /installation

- ▶ Conduct regular inspections of the entire electrical installation by a professional electrical engineer.
- ▶ Furthermore, periodic execution of machine and system inspections shall be conducted in accordance with the standards specified in DIN EN 60204-1 (VDE 0113 Part 1) or DIN VDE 0701-0702.
- ▶ Check the hydraulic power unit housing, cables, and connection components, as well as the connector contacts, for any signs of damage.



No damage, including but not limited to cracks, abrasions, deformations, or discolorations, is permissible. The hydraulic power unit functions solely when the electrical components are undamaged.

### 10.5.2 Monitoring the filling level

The oil fluid level is monitored by an integrated fuel level sensor equipped with two conversion points: one for warning and the other for shutdown. The frequency converters have been evaluated to ensure that the hydraulic power unit ceases operation below the designated stop limit.

If the oil level falls below the Minimum oil fill level, please implement the following measures:

- Identify and eliminate the cause of the leakage.
- Then, fill the Hydraulic Fluids to the specified oil filling level.

### 10.5.3 Monitoring the oil temperature

The oil temperature is monitored by an Integrated Oil Injection Sensor, which features two conversion points: one for warning and one for stopping. The frequency converters are utilized to ensure that the hydraulic power unit is shut down when the stop temperature is exceeded.

#### Potential Causes of Temperature Increase

Potential causes of elevated temperatures include:

- Heat exchanger malfunction
- Variations in the conditions of cooling water
- Malfunctions or improper settings of the pressure valve (e.g., maximum pressure limit, pump control, pressure reducing valve).
- Pump malfunction due to wear and increased leakage.
- A modification in ambient conditions, such as an elevation in ambient temperature
- Variations in driver load conditions



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

The temperature display controller is configured with a default activation temperature for the cooling fan set at 30° C. For instructions on adjusting this preset value, please refer to the "Controller" section in the Commissioning Manual.

### 10.5.4 Visual inspection of the hydraulic fluid level and breathing filter

- ▶ Conduct an annual visual inspection, replacing the breathing filters and replenishing the hydraulic fluids as required. Refer to Figure 1, item 2 for further details.
- ▶ If the breathing filters are utilized as outlined in Chapter 8.1.2, "Filling the Hydraulic Power Unit," it is imperative to conduct a visual inspection annually. Should any contamination or damage be detected, replacement of the filters is required.

### 10.5.5 Checking the pressure value

The pressure value should be examined when there is a change in drive behavior, such as an increase in cycle times or a decrease in the quality of the finished product. Otherwise, it is advisable to conduct an inspection at six-month intervals.



It is recommended by Bosch Rexroth that the pressure value be recorded in the maintenance documentation.

### 10.5.6 Hydraulic fluid care

The hydraulic fluids shall be analyzed no less than once per year.

To conduct an analysis of hydraulic fluids, it is imperative to collect a comprehensive hydraulic fluid sample. According to the specifications of the appropriate hydraulic fluid manufacturer, it is imperative to inspect the hydraulic fluid sample in a qualified laboratory.

**Measures** Depending on the outcomes, it may be necessary to implement additional measures, including but not limited to the following:

- Additional filtration measures
- Dehydration
- Substitution



Avoid using treated and recycled Hydraulic Fluids (secondary extracted Hydraulic Fluids ).

