

General operating instructions for clamping and drive modules and drive modules with and without control modules

RE 51150-B/07.11

Material no. R901310980

Replaces: -
English

Operating instructions



The data specified below only serve to describe the product. Any information with regard to use only refers to application examples and recommendations. Data available in catalogs are no guaranteed characteristics. The information given does not exempt the user from making own evaluations and tests. 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 photo shown.

The original operating instructions were prepared in German.

Content

1	About this documentation.....	5
1.1	Validity of the documentation.....	5
1.2	Necessary and amending documentation.....	5
1.3	Illustration of information.....	6
1.3.1	Safety instructions.....	6
1.3.2	Symbols.....	7
1.3.3	Abbreviations.....	7
2	Safety instructions.....	8
2.1	General information on this chapter.....	8
2.2	Intended use.....	8
2.3	Improper use.....	9
2.4	Qualification of personnel.....	9
2.5	General safety instructions.....	9
2.6	Product- and technology-related safety instructions.....	10
2.7	Safety equipment.....	11
2.8	Obligations of the machine manufacturer.....	11
2.9	Obligations of the operator.....	12
3	General warnings of damage to property and damage to the product ..	13
4	Scope of delivery.....	15
5	Information on this product.....	16
5.1	Performance description.....	16
5.2	Product description.....	16
5.3	Interfaces.....	19
5.3.1	Hydraulic connections.....	19
5.3.2	Electrical connections.....	21
5.4	Product identification.....	23
6	Transport and storage.....	25
6.1	Transporting drive modules.....	25
6.1.1	Preparing the drive module for transport.....	25
6.1.2	Manual transport.....	25
6.1.3	Transport using forklifts and similar floor conveyors.....	25
6.1.4	Transport by means of lifting gear and attachment points.....	26
6.1.5	Freight transport.....	28
6.2	Storing drive modules.....	28
7	Assembly.....	29
7.1	Unpacking.....	29
7.2	Drive module assembly.....	29
7.3	Hydraulically connecting the drive module.....	29
7.4	Connecting to the water supply.....	30
7.5	Connecting the electric supply.....	30
7.5.1	Earthing and potential equalization.....	30
7.5.2	Laying the power supply and control cables and connecting the electricity supply...30	30
7.5.3	Installing the electrical control and monitoring equipment.....	30
8	Commissioning.....	31
8.1	First commissioning.....	31
8.1.1	Before commissioning.....	31
8.1.2	Valve settings.....	31
8.1.3	Safe handling of pressure tapping points.....	32
8.1.4	Accumulator.....	32
8.1.5	Filling the hydraulic system.....	33
8.1.6	Activating the electric supply.....	33
8.1.7	Bleeding the complete hydraulic system of the machine.....	33
8.1.8	Commissioning.....	34
8.1.9	Flushing the hydraulic system.....	34
8.1.10	The most frequent errors during commissioning.....	35
8.2	Re-commissioning after extended standstill.....	36

9	Operation	37
10	Maintenance and repair	39
10.1	Maintenance documentation	39
10.2	Inspection, maintenance, repair	39
10.2.1	Filling level.....	40
10.2.2	Oil temperature (optional).....	40
10.2.3	Filter clogging indicator (optional)	41
10.2.4	Pressure values.....	42
10.2.5	Oil maintenance	42
10.2.6	Hydraulic accumulator	42
10.2.7	Hose lines	43
10.2.8	Piping	44
10.2.9	Heat exchanger (UPE5).....	44
10.2.10	External inspection of the tank.....	45
10.3	Repair.....	46
10.4	Spare and wear parts.....	46
11	Decommissioning	47
11.1	Preparing for decommissioning.....	47
11.2	Decommissioning the drive module	47
12	Disassembly and exchange	48
12.1	Preparing disassembly.....	48
12.2	Disassembling the drive module	48
13	Disposal	49
14	Extension and conversion	50
15	Troubleshooting	51
15.1	How to proceed for troubleshooting	51
15.1.1	Overview of the impact of defects.....	51
16	Technical data	54
17	Appendix	55
17.1	List of addresses	55

1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- Clamping and drive module UPE2
- Drive module UPE5

This documentation is intended for assembly fitters, service technicians and plant operators.

This documentation contains important information on the safe and appropriate transport and assembly, commissioning, maintenance, disassembly and simple troubleshooting of clamping and drive modules and drive modules with and without control modules, hereinafter only referred to as "drive module".

- ▶ Read this documentation completely, especially chapter 2 "General safety instructions" before working with the drive module.

1.2 Necessary and amending documentation

These are general operating instructions pertaining to drive modules that have been designed and manufactured to customer specifications.







- ▶ For this reason you should keep the general and product-specific documentation to hand when reading these instructions (see Chapter 4 "Scope of delivery").
- ▶ You should observe the documentation for the complete machine.
- ▶ You should also observe the documentation pertaining to the other components, assemblies and partly completed machinery, which form part of the complete machinery.
- ▶ The drive module may not be commissioned until you are provided with the documentation marked with the book symbol , which applies to your ordered drive module and have understood and observed it.

Table 1: Necessary and amending general documentation

	Title	Document number	Document type
	Clamping and drive module UPE2	51142	Data sheet
	Drive module UPE5	51145	Data sheet
	Control module IH15A	51144	Data sheet
	Control module IH15B	51156	Data sheet
	Hydraulic fluids on mineral oil basis and related hydrocarbons	90220	Data sheet

You can find these operating instructions as well as related documents in the media directory under

www.boschrexroth.com/various/utilities/mediadirectory/


1.3 Illustration of information

Consistent 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 operations are explained which bear the risk of personal injury or damage to property. The measures described for preventing these hazards must be observed.

Safety instructions are set out as follows:

 SIGNAL WORD
Type and source of danger Consequences in case of non-compliance ▶ Measures for the prevention of dangers ▶ <Enumeration>

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


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

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

1.3.2 Symbols

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

Table 3: Meaning of the symbols

Symbol	Meaning
	If this information is not observed, the product cannot be used and/or operated optimally.
▶	Individual, self-dependent step
1. 2. 3.	Numbered instruction: The numbers indicate that the steps 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
REXXXXX-B	Rexroth document in English language
RXXXXXX-B	Rexroth document in another language
UPE	Unit Power Energy
IH	Industrial Hydraulics

2 Safety instructions

2.1 General information on this chapter

The drive module was designed and manufactured considering the provisions of directives, standards and specifications relating to this technology. However, there is still the risk 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 drive module.
- ▶ Also keep the general and product-specific documentation to hand when reading this documentation (see Chapter 4 "Scope of delivery").
- ▶ This documentation together with the relevant product-specific documentation should be kept so as to be readily accessible to all users.
- ▶ Always include the required documentation when you pass the drive module on to third parties.

Due to the interaction between the drive module and the complete machine, the installation of the drive module into the machinery 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 complete machine to have undertaken an independent risk assessment. Furthermore, the manufacturer must on this basis have prepared operating instructions for the complete machine

2.2 Intended use

The drive module constitutes partly completed machinery in terms of EC Machinery Directive 2006/42/EC. In terms of the EC Machinery Directive, the drive module is not considered to be a ready-to-use machine. The drive module is exclusively intended for integration into a machine or system or for assembly with other components to form a machine or a system. The drive module 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 drive module is not considered to be a safety component in terms of EC Machinery Directive 2006/42/EC.

UPE2 clamping and drive modules may be used as follows:

- In the general mechanical engineering sector
- For test machines and test stands
- For clamping, locking, releasing and indexing at machines
- As drive for hydraulic tools

The UPE5 drive module may be used as follows:

- In the general mechanical engineering sector
- For test stands
- For lifting platforms
- For conveyors
- For winding machines

The drive module is only intended for professional use and not for private use.

Intended use includes having read and understood this documentation completely, especially the chapter 2 "Safety instructions".

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.

2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of mechanics, electrics and hydraulics as well as of the appropriate technical terms. In order to ensure operational safety, these activities may only be carried out by corresponding experts or an instructed person under the direction and supervision of an expert.

Experts are those who can 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 conditions pertaining to the work to be undertaken. An expert must observe the relevant specific professional rules. Hydraulic expert knowledge means, e.g. that the personnel are able to read and completely understand hydraulic schemes. Particularly the functionality of the installed safety components in the overall concept must be completely understood.

2.5 General safety instructions

- Observe the valid regulations on accident prevention and for environmental protection.
- Observe the safety regulations and provisions of the country where the product is implemented/used.
- Exclusively use Rexroth products in good technical order and condition.
- Observe all notes on the product.
- Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to react.
- Only use accessories and spare parts authorized by the manufacturer in order to exclude hazards to persons due to inappropriate spare parts.
- Comply with the technical data and environmental conditions indicated in the product documentation according to chapter 16.
- 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 please only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product.
- Do not commission the product until you can be sure that the end product (for example a machine or system) where the Rexroth product is installed complies with the country-specific provisions, safety regulations and standards of the application.
- Never remove or damage lead seals that have been fitted by Bosch Rexroth.

2.6 Product- and technology-related safety instructions

WARNING

Pressurized system!

Danger to life, risk of injury, severe injury when working at systems that have not been stopped! Damage to property!

- ▶ Ensure that the drive module is completely depressurized.
- ▶ Do not disconnect lines, connections or components as long as the drive module is under pressure.
- ▶ Switch off all force-transmitting components and ports (electric, pneumatic, hydraulic) according to the manufacturer's instructions and secure them against restarting. If possible, remove the main fuse of the system.

High electrical voltage!

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

- ▶ Make sure the relevant system part is de-energized before assembling the drive module or when connecting and disconnecting connectors.
- ▶ Protect the system against being switched on.

Leaking hydraulic fluid mist due to defective or improperly assembled seals!

Risk of fire, risk of explosion, risk due to allergic reactions, environmental pollution!

- ▶ Welding works may only be undertaken when the drive module is depressurized.
- ▶ Keep open fire and sources of ignition away from the drive module.

CAUTION

Leaking hydraulic fluid due to leakage of the drive module/the hydraulic system!

Risk of burning! Risk of injury!

- ▶ Switch the system off immediately (emergency stop switch).
- ▶ Identify and remedy the cause of the leakage.
- ▶ Never try to stop or seal the leak or the oil jet using a cloth.
- ▶ Avoid direct contact with the leaking hydraulic fluid. It might be under high pressure.
- ▶ Carry out visual inspections for tightness of the drive module and the oil-containing components on a regular basis.

Slip hazard due to oily surfaces!

Risk of injury!

- ▶ Protect and mark the danger zone.
- ▶ Use an oil binding agent in order to bind the leaked hydraulic fluid.
- ▶ Remove and dispose of (see chapter 13 "Disposal") the contaminated oil binding agent.
- ▶ Wear your personal protective equipment like safety boots.

 **CAUTION****Danger due to insufficient fastening!**

Risk of injury!

- ▶ Always ensure a vertical installation position (UPE2).
- ▶ Fasten the product using all screws according to the connection dimensions specified in the relevant data sheet.

