



EcoPump VP

Pneumatic Vertical Piston Pump

Operation manual

MPU00026EN, V03

N24170028, N24170030, N24170040




Information about the document

This document describes the correct handling of the product.

- Read the document prior to every activity.
- Prepare the document for the application.
- Pass on the product only together with the complete documentation.
- Always follow safety instructions, handling instructions and specifications of every kind.
- Illustrations can deviate from the technical construction.

Validity range of the document


This document describes the following product:

N24170028 EcoPump VP 500 270 SST PU	
N24170030 EcoPump VP 1000 135 SST PU	
N24170040 EcoPump VP 500 270 C SST PU	

Applicable documents

If you use accessories, follow the operating instructions for the accessories.

MCU00002* - **EcoPUC A**

 An asterisk (*) in the document number replaces the symbol of the language variant.

Hotline and Contact

If you have queries or would like technical information, please contact your dealer or sales partner.

TABLE OF CONTENTS

1	Product overview	5	9	Maintenance	16
	1.1 Overview.....	5		9.1 Safety notes.....	16
	1.2 Short description.....	5		9.2 Maintenance schedule.....	17
2	Safety	5		9.3 Dismantle and assemble.....	18
	2.1 Presentation of Notes.....	5		9.3.1 Disassemble control unit.....	18
	2.2 Intended Use.....	5		9.3.2 Dismantle control unit.....	18
	2.3 Residual risks.....	6		9.3.3 Assemble control unit.....	19
	2.4 Conduct in the event of a hazardous situation.....	6		9.3.4 Assemble control unit.....	20
	2.5 Staff qualification.....	7		9.3.5 Disassemble fluid part and connecting rods.....	21
	2.6 Personal protective equipment.....	7		9.3.6 Dismantle motor.....	22
3	Design and Function	8		9.3.7 Dismantle fluid part.....	24
	3.1 Control Unit.....	8		9.3.8 Dismantling Housing.....	27
	3.2 Motor.....	8		9.3.9 Assembling Housing.....	27
	3.3 Fluid part.....	8		9.3.10 Assemble fluid part.....	28
4	Transport, scope of supply and storage	9	10	Faults	30
	4.1 Unpacking.....	9		10.1 Defects table.....	30
	4.2 Transport.....	9		10.2 Troubleshooting.....	33
	4.3 Scope of delivery.....	9		10.2.1 Replace switchover valve.....	33
	4.4 Handling of packaging material.....	10		10.2.2 Bring diaphragm in the control unit in the home position.....	33
	4.5 Storage.....	10		10.2.3 Assembling ice reduction.....	34
5	Assembly	10	11	Disassembly and Disposal	36
	5.1 Safety recommendations.....	10		11.1 Safety recommendations.....	36
	5.2 Requirements for the Installation point... ..	10		11.2 Disassembly.....	37
	5.3 Assembly.....	10		11.3 Disposal	38
	5.3.1 Assembling the pump.....	10	12	Technical data	38
	5.3.2 Assemble sound mufflers and compressed air connection.....	11		12.1 Dimensions and weight.....	38
	5.3.3 Rotate fluid part.....	11		12.2 Connections.....	39
	5.4 Connecting.....	12		12.3 Operating conditions.....	39
6	Commissioning	12		12.4 Emissions.....	39
	6.1 Safety recommendations.....	12		12.5 Operating values.....	39
	6.2 Commissioning.....	13		12.6 Compressed air.....	39
	6.3 Setting operating parameters	13		12.7 Type plate.....	40
7	Operation	14		12.8 Materials used.....	40
	7.1 Safety recommendations.....	14		12.9 Operating and auxiliary materials.....	40
	7.2 General notes.....	14		12.10 Material specification.....	40
	7.3 Rinsing.....	14	13	Replacement parts, tools and accessories	41
	7.3.1 Safety recommendations.....	14		13.1 Replacement parts.....	41
	7.3.2 Flush the pump.....	14		13.1.1 Control Unit.....	41
8	Cleaning	15		13.1.2 Fluid part.....	42
	8.1 Safety recommendations	15		13.1.3 Motor.....	44
	8.2 Cleaning.....	16		13.1.4 Repair kits.....	45

13.1.5 Seal sets.....	46
13.2 Tools.....	47
13.3 Accessories.....	47
13.4 Order.....	47
14 Index.....	48

1 Product overview

1.1 Overview

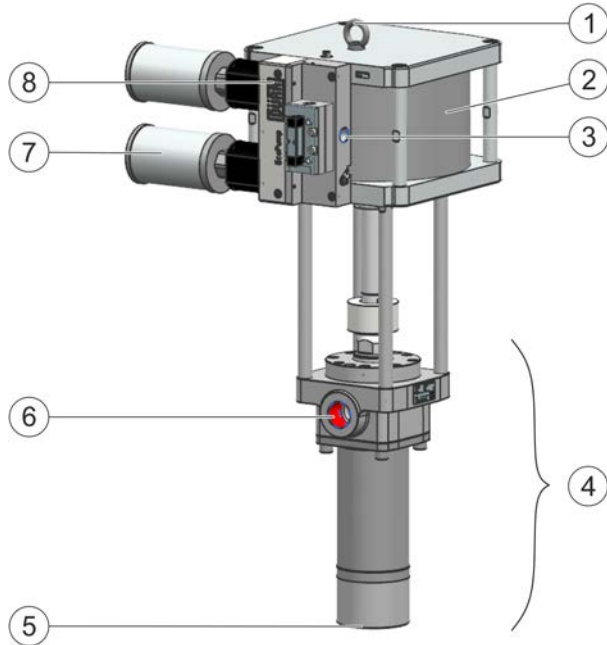


Fig. 1: Assemblies

- 1 Transport ring bolt
- 2 Motor
- 3 Compressed air connection
- 4 Fluid part
- 5 Material inlet
- 6 Material outlet
- 7 Sound muffler
- 8 Control unit

1.2 Short description

The vertical piston pump (hereafter called "pump") is a pneumatically operated pump. The pump conveys low viscosity to high viscosity coating materials. The pump is suitable for medium pressure application and high pressure application.

2 Safety

2.1 Presentation of Notes

The following notes can appear in this instruction:

! DANGER!

High risk situation that can lead to serious injuries or death.

! WARNING!

Medium risk situation that can lead to serious injuries or death.

! CAUTION!

Low risk situations that can lead to minor injuries.

! NOTICE!

Situations that can lead to material damage.

! ENVIRONMENT!

Situations that can lead to environmental damage.



Additional information and recommendations.

2.2 Intended Use

The pump is a pneumatically operated vertical piston pump.

The pump may only be used for pumping low viscosity to high viscosity coating materials and their detergents. The pump is used for the following applications:

- Airless applications with (ignitable and non-ignitable) water-based and solvent-based coating materials
- PVC applications with (flammable and non-flammable) solvent-free coating materials
- Adhesive applications with (flammable and non-flammable) solvent-free coating materials

The selection of sealing material depends on the coating material.

The pump is approved for use in explosive areas of Ex zones 1 and 2.

Operate the pump only in the industrial area and within the approved technical data ↪ 12 "Technical data".

By using appropriate safety valves or safety switches (PLr = b), the operator must ensure that the technical data are observed, in particular the maximum connection air pressure P1 and the maximum output pressure.

The maintenance unit for supplying the pump must be equipped with an overpressure valve that triggers at 6bar connection air pressure.

Tighten housing parts on block. O-rings are used for sealing. Maintain the specified tightening torques.


Misuse

Not using as intended entails danger to life.

Examples of wrong use are:

- Use outdoors
- Installation without mechanical ventilation
- Use of unapproved materials, see safety data sheets
- Use in explosive areas Ex zone 0
- Operating an ungrounded pump
- Making conversions or changes on your own
- Use of non-conductive lines
- Use of unsuitable components
- Use of unapproved components by Dürr Systems

Ex labeling

 II 2G Ex h IIA T6 Gb X

- II - Device group II: all areas except mining
- 2G - Device category 2 for gaseous atmosphere
- Ex h - Mechanical explosion protection
- IIA - Explosion group IIA
- T6 - Temperature class
- Gb - Device protection level Gb
- X - The pump is configured for operation in an ambient temperature of 15°C to 40°C.

2.3 Residual risks

Danger of explosion due to sources of ignition in an explosive atmosphere.

Sparks, open flames and hot surfaces can cause explosions in explosive atmospheres. Serious injury and death could be the consequence.

- Before carrying out any work, make sure that there is no explosive atmosphere.
- Do not use any sources of ignition and no open light in the work area.
- Do not smoke.
- Do not unpack Pump in Ex zone.
- Dispose of packaging according to regulation outside of Ex zone or store it.
- Use tools with Ex approval.
- Ground Pump.
- Wear suitable protective equipment.

Sparks due to electrostatic discharge

If the pump is not properly grounded or the potential equalization fails, components may get charged electrostatically. Electrostatic discharge can cause sparks that in explosive atmosphere can cause a fire or an explosion. Serious injury and death could be the consequence.

- Ground Pump as specified.
- Check connection of grounding cable during operation.

Escaping material

Material leaking under high pressure can penetrate the body. Even if the injury looks like a harmless cut wound, the penetrating material leads to amputation, serious injuries can cause death.

- Do not try to seal leakages using body parts, gloves or towels.
- If there are injuries, seek medical attention immediately.
- Install appropriate pressure release device (e.g. valve or ball valve).

Before working on the product:

- Purge the system, in which the product is installed.
- Disconnect the system, in which the product is installed, from compressed air and material supply.
- Depressurize the lines.
- Secure the system against being switched on again.

Danger from harmful or irritant substances

Serious injuries or death can result if you come into contact with dangerous fluids or steam.

- Pump Check regularly for leakage. Observe local regulations and maintenance schedule.
- Ensure that the forced ventilation is operational.
- Ensure that the pump is integrated in a closed process.
- Follow the safety data sheet.
- Wear specified protective equipment.

2.4 Conduct in the event of a hazardous situation

Conduct in case of danger depends on the operator's installation situation.

Perform the following activities:

- Close lines.
- Secure against reconnection.
- Depressurize lines.

2.5 Staff qualification

WARNING!

Inadequate qualification

Wrong estimation of dangers can cause serious injury or death.

- Only sufficiently qualified persons may execute all work.
- Some work requires additional qualification. Additional qualifications of specialized personnel are marked with a “+”.

This document is intended for qualified personnel in industry and craftsmanship.

Cleaning staff

The cleaning staff receives regular instructions from the operator about the following contents:

- Using the product
- Handling cleaning tools
- Handling cleaning agents
- Technical Measures for occupational safety and health

Electrician

Electricians assemble, install, service and repair electrical systems in a professional manner.

Furthermore, electrical engineers have the following knowledge:

- Guidelines, Standards and Rules of Engineering
- Local conditions
- Electrical Systems and Their Loading Limits
- Technical Measures for occupational safety and health

Mechanic

The mechanic is trained specifically for the field of work in which he works.