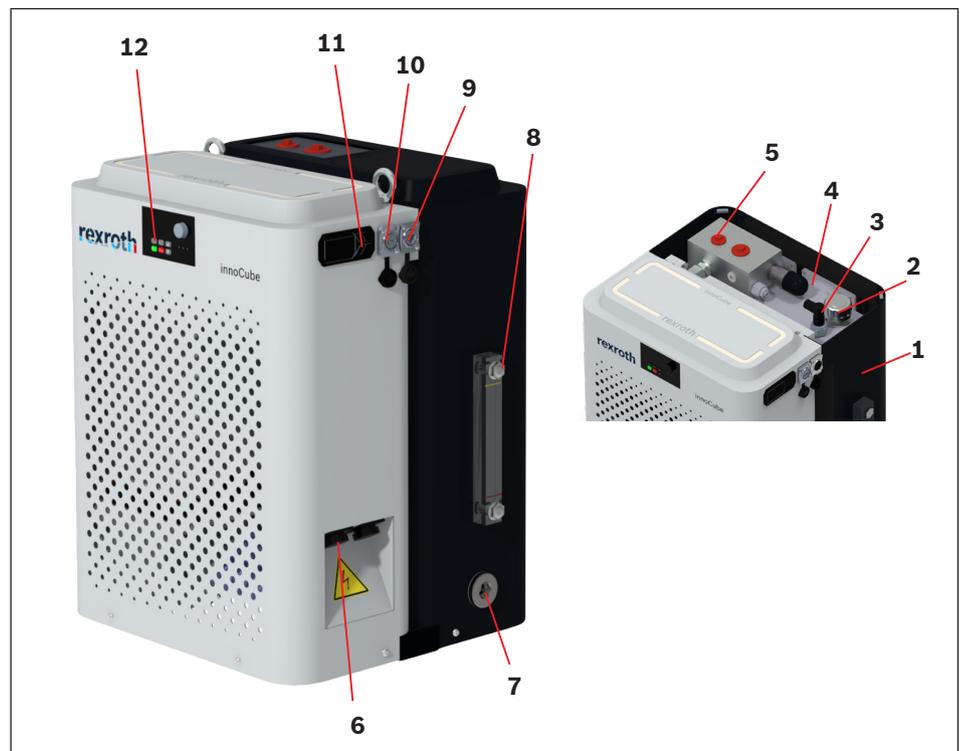


Fig. 1: Component Overview

To replace the hydraulic fluids, please adhere to the following procedure:

- ▶ Completely drain hydraulic fluids. Refer to Chapter 11.1, "Preparing for Decommissioning."
- ▶ Ensure that the pipeline and actuator within this connection are thoroughly drained.
- ▶ Implement exhaust measures if deemed necessary.
- ▶ Fill and bleed the hydraulic system as outlined in Chapter 8.1.2, "Filling Hydraulic Power Unit."

### **10.5.7 Visual inspection for leakage, cracking, force efforts and corrosion**

The External Inspection is a visual examination that must be conducted at a minimum of once every six months. The Visual inspection frequency should be increased based on specific working conditions and usage. If deemed necessary, cleanse the system prior to conducting a visual inspection.

Conduct a visual inspection to identify the following phenomena:

- Leakage
- Cracking
- Corrosion
- Indentation caused by external force action

**Leakage** To prevent leakage of the threaded fastener, it is essential to ensure proper tightening and apply appropriate markings. If leakage persists at this location, a comprehensive inspection of the contact point must be conducted to identify the underlying cause of the leakage. Depending on the outcome, the Seal and/or the component shall be replaced accordingly.

**Cracking and the leakage it causes** In order to prevent cracking and leakage, it is imperative to identify the underlying cause and rectify the fault. The affected component must subsequently be either replaced or thoroughly repaired.

**The Impact of External Forces** If evidence of external force action is observed, the underlying cause must be thoroughly identified, and the issue promptly resolved. The component, along with the adjacent components, must subsequently undergo a thorough inspection for any potential damage and be subjected to further evaluation to ensure reliability in operational use. Replace or fully repair the component, as necessary.

**Corrosion** In the presence of Corrosion signs, the component must be inspected for damage and subsequently assessed for its reliability in operational use. Replace or fully repair the component, as necessary. In all circumstances, corrosion protection must be ensured.