Hazard due to incorrect connection of the control and supply lines!

Unforeseeable reactions, risk of injury!

- ▶ Ensure that only trained specialists are commissioned with the assembly.
- ▶ Observe the circuit diagrams located at the device when assembling the product.

2.7 Safety equipment

- Make sure that all safety devices belonging to the drive module are present, have been installed properly and are fully functional. Do not displace, bypass or disable safety equipment.
- If it should be necessary to disable any safety equipment temporarily, for example for commissioning or maintenance work, always take the appropriate measures to ensure that no hazard to a person's life or health or to property may occur. Also observe the superordinate operating instructions for the machine or system.

2.8 Obligations of the machine manufacturer

In order to ensure safety when handling the drive module, the manufacturer of the machine must:

- Select the safest installation position for the drive module possible in order to avoid possible damage of the drive module.
- Provide for sufficient protection of the drive module including all attachment parts depending on the selected installation position in order to avoid possible damage of the drive module and its attachment parts.
- Prescribe the wearing of personal protective equipment or perform suitable protection measures in order to reduce the risk of collision, the risk of hearing damage and the risk of burns at hot surfaces for operating or maintenance personnel.
- Label the hydraulic components according to the specifications of EN 982, 7.3 et sqq.
- Take suitable protective measures in order to reduce the slip hazard caused by oily surfaces around the drive module.

2.9 Obligations of the operator

The operator of the Bosch Rexroth drive modules must provide personnel training on the following topics and on a regular basis:

- Observation and use of the operating instructions and the legal regulations
- Intended use and operation of the Bosch Rexroth product
- Observation of the instructions from the factory security office as well as the operator's operating instructions
- How to behave in case of emergency



Bosch Rexroth offers measures supporting the training in specific fields. You can find an overview of the training contents on the Internet at <http://www.boschrexroth.de/didactic>.

3 General warnings of damage to property and damage to the product

NOTICE

Danger due to improper handling!

Damage to property!

- ▶ The product may only be operated according to section 2.2 "Intended use".
- ▶ Do not hit against areas relevant for the functioning (e.g. sealing surfaces) and attachment parts (e.g. control, accumulator, valves).

Mixing hydraulic fluids!

Damage to property!

- ▶ Any mixing of hydraulic fluids of different manufacturers and/or of different types of the same manufacturer is generally not admissible.

Pollution by fluids and foreign bodies!

Early wear and malfunctions!

Take the following measures for protecting the drive module:

- ▶ During assembly, provide for cleanliness in order to prevent foreign bodies e.g. welding beads or metal chips from getting into the hydraulic lines and causing product wear or malfunctions.
- ▶ Make sure that all connections, hydraulic lines and attachment parts (e.g. measuring instruments) are clean and free of chips.
- ▶ For removing lubricants or any other heavy pollution, use industrial residue-free wipes.
- ▶ Before commissioning, ensure that all hydraulic and mechanical connections are connected.
- ▶ During filling, filter the hydraulic fluid using a suitable filter system in order to minimize the solid particle contamination and water in the system.

Improper cleaning!

Damage to property!

- ▶ Cover all openings with the appropriate protective plugs in order to prevent cleaning agents from penetrating the system.
- ▶ Check that all seals and electrical plug-in connections are firmly fitted to prevent the penetration of cleaning agents.
- ▶ Do not use aggressive cleaning agents for the cleaning. Clean the drive module using a suitable cleaning liquid.
- ▶ Do not use a pressure washer.

Operation with a lack of hydraulic fluid!

Damage to property!

- ▶ Observe the data sheet specifications regarding the point "Control of the hydraulic fluid" and the prescribed remedial measures for the control result.

General warnings of damage to property and damage to the product***NOTICE*****Leaking or spilt hydraulic fluid!**

Environmental pollution and pollution 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 drain tray under the drive module.
- ▶ Observe the information in the safety data sheet of the hydraulic fluid and the system manufacturer's specifications.

4 Scope of delivery

These operating instructions have been prepared for drive modules.

In addition to the actual product itself, the scope of delivery for drive modules also includes both general and product-specific documentation.

These documents are listed in the following table:

Table 5: Scope of delivery documents

	Document	Drive module	Assembly
Product-specific documentation	Technical specification	x	x
	Hydraulic diagram	x	Catalog sheet, if applicable
	Component list to the hydraulic diagram	x	Catalog sheet, if applicable
	Assembly drawing	x	Catalog sheet, if applicable
	EC declaration of incorporation	x	—
General documentation	Operating instructions (this document)	x	x
	Data sheet	x	x
	Assembly instructions	x	—

5 Information on this product

5.1 Performance description

A drive module constitutes a complete drive system that is delivered ready for connection. It is used for supplying hydraulic circuits with hydraulic fluid.

5.2 Product description

The drive module for which these operating instructions have been prepared is exclusively intended for installation into machinery. This product has generally been designed and manufactured to customer specifications. For the specific description of your product, please refer to the relevant product-specific documentation consisting of:

Product-specific documentation

- Technical specification: Description of the operating conditions and information on the installation into the machinery
- Hydraulic diagram: Function(s) and logic mode of operation of the product
- Component list to the hydraulic diagram
- Assembly drawing: Structural design, dimensions, connections, etc.

Basic elements

Drive modules according to these operating instructions at least consist of:

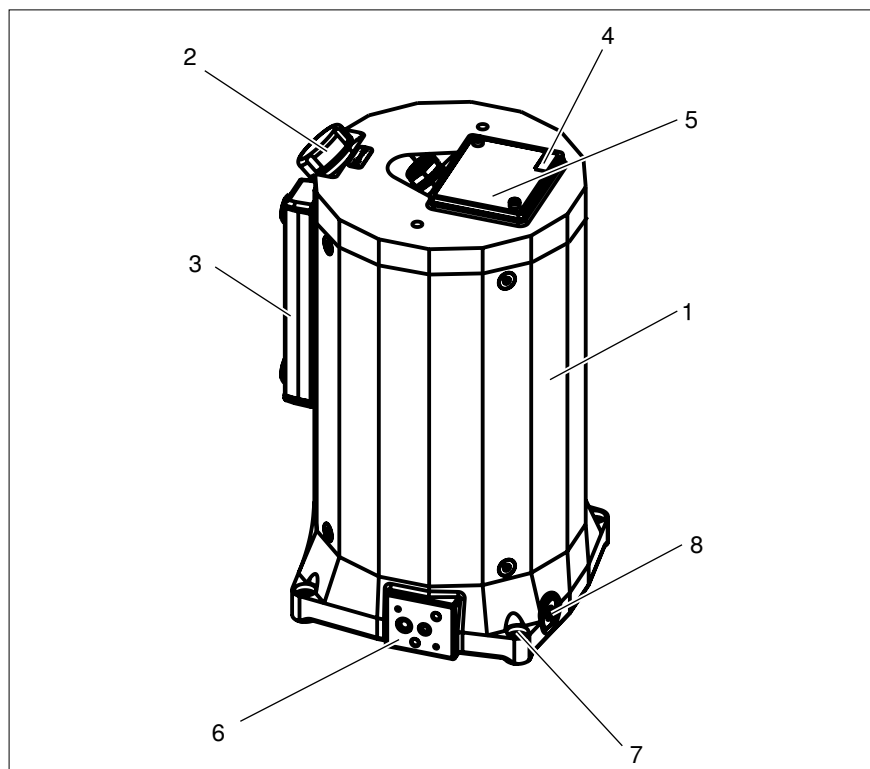
- Electric motor and pump
- Tank
- Oil level display

Extensions

Apart from that, drive modules may comprise:

- Hydraulic control
 - Accumulator
 - Pump pressure limiting device
 - Additional protective devices to prevent unintended pressures
 - Additional equipment for recording defined operating conditions (pressure, temperature, filling level, filter contamination)
 - Pipe / hose line, fittings, etc.
- For reasons in connection with the thermal load, operate the drive module in short-time operation, intermittent operation or continuous operation, depending on the type.
- Select the duty cycle depending on the power output and the environmental conditions so that the maximum admissible operating temperature is not exceeded.

UPE2

**Fig. 1: Drive module UPE2**

- | | |
|-------------------------------------|--------------------------------------|
| 1 Tank with electric motor and pump | 6 Control connection surface |
| 2 Filling plug | 7 Through holes for fastening screws |
| 3 Oil level display | 8 Oil drain screw |
| 4 Name plate | |
| 5 Terminal box | |

Explanation of the function: See table 6.

Information on this product

UPE5

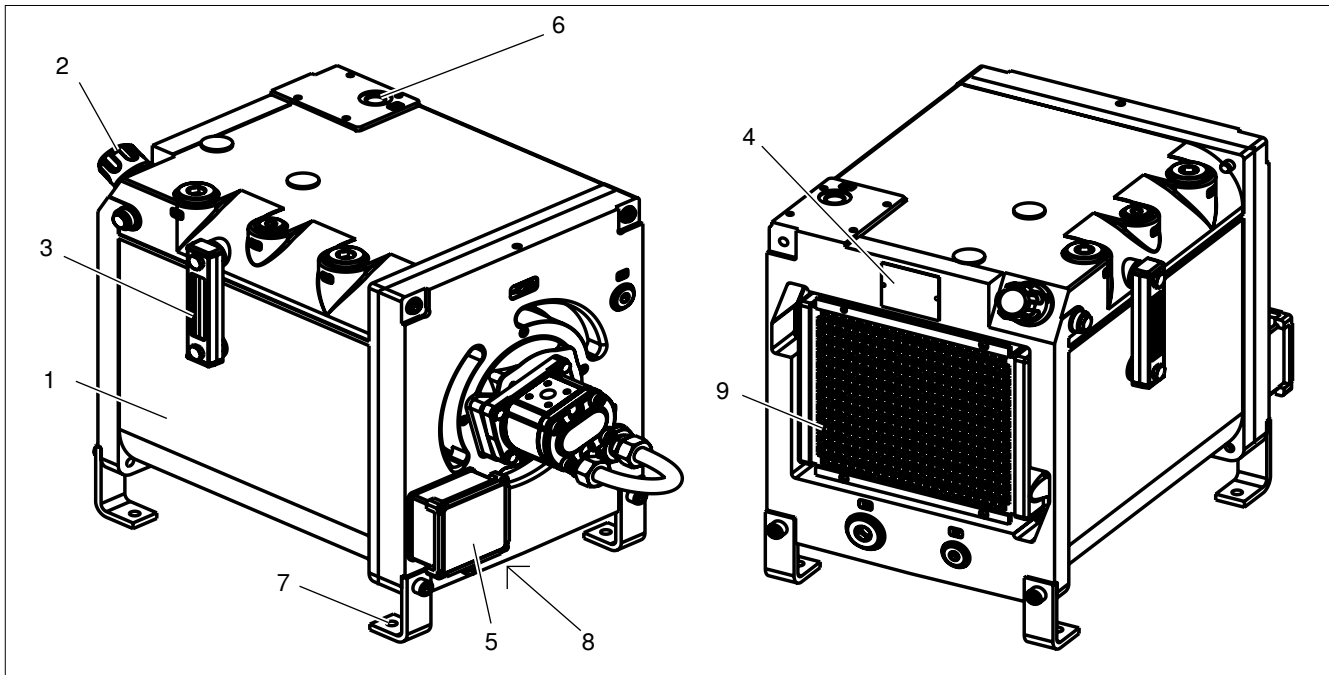


Fig. 2: Drive module UPE5

- | | | | |
|---|-----------------------------------|---|------------------------------------|
| 1 | Tank with electric motor and pump | 6 | Control connection surface |
| 2 | Filling plug | 7 | Through holes for fastening screws |
| 3 | Oil level display | 8 | Oil drain screw (not visible) |
| 4 | Name plate | 9 | Oil-air cooler |
| 5 | Terminal box | | |