Furthermore, he has the following knowledge:

- Guidelines, Standards and Rules of Engineering
- Local conditions
- Technical Measures for occupational safety and health

The mechanic is responsible for the following activities on equipment and components:

- Assembly
- Waiting
- Maintenance
- Disassembly

+ Additional qualification high pressure

In addition, the mechanic has knowledge of regulations and safety measures for high pressure systems > 20 bar.

+ additional qualification explosion protection

In addition to the knowledge of the various specialist fields, the mechanic has knowledge of regulations and safety measures when working in potentially explosive areas.

Dürr Systems offers special product training for ↪ “Hotline and Contact”.

2.6 Personal protective equipment

When working in explosive areas, the protective clothing, including gloves, must meet the requirements of DIN EN 1149-5. Footwear must meet the requirements of EN ISO 20344 and EN IEC 61340-4-3. The volume resistivity must not exceed 100MΩ.

Wear the specified personal protective equipment when working. Provide the following personal protective equipment:



Anti-Static Safety Boots

Protect feet from crushing, falling items and slipping on slippery ground.

Moreover, anti-static safety boots reduce electrostatic charge by discharging the electrostatic charges.



Face protection

Protect the face from dust, paint drops and particles flying around, such as chips and slivers.



Protective gloves

Protect the hands from:

- mechanical forces
- Thermal forces
- Chemical effects



Protective workwear

Tight fitting workwear with low tear strength, tight sleeves and no hanging parts.



Respirator mask

Protects from hazardous gases, vapors, dust and similar materials and media.



Use ear protection

Protects from auditory damage due to noise.

3 Design and Function

3.1 Control Unit

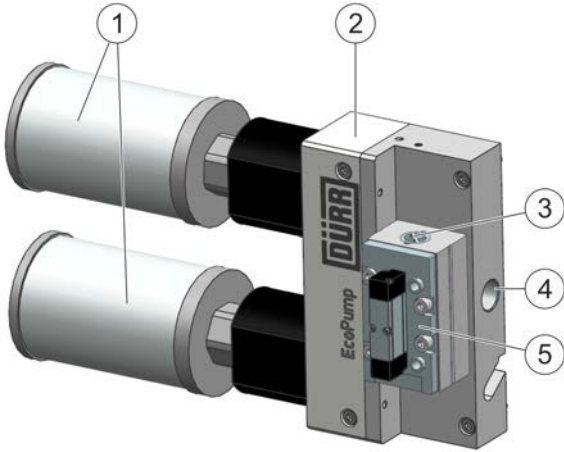


Fig. 2: Control Unit operation

Air reaches into the distributor block (2) of the control unit (5) via the compressed air connection (4). The valve (3) in the distributor block (2) controls the air intake to the motor. The air outlet is through the two sound mufflers (1).

3.2 Motor

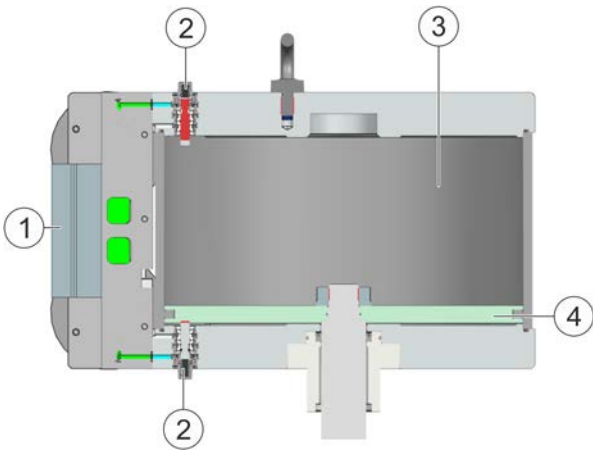


Fig. 3: Motor operation

The pneumatically operated motor drives the pump. The piston (4) of the motor divides the cylinder (3) into two air chambers. Compressed air moves the piston (4) to and fro in the cylinder (3).

When the piston reaches one end of the cylinder, the piston switches the switchover valve (2). The switchover valve (2) causes the control unit (1) to change the supply of motor air from one side of the piston to the other. The piston moves in the opposite direction.

3.3 Fluid part

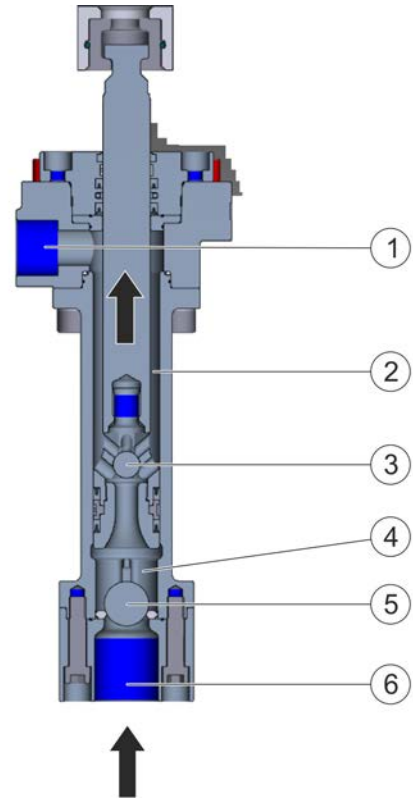


Fig. 4: Fluid part operation

At the time of the upward stroke, the non-return valve in the piston (3) closes and pumps the material in the top piston chamber (2) into the pressure line through the material outlet (1). At the same time, the non-return valve on the material inlet (5) opens and sucks materials into the lower piston chamber (4). The initial material pressure in the material input (6) supports the suction process.

At the time of the downward stroke, the non-return valve in the piston (3) opens and the non-return valve (5) at the material intake closes. The material in the lower piston chamber (4) is pumped into the pressure line by the piston to the material outlet (1).

4 Transport, scope of supply and storage

4.1 Unpacking

EX DANGER!

Electrostatically charged plastic films and foils in potentially explosive areas

The foil and the product can charge electrostatically at the time of the unpacking. Electrostatic discharge can cause sparks that in explosive atmosphere can cause a fire or an explosion. Serious injury and death could be the consequence.

- Unpack product outside Ex zones.
- Discharge the product.
- Dispose packaging outside of the Ex zone in accordance with the regulation or store properly for a later return.

4.2 Transport

WARNING!

Raising heavy loads

Raising heavy loads without suitable hoist and stopper material can cause major injuries.

- Transport heavy loads only by using suitable hoists and stoppers.

WARNING!

Hovering load

Hovering loads can fall down and cause serious injuries or death.

- Do not enter the area below hovering loads.
- Wear specified protective equipment.
- Only use approved hoists and stoppers.
- Ensure that the hoists and stoppers have adequate bearing capacity.

NOTICE!

Incorrect Transport

Improper transportation of the pump may cause the agitator the pump to fall and suffer damage.

- Protect Pump from moisture.
- Protect Pump from vibrations.
- Use transport locks (e. g. against slipping).

i Permissible ambient temperature during the transportation for a few hours:
-30°C to 60°C

Personnel:

- Mechanic

Protective equipment:

- Protective workwear
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Pump has been disassembled ↪ 11.2 “Disassembly”.

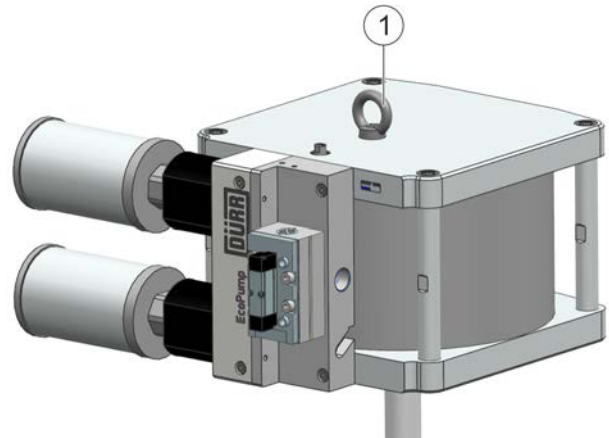


Fig. 5: Transport ring bolt

1. Fix stoppers on the eye bolts (1).
2. Transport pump using a hoist.

4.3 Scope of delivery

The scope of supply only includes the pump. Sound muffler and compressed air connection are included and must be assembled before commissioning ↪ 5.3 “Assembly”

Personnel:

- Mechanic

Protective equipment:

- Protective workwear
- Protective gloves
- Anti-Static Safety Boots

1. Check the pump for integrity on receiving it.
2. Report defects immediately ↪ “Hotline and Contact”.

4.4 Handling of packaging material

ENVIRONMENT!

Incorrect disposal

Incorrectly disposed packaging material can damage environment.

- Dispose of material no longer required in an environment-friendly manner.
- Observe local disposal specifications.

4.5 Storage

Requirements for the warehouse:

- Do not store outdoors.
- Store in a dry and dust-free place.
- Do not expose to aggressive media.
- Protect from solar radiation.
- Avoid mechanical vibrations.
- Close all openings when storing after disassembly.
- Temperature: 10°C to 40°C
- Relative humidity: 35% to 90%

5 Assembly

5.1 Safety recommendations

WARNING!

Unsuitable tools in explosive areas

Tools that do not have Ex approval can generate sparks and cause a fire or an explosion in Ex zones. It can cause serious injuries or death.

- If possible, carry out cleaning and maintenance work outside the Ex zones.
- For work within the Ex zone, use tools with the corresponding Ex labeling.

5.2 Requirements for the Installation point.

- Control air supply and the material feed can be paused and secured against reconnection.
- Lines, seals and screw connections must be designed to conform to the pump requirements ↪ 12.5 “Operating values”.
- The pump must be protected from atmospheric influences at the installation point.
- Ensure by using appropriate safety valves or safety switches (PLr = b) that the technical data are observed, in particular the maximum connection air pressure and the maximum output material pressure.

5.3 Assembly

5.3.1 Assembling the pump

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective gloves
- Protective workwear
- Anti-Static Safety Boots

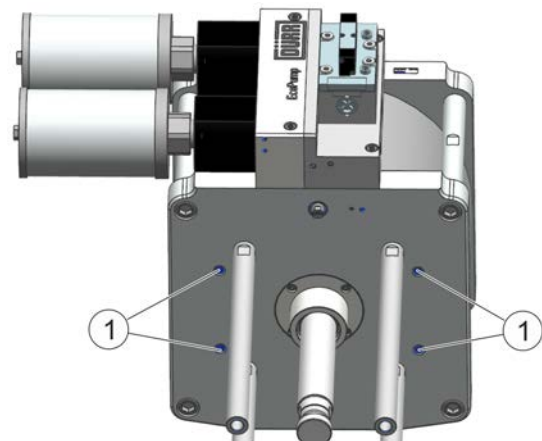


Fig. 6: Assembling the Pump

1. Mount pump on a suitable stand.
Use bores (1) for fastening.

5.3.2 Assemble sound mufflers and compressed air connection

The pump is supplied with sound mufflers and compressed air connection, both disassembled.