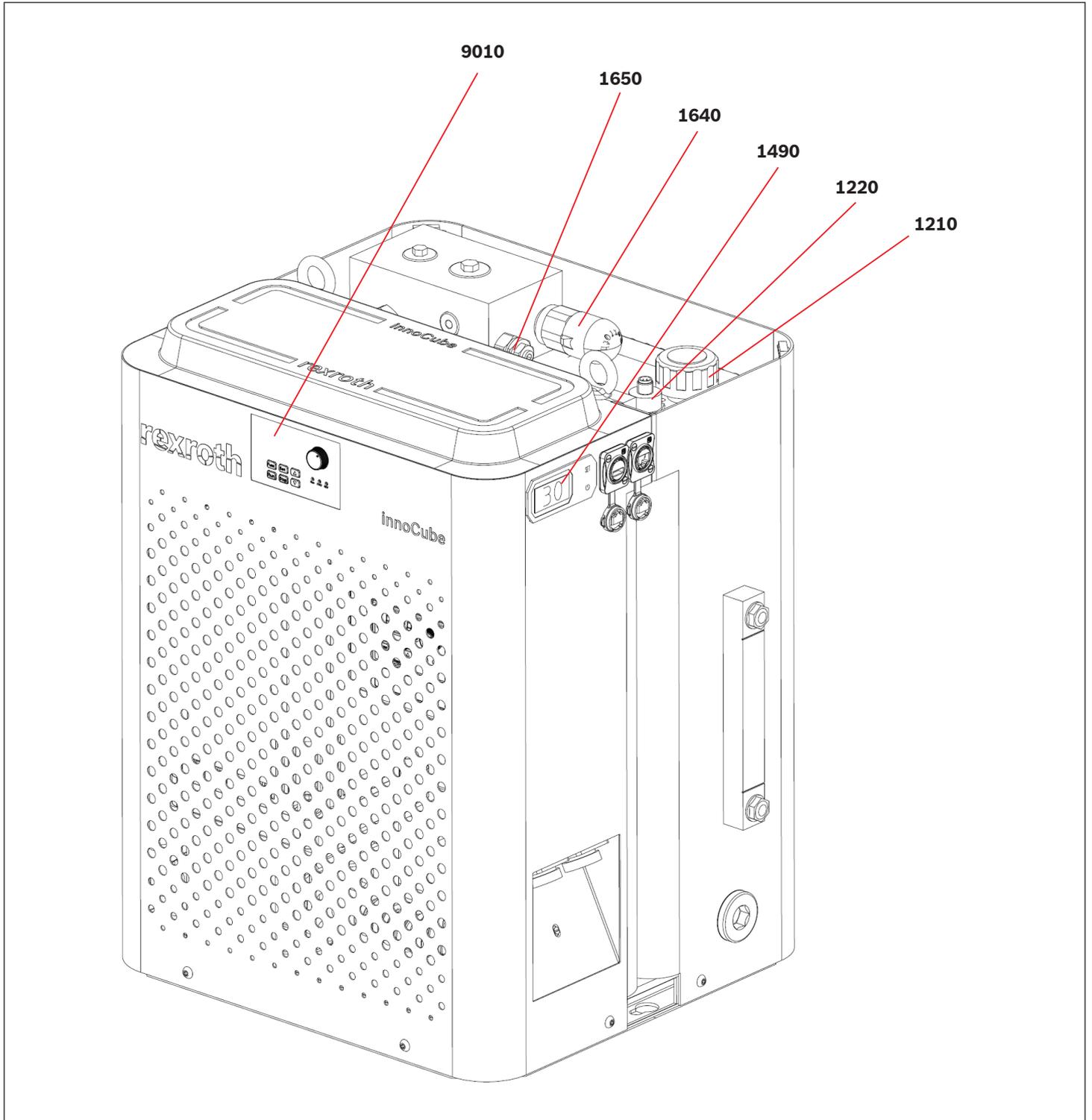
### **10.5.8 Inspect the heat exchanger**

No specific maintenance is necessary for the heat exchanger. The water-cooled heat exchanger device is durable and does not impose any additional requirements on the cooling water equipment. Air-cooled heat exchanger unit: If debris is found obstructing the air duct during a visual inspection, please ensure it is promptly cleaned.