Table 6: Functions elements drive modules

No.	Element	Function
1	Tank with electric motor and pump	Tank is used for accepting the hydraulic fluid
2	Filling plug	Filling of the tank with hydraulic fluid
3	Oil level display	Hydraulic fluid level monitoring
4	Name plate	Name plate for the unambiguous identification of the drive module
5	Terminal box	Connection electric motor as well as connection temperature switch (optional)
6	Control connection surface	Connection surface for attaching the filling plug
7	Through holes and/or tapped holes for attachment	Through holes and/or tapped holes for attachment of the drive module
8	Oil drain screw	Tank draining
9	Oil-air cooler	Cooler is used for cooling the hydraulic fluid

5.3 Interfaces

5.3.1 Hydraulic connections

UPE2

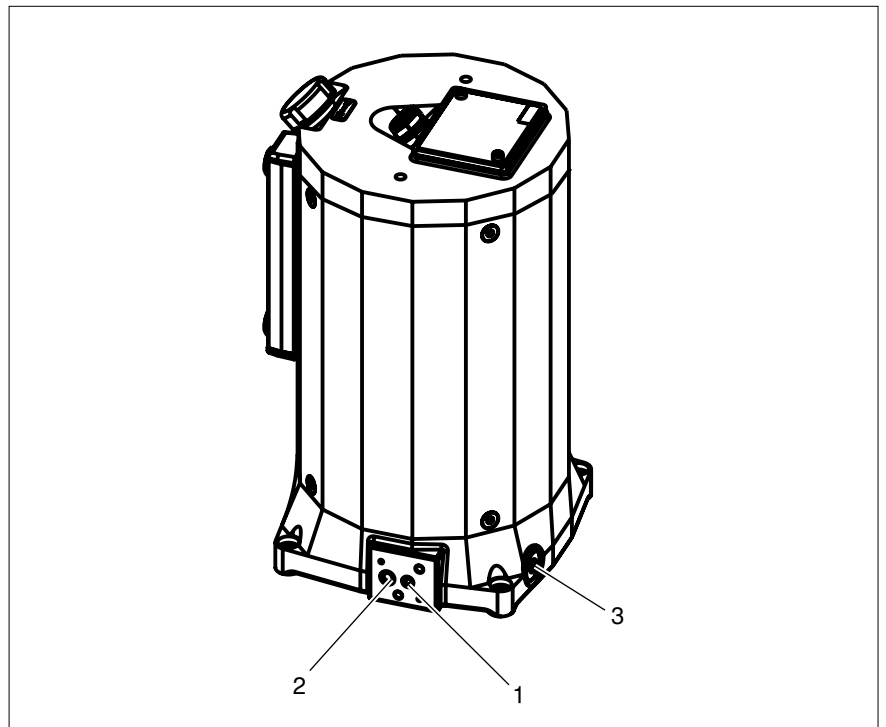


Fig. 3: Hydraulic connections drive module UPE2

- | | |
|---|-------------------|
| 1 Pump connection "P" for control modules | 3 Oil drain screw |
| 2 Tank port "T" for control modules | |

Explanation of the function: See table 7.

Information on this product

UPE5

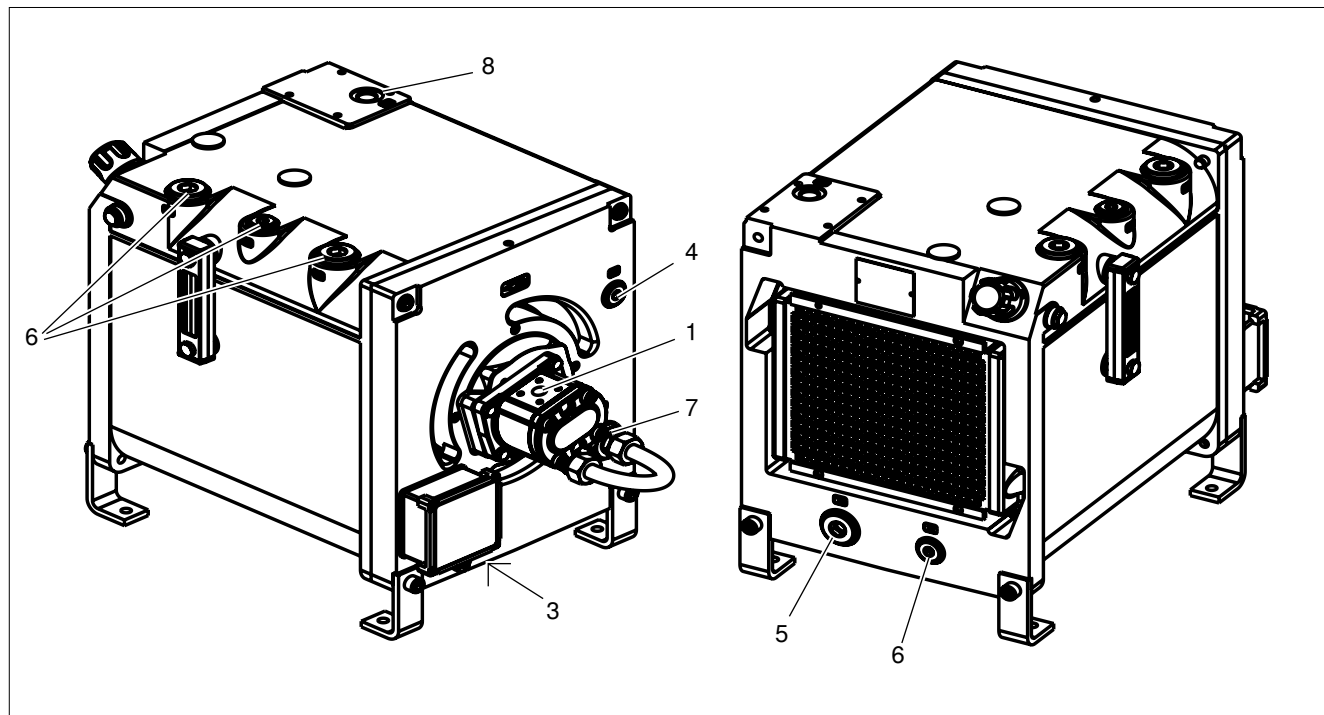


Fig. 4: Hydraulic connections drive module UPE5

- | | |
|---|--|
| 1 Pump connection "P" for control modules | 6 Tank port "T2, T3, T4, T5" |
| 3 Oil drain screw (not visible) | 7 Suction port "S" |
| 4 Cooler connection "K1" for leakage oil | 8 Cooler connection "K2" for control modules |
| 5 Tank port "T1" | |

Table 7: Hydraulic connections drive modules

No.	Element	Function
1	Pump connection "P"	Via the pump connection, the control modules are supplied with hydraulic fluid
2	Tank port "T"	Via the tank port, the hydraulic fluid of the control modules is led back into the tank
3	Oil drain screw	Tank draining
4	Cooler connection "K1" for leakage oil	Control pump leakage oil connection
5	Tank port "T1"	Oil leakage in the tank under minimum oil level
6	Tank port "T2, T3, T4, T5"	External actuator tank oil connection
7	Suction port "S"	Through the port, the pump sucks hydraulic fluid from the tank
8	Cooler connection "K2" for control modules	Via the cooler connection, the hydraulic fluid of the control modules is led back into the tank via the cooler

5.3.2 Electrical connections

UPE2

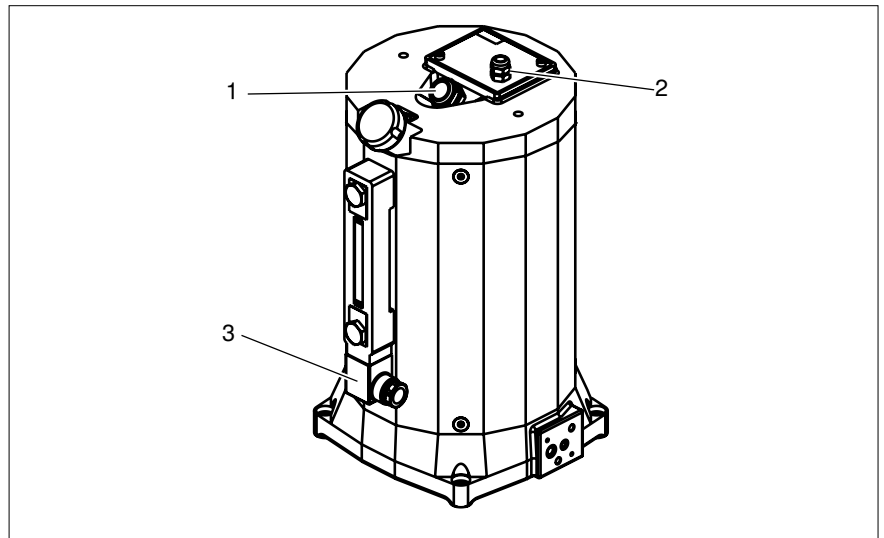


Fig. 5: Electrical connections drive module UPE2

- | | | | |
|---|--------------------|---|-------------------------------------|
| 1 | Electric motor | 3 | Oil level display with level switch |
| 2 | Temperature switch | | |

Explanation of the function: See table 8.