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective gloves
- Protective workwear
- Anti-Static Safety Boots

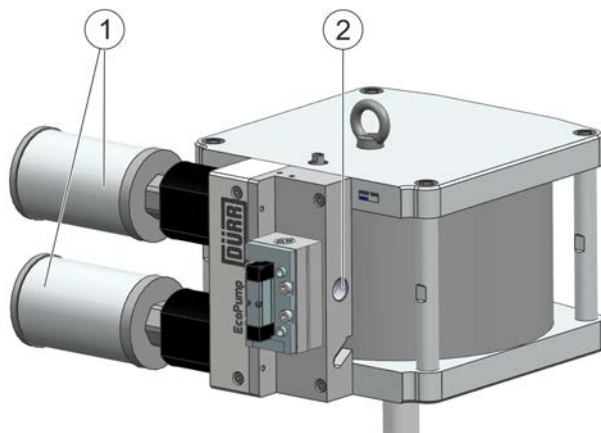


Fig. 7: Assembling Sound Mufflers and Compressed Air Connection

1. Tighten sound muffler (1) by hand.
2. Tighten compressed air connection (2) by hand.

5.3.3 Rotate fluid part

If the fluid part is mounted to the air motor while being rotated in 90° increments, the position of the outlet can be changed.

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective gloves
- Protective workwear
- Anti-Static Safety Boots

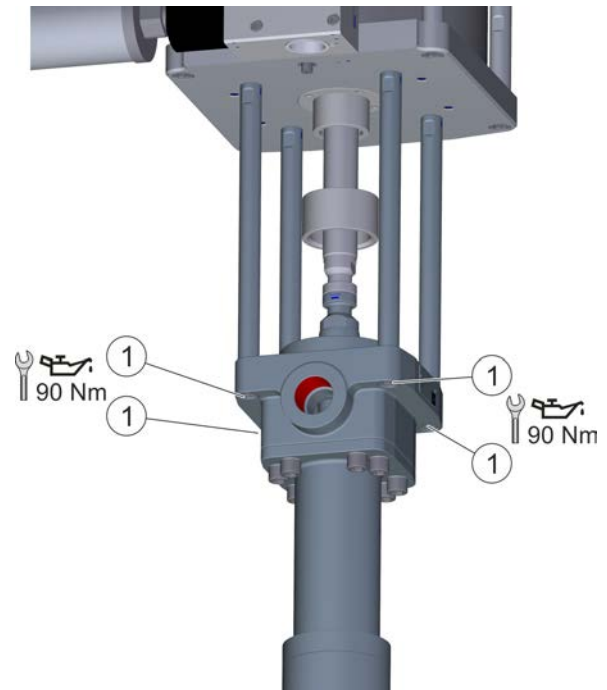


Fig. 8: Rotate fluid part

Molykote TP-42 Paste

1. Rotate fluid part in 90° increments into any direction.
2. Tighten four screws (1).
⇒ Fluid part is assembled.

5.4 Connecting

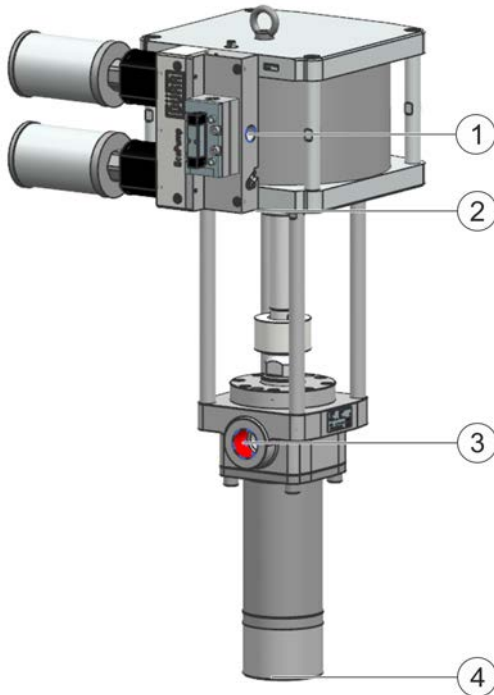


Fig. 9: Connecting the Pump

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Face protection
- Protective workwear
- Protective gloves
- Anti-Static Safety Boots

1. Grease all O-rings and threads of the pipelines using Klüber Syntheso GLEP 1.
2. Assemble material inlet (4).
3. Screw-in high pressure hose into the material outlet (3).
4. Connect control air hose to the compressed air connection (1).

Grounding the Pump

Movement of the piston and of the flowing material create the charge. The charge can only flow if the piston pump is grounded with all components. Connection of the suction pipe and pressure pipe are not sufficient for grounding.

Personnel:

- Electrician
- + additional qualification explosion protection

- + Additional qualification high pressure

Protective equipment:

- Anti-Static Safety Boots

1. Connect the grounding cable to the grounding hole (2).
2. Connect the other end of the grounding cable to a secure current conductor.
3. Measure volume resistivity.

6 Commissioning

6.1 Safety recommendations

WARNING!

Risk of injury due to noise

The sound pressure level during commissioning may cause severe hearing damage.

- Wear ear protection.
- Put the pump only with assembled sound muffler into operation.

WARNING!

Danger from harmful or irritant substances

Serious injuries or death can result if you come into contact with dangerous fluids or steam.

- Check pump regularly for leakage. Observe local regulations and maintenance schedule.
- Ensure that the forced ventilation is operational.
- Ensure that the pump is integrated in a closed process.
- Follow the safety data sheet.
- Wear specified protective clothing.

WARNING!

Risk of injury from whipping hoses

If hoses under pressure come off loose, the hoses can lash around and cause injuries.

- Check that the hose connections are seated tightly.
- Check hoses for damage.

WARNING!

Danger due to escaping compressed air

Compressed air escaping from the sound muffler can contain solid or liquid particles. Particles under pressure can injure the eyes or the skin.

- Wear specified protective equipment.

 **WARNING!**
Sparks due to electrostatic discharge

If the pump is not grounded, there can be an electrostatic charge on the the pump. Electrostatic discharge can cause sparks that in explosive atmosphere can cause a fire or an explosion. Serious injury and death could be the consequence.

- Ground Pump as specified.
- Before carrying out any work, make sure that there is no explosive atmosphere.

 **WARNING!**
Danger due to freezing


The noise mufflers on the motor can cool down drastically. Contact with it can result in frostbite.

- Before working on the motor, ensure that the noise muffler is at room temperature.

 **WARNING!**
Unsuitable tools in explosive areas

Tools that do not have Ex approval can generate sparks and cause a fire or an explosion in Ex zones. It can cause serious injuries or death.

- If possible, carry out cleaning and maintenance work outside the Ex zones.
- For work within the Ex zone, use tools with the corresponding Ex labeling.

 The operator must ensure that connected pipelines or hose lines are tested according to the specifications in force (e.g. pressure test).

6.2 Commissioning

Checks before commissioning:

- Pump is grounded.
- Pump is properly assembled ↪ 5 "Assembly".
- Screw connections are tightened as specified.
- Sound muffler and compressed air connection are assembled ↪ 5.3.2 "Assemble sound mufflers and compressed air connection".
- Appropriate safety valves and safety switches (PLr = b) are used to ensure that the technical data are observed, in particular the maximum connection air pressure and the maximum output material pressure.
- The maintenance unit for supplying the pump with air is equipped with an overpressure valve that triggers at 6bar connection air pressure.
- Ensure that the housing parts on the block are tightened and sealed with O-rings.

Put pump into operation


Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Face protection
- Use ear protection
- Protective gloves
- Anti-Static Safety Boots

1. Purge pump before the initial commissioning ↪ 7.3 "Rinsing".

 Residues of the testing media might still be in the pump.

2. Ensure that there is no air in the pump.
 - Let the pump run with the minimum cycle rate.
3. During this time, check the tightness of the pump, connections and lines.
4. Watch out for unusual noises. Carry out checks if there are unusual noises ↪ 7.2 "General notes".

6.3 Setting operating parameters

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Use ear protection
- Protective gloves
- Anti-Static Safety Boots

1. Set the operating parameters on the higher level control.
2. Check operating parameters ↪ 12.5 "Operating values".

7 Operation

7.1 Safety recommendations

WARNING!

Risk of injury due to noise

The sound pressure level during normal operation may cause severe hearing damage.

- Wear ear protection.
- Put the pump only with assembled sound muffler into operation.

WARNING!

Danger due to freezing

The noise mufflers on the motor can cool down drastically. Contact with it can result in frostbite.

- Wear protective hand gloves.

WARNING!

Danger from harmful or irritant substances

Serious injuries or death can result if you come into contact with dangerous fluids or steam.

- Check pump regularly for leakage. Observe local regulations and maintenance schedule.
- Ensure that the forced ventilation is operational.
- Ensure that the pump is integrated in a closed process.
- Follow the safety data sheet.
- Wear specified protective clothing.

7.2 General notes

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Respirator mask
- Face protection
- Use ear protection
- Protective gloves
- Protective workwear
- Anti-Static Safety Boots

Check for unusual noises during operation. Perform visual inspections:

- Check tightness of the connections.
- If there are conspicuous noises, carry out further checks during down times.
- Check for steady delivery pressure.
- Appropriate safety valves and safety switches (PLr = b) are used to ensure that the technical data are observed, in particular the maximum connection air pressure and the maximum output material pressure.
- The maintenance unit for supplying the pump with air is equipped with an overpressure valve that triggers at 6bar connection air pressure.



If the pump is not in operating mode, the number of cycle of the pump can drop down to the minimum flow velocity of the medium.

- Pump wear and operating expenses are reduced.

7.3 Rinsing

7.3.1 Safety recommendations

NOTICE!

Material damage due to unsuitable rinsing agent

If the rinsing agent reacts chemically with the components or the material, components get damaged.

- Use only the rinsing agents that are compatible with the components and the material.
- Refer to safety data sheet of material manufacturer.

7.3.2 Flush the pump

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Face protection
- Protective gloves
- Protective workwear
- Anti-Static Safety Boots
- Use ear protection

Complete the following steps if the pump is not in operation for a longish period:

- Purge pump with a suitable detergent ↪ 12.9 “Operating and auxiliary materials”.
- Disconnect compressed air supply to pump.

8 Cleaning

8.1 Safety recommendations

WARNING!

Risk of injury due to residual pressure

After switching off the pump, there may be residual pressure inside of the pipes and the pump. Serious injuries due to escaping compressed air and material can be the consequence.

Before working on the pump:

- Disconnect the system, in which the product is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.
- Ensure that the pump is unpressurized.
- Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.

WARNING!

Unexpected motor start

If the pump is connected to the compressed air supply, the motor may start unexpectedly. This may cause a crushing hazard and injuries due to parts flying around.

Before working on the product:

- Disconnect the system, in which the product is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.
- Ensure that the pump is unpressurized.
- Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.

WARNING!

Unsuitable tools in explosive areas

Tools that do not have Ex approval can generate sparks and cause a fire or an explosion in Ex zones. It can cause serious injuries or death.