The dust particles must not exceed a size of 1 mm.

### 10.6 Spare and wear parts



**Fig. 27: Spare Parts and Wear Parts**

**Table 19: Spare Parts and wear parts**

Material Number	Name	Notes	Assembly
R912005784	FPCC02.1-VANN-7P-NNNN	Control Panel	9010
R988149999	STC-1000HX-02	Thermostat	1490
R900423725	DBDS 6 K1X/315	Safety Valve Block - Pressure Relief Valve	1640
R901109366	OD21010356-VSTXX06-18X03	Safety Valve Block - Restrictor Valve	1650
R928018808	Air filter FEF 0 P10-F00	Air filter	1210
R901456587	The Float Switch M60.1.A2.B4.270.320.&	Float Switch	1220

- ▶ Kindly submit the spare parts order to your nearest Bosch Rexroth Service Center or reach out to us directly.  
For comprehensive address information, kindly visit [www.boschrexroth.com.cn](http://www.boschrexroth.com.cn)

**Request for Spare Parts**

- ▶ Submit written requests for spare parts. In the event of an emergency, orders may also be placed via telephone; however, a written confirmation of the order will subsequently be required.
- ▶ Kindly provide the following information when placing an order for spare parts:
  - Material Number and Order Number of the Hydraulic Power Unit (as indicated on the Nameplate)
  - Material number assigned to each component
  - Required Quantity
  - The type of shipment required (e.g., parcel post, freight, air, courier service, etc.).

**Replacement for Spare parts**

Please contact your service partner of Bosch Rexroth or obtain the service support via the following channel:  
Hotline: +86 400 8807030

# 11. Decommissioning

## 11.1 Preparing for decommissioning

- ▶ A collection container capable of accommodating the entire hydraulic fluid volume must be provided.



The total volume of the hydraulic system encompasses the capacities of the oil tank, the pipeline system, the drive mechanism, and other related components.

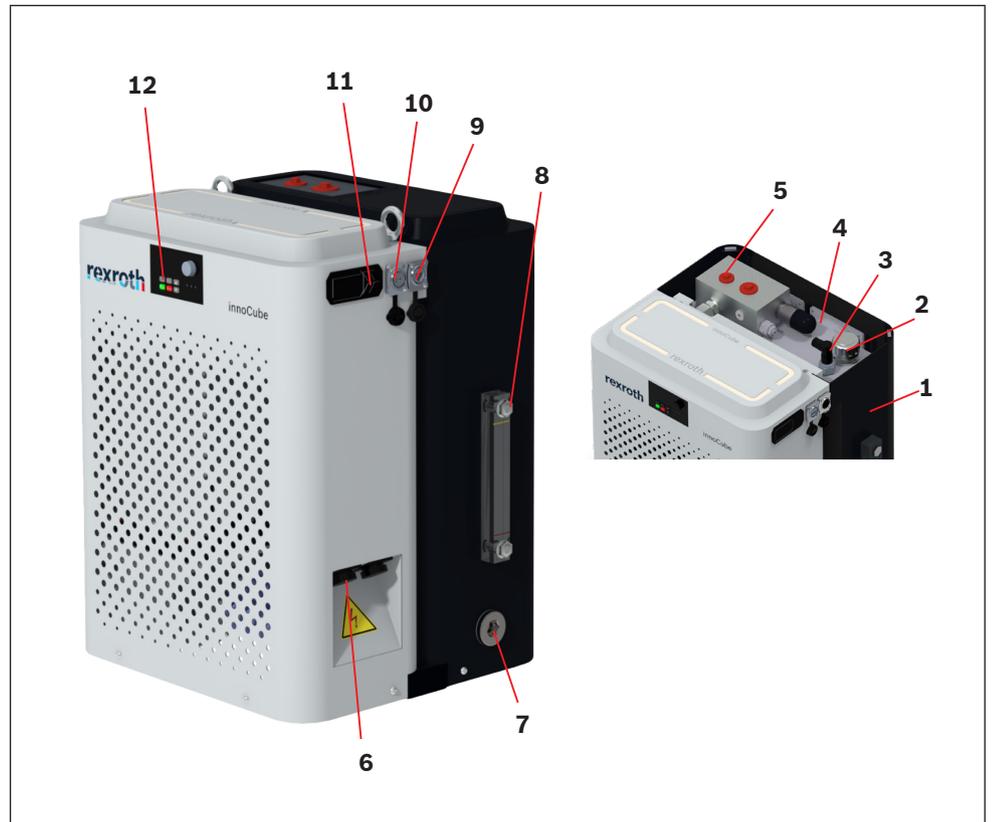
- ▶ Always adhere to the relevant instructions pertaining to the complete machine/system.
- ▶ In the absence of further information within these operating instructions, please proceed with the following steps:
  - Prevent hazards associated with nearby machinery.
  - Unauthorized personnel must not be allowed access to the working area.
  - Reduce and securely stabilize all loads.