5.4 Product identification

The drive module is unambiguously identified by:

- Name plate
- Product-specific and general documentation
- Delivery note and accompanying documents

UPE2

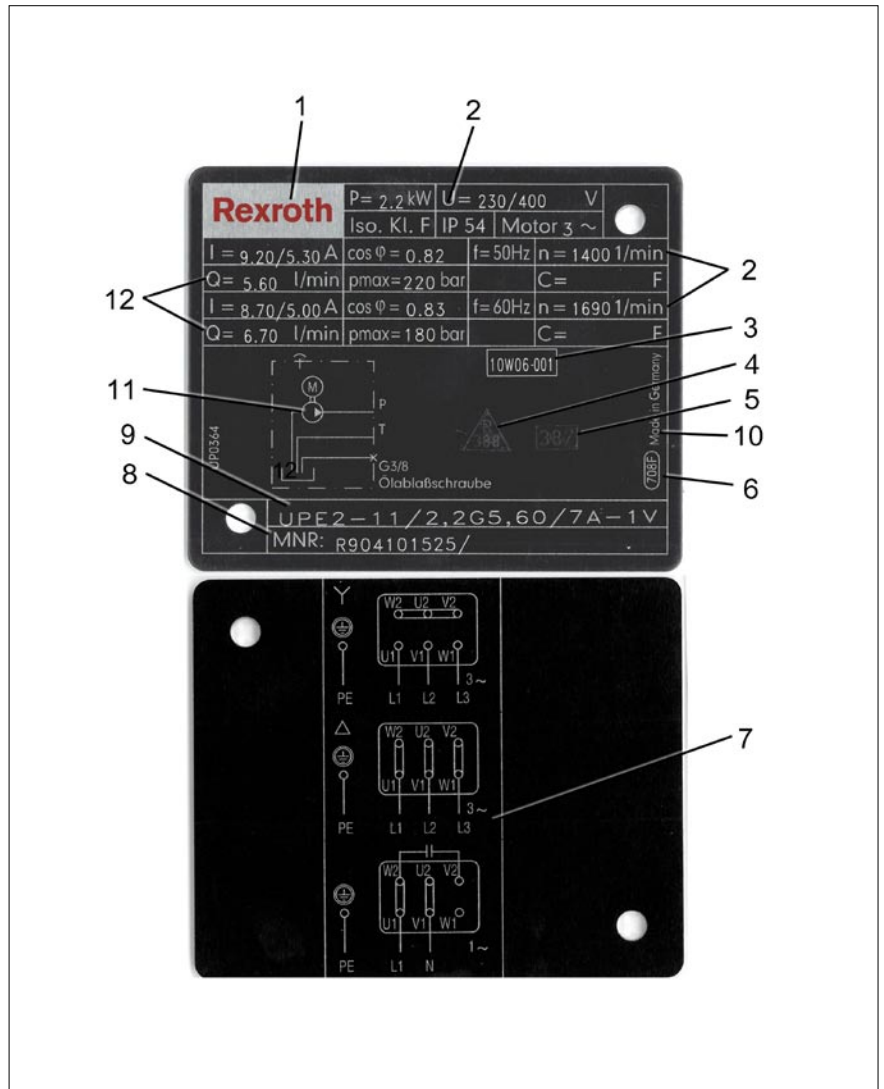


Fig. 7: Drive module UPE2

- | | |
|--|-------------------------------|
| 1 Manufacturer | 7 Terminal allocation |
| 2 Technical data of the electric motor | 8 Material number |
| 3 Date of manufacture | 9 Material short text |
| 4 Personal stamp of the examiner | 10 Designation of origin |
| 5 Personal stamp of the fitter | 11 Circuit diagram symbol |
| 6 Area / works number | 12 Technical data of the pump |

Information on this product

UPE5

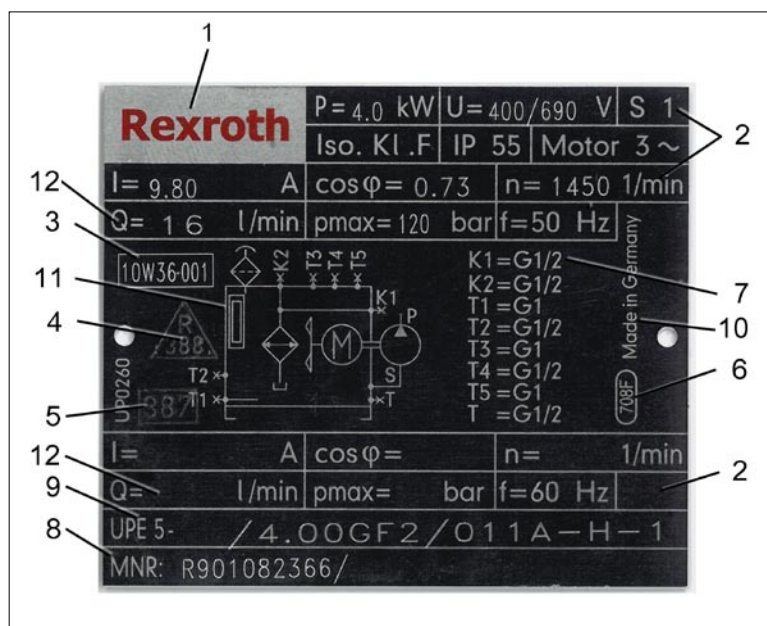


Fig. 8: Drive module UPE5

- | | | | |
|---|--------------------------------------|----|----------------------------|
| 1 | Manufacturer | 7 | Connection sizes |
| 2 | Technical data of the electric motor | 8 | Material number |
| 3 | Date of manufacture | 9 | Material short text |
| 4 | Personal stamp of the examiner | 10 | Designation of origin |
| 5 | Personal stamp of the fitter | 11 | Circuit diagram symbol |
| 6 | Area / works number | 12 | Technical data of the pump |

6 Transport and storage

- ▶ When storing and transporting the product, always observe the ambient conditions specified in Chapter 6.2 "Storing the drive module".
- ▶ If the package has to be opened e.g. for inspection purposes, you should reseal the packaging to the condition in which it was supplied.
- ▶ Wherever possible, the packaging should not be removed until directly before assembling the unit.

6.1 Transporting drive modules

6.1.1 Preparing the drive module for transport

The following preparations must be carried out before transport:

- ▶ Check the space required for the installation of the drive module at the place of use.
- ▶ Check the transport route. Depending on the method of transport, allow for additional space around the drive module.
- ▶ After previous operation of the drive module, depressurize the installed accumulators on the oil side. If possible, reduce the pressure on the gas side to a value of 2 bar (200 kPa).



Bosch Rexroth always delivers drive modules without hydraulic fluid. Any deviations from this rule are described explicitly in the product-specific documentation. From the factory inspection there may, however, still be oil residues in the product.

6.1.2 Manual transport

! CAUTION

Hazard due to overload and/or unsuitable gesture during lifting and transport!

Most severe injuries and injuries that adversely affect posture!

- ▶ Completely drain the drive module.
- ▶ Secure the drive module for the transport within the company, e.g. by means of a pallet.
- ▶ Only lift the drive module using attachment devices or suitable lifting gear.

6.1.3 Transport using forklifts and similar floor conveyors



When using floor conveyors, e.g. forklifts, the drive module may only be transported by personnel who can prove they hold the relevant qualifications, including safety training, for the respective device.

You should proceed as follows:

- ▶ Secure the drive module at the floor conveyor against tilting. For this purpose, use suitable attachment devices like e.g. tie downs.
- ▶ Do not fasten attachment devices at the control modules.

Transport and storage

- ▶ Carefully lift the drive module taking into consideration the stable center of gravity location and transport it to the desired position.
- ▶ Ensure that the control modules of the drive module do not come into contact with the attachment devices during transport.
- ▶ Carefully set the drive module down again and remove the attachment devices.

6.1.4 Transport by means of lifting gear and attachment points

The drive module can be transported by means of lifting gear in connection with attachment devices, e.g. lifting strap or chain.

- ▶ Make sure that the lifting capacity of the lifting gear and the attachment devices is sufficiently dimensioned in order to safely bear the drive module's weight.

The weights of the drive modules are contained in table 16 in chapter 16 "Technical data".

Tapped hole for ring bolt

For safe transport of the drive modules, a ring bolt can be screwed into the tapped holes in the tank cover.

Tapped hole UPE2

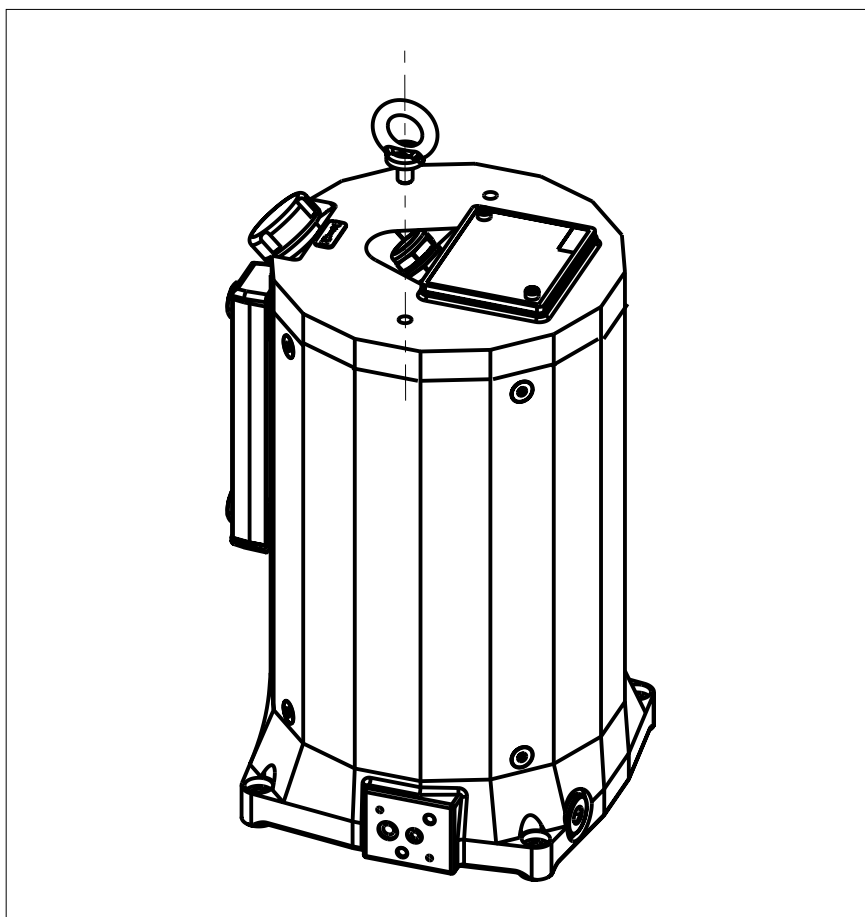


Fig. 9: Tapped holes for ring bolt at the UPE2 (eyebolt)