- If possible, carry out cleaning and maintenance work outside the Ex zones.
- For work within the Ex zone, use tools with the corresponding Ex labeling.

WARNING!

Danger of fire and explosion

Flammable coating materials and their detergents and cleaning agents can cause a fire or an explosion.

- Ensure that the flashpoint of the cleaning agent is at least 15K above the ambient temperature or clean Pump at the cleaning areas with active technical ventilation, in painting booths, according to EN 16985.
- Only electrically conductive containers may be used for the cleaning fluid. Containers must be grounded.
- Note explosion group of the fluid.
- Follow the safety data sheet.
- Ensure that forced ventilation and fire protection equipment are in operation.
- Do not use sources of ignition and open light.
- Do not smoke.
- Ground Pump.

WARNING!

Danger due to freezing

The noise mufflers on the motor can cool down drastically. Contact with it can result in frostbite.

- Before working on the motor, ensure that the noise muffler is at room temperature.

WARNING!

Danger from harmful or irritant substances

Serious injuries or death can result if you come into contact with dangerous fluids or steam.

- Check pump regularly for leakage. Observe local regulations and maintenance schedule.
- Ensure that the forced ventilation is operational.
- Ensure that the pump is integrated in a closed process.
- Follow the safety data sheet.
- Wear specified protective clothing.

NOTICE!

Unsuitable cleaning agents

Unsuitable detergents can cause material damage.

- Only use cleaning agents approved by the material manufacturer.
- Follow safety data sheets.

! NOTICE!

Unsuitable Cleaning Tools

Unsuitable cleaning tools can cause damage.

- Only use cloths, soft brushes and paintbrushes.
- Do not use abrasive cleaning tools.
- Do not use compressed air for cleaning.
- Do not use any thinner spray guns.
- Do not use high pressure for cleaning agents.

8.2 Cleaning

ENVIRONMENT!

Environmental damage due to wrong disposal

Improper waste disposal threatens the environment and prevents re-use and recycling.

- Collect leaked out operating and auxiliary materials completely.
- Dispose of operating and auxiliary materials according to the disposal provisions in force.
- In case of doubt, refer to the local disposal authorities.

Make sure that the Pump is completely free of media residues and other contamination.

Personnel:

- Cleaning staff

Protective equipment:

- Protective gloves
- Anti-Static Safety Boots
- Face protection
- Protective workwear
- Respirator mask

1. Clean pump carefully using a moist cloth.

9 Maintenance

9.1 Safety notes

WARNING!

Unsuitable replacement parts in explosive areas

Replacement parts not compliant with the specifications of the ATEX guidelines can cause explosions in an explosive atmosphere. Serious injury and death could be the consequence.

- Use exclusively original replacement parts.

WARNING!

Unsuitable tools in explosive areas

Tools that do not have Ex approval can generate sparks and cause a fire or an explosion in Ex zones. It can cause serious injuries or death.

- If possible, carry out cleaning and maintenance work outside the Ex zones.
- For work within the Ex zone, use tools with the corresponding Ex labeling.

WARNING!

Danger due to freezing

The noise mufflers on the motor can cool down drastically. Contact with it can result in frostbite.

- Before working on the motor, ensure that the noise muffler is at room temperature.

WARNING!

Risk of injury due to residual pressure

After switching off the pump, there may be residual pressure inside of the pipes and the pump. Serious injuries due to escaping compressed air and material can be the consequence.

Before working on the pump:

- Disconnect the system, in which the product is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.
- Ensure that the pump is unpressurized.
- Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.

 **WARNING!**


Unexpected motor start


If the pump is connected to the compressed air supply, the motor may start unexpectedly. This may cause a crushing hazard and injuries due to parts flying around.

Before working on the product:

- Disconnect the system, in which the product is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.
- Ensure that the pump is unpressurized.
- Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.

9.2 Maintenance schedule

 If a maintenance assistant is used in the system visualizer, the maintenance intervals of the maintenance assistant are valid.

 The life cycle and the associated maintenance intervals depend heavily on the abrasiveness and temperature of the material to be pumped as well as the pumping pressure and twice the number of strokes of the pump. The present details are guide values and must be suitably adjusted according to the application.

Interval	Maintenance work
weekly	Check cleanliness of the pump. Test the tightness and condition of the connections, hoses and lines. Check tightness and state of the pump. Check noise generation in the pump. Check for steady delivery pressure.
after about 1 million cycles (corresponding to 10 dual strokes /min. in a single shift operation for 6 months)	Replace rod seal of the fluid part. ↳ 9.3.7.1 “Dismantle non-return valve in the piston” Replace piston seal of the fluid part. ↳ 9.3.7.1 “Dismantle non-return valve in the piston”
after about 10 million cycles (corresponding to 10 dual strokes /min. in a single shift operation for 5 years)	Replace worn out parts: Replace piston seals of the air motor ↳ 9.3.6.3 “Disassemble piston seal.”. Replace rod seal of the air motor ↳ 9.3.7.3 “Dismantle seal set.”. Replace rod seal of the air motor. Replace non-return valves,. ▪ ↳ 9.3.7.1 “Dismantle non-return valve in the piston” ▪ ↳ 9.3.7.2 “Dismantle non-return valve in the material inlet” Replace changeover valve ↳ 10.2.1 “Replace switchover valve”. Replace valve in the control unit ↳ 9.3.2.2 “Removing the valve”.

9.3 Dismantle and assemble

9.3.1 Disassemble control unit

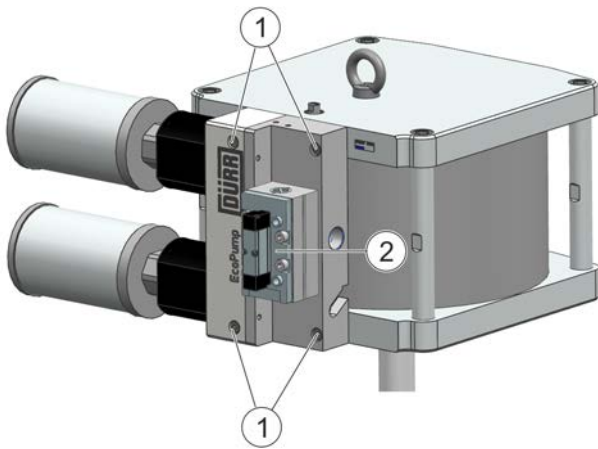


Fig. 10: Disassemble control unit

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Thread off four screws (1).
2. Remove control unit (2) from the motor.
3. Remove O-rings between control unit (2) and motor.

9.3.2 Dismantle control unit

9.3.2.1 Remove membrane

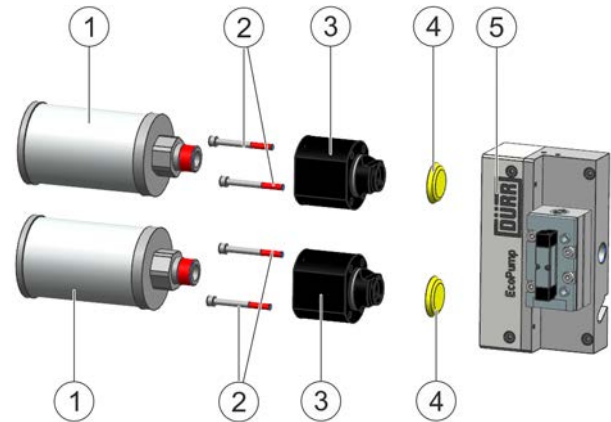


Fig. 11: Remove membrane

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Unscrew sound muffler (1).
2. Thread off four screws (2).
3. Pull out adapter (3) together with O-ring from the housing (5).
4. Pull out two membranes (4) from the housing (5) using a long nose pliers.

9.3.2.2 Removing the valve

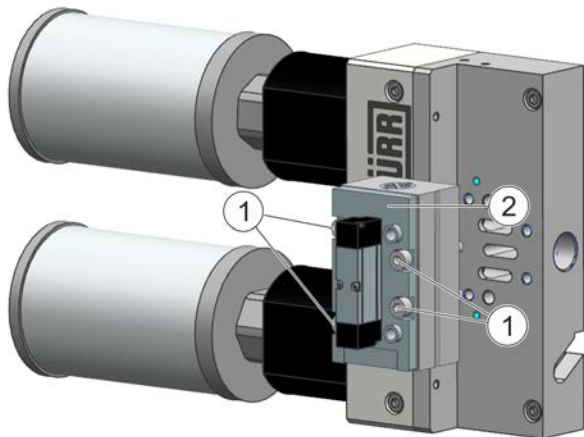


Fig. 12: Removing the valve

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Unscrew four hexagon screws (1) from the valve (2).
2. Remove valve (2).

9.3.3 Assemble control unit.

9.3.3.1 Assembling valve

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

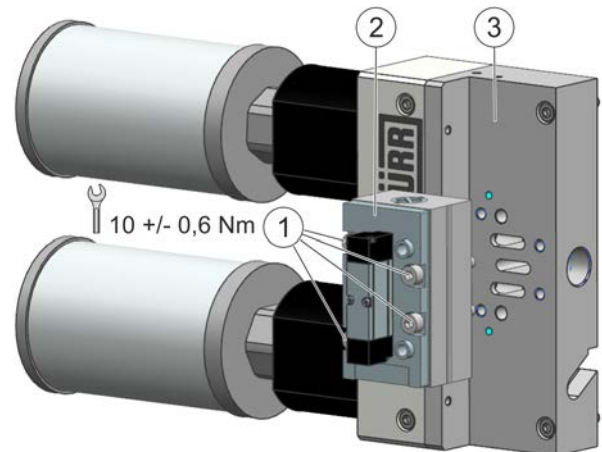


Fig. 13: Installing Valve

1. Remove any dirt. Clean sealing surfaces using alcohol.
2. Insert four screws (1) into the bores of the valve (2).
3. Mount valve (2) to the valve plate (3).

Observe tightening torque.

4. Tighten screws (1) in clockwise direction using suitable tools (e.g. torque wrench).

9.3.3.2 Install membrane.

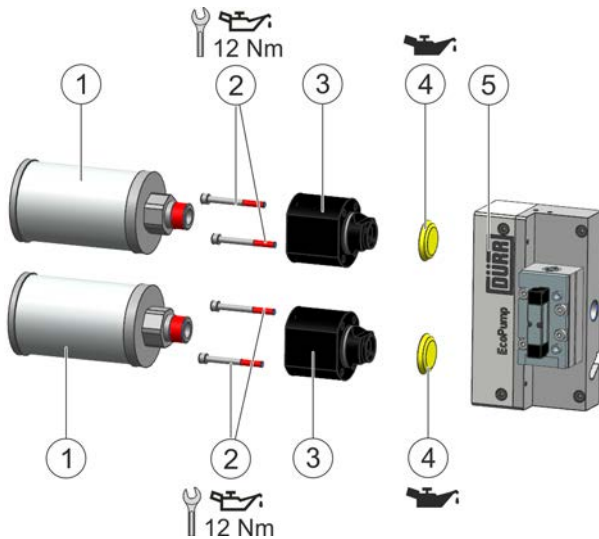


Fig. 14: Install membrane

Klüber Syntheso GLEP 1

Molykote TP-42 Paste

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Lightly grease bore for the two membranes (4).
2. Push in membranes (4) into the housing (5) up to the stop with the closed side in front.
3. Push in adapter (3) with O-ring into the housing (5).
4. Grease screws (2).