## 11.2 Decommissioning the system

- ▶ Turn off the Power Supply and ensure the system does not restart.
- ▶ Disable the hydraulic power supply and ensure that it remains deactivated.
- ▶ Please ensure that all system components are thoroughly depressurized and completely de-energized.
- ▶ Utilizing a Hex key, carefully loosen the oil tank drain plug, as illustrated in Figure 1, item 10, and proceed to drain the hydraulic fluids into the designated collection tank. Ensure that the pipeline and the actuator are thoroughly drained. If necessary, implement the exhaust measures.
- ▶ Manage the cooling water interface (water-cooled version) using an appropriate corrosion inhibitor.

### Complete Machine/System

Decommissioning the entire machine/system in accordance with the procedures outlined in the operating instructions for the complete machine/system.



**Fig. 1: Component Overview**

## 12. Disassembly and exchange

- ▶ Assemble the equipment components only when necessary work is required.

In general, all disassembled components shall be appropriately reassembled at their designated locations.

### 12.1 Preparing for disassembly

- ▶ Ensure that the hydraulic power unit maintains adequate stability.
- ▶ Please observe the weight and the Center of gravity position of the hydraulic power unit.
- ▶ Ensure the machine's stability before loosening the hydraulic power unit.
- ▶ Prior to removal, ensure the hydraulic fluids are drained from the hydraulic power unit as outlined in Chapter 11, "Decommissioning."
- ▶ Utilize the designated eyebolt as specified; refer to Figure 3.
- ▶ To ensure safe transportation of the hydraulic power unit after its removal, verify the Safe Assembly of the eyebolt.

**Establish Safety Measures**

- ▶ Always adhere to the relevant instructions pertaining to the complete machine/system.
- ▶ In the absence of further information from these instructions, please proceed with the following steps:
  - Execute the Decommissioning operation as outlined in Chapter 11 of these operating instructions.
  - Unauthorized personnel must not be allowed access to the working area.

**12.2 Disassembly process**

- ▶ To remove, execute the work steps in the reverse order as outlined in Chapter 7, Assembly.
- ▶ Even after the oil has been drained, hydraulic fluids may still discharge from the hydraulic piping system of the hydraulic power unit or the hydraulic system. Therefore, all pipe outlets must be securely sealed using an appropriate blocker.



After removal, refer to the information regarding product safety transportation provided in Chapter 6, titled "Transport and Storage."



**Fig. 3: Eyebolt**

## 13. Disposal

### 13.1 Environmental protection

The disposal of hydraulic power units, their components, hydraulic fluids, and packaging materials has the potential to cause environmental pollution.