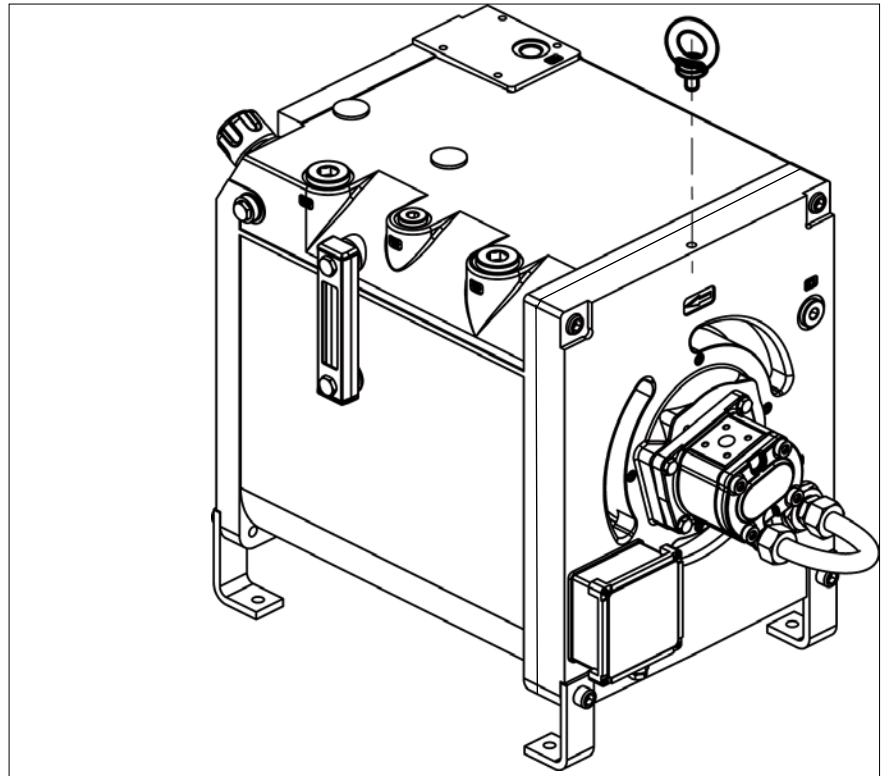
Tapped hole UPE5

Fig. 10: Tapped holes for ring bolt at the UPE5 (eyebolt)

Transporting the drive module

- ▶ Screw the ring bolt (eyebolt) into the tapped hole until it is hand-tight.
- ▶ Fasten a lifting strap or chain at the ring bolt.
- ▶ Hang the lifting strap or chain to a crane hook.
- ▶ Make sure that the lifting strap or chain cannot damage attachment parts during lifting.
- ▶ Lift the drive module slowly and carefully, taking into consideration the stable center of gravity location in order to avoid oscillations of the drive module.
- ▶ Ensure that the control modules of the drive module do not come into contact with the lifting gear during transport.
- ▶ Transport the drive module to the desired location.

Transport and storage

- ▶ Carefully set the drive module down again and remove the attachment devices.

6.1.5 Freight transport



The various regulations of the assigned forwarding agents e.g. shipping companies, railway companies, forwarders, airlines must be observed.

- ▶ Fasten the drive module on the transport vehicle, e.g. by lashing up, screwing to the loading area or a pallet.
- ▶ Ensure that the attached control modules of the drive module do not come into contact with the attachment devices during transport.

6.2 Storing drive modules

For storing the drive module, you have to comply with the following environmental conditions:

Storage conditions

Table 9: Storage conditions

Denomination	Area
Temperature range	10 - 25 °C
Relative humidity (no condensation)	Max. 65 %
UV protection	100 %
Condensation	None
Additional ozone formation close to the storage	None

Storage up to 3 months

No special preservation necessary.

Storage longer than 3 months

Contact Bosch Rexroth for the preservation and later commissioning of the drive module if the drive module must be stored for a period of more than three months.

7 Assembly

This chapter describes the assembly of the drive module at its place of use as well as the connection of the drive module to the hydraulic system, the electrical systems and the water supply of the machine, if applicable.

For information regarding the installation into the complete machine, particularly regarding its overall function and logic mode of operation, please refer to the instructions and/or the documentation for the complete machine.

7.1 Unpacking

- ▶ Remove the drive module packaging.
- ▶ Dispose of the packaging material in accordance with the national regulations in your country and/or your company-internal specifications/procedures.

7.2 Drive module assembly

To assemble the drive module proceed as follows:

1. Position the drive module as specified in the assembly drawing of the machine.
2. Ensure that the footprint contact associated with mounting is consistent.
3. Always ensure a vertical installation position (UPE2)!
4. Level the drive module so that its longitudinal and transverse axes are horizontal.
5. Securely fix the drive module at the mounting positions specified in the general documentation.

7.3 Hydraulically connecting the drive module

- | | |
|------------------------------|--|
| Preparation | <p>Remove the plugs and flange covers (colored plastic) and replace them by pressure-resistant fittings or flanges.</p> <ul style="list-style-type: none"> ▶ You should observe the manufacturer's installation instructions for the screw fittings to ensure there is no external leakage. We recommend the use of fittings with elastic seals. |
| Cleaning lines | <ul style="list-style-type: none"> ▶ Before installing, clean the connection lines to the hydraulic system, ensuring they are free from dirt, scales, chippings, etc. Welded pipes must be blank on the inside and flushed. ▶ Do not use cleaning rags/cotton waste for cleaning. |
| Connecting hose lines | <p>NOTICE! Formation of backpressure in the tank line (UPE5)!
Damage to hydraulic components</p> <ul style="list-style-type: none"> ▶ When installing the hose lines make sure that the tank line is not blocked. ▶ Observe the project-specific documentation during the assembly. ▶ Install the hose lines so that <ul style="list-style-type: none"> – kinking and tensile load of the hose are avoided during operation, – the hose is not twisted or turned, – the outer layer of the hose is not rubbed off by abrasion or impact. |



If a hose assembly becomes detached and there is a risk of whipping, it is advisable to fit a hose safety catch. If the hose assemblies are equipped with loosening-resistant fittings, no safety catch is required.

7.4 Connecting to the water supply

- ▶ Tighten the fittings according to the manufacturer's specifications.
- ▶ Lay the lines to the water connections provided and connect them according to the circuit diagram.

7.5 Connecting the electric supply

7.5.1 Earthing and potential equalization

Drive modules from Bosch Rexroth are supplied with connection for the external earthing system. Potential equalization within the drive module will only occur if the electrical wiring of the components is included in the scope of delivery. If this is not the case, potential equalization must be carried out by the machine manufacturer when wiring the drive module to the machine.



The drive modules must be grounded!

The earthing line and the lines for the potential equalization must have the minimum cross-section as per VDE regulations and a yellow-green sheath or labeling.

- ▶ Before connecting the cables, you should earth the device that is to be connected and provide for potential equalization via a common equalizing bar.

7.5.2 Laying the power supply and control cables and connecting the electricity supply

- ▶ The electrical installation must be performed in accordance with the currently applicable rules of electrical engineering.
- ▶ You must ensure that the power supply is disconnected and also safeguarded against being switched on unintentionally.
- ▶ You should prevent this e.g. by using a warning sign to draw attention to works at the electrical system.

7.5.3 Installing the electrical control and monitoring equipment

- ▶ Connect the control and monitoring equipment (switching devices, open-loop or closed-loop control equipment or frequency converters) according to the relevant documentation, taking into account the appropriate safety precautions.

8 Commissioning

DANGER

Risk of breaking hose lines due to overload or aging!

Danger to life, risk of injury!

- ▶ Replace the hose lines after 6 years at the latest or if damage is visible.

According to EC Machinery Directive 2006/42/EC, commissioning must not be undertaken until it has been determined that the machinery into which the drive module is to be installed complies with the provisions of all relevant guidelines/directives.

The combination of components may give rise to other types of hazard. It is therefore essential that the information in the operating instructions for the complete machine be observed.

This applies in particular to "Mechanical hazards" that may result from mechanical movements of the machine initiated by the drive modules and drives (cylinders, motors).

8.1 First commissioning

8.1.1 Before commissioning

- ▶ Ensure that the line system is in good, work-safe condition.
- ▶ Open the taps in the cooling water line (if present).
- ▶ Get the data sheets of the components to be assembled according to the parts list ready.
- ▶ Keep the suitable tool ready.
- ▶ Compare the pressure adjustment of the type tested pressure relief valve with the maximum admissible operating pressure of the accumulator (if available). The pressure adjustment of the type tested pressure relief valve must not be higher than the admissible operating pressure of the accumulator.
- ▶ Adjust the electrical level monitoring and/or temperature measuring device (if present) as required for operation of the machine.

8.1.2 Valve settings

- ▶ Set pressure valves and flow control valves to the lowest settings possible.
- ▶ Bring directional valves into the basic position.
- ▶ Do not energize proportional valves to the command value.



Do not make any changes on sealed valves.



Do not change the factory settings. Do not set or adjust valves that, according to the technical specifications (circuit diagram or parts list), have been provided with a fixed factory setting.

8.1.3 Safe handling of pressure tapping points

When setting pressure valves, the respective pressures must be displayed. This can be done by using fixed installed pressure gauges, digital pressure displays or by connecting external measuring equipment. For this purpose, measuring couplings have been installed within the drive module. As the measuring points can be operated while under pressure, extreme caution is required!

If the scope of delivery includes a measuring device that is connected to both measuring hose and coupling, the connection may only be opened on the coupling side. The following diagram (see Fig. 11) shows the position for safe separation of the measuring equipment from the pressurized measuring coupling of the drive module.

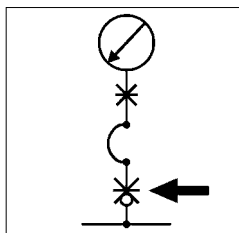


Fig. 11: Position for safe separation of the measuring equipment (arrow)

8.1.4 Accumulator

If the drive modules includes accumulators, the instructions applicable at the place of installation are to be complied with before commissioning as well as during operation. Operating Instructions are supplied with each accumulator.

- ▶ You should ensure that these documents are kept together with the accumulator. Experts will need these for subsequent inspections.
- ▶ On the hydraulic fluid side, the hydraulic system must be sealed tightly, bled (see Chapter 8.1.7 "Bleeding the complete hydraulic system of the machine") and depressurized.
- ▶ Fill the accumulator according to the information in the circuit diagram to the prescribed preset gas pressure.
- ▶ The filling and measuring procedures are undertaken using testing and filling equipment (in this connection see "Product-specific operating instructions" for this device).



Affix a label to the accumulator specifying the accumulator filling pressure and note this value in the circuit diagram. This will enable you to perform a comparative control at a later date.

8.1.5 Filling the hydraulic system

CAUTION

Contact with hydraulic fluid!

Health hazard/impairment of health, e.g. eye injuries, skin lesions, intoxication upon inhalation!

- ▶ Observe the safety data sheet on the hydraulic fluid used.

Fill the hydraulic system with suitable hydraulic fluid as specified, proceeding as follows:

- ▶ When filling the hydraulic system you should ensure absolute cleanliness.
- ▶ If, after transport or storage, the drive module is seen to be contaminated, you should clean the filter inlets on the tank before opening.
- ▶ Under no circumstances should you remove filter screens at the filler neck and/or the filter insert while filling.
- ▶ With longer transport or storage times, check the tank for any water present and remove via the drain cock.



Recommendation: Experience has shown that the cleanliness class required for operation of the machine is already exceeded in the case of new hydraulic fluids in the original container.

If you wish to ensure that the cleanliness class is acceptable, use a special filter unit for filling the drive module if necessary, or use a filter station with fine filter.