Observe tightening torque.

5. Tighten adapters (3) with two screws (2) each.
6. Screw-in and hand-tighten sound mufflers (1) in the adapter (3).

9.3.4 Assemble control unit

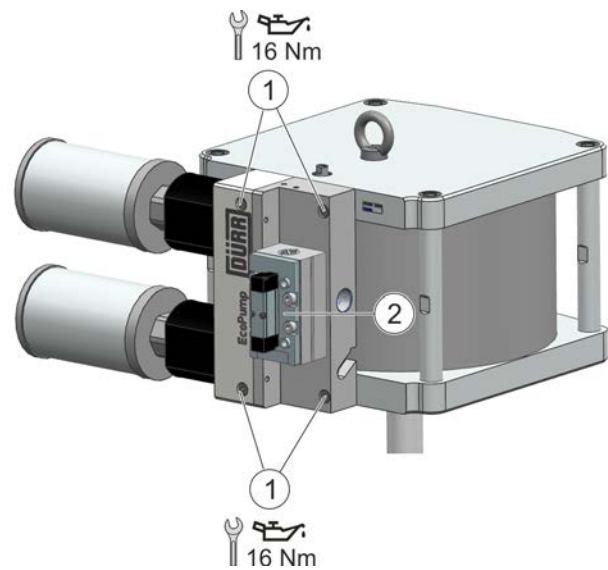


Fig. 15: Assemble control unit

Molykote TP-42 Paste

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Grease O-rings.
2. Insert O-rings between control unit (2) and motor.
3. Grease screws (1).

Observe tightening torque.

4. Firmly attach control unit (2) with four screws (1).

9.3.5 Disassemble fluid part and connecting rods.

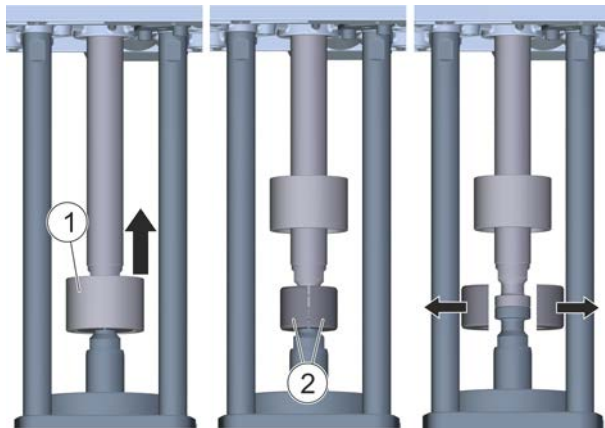


Fig. 16: Disassembling Coupling

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Push coupling sleeve (1) upwards.
2. Remove half shells (2)
3. Secure fluid part against falling down.

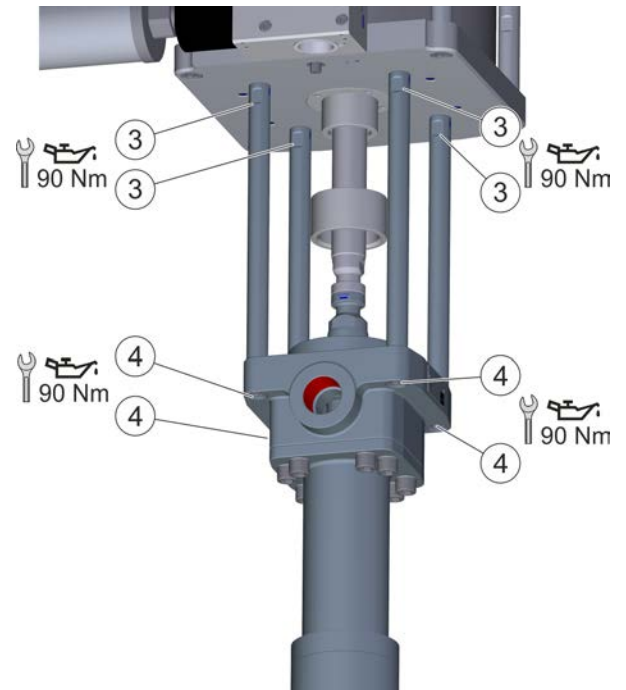


Fig. 17: Disassemble fluid part and connecting rods.

Molykote TP-42 Paste

4. Thread off four screws (4).
⇒ Fluid part is disassembled.
5. Unscrew four connecting rods (3) on key surfaces.

9.3.6 Dismantle motor

9.3.6.1 Disassemble rod seal.

Personnel:

- Electrician
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Control unit is disassembled ↪ 9.3.1 “Disassemble control unit”.
- Fluid part and connecting rods are disassembled ↪ 9.3.5 “Disassemble fluid part and connecting rods.”.

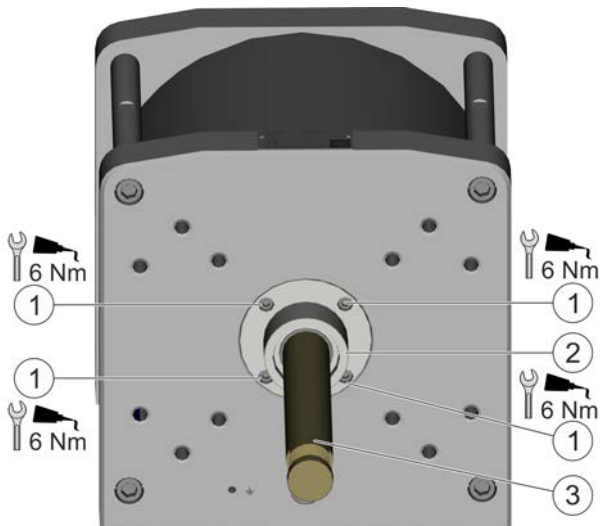


Fig. 18: Disassembling seal housing

Loctite 222

1. Thread off four screws (1).

2. Push down seal housing (2) from the piston rod (3).

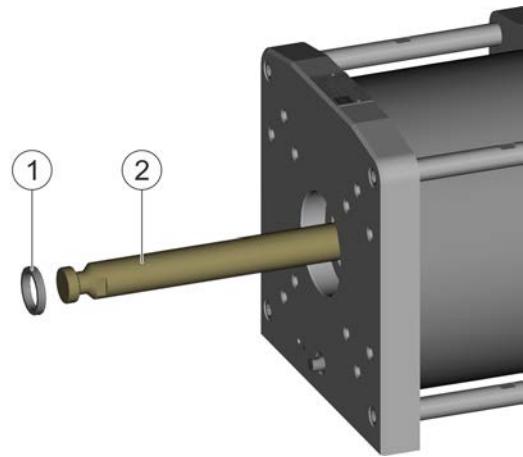


Fig. 19: Removing Rod Seal

3. Push down rod seal (1) from the piston rod (2).

9.3.6.2 Removing the plain bearing

Personnel:

- Electrician
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Seal housing is disassembled.

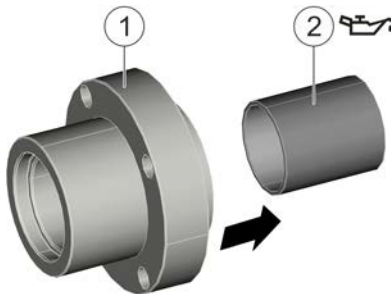


Fig. 20: Disassembling Plain Bearing

Molykote TP-42 Paste

1. Press out plain bearing (2) from the seal housing (1) using suitable tool.

9.3.6.3 Disassemble piston seal.

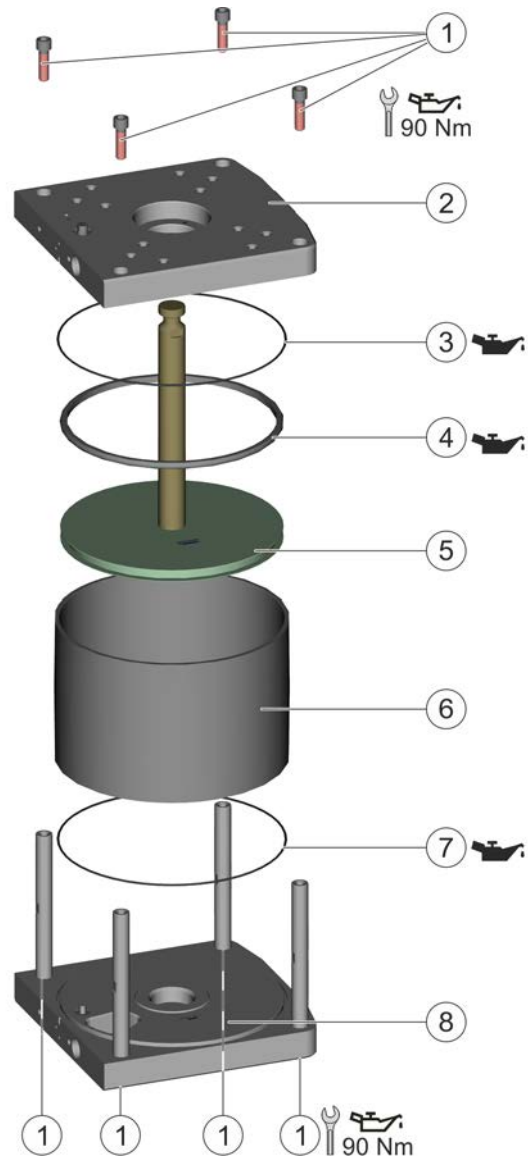


Fig. 21: Removing Piston Seal in the Motor

Molykote TP-42 Paste

Klüber Syntheso GLEP 1

Personnel:

- Electrician
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Remove screw (1) from the end plate (open) (2).
2. Push down end plate (open) (2) from the piston rod.
3. Take out O-ring (3) from the end plate (open) (2).
4. Remove tube (6) with piston rod and piston (5) from end plate (closed) (8).
5. Pull off piston rod with piston (5) from the tube (6).
6. Remove piston seal (4) from the piston rod with piston (5).
7. Remove O-ring (7) from plate (8).

9.3.6.4 Assemble motor.

Personnel:

- Electrician
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Grease all O-rings ↪ 12.9 “Operating and auxiliary materials”.
2. Grease thread and screw heads with Molykote TP-42 paste.
3. Coat the tube of the piston inside with the supplied grease.
4. Lubricate bearing with Molykote TP-42 paste.
5. Assemble motor in reverse sequence of dismantling.
 - Observe tightening torques and thread protection.