Therefore, please adhere to the following guidelines:

- ▶ Prior to disposal, ensure the hydraulic power unit is thoroughly drained.
- ▶ Dispose of hydraulic fluids in strict accordance with the national regulations currently applicable in your country or region. Please also adhere to the relevant safety data sheet.
- ▶ Disassemble the hydraulic power unit into its individual components for the purpose of recycling.
- ▶ Products after disassembly:
  - Cast iron
  - Steel
  - Non-ferrous metals
  - Plastic
  - Seal

## 14. Extension and modification

Any extension or modification of the product shall entail the corresponding responsibility.

**Any statement shall be deemed null and void**

If you undertake any extensions or modifications to Bosch Rexroth products, you are altering their availability. Any claims made by Bosch Rexroth regarding this product are null and void.



For a hydraulic power unit, the following results will be obtained:

The hydraulic power unit is classified as a semi-finished machinery in compliance with the provisions of the EC Machinery Directive 2006/42/EC. For this product, you will be provided with an official company statement as well as documentation specific to the product. If the hydraulic power unit is extended or modified, this declaration will be rendered invalid. Should you have any inquiries, kindly direct them to the nearest Bosch Rexroth Service Center or directly to the Headquarters.

For comprehensive address information, please visit [www.boschrexroth.com](http://www.boschrexroth.com).

## 15. Troubleshooting

### **WARNING**

#### **Safeguards have been disabled.**

Danger to life! Risk of injury!

- ▶ Ensure that all safeguards are fully activated, including but not limited to the fuse, protective grounding conductor, pressure relief valve, and caps (for frequency converters).
- ▶ If it becomes necessary to deactivate the safeguards or remove the protective cover for troubleshooting purposes, utmost caution must be exercised.
- ▶ If feasible, conduct operations of the machine/system in setup mode with reduced performance metrics to facilitate the identification of errors.

Successful troubleshooting of a hydraulic power unit necessitates a precise understanding of the configurations and operational modes of each individual component. The hydraulics and electrical systems, along with electronic components, can complicate the troubleshooting process.

The circuit diagram (including Hydraulic and electrical diagrams), the bill of materials, the functional diagram (if applicable), and all other relevant documentation must be readily available to ensure effective fault diagnosis.



For detailed instructions and information regarding VFC 5615 frequency converters and Sytronix FCP 5020 system faults, please consult the commissioning instructions 51045-IB. Refer specifically to Chapter 1.2, titled "Required Documentation and Amending Documentation."

### 15.1 How to proceed for troubleshooting

- ▶ Work should be conducted in a systematic and goal-oriented manner, even under time constraints. Arbitrarily disassembling and altering settings may, in the worst-case scenario, lead to an inability to address the root cause of the error.
- ▶ Initially, it is essential to acquire a comprehensive understanding of the operation of the hydraulic power unit in conjunction with the entire machine or system.
- ▶ Prior to the occurrence of any initial malfunction, ascertain whether the hydraulic power unit is operating correctly in conjunction with the entire machine or system.
- ▶ Endeavor to ascertain whether the entire machine/system, inclusive of the integrated hydraulic power unit, has undergone any modifications.

#### **Control Issue**

- Have the application conditions or the application field of the hydraulic power unit been modified?
- Has any modification, such as retrofitting, or repair work been conducted on the entire system, including the machine/system, electrical system, control device, or the hydraulic power unit?
- If affirmative: What modifications or repairs were undertaken?

- Is the hydraulic power unit or machine/system being utilized according to its intended purpose?
  - How can the fault be identified?
- ▶ Strive to thoroughly comprehend the underlying cause of the error.
  - ▶ If deemed necessary, inquire about the identity of the actual (machine) operator.