When filling the pump housing you should proceed as follows:

- ▶ For pumps with leakage oil connection, fill the housing with hydraulic fluid (see also Operating instructions of the attached pump).
- ▶ Observe the maximum/minimum fluid levels, taking into consideration tank volumes, line system, drives, etc.

8.1.6 Activating the electric supply

See machine manufacturer's operating instructions.

8.1.7 Bleeding the complete hydraulic system of the machine



See machine manufacturer's operating instructions.

- ▶ Bleed the hydraulic system at the hydraulic components at the highest point.

Commissioning

8.1.8 Commissioning

The following steps are to be performed unless superordinate commissioning instructions applicable at machine level are to be observed.

- ▶ Start the electric motor in inching mode. Check the direction of rotation.
- ▶ Flush the hydraulic system as described in Chapter 8.1.9.
- ▶ Operate the directional valves and extend and retract the actuators several times. Repeat the bleeding processes (bleeding is ensured if there is no oil foam in the tank, no jerky movements at the actuator and no abnormal noises).
- ▶ Operate the system at low pressure until the drive module is completely bled. Only increase the load step by step.
- ▶ Observe the fluid level in the container and top up, if necessary.
- ▶ Monitor the operating temperature as it sets itself after the machine has been in full operation for several hours.
- ▶ Check the drive module for external leakage, seal any leakage points; check the connection points again for tightness after a few hours.

Problems in the commissioning

Tables describing the fault causes and their consequences in drive modules are available as support for the systematic search and/or localization of faults (see Chapter 15).

8.1.9 Flushing the hydraulic system

Flushing the hydraulic system to attain a specified oil cleanliness class prevents faults and simultaneously increases the service life of the components. After installing the drive module into the machine and/or after installing with the hydraulic system, it must be ensured that the minimum requirements are met with respect to the cleanliness class of the components. Hydraulic systems in general industrial applications require a cleanliness class of 20/18/15 according to ISO 4406, whereas hydraulic systems with servo valves or high-response valves of higher quality demand a higher cleanliness class e.g. 18/16/13.



You must take into consideration the cleanliness requirement for the components as specified on the manufacturers' data sheets, when determining the flushing target.

Preparations:**Necessary material**

- Supply of spare or flushing filter elements
- If required: Supply of additional material for piping and hose assemblies for establishing flushing and/or shorting links
- Supply of flushing plates or directional valves
- On a case-by-case basis: Supply of flushing fluid (see following note)

Information on the flushing liquid

You can use the same medium as the one that is also to be used later when operating the hydraulic system. When using another hydraulic fluid, the latter must be compatible with the operating medium intended for use with the hydraulic system, as well as with the materials, particularly seals, used in the hydraulic system. A maximum admissible residual amount of flushing liquid in the operating medium (e.g. 0.5 volume %) may be specified in certain circumstances (see manufacturer's specification); in this case, this has to be assured by carefully draining the flushing liquid before filling with the operating medium.



For more complex hydraulic systems with ring and branch lines, the flushing process must be planned in detail and undertaken with care. This is imperative if piping within the system have been welded and possibly also pickled.



The following statements assume that the flushing process is undertaken using the drive module described in these operating instructions. When using a separate flushing unit, it is imperative to observe the operating instructions pertaining to this unit!

Flushing temperature

For flushing, the drive module has to be brought to operating temperature, if possible, and operated with reduced pressure settings. Remember either to deactivate any existing pressure monitoring circuits for the flushing phase or to adjust them to the lower flushing pressures.

Flushing duration

No generally valid statement can be made regarding the flushing duration. It is recommended that oil samples be taken at periodic intervals during the flushing process and then analyzed for cleanliness. Suitable sampling points include e.g. the return line downstream from any existing return line filter. Depending on these results the decision then has to be made as to whether the flushing operation should be stopped (once the target cleanliness level has been attained) or continued.



Only make operating pressure settings at the pressure valves intended for that purpose. Never change the setting of sealed valves or valves with a fixed factory setting.

After flushing

After completing the flushing process care should be taken to ensure that the operating settings of the drive module are restored, that any flushing connections are dismantled and connection lines sealed so as to be pressure-tight. When replacing the flushing plates with original valves, these are to be assembled according to manufacturer specification.

8.1.10 The most frequent errors during commissioning

- The fluid level is not being checked.
- The system is being filled with unfiltered hydraulic fluid.
- The hydraulic system is not bled correctly.
- Pressure relief valves are being set too close to the working pressure (closing pressure difference is not being observed).
- Pressure controllers of hydraulic pumps are being set higher than or equal to the pressure relief valve.
- Abnormal pump noises are not being observed (cavitation, leaky suction line, too much air in the hydraulic fluid).
- The switching hysteresis of pressure switches is not being considered in the setting.
- Before commissioning, the hydraulic pump and hydraulic motor housings are not being filled with hydraulic fluid.
- The settings are not being documented.
- During commissioning, uninvolved personnel are staying in the vicinity of the machine.

Commissioning**8.2 Re-commissioning after extended standstill**

When re-commissioning the system after an extended standstill period, you should proceed as follows:

- ▶ Check:
 - The oil level
 - The accumulator pressure on the gas side
 - The tightness of the hydraulic components and the line system
- ▶ Perform switch-on procedures with increased caution.
- ▶ Bleed the hydraulic system.
- ▶ Observe the information in the operating instructions of the machine manufacturer.

Standstill 3 months ▶ Contact Bosch Rexroth for the re-commissioning after a standstill of more than 3 months.

Re-commissioning ▶ In order to re-commission the drive module, proceed as described in chapter 8.1 "First commissioning".

9 Operation

DANGER

Risk of breaking hose lines due to overload or aging!

Danger to life, risk of injury!

- ▶ Replace the hose lines after 6 years at the latest or if damage is visible.

CAUTION

High noise development during operation!

Danger of hearing damage, deafness!

- ▶ Always protect yourself by wearing ear protection when working close to the drive module. The noise development may reach up to 80 dB(A) (UPE2) or 74 dB(A) (UPE5).

Hot surfaces!

Risk of injury! Risk of burning!

- ▶ Only touch the drive module surfaces with protective gloves or do not work at hot surfaces. During or after the operation, the temperatures may exceed 60 °C, depending on the operating conditions.
- ▶ Allow the drive module to cool down sufficiently before touching it.
- ▶ Observe the protective measures of the end machine manufacturer.

Leakage at joints due to seal failure caused by excessive temperatures!

Risk of injury!

- ▶ Ensure that with drive modules without temperature switch, the maximum operating temperature remains within the temperature range prescribed in the relevant data sheet.

NOTICE

Transmission of vibration from the machine by switching the hydraulic valves at the control!

Unforeseeable reactions, risk of injury!

- ▶ Put the drive module onto damping elements.
- ▶ Use hose elements for connection.

As partly completed machinery, the drive module is intended for installation into machinery.

Information on operating the drive module can only be provided in connection with the machine.



For this information, please refer to the operating instructions of the machine manufacturer.

Information on the functional operation and logic of the drive module can be obtained either from hydraulic experts or from the general and product-specific documentation.

The drive module may only be operated with the data admissible according to chapter 16 "Technical data".

Operation

The drive module may only be operated if it is in an unobjectionable condition. In order to guarantee long and reliable functioning of the drive module, Bosch Rexroth recommends checking the hydraulic system and the drive module regularly:

- ▶ Continuously monitor noises, vibrations and temperatures.
- ▶ After some operating time, check the hydraulic fluid in the tank for bubble or foam formation at the surface.

Changes in operating speeds, temperatures, noise increase or power consumption are an indication of wear or damage at the system or the drive module.

10 Maintenance and repair

DANGER

Risk of breaking hose lines due to overload or aging!

Danger to life, risk of injury!

- ▶ Replace the hose lines after 6 years at the latest or if damage is visible.

Bosch Rexroth offers a wide range of repair services for maintenance of the drive module. Please send any enquiry to your nearest Bosch Rexroth service center or directly contact the headquarters. For the addresses, please refer to www.boschrexroth.com.

Maintenance tasks (inspection, service, repair) must be defined in terms of component-specific requirements, operating conditions (pressures, temperatures, ambient conditions) and use (duty cycle, cycle times, shift operation). See machine manufacturer's operating instructions.

Within this framework, a visual inspection is to be undertaken to detect obvious faults:

- Incomprehensible notes or warning signs
- Leaks
- Loose and/or missing components
- Indication of the application of external force

10.1 Maintenance documentation

It is recommended that the results of the inspections and the derived measures required be documented,

- So that considering functionality and economy, the service intervals can be adjusted to the actual operating conditions,
- As they offer the possibility of early fault recognition thanks to comparative evaluation (preventive maintenance).



Any negative trend of the test parameters e.g. oil temperature, replacement intervals of the filter elements or noise may be an indication of changes. The error tables (see Chapter 15) may provide help in minimizing this problem.



Gradual temperature increases and/or shorter filter replacement intervals may be an indication of possible wear at pumps, control edges, seals and aging of the hydraulic fluid and means that an inspection should be undertaken of all components under consideration.

An immediate high temperature increase is an alarm signal and requires an immediate inspection of the machine.

10.2 Inspection, maintenance, repair

Recommendations are based on the following: A Central European climate and an environmental load as is usual in metal-processing companies.

Maintenance and repair

- ▶ Before commencing the inspection, cleaning should be undertaken if necessary.
- ▶ Always ensure cleanliness when working at the drive module.

10.2.1 Filling level

- ▶ Carry out a filling level control in an interval of 8 operating hours.

Oil level

The oil level is not constant during operation of the drive module.

Level changes result from the different volume requirements of plunger and differential cylinder and/or the absorption/delivery of hydraulic fluid in hydraulic accumulators during a working cycle.

Due to the variable conditions mentioned above a complete working cycle of the machine must be observed when undertaking the visual inspection of the oil level. This will enable you to determine whether hydraulic fluid needs to be refilled or topped up, and if so, by how much.

During operation, the oil level must neither exceed the upper mark nor fall below the lower mark. If the minimum filling level is undershot, there is a risk of pump failure due to cavitation.

If the maximum filling level is exceeded, this may have been caused by the thermal expansion of the hydraulic fluid or by fluid entry (e.g. water in the case of internal leaks of the oil/water cooler).

Level monitoring

Optionally, the drive module may be equipped with an electric fluid level indicator. The switching points can be seen from the technical specification and the circuit diagram.

Maintenance, repair**Measures to be taken if the maximum filling level is exceeded:**

- ▶ Approximately determine the expansion by temperature increase ($\Delta V = \text{thermal expansion coefficient} \times \Delta T$).
 - Correct the filling level.
- ▶ If the maximum filling level is exceeded due to assumed water ingress:
 - Close the water valves (shut-off the cooling water supply).
 - Draw an oil sample at the lowest point of the tank and check it for water content.
 - If the suspected water ingress is confirmed, you should complete the machine working cycle and then shut down safely.
 - Repair the oil/water coolers according to the manufacturer's specifications or exchange them, if necessary.
- ▶ Perform more extensive control measures and implement the following measures depending on these results:
 - Clean the hydraulic fluid or replace it.
 - Carry out a flushing process, if necessary.
 - Check the hydraulic fluid for admissible water content.