9.3.7 Dismantle fluid part.

9.3.7.1 Dismantle non-return valve in the piston

Dismantle piston rod

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Fluid part is disassembled ↪ 9.3.5 “Disassemble fluid part and connecting rods.”.

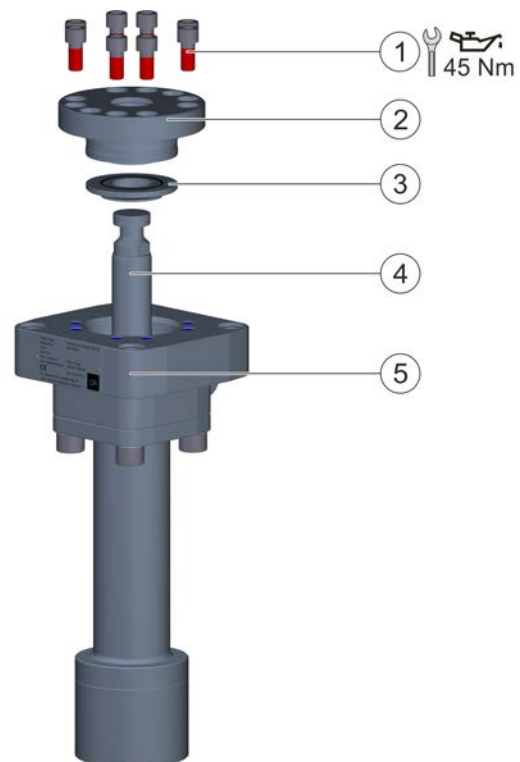


Fig. 22: Disassemble piston rod

Molykote TP-42 Paste

1. Loosen screws (1).

2. Remove sealing gland (2) from material outlet housing (5). For this, screw in two of the screws (1) into the pull-off thread of the sealing gland (2). Force off sealing gland (2).
3. Pull out disk (3) together with piston rod (4) of the material outlet housing (5).

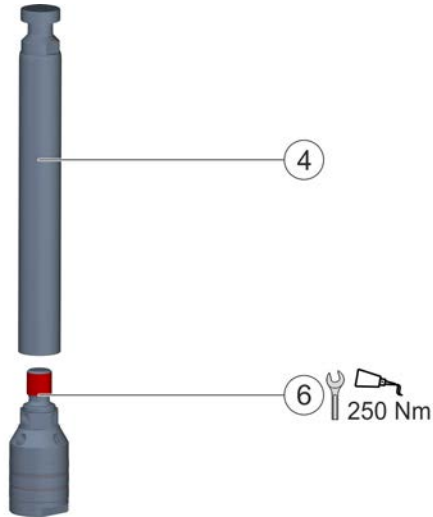


Fig. 23: Disassemble piston rod inlet

Loctite 2701

4. Unscrew piston rod inlet (6) from piston rod (4).

Dismantling non-return valve

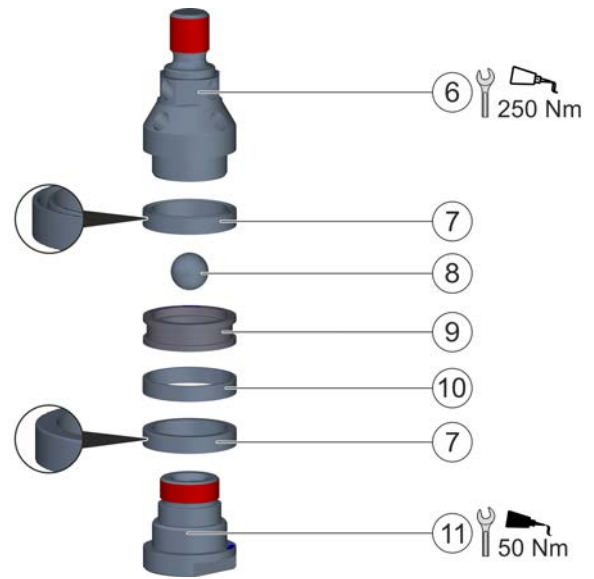


Fig. 24: Dismantle non-return valve

Loctite 2701

Loctite 222

5. Unscrew valve ball guide (11) from piston rod inlet (6).
6. Push down piston seals (7), guide bush (9) and guide belt (10) from valve ball guide (11).
7. Remove valve ball (8) from the valve ball guide (11).

9.3.7.2 Dismantle non-return valve in the material inlet

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Material supply line is disassembled.

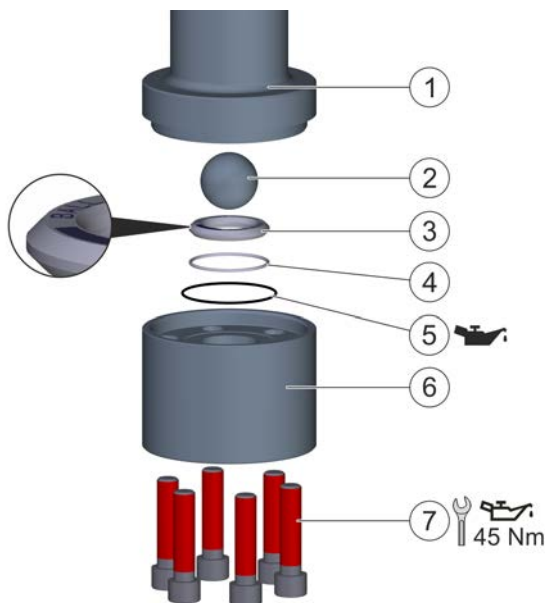


Fig. 25: Dismantle non-return valve in the material inlet

Klüber Syntheso GLEP 1

Molykote TP-42 Paste

1. Loosen screws (7).
2. Remove cylinder flange (6) from cylinder housing (1).
3. Remove O-ring (5) from the groove of the cylinder flange (6).
4. Remove O-ring (4) from the sealing disk (3).

5. Take sealing disk (3) out of the cylinder housing (1).

6. Take ball (2) out of the cylinder housing (1).

9.3.7.3 Dismantle seal set.

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Fluid part is disassembled → 9.3.5 “Disassemble fluid part and connecting rods.”.

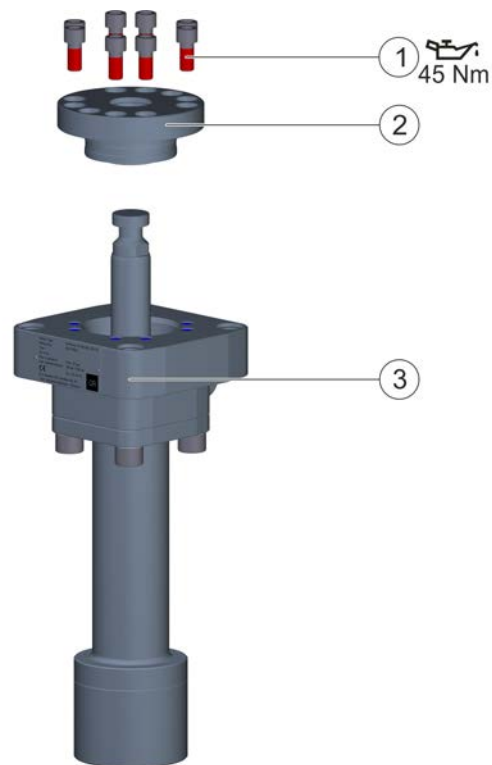


Fig. 26: Disassemble seal set

Molykote TP-42 Paste

1. Loosen screws (1).

- Remove sealing gland (2) from material outlet housing (3).

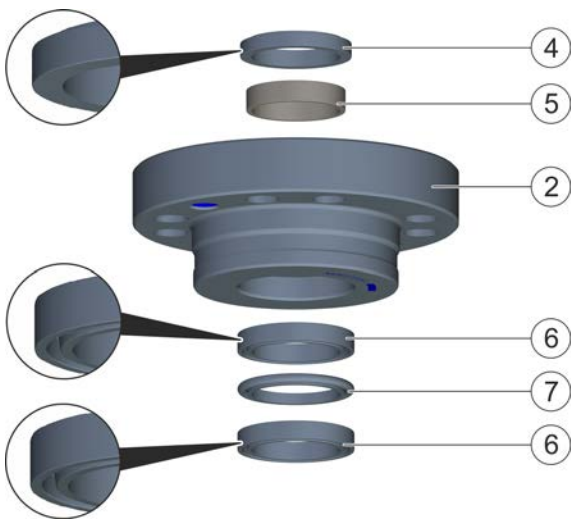


Fig. 27: Dismantling seal set

- Remove stripper (4) and guide ring (5) from the sealing gland (2) by pulling them upwards.
- Remove groove rings (6) and rod seal (7) from the sealing gland (2) by pulling them downwards.

9.3.8 Dismantling Housing

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Piston rod has been disassembled ↪ 9.3.5 “Disassemble fluid part and connecting rods.”.

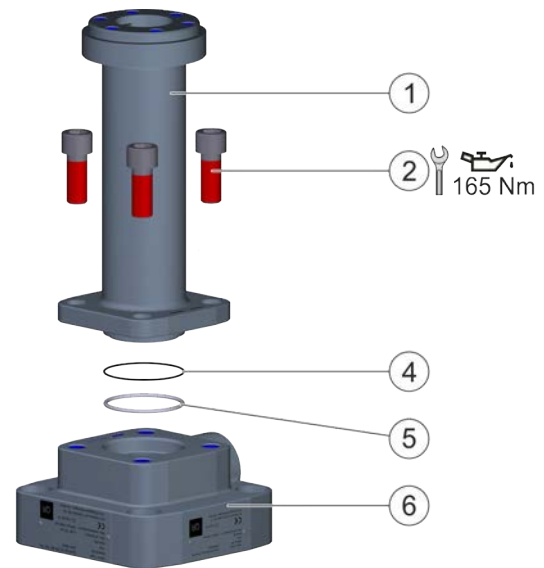


Fig. 28: Dismantling Housing

Molykote TP-42 Paste

- Loosen screws (2).
- Remove cylinder housing (1) from material inlet housing (5).
- Remove O-ring (3) from the groove in the cylinder (1).
- Take O-ring (4) out of the material inlet housing (5).

9.3.9 Assembling Housing

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

- Assemble housing in reverse sequence of dismantling ↪ 9.3.8 “Dismantling Housing”.

Apply Molykote TP-42 paste onto the threads and the screw head.
Observe tightening torques and greases ↪ 9.3.8 “Dismantling Housing”.

9.3.10 Assemble fluid part.

Installation of piston rod in the fluid part

Use the appropriate tools to ensure a safe assembly of the piston rod 13.2 "Tools".