## 15.2 Overview of the impact of defects

**Table 20: Impact of Deficiencies**

Error	Possible cause	Remedy
Excessive Noise Levels	The hydraulic fluid level within the oil tank is insufficient.	<ul style="list-style-type: none"> <li>▶ Please verify the hydraulic fluid level.</li> <li>▶ Inspect and eliminate all instances of leakage.</li> <li>▶ If necessary, replenish the hydraulic fluids to ensure that the lubrication oil level remains within the designated markings of the oil level indicator.</li> </ul>
	The hydraulic power unit is situated on the vibrating surface.	▶ Ensure that the hydraulic power unit is positioned on a secure, vibration-free surface.
	Connect the hydraulic power unit to the machine via the pipeline.	▶ Design the Hydraulic connection route between the hydraulic power unit and the machine via the hose line.
Pressure fluctuations in the pressure line.	Vibration Control System, such as a Pressure Controller	▶ Check the control settings. For comprehensive information, please consult the commissioning instructions 51045-IB "p/Q - PID Control." Refer to Chapter 1.2, titled "Required and Amending Documentation Documents."
Inappropriate Operating Pressure	Improper configuration of the pressure command value	▶ Verify and adjust the specified pressure, if applicable. For additional information, please refer to the "Pressure Command Value" section in the commissioning instructions 51045-IB, specifically Chapter 1.2, titled "Required and Amending Documentation."
	Excess Pressure Loss resulting from incorrect dimensions of the hose line.	▶ Replace the hose line to prevent exceeding the specified Nominal Width.
The specified pressure command value has not been achieved, or the flow is inadequate.	Speed limit too low	▶ If applicable, please modify the Flow Restriction Parameter F 1.12. For further details, please refer to "Flow Control Value" in the commissioning instructions 51045-IB, specifically in Chapter 1.2, titled "Required and Amending Documentation."
Frequency converters overload during operation.	Insufficient Load Capacity of the Drive	▶ Ensure that the operating point is situated within a continuous characteristic curve. For further details regarding the Continuous Characteristic Curve, please refer to data sheet 51045 and consult Chapter 1.2, titled "Required and Amending Documentation."
When disconnecting the hydraulic actuator, conduct variable frequency. The device is at risk of experiencing an overload.	Pressure relief valve set too high.	▶ It is imperative to ensure that the pressure relief valve is calibrated to a setting that is 10% higher than the designated Operating Pressure.
	Driving effect based on the generator (attributable to rotor inertia).	▶ Extend the Delay Ramp. For further information, please refer to "Acceleration Limit" in the commissioning instructions 51045-IB, specifically in Chapter 1.2, titled "Required and Amending Documentation."
Overcurrent in Frequency Converters During the Connection of a Hydraulic Actuator.	Motor Current Overload During Acceleration	▶ Extend the acceleration ramp. For further information, please refer to "Acceleration Limit" in the commissioning instructions 51045-IB, specifically in Chapter 1.2, titled "Required and Amending Documentation."