10.2.2 Oil temperature (optional)

- ▶ Check the oil temperature at intervals of 8 operating hours.

If specified in the order, the drive module may be equipped with a temperature switch.

Possible causes for temperature increase

- ▶ For the switching point, please refer to the data sheet and the circuit diagram.

Possible causes for a temperature increase are:

- Malfunctioning of the heat exchangers
 - A change in the cooling water conditions
 - Malfunctioning or incorrect setting of the pressure valves (e.g. maximum pressure limitation, pump controller, pressure relief valve)
 - Fault at the pump (wear, increased leakage)
 - A change in ambient conditions (e.g. increased ambient temperature)
 - A change in load conditions at the drives
- ▶ In case of an inadmissible temperature increase, determine the causes and remedy them.

10.2.3 Filter clogging indicator (optional)

- ▶ Check the level of contamination of the filters at intervals of 8 operating hours.

Bosch Rexroth filters will be used as standard.

With these filters, if the admissible differential pressure is exceeded, an optical signal is output, i.e. a red ring becomes visible.

Cold start

- ▶ After a cold start and reaching of the operating temperature, push in the black cap of the clogging indicator (check function).

With this control, if the cap jumps out again immediately, the filter element must be replaced at the end of the shift at the latest.

In addition, the monitoring equipment may be electrical for evaluation at control level.

- ▶ For the switching point, please refer to the technical specification and the circuit diagram.



You should be wary if the filter clogging indicator still does not indicate that a replacement is necessary after several inspection intervals. Of course, this may be an indication that the hydraulic fluid is clean. It may, however, also be due to the following reasons:

- The filter clogging indicator is defective.
- The filter element is defective.
- A bypass valve, if present, does not close properly (e.g. due to penetration of dirt particles).

Maintenance, repair

- ▶ Measure: Plan and carry out a filter replacement at the end of the shift.
- ▶ If the intervals between necessary replacement of the filter elements become shorter, the reason for the increased deposition of dirt is to be identified and remedied.
- ▶ Before commencing the work, prepare receptacles for the hydraulic fluid as well as for filter housing and filter element.



When disassembling and assembling the filter element, please refer to the operating instructions of the filter manufacturer.

- ▶ Dispose of the filter elements according to the national or operator-specific regulations.

10.2.4 Pressure values

The pressure values must be checked if the behavior of the drives changes (e.g. cycle time extension, end product quality, etc). Otherwise, one control at least every six months is recommended.



We recommend recording the pressure values within the scope of the maintenance documentation.

Lead seals

Lead seals e.g. at the accumulator shut-off block provide information that the original pressure setting has not been changed. Without attaining the set pressure, the sealed valves cannot be checked within the scope of a normal inspection. The inspection here comprises a check to ensure the lead seals are intact.

- ▶ If the lead seals are defective, contact the manufacturer.

10.2.5 Oil maintenance

An oil analysis should be performed at least once per year.

An oil analysis entails drawing a sample of oil in a professional manner.

Maintenance, repair

- ▶ The oil sample must be checked in a qualified laboratory in accordance with the hydraulic fluid manufacturer's specifications.
- ▶ Carry out more measures according to the results, e.g.:
 - Additional filtration (measures)
 - Dehydrogenation
 - Exchange
- ▶ Do not use reconditioned oil (recovered oil).
- ▶ In case of an oil change, drain the hydraulic fluid completely (in this connection see also Chapter 11.1 "Preparing for decommissioning").
- ▶ In this connection, ensure complete draining of the lines and actuators.
- ▶ If necessary, carry out ventilation measures.
- ▶ Fill the hydraulic system and subsequently bleed it, as with the initial filling.

10.2.6 Hydraulic accumulator



There are legally prescribed inspections for accumulators, which have to be undertaken at defined intervals. This is the responsibility of the operator.

In order for the accumulator to function as intended, the gas pre-charge is to be checked periodically according to the information in the circuit diagram.



Regarding the maintenance of hydraulic accumulators, you should observe the relevant stipulations of ISO 4413 (Chapter 7.3.2.2) in its current version, as well as those in the operating instructions of the accumulator manufacturer.

Gas filling pressure

The essential maintenance required for hydraulic accumulators entails the verification and setting of the gas filling pressure.

For this purpose, only the testing and filling equipment and procedures may be used, which are recommended by the manufacturer for filling accumulators.

- ▶ Select the gas filling pressure depending on the gas temperature.

- ▶ Make sure that the maximum pressure for the accumulator is not exceeded.
 - ▶ Ensure that the gas valve is securely closed after each inspection or adjustment.
- Disassembly from the system** Before dismantling hydraulic accumulators, the liquid pressure in the accumulator must be reduced to ambient pressure (i.e. be in a depressurized condition).
- Maintenance information for hydraulic accumulators** Service, maintenance and/or replacement of hydraulic accumulator components may only be carried out by sufficiently trained personnel (see Chapter 2.9 "Obligations of the operator") on the basis of written instructions and by using parts and materials, the manufacture of which has been certified as being in accordance with current specifications.



Before dismantling an accumulator, it must be completely depressurized on both the hydraulic fluid and the gas side.

10.2.7 Hose lines

Hose assemblies consist of an elastic part (hose) and fittings mounted on both sides.



Hose lines are components requiring permanent monitoring.

Maintenance, repair

DANGER! Risk of breaking hose lines due to overload or aging (UPE5)!

Danger to life, risk of injury!

- ▶ Replace the hose lines after 6 years at the latest or if damage is visible.
- ▶ Replace the hose lines if one of the following is determined during the inspection:
 - Damage of the outer layer down to the core (e.g. abrasion points, cuts or cracks).
 - Visible traces of overheating, fire: Carbonization, blistering or fouling due to partial heat impact (hot spots).
 - Embrittlement of the outer layer (formation of cracks in the elastic part).
 - Deformation not corresponding to the original shape of the components in both depressurized and pressurized condition.
 - Leaks.
 - Damage or deformation of the fitting (sealing function impaired).
 - Corrosion of the fitting reducing function and stability.
 - Hose working loose from the fitting.
 - Storage time and service life exceeded.

Maintenance and repair**10.2.8 Piping**

The piping consists of the pipes and the connection elements.

Connection types:

- Form-type fitting
- Flare-type fitting
- Welded conical fitting
- Compression connector
- Flange connection

- ▶ Check the piping at least once every six months (or more frequently depending on operating conditions and use).

In order to allow for a visual inspection, prior cleaning may be required.

There is a test for:

- Corrosion
- Crack formation
- Leaks
- Indication of the application of external force

Maintenance, repair

- ▶ In case of leakage at fittings, you must re-tighten and record them. If there is still leakage at this fitting, the fitting must be carefully examined for the cause of the leakage. Depending on the findings, the seals may need to be renewed and/or the fitting replaced with a pipe section. In case of leakage at flanges, you must proceed in a similar manner.
- ▶ In case of crack formation or leakage at welded seams, you must determine and remedy the cause. Afterwards, you must replace the components concerned or repair them in a professional manner.
- ▶ If there are signs of an application of external force, you must determine and remedy the cause. Afterwards, the component and also adjacent pressurized components are to be checked for damage and assessed with respect to further reliable use. If necessary, the component is to be replaced or repaired in a professional manner.
- ▶ If there are signs of corrosion, you must check the component for damage and assess it with respect to further reliable use. If necessary, you must replace this component repair it in a professional manner. Corrosion protection has to be applied.

10.2.9 Heat exchanger (UPE5)

The following may be installed, depending on the drive module:

- Oil-air cooler
- Oil-water cooler

In case of decreasing cooling power

- ▶ Check the cooler element for pollution of the lamellae regularly and provide for cleaning, if necessary.
- ▶ When using water filters in the cooling circuit, check the water filter elements at least once every six months and clean them, if necessary.

10.2.10 External inspection of the tank

- ▶ The external inspection is a visual inspection. Carry out an external inspection of the tank at least once every six months, or more frequently depending on operating conditions and use.

In order to allow for a visual inspection, prior cleaning may be required.

Visual inspection

There is a visual inspection for:

- Leakage
- Crack formation
- Corrosion
- Dents due to the application of external force

Maintenance, repair

- ▶ In case of leakage at components installed into the tank, you must re-tighten and record them. If there is still leakage at this point, you must carefully examine the contact point for the cause of the leakage. Depending on the result, seals are to be renewed and/or the component replaced.
- ▶ In case of crack formation or leakage, you must determine and remedy the cause. Afterwards, you must replace the components concerned or repair them in a professional manner.
- ▶ If there are signs of an application of external force, you must determine and remedy the cause. Afterwards, the component and also adjacent components are to be checked for damage and assessed with respect to further reliable use. If necessary, the components are to be replaced or repaired in a professional manner.



If there are signs of an application of external force on the tank, an internal inspection of the tank should be undertaken.

- ▶ In case of crack formation at welded seams, you must determine and remedy the cause. Afterwards, the welded seams concerned are to be repaired in a professional manner.
- ▶ If foreign bodies are detected, you must remove them from the tank. Determine the origin and the cause of the presence of the foreign matter. Depending on the cause established, you must introduce suitable measures to ensure safe operation of the drive module.
- ▶ If there are signs of corrosion, you must check the component concerned for damage and assess it with respect to further reliable use. If necessary, you must replace this component repair it in a professional manner. Media-resistant corrosion protection has to be applied.
- ▶ If piping and hose fittings are loose, you must tighten them professionally.
- ▶ If screw connections are loose, the parts to be secured must sit correctly and the screw connection tightened professionally.

10.3 Repair



Bosch Rexroth offers a wide range of repair services for the drive module.

- Only use genuine spare parts from Bosch Rexroth for repairing the Rexroth product.
- Tested and pre-assembled original Rexroth assemblies allow for successful repair requiring only little time.

10.4 Spare and wear parts

NOTICE

Malfunction of the machine due to the use of incorrect spare parts!

Damage to property!

- ▶ Only use components listed in the product-specific documentation (parts list).
 - ▶ Only use new seals with the required resistance to media.
 - ▶ As the sealing material may differ despite being of identical appearance, the material number should be checked.
-
- ▶ Order spare parts in writing.
 - ▶ Please send your spare parts order to the Bosch Rexroth service next to you or directly to the headquarters (see "List of addresses" in chapter 17 "Appendix").
 - ▶ When ordering spare parts, please indicate the following information:
 - The material number of the required spare part
 - The Bosch Rexroth order number (SAP commissions No.)
 - The order date
 - ▶ Additionally indicate:
 - The number of the desired individual components
 - The desired type of dispatch (e.g. as parcel, freight, air freight, by courier service, etc.)