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

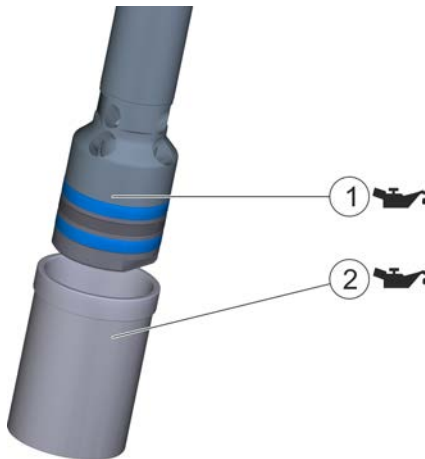


Fig. 29: Grease assembly tool and piston rod

Klüber Syntheso GLEP 1

1. Grease piston rod (1) and assembly tool (2).

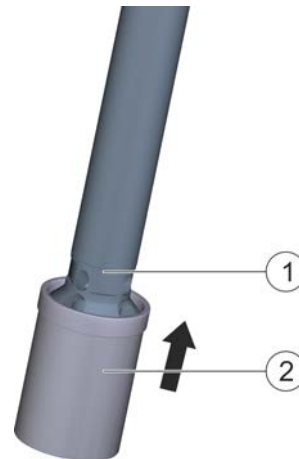


Fig. 30: Mount assembly tool

2. Position assembly tool (2) above piston rod (1). Make sure to not to squeeze any of the two seals.

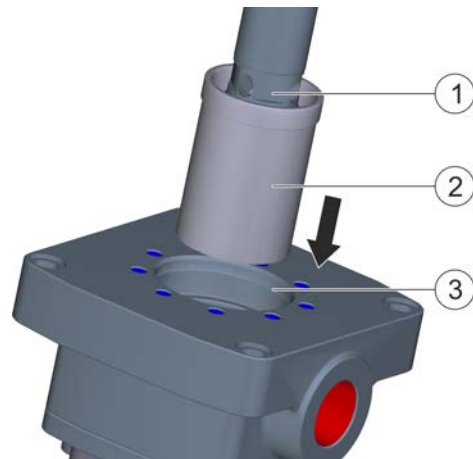


Fig. 31: Assembly in fluid part

3. Insert assembly tool (2) with piston rod (1) into the fluid part (3).

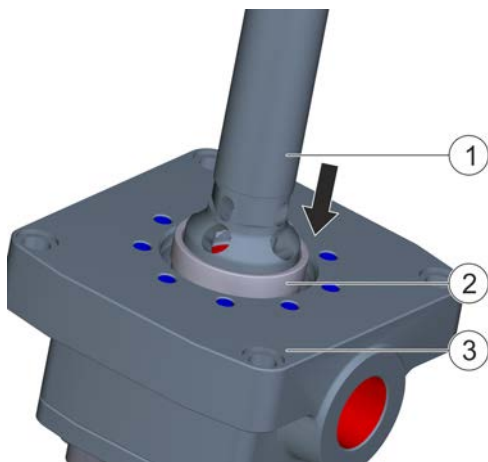


Fig. 32: Push assembly tool into the fluid part

4. Push assembly tool (2) with piston rod (1) fully into the fluid part (3).
5. Move piston rod (1) into the fluid part (3).

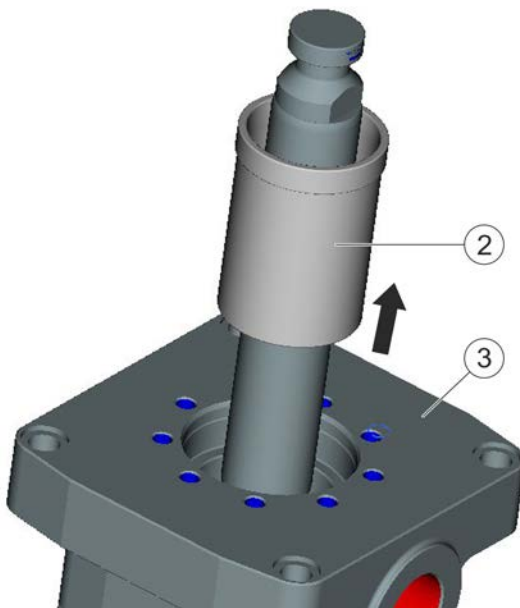


Fig. 33: Remove assembly tool from fluid part

6. Pull out assembly tool (2) from fluid part (3).
⇒ Piston rod is correctly installed in the fluid part.
7. Continue assembling the fluid part in reverse sequence of dismantling ↪ 9.3.7 "Dismantle fluid part."

Observe installation position of the seals.
↪ 9.3.7.3 "Dismantle seal set."

Apply Molykote TP-42 paste onto the threads and the screw head.
Observe tightening torques and greases
↪ 9.3.7 "Dismantle fluid part."

9.3.11 Assemble fluid part and connecting rods.

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:


- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

1. Apply Molykote TP-42 paste onto the threads and the screw heads.
2. Assemble fluid part and connecting rods in reverse order of disassembly.
 - ↪ 9.3.5 "Disassemble fluid part and connecting rods."
 - ↪ 5.3.3 "Rotate fluid part"

Observe tightening torque and grease
↪ 9.3.5 "Disassemble fluid part and connecting rods."

10 Faults

10.1 Defects table

 If the pump remains static at the top or bottom dead center due to process conditions, the air can audibly escape from the interface of the control unit. Ice formation could take place on the exterior of the noise muffler, depending on the process parameters and the ambient air. This does not have any adverse effect on the pump.

Fault description	Cause	Remedy
Pump does not run.	No or insufficient compressed air supply	Check compressed air supply.
	Switchover valve defective	Replace changeover valve ↪ 10.2.1 “Replace switchover valve”.
	Valve in the control unit defective	Replace valve in the control unit ↪ 9.3.2 “Dismantle control unit”.
	One or more ball valves on suction side or pressure side closed	Open all ball valves.
	Diaphragm in the control unit not in the home position.	Bring both diaphragms in the control unit in the home position ↪ 10.2.2 “Bring diaphragm in the control unit in the home position.”.
	The sound mufflers are frosted from inside.	Check and change compressed air conditions ↪ 12.6 “Compressed air”, ↪ 10.2.3 “Assembling ice reduction”.
Pump does not deliver.	Material supply interrupted	Check the connection and operation of the material supply system. Check material viscosity and fluidity.
	Air has penetrated the suction line.	<ul style="list-style-type: none"> ▪ Check seals and pipe connections. ▪ Check material supply line. ▪ Vent the system.
	Piston seal defective or incorrect installation position	Check installation position, replace piston seals if defective ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
	Rod seal is defective	Replace rod seal ↪ 9.3.7.3 “Dismantle seal set.”.
	Non-return valve in piston or material inlet does not seal properly or is stuck.	Check the non-return valves and replace if necessary ↪ 9.3.7.2 “Dismantle non-return valve in the material inlet”, ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
Operating pressure is not reached.	No or insufficient compressed air or material supply	Check air pressure and flow rate of air. Check valves and hoses of the compressed air supply and material supply for kinks, blockages or bottlenecks due to dirt particles or foreign bodies,
	Piston seal defective or incorrect installation position	Check installation position, replace piston seals if defective ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.

Fault description	Cause	Remedy
	Switchover valve defective	Replace changeover valve ↪ 10.2.1 “Replace switchover valve”.
	Non-return valve in piston or material inlet does not seal properly.	Check the non-return valves and replace if necessary ↪ 9.3.7.2 “Dismantle non-return valve in the material inlet”, ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
	The sound mufflers are frosted from inside.	Check and change compressed air conditions ↪ 12.6 “Compressed air”, ↪ 10.2.3 “Assembling ice reduction”.
	Rod seal of the fluid part defective	Replace rod seal of the fluid part ↪ 9.3.7.3 “Dismantle seal set.”.
	Piston seal of the motor defective	Replace valve in the control unit ↪ 9.3.7.3 “Dismantle seal set.”.
	Membrane in the control unit defective	Replace diaphragm in the control unit. ↪ 9.3.6 “Dismantle motor”.
Major material leak on the piston rod.	Rod seal of the fluid part defective	Replace rod seals of the fluid part ↪ 9.3.7.3 “Dismantle seal set.”.
	Piston rod damaged	Replace piston rod. ↪ 9.3.6 “Dismantle motor”
Pump does not come to rest.	Piston seal defective or incorrect installation position	Check installation position, replace piston seals if defective ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
	Seal washer or balls of the non-return valves soiled or defective	Replace seal washers and balls ↪ 9.3.7.2 “Dismantle non-return valve in the material inlet”, ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
Motor skips at the top end of the stroke.	Bottom changeover valve defective	Replace changeover valve ↪ 10.2.1 “Replace switchover valve”.
Motor skips at the bottom end of the stroke.	Top changeover valve defective	Replace changeover valve ↪ 10.2.1 “Replace switchover valve”.
Motor switches over slowly.	Changeover valve defective	Replace changeover valve ↪ 10.2.1 “Replace switchover valve”.
	Valve in the control unit defective	Replace valve in the control unit ↪ 9.3.2 “Dismantle control unit”.
	The sound mufflers are frosted from inside.	Check and change compressed air conditions ↪ 12.6 “Compressed air”, ↪ 10.2.3 “Assembling ice reduction”.
	Membrane in the control unit defective	Replace diaphragm in the control unit ↪ 9.3.2 “Dismantle control unit”, ↪ 9.3.2.1 “Remove membrane”.
Air streams continuously through the sound muffler.	Membrane in the control unit defective	Replace diaphragm ↪ 9.3.2 “Dismantle control unit”.
	Piston seal of the motor defective	Replace piston seal of the motor ↪ 9.3.6.3 “Disassemble piston seal.”.

Fault description	Cause	Remedy
	Control unit defective	Replace control unit ↪ 9.3.1 “Disassemble control unit”.
Material conveyance during downward stroke too little	Non-return valve in the material inlet soiled or defective	Clean non-return valve in the material inlet and replace if necessary ↪ 9.3.7.2 “Dismantle non-return valve in the material inlet”.
Material conveyance during downward stroke too little	Non-return valve in the piston soiled or worn out.	Clean non-return valve in the piston and replace if necessary ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
	Piston seals worn out	Replace piston seals ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
Significant pressure fluctuations during normal operation	Air in material system	<ul style="list-style-type: none"> ▪ Check seals and pipe connections. ▪ Check material supply line. ▪ Vent system.
	Piston seal defective or incorrect installation position	Check installation position, replace piston seals if defective ↪ 9.3.7.1 “Dismantle non-return valve in the piston”.
	Switchover valve defective	Replace changeover valve ↪ 10.2.1 “Replace switchover valve”.
	Valve in the control unit defective	Replace valve in the control unit ↪ 9.3.2 “Dismantle control unit”.
	Diaphragm in the control unit defective	Replace diaphragm in the control unit ↪ 9.3.6 “Dismantle motor”.
	Initial material pressure too high.	Check material viscosity and fluidity.
	Control unit defective	Replace control unit ↪ 9.3.1 “Disassemble control unit”.

10.2 Troubleshooting

10.2.1 Replace switchover valve

There is one changeover valve each on both sides of the motor.