Error	Possible cause	Remedy
Frequency converters Overheating	The ambient temperature is excessively elevated.	<ul style="list-style-type: none"> <li>▶ Ensure adequate air circulation around the equipment.</li> </ul>
Hydraulic fluid temperature is excessively elevated.	Insufficient Cooling Capacity of Hydraulic Fluids.	<ul style="list-style-type: none"> <li>▶ Calculate the heat introduced into the Hydraulic system, for example, by calculating the hydraulics power loss of the valve, rotary drive introduction, etc.</li> <li>▶ Compare the results with the Selected oil cooling power of the hydraulic power unit.</li> <li>▶ Increase the cooling water flow rate or replace the hydraulic power unit with a model that possesses greater oil cooling capacity.</li> </ul>
	The pressure valve has not been correctly adjusted and is typically set at a level that is too low. A portion of the pump's discharge volume is redirected to the oil tank via the pressure relief valve.	<ul style="list-style-type: none"> <li>▶ Make sure that the pressure relief valve is set 10 % over the operating pressure.</li> </ul>
	External heat input into the hydraulic fluid.	<ul style="list-style-type: none"> <li>▶ Please verify whether the external heat source is positioned in close proximity to the hydraulic system.</li> <li>▶ If deemed necessary, isolate the heat source from the hydraulic system.</li> </ul>
	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	<ul style="list-style-type: none"> <li>▶ Make sure that the coolant complies with the requirements of the technical specifications.</li> </ul>
	Increased efficiency loss resulting from changes in conditions (including wear).	<ul style="list-style-type: none"> <li>▶ Conduct maintenance procedures and replace the affected component, if deemed necessary.</li> </ul>
Contamination of Fueling and Breathing Filters	Contaminated Ambient Air	<ul style="list-style-type: none"> <li>▶ Please clean or replace the breathing filters as indicated in Table 19, titled "Spare Parts and Wear Parts."</li> </ul>
The oil filling level does not fall within the designated range.	Leakage	<ul style="list-style-type: none"> <li>▶ Investigate and address the root cause of Hydraulic Fluids.</li> <li>▶ If deemed necessary, replenish the hydraulic fluids (refer also to the error message: "Pressure fluctuations in the pressure line").</li> </ul>
	Oscillating volume too high	<ul style="list-style-type: none"> <li>▶ Ensure that the specified Total Oscillation Volume for the push rod or differential hydraulic cylinder is consistent with the requirements of the hydraulic power unit.</li> </ul>
	Water ingress	<ul style="list-style-type: none"> <li>▶ Check the function of the externally installed heat exchanger.</li> </ul>
Hydraulic fluid viscosity too high	The hydraulic fluid temperature is insufficient, or the Viscosity grade too high.	<ul style="list-style-type: none"> <li>▶ Prior to initiating the machine function, ensure that the temperature of the hydraulic power unit is sufficiently elevated.</li> <li>▶ If necessary, utilize Hydraulic Fluids with a lower viscosity grade.</li> </ul>

## 16. Technical data

The technical data can be found in data sheet RE 51045. Please refer to Chapter 1.2, titled "Required Documentation and Amending Documentation."

## 17. Appendix

### 17.1 List of addresses

**Contact Information for Service  
and Spare Parts:**

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## 17.2 Declaration of incorporation



### Declaration of Incorporation

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

Doc.-No.: DCTC-31000-320

Date: 09.19.2025

The manufacturer

Bosch Rexroth (Changzhou) Co. Ltd.  
No 17 Longmen Road,  
Wujin Hi-tech Industrial Zone  
Changzhou, Jiangsu,  
China

Here by declares that the partly completed machinery

Name: innoCube - Compact Hydraulic Power Unit  
Function: Drive unit for hydraulic work machine  
Material- / Serial no: According to R.51045  
Type code: INNOCUBE-1X/...

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 (**Datasheet, Operating instruction, Commissioning instructions 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.

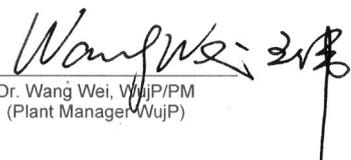
The partly completed machinery is applied to the following further EC-Directives and harmonized standards:

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: Yao Xuming  
Address: Bosch Rexroth (Changzhou) Co. Ltd, No 17 Longmen Road, Wujin Hi-tech Industrial Zone,  
Changzhou, Jiangsu, China

Changzhou	09.19.2025		
Place	Date	Dr. Chen Yongbo, DC/EIH-CN (Director Product Development IH China)	Dr. Wang Wei, WujP/PM (Plant Manager WujP)

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:

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

No.	Requirement	applied	fulfilled
	<b>General principles</b>		
1.	<b>Risk assessment and risk reduction</b>	x	---
1.	<b>Essential health and safety requirements</b>		
1.1	<b>GENERAL REMARKS</b>		
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	<b>CONTROL SYSTEMS</b>		
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	<b>PROTECTION AGAINST MECHANICAL HAZARDS</b>		
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	<b>REQUIRED CHARACTERISTICS OF GUARDS AND PROTECTIVE DEVICES</b>		
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	<b>RISKS DUE TO OTHER HAZARDS</b>		
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	---
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	<b>MAINTENANCE</b>		
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	<b>INFORMATION</b>		
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.

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