Please refer to the list of addresses in chapter 17 "Appendix" for the addresses of our foreign subsidiaries.

11 Decommissioning

11.1 Preparing for decommissioning

- ▶ Provide a collecting tank that is large enough to accommodate the total hydraulic fluid volume.

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

Ensuring safety

As a basic principle you should observe the related instructions for the complete machine. Unless otherwise specified in these operating instructions, you should complete the following steps:

- ▶ Make sure that there are no hazards caused by adjacent machines.
- ▶ Do not allow uninvolved persons to remain in the area concerned.
- ▶ Lower the load or provide for safe foundation.

11.2 Decommissioning the drive module

- ▶ Switch off the electric power and secure the system against re-activation (short-circuit/bridge supply side).
- ▶ Switch off the hydraulic pressure supply and secure it against re-activation.
- ▶ Depressurize the accumulator on the oil side.
- ▶ Drain the hydraulic fluid into the collecting tank provided. In this connection, ensure complete draining of the lines and actuators. If necessary, carry out bleeding measures.
- ▶ Decommission the machine as described in the overall machine manual.

12 Disassembly and exchange



Only disassemble the component parts as far as is necessary to undertake the required work. As a basic principle, all disassembled parts should be professionally reassembled at the intended place.

12.1 Preparing disassembly

Ensuring safety:

As a basic principle you should observe the related instructions for the complete machine. Unless otherwise specified in these instructions, complete the following steps:

- ▶ Carry out the decommissioning as described in chapter 11 of these operating instructions.
- ▶ Do not allow uninvolved persons to remain in the area concerned.

12.2 Disassembling the drive module

- ▶ When disassembling you should perform the work steps described in Chapter 7 "Assembly" but in reverse order.
- ▶ Despite prior draining, hydraulic fluid will still seep out of the hydraulic line system of the drive module and/or the hydraulic system. All line outlets should therefore be closed using suitable plugs.

Seeping hydraulic fluid



After disassembly is complete, you should observe the information in Chapter 6 regarding safe transportation of the product.

13 Disposal

Irresponsible disposal of the drive module may result in environmental pollution. Please therefore observe the following points:

- ▶ Dispose of the drive module in accordance with the currently applicable national regulations in your country.
- ▶ Disassemble the drive module into its individual components in order to recycle them.
- ▶ Dispose of hydraulic fluid residues according to the respective safety data sheets valid for these hydraulic fluids.
- ▶ Separate:
 - Cast iron
 - Steel
 - Non-ferrous metal
 - Seals
 - Plastic
 - Electronic components

14 Extension and conversion

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

Statements become invalid

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



This means the following for drive modules:

Drive modules are partly completed machinery in terms of EC Machinery Directive 2006/42/EC. Together with the general and product-specific documentation, you have received a declaration of incorporation for these products. In the case of extension to or conversion of the drive module, this declaration will become invalid.

Please send any queries you may have to your nearest Bosch Rexroth service center or directly to the headquarters. For the addresses, please refer to www.boschrexroth.com.

15 Troubleshooting

Successful troubleshooting within a drive module requires precise knowledge of the set-up and the mode of operation of the individual components. The combination of hydraulic and electrical systems and electronics makes the troubleshooting even more complex.

For effective troubleshooting, the circuit diagrams (hydraulic and electrical, if applicable), parts lists, any functional diagrams and other documents must be available.

15.1 How to proceed for troubleshooting

- ▶ Always work systematically and focused, even when under time pressure. Random and imprudent disassembly and readjustment of settings can, in the worst-case scenario, result in the inability to determine the original cause of the fault.
- ▶ First get a general idea of how your drive module works in conjunction with the overall system.
- ▶ Try to establish whether the drive module was working properly in conjunction with the entire system before the problem first occurred.
- ▶ Try to determine any changes of the overall system in which the drive module is integrated:

Control questions

- Were there any changes to the drive module's operating conditions or operating range?
 - Were there any changes (e.g. retrofitting) or repair works on the entire system (machine/system, electrics, control) or on the drive module?
 - If so: What were they?
 - Was the drive module or machine used as intended?
 - How did the fault become apparent?
- ▶ Try to get a clear idea of the cause of the fault.
 - ▶ Ask the direct (machine) operator.

15.1.1 Overview of the impact of defects

The following tables contain errors/faults and their consequences, the causes of which are not exclusively attributable to the drive module. The listed error sources, possible causes and remedies refer exclusively to the drive module. You will also frequently have to look at the control system or connection technology when seeking the causes of faults.

The following list is meant as an aid, but does not claim to be comprehensive.

Tabular classification of the impact of defects:

"A" Excessive / abnormal noises

"B" Insufficient power / torque / pressure in the drives

"C" Irregular drive movements (pressure and volume fluctuations)

"D" Operating or oil temperature too high

"E" Polluted hydraulic fluid

Troubleshooting

Table 10: Impact of defect "A": Excessive / abnormal noises

	Fault	Possible causes	Remedy
1	Mechanical drive section	Pump and/or motor fastening loose	Tighten fastening
		Pump or motor defective	Replace pump / motor
		Wrong direction of rotation	Change around the electrical connections of the energy supply. Terminal assignment, see data sheet
2	Suction conditions	Oil level in the tank is too low	Check and remedy the cause of the oil loss, top up the hydraulic fluid (see also A5)
		Ventilation filter contaminated	Clean or replace ventilation filter
		Suction line plugged, not tight	Clean, seal the suction line
		Location over 1000 m above sea level	Provide for structural changes after consultation with Bosch Rexroth
3	Pump	Pump seals or pump defective	Exchange pump
		Vibrating controller system, e.g. pressure controller	Check for sufficient bleeding and correct basic setting of the controller according to the manufacturer specifications
4	Pressure valves	Flow noises and vibrations due to wrong setting	Check and, if necessary, correct the settings according to the specifications in the circuit diagram
5	Hydraulic fluid	Viscosity too high (temperature too low)	Before starting the machine function, temper the drive module; if necessary, use oil of a lower viscosity class. Admissible hydraulic fluids see data sheet.
		Oil foams (proportion of air too great)	Check and remedy the cause of the ingress of air

Table 11: Impact of defect "B": Insufficient power / torque / pressure in the drives

	Fault	Possible causes	Remedy
1	Pressure valves	Operating pressure setting too low	Control of the setting according to the specifications in the circuit diagram
2	Directional valves	Incorrect spool position (e.g. pressureless circulation; valve does not switch)	Check for jammed plug-in connection and correct current feed of the solenoid
3	Piping and hose assemblies to the drive	Pressure loss too high due to incorrect dimensioning	Replace the piping and hose assemblies with larger nominal widths
4	Other	Total values for flow- and load resistance and/or leaks too large	Check the hydraulic design after consulting with Bosch Rexroth

Table 12: Impact of defect "C": The pump is switched on or off too frequently

	Fault	Possible causes	Remedy
1	Pump	For machines with accumulators, the pump delivery volume is too low	Check the design of the pump/accumulator circuit; enlarge the accumulator, if necessary
2	Accumulator	Tap to the accumulator is closed	Check the spool position at the accumulator module, the gas pre-load and the settings according to the circuit diagram
		The preset gas pressure is not correct	
		Operating and set pressures (e.g. pressure switch) do not correspond to the requirements	

Table 13: Impact of defect "D": Oil temperature too high

	Fault	Possible causes	Remedy
1	Pump	Partial load operation of the machine, pump delivery volume cannot be adjusted in the case of fixed displacement pumps	Check the hydraulic design after consulting with Bosch Rexroth
2	Pressure valve	Incorrect setting of pressure valves - usually too low. One part of the pump delivery volume flows back to the tank via the pressure relief valves.	Check and, if necessary, correct the settings according to the specifications in the circuit diagram
3	Heat radiation	Insufficient heat dissipation due to: 1. Too little oil in the tank 2. Insufficient heat radiation due to encapsulation/ lack of ventilation	1. Check the oil level in the tank 2. Provide for forced ventilation, if necessary
4	Heat exchanger	For oil/air coolers: The air flow is impaired, ambient temperature too high For oil/water coolers: Too little flow of cooling water, temperature of cooling water too high, too little cooling water in the system, inlet pressure too low or deposits in the heat exchanger	Check whether the coolants (air, water) comply with the requirements of the technical specification
5	Other	Increased reduction in efficiency due to changed conditions, also wear, if applicable	Perform maintenance work, replace components, if necessary

Table 14: Impact of defect "E": Polluted hydraulic fluid

	Fault	Possible causes	Remedy
1	Particulate contamination	1. Deposition of dirt due to insufficiently cleaned components (e.g. piping) during installation 2. Deposition of dirt during filling of the hydraulic fluid 3. Deposition of dirt due to improperly undertaken maintenance and repair work 4. Ingress from the environment, e.g. via piston rods, pressure intensifiers, ventilation filters 5. Wear debris of components	Determination of the causes Rectification of the causes Flushing the hydraulic system Admissible cleanliness class, see data sheet
2	Water in the oil	1. Corrosion of the oil/water cooler due to water quality deviating from the material specification of the heat exchanger 2. Pressure surges on the cooling water side	1. Examination of the water quality, replacement of the heat exchanger if necessary 2. Solenoid water lock valves must only be arranged in the supply line!

16 Technical data

Table 15: Technical data

Hydraulic fluid		Mineral oil (HLP) according to DIN 51524 part 2 Please observe our specifications according to data sheet 07075
Hydraulic fluid temperature range	UPE2	-20 °C to 80 °C
	UPE5	-10 °C to 70 °C
Maximum admissible degree of contamination of the hydraulic fluid		Class 20/18/15 Cleanliness class according to ISO 4406 (c)
Optimum viscosity range		10 to 200 mm ² /s
Direction of rotation	UPE2	Optional (radial piston pump), Clockwise (external gear pump)
	UPE5	Clockwise
Installation position	UPE2	Vertical
	UPE5	Depending on design (horizontal, vertical, wall mounting)
Mode of operation	UPE2	All modes of operations in which the oil temperature remains below 80 °C
	UPE5	S1 continuous operation
Protection class according to VDE 0530 / EN 60034	UPE2	IP54 with drive module completely mounted
	UPE5	IP55 with drive module completely mounted

Table 16: Weight

Type	Weight / kg (ca.)
UPE2-1X/1,1R.../3...	17.8
UPE2-1X/1,1R.../4..	18.4
UPE2-1X/1,1G.../4..	19.6
UPE2-1X/2,2R.../5..	23.0
UPE2-1X/2,2R.../7..	25.0
UPE2-1X/2,2G.../7..	26.6
UPE5-1X/...	75.0



For more technical data, please refer to the general and product-specific documentation; in this connection, refer to chapter 1.2 "Necessary and amending general documentation" and chapter 4 "Scope of delivery".

17 Appendix

17.1 List of addresses

Please refer to www.boschrexroth.com for addresses of foreign subsidiaries.

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