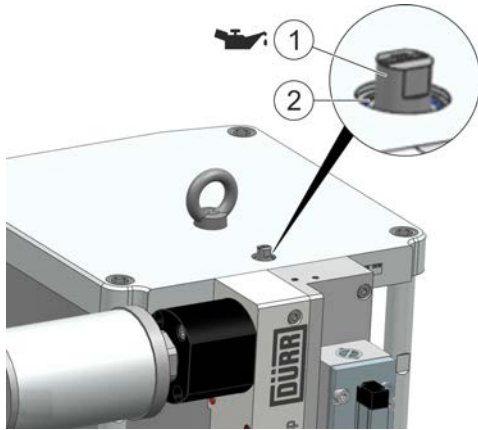


Fig. 34: Replace switchover valve

Klüber Syntheso GLEP 1

Personnel:

- Electrician
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective workwear
- Respirator mask
- Face protection
- Protective gloves
- Anti-Static Safety Boots

Removal

1. Remove retainer ring (2).
2. Pull out switchover valve (1) and O-rings from front plate of the motor using pliers.

Installing

3. Greaseswitchover valve (1) and O-rings on the switchover valve.
4. Push in switchover valve (1) with slight rotatory movements into the front plate of the drive.
5. Assemble the retainer ring (2) on the switchover valve (1).

10.2.2 Bring diaphragm in the control unit in the home position.

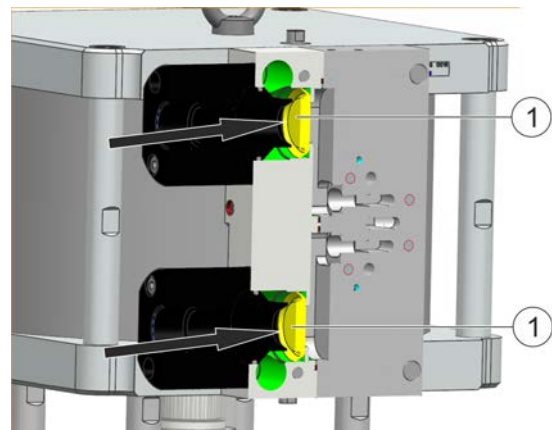


Fig. 35: Shift diaphragms

1. Unscrew both sound mufflers from the control unit.
2. Push in both diaphragms (1) into the housing up to the stop using a blunt object.

10.2.3 Assembling ice reduction

i If the noise mufflers are frosted from inside during the operation of the pump, it is advisable to install the “frost-reducing” accessory ↪ 10.1 “Defects table”.

Personnel:

- Mechanic
- + additional qualification explosion protection
- + Additional qualification high pressure

Protective equipment:

- Protective gloves
- Protective workwear
- Anti-Static Safety Boots

Materials:

- Frost reducing accessories ↪ 13.3 “Accessories”

Removing Adapter

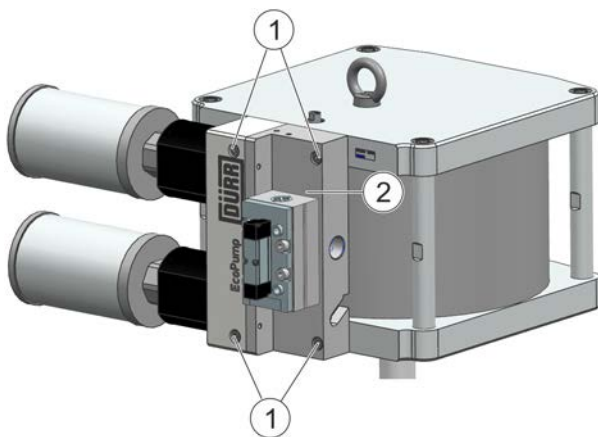


Fig. 36: Disassemble control unit

1. Thread off four screws (1).
2. Remove control unit (2) from the motor.

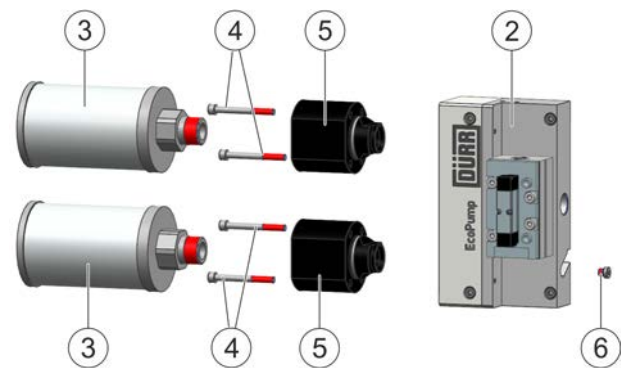


Fig. 37: Removing Adapter

3. Unscrew sound muffler (3).
4. Thread off four screws (4).
5. Pull out adapter (5) together with O-ring from the housing (2).

6. Unscrew sealing screw (6).

Install ice reduction kit

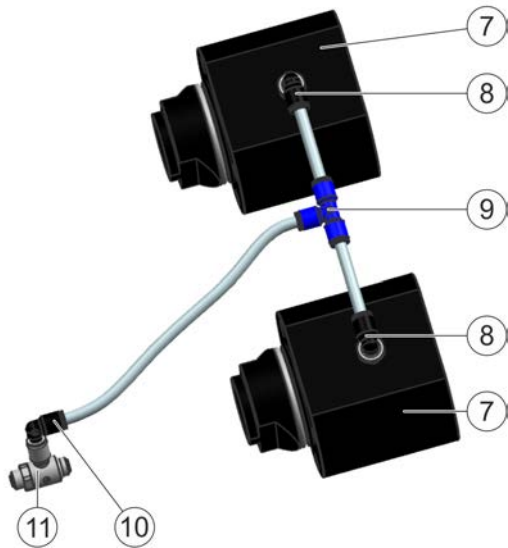


Fig. 38: Ice reduction kit

- 7 Adapter
- 8 Screw-in plug connector
- 9 T-connecting piece
- 10 Plug-in bracket
- 11 Throttle valve

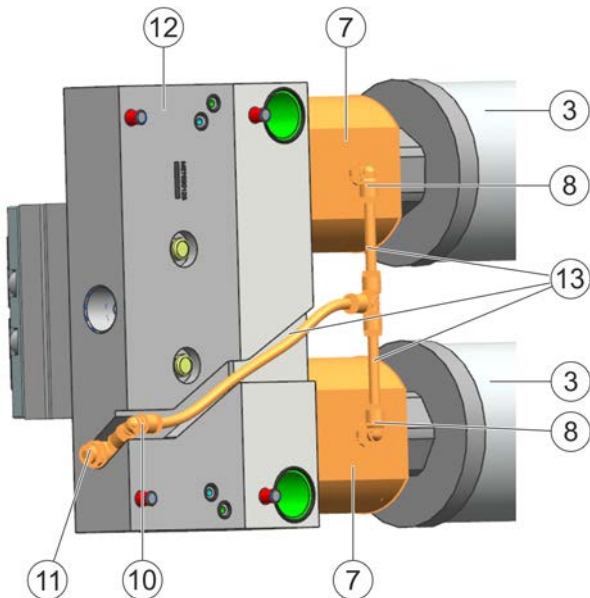


Fig. 39: Install ice reduction kit

- 7. The air quantity can be adjusted on the throttle valve in the installed state.
Screw the throttle valve (11) into the valve block (12).
- 8. Insert the plug-in bracket (10) into the throttle valve (11).
- 9. O-rings are mounted on the new adapters (7).
Insert new adapters (7) into the valve block (12) and screw tight.
- 10. Mount sound muffler (3) onto the adapters (7).
- 11. Screw the screw-in plug-in connections (8) into the adapters (7).
- 12. Connect hoses (13) with the screw-in plug-in connections (8), the T-connecting piece (9) and the plug-in bracket (10).

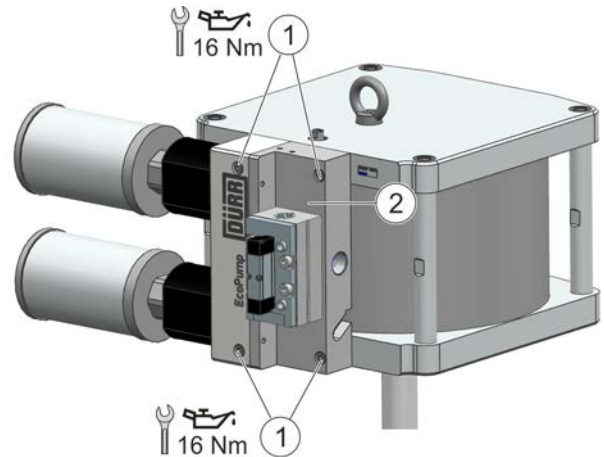


Fig. 40: Assemble control unit

Molykote TP-42 Paste

- 13. Observe tightening torque. All O-rings are mounted on the control unit (2).
Firmly attach control unit (2) to the motor with four screws (1).
- 14. Ice reduction kit is mounted.

11 Disassembly and Disposal

11.1 Safety recommendations

WARNING!

Risk of injury due to residual pressure

After switching off the pump, there may be residual pressure inside of the pipes and the pump. Serious injuries due to escaping compressed air and material can be the consequence.

Before working on the pump:

- Disconnect the system, in which the product is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.
- Ensure that the pump is unpressurized.
- Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.

WARNING!

Unexpected motor start

If the pump is connected to the compressed air supply, the motor may start unexpectedly. This may cause a crushing hazard and injuries due to parts flying around.

Before working on the product:

- Disconnect the system, in which the product is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.
- Ensure that the pump is unpressurized.
- Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.

WARNING!

Danger from harmful or irritant substances

Serious injuries or death can result if you come into contact with dangerous fluids or steam.

- Pump Check regularly for leakage. Observe local regulations and maintenance schedule.
- Ensure that the forced ventilation is operational.
- Follow the safety data sheet.
- Wear specified protective clothing.
- Avoid contact (e.g. with eyes, skin).

WARNING!

Raising heavy loads

Raising heavy loads without suitable hoist and stopper material can cause major injuries.

- Transport heavy loads only by using suitable hoists and stoppers.

WARNING!

Danger due to freezing

The noise mufflers on the motor can cool down drastically. Contact with it can result in frostbite.

- Before working on the motor, ensure that the noise muffler is at room temperature.

WARNING!

Unsuitable tools in explosive areas

Tools that do not have Ex approval can generate sparks and cause a fire or an explosion in Ex zones. It can cause serious injuries or death.

- If possible, carry out cleaning and maintenance work outside the Ex zones.
- For work within the Ex zone, use tools with the corresponding Ex labeling.



Even if the pump is purged, medium can still come out on loosening the pipe connections.

- Place suitable collecting trays below the pipe connections.

11.2 Disassembly

Personnel:

- Mechanic
- + Additional qualification high pressure
- + additional qualification explosion protection

Protective equipment:

- Face protection
- Protective workwear
- Protective gloves
- Anti-Static Safety Boots

Requirements:

- Pump has been cleaned ↪ 8.2 “Cleaning” and purged ↪ 7.3 “Rinsing”.
- Ball valves are closed.
- Lines are depressurized.
- Collecting vessel is under the pump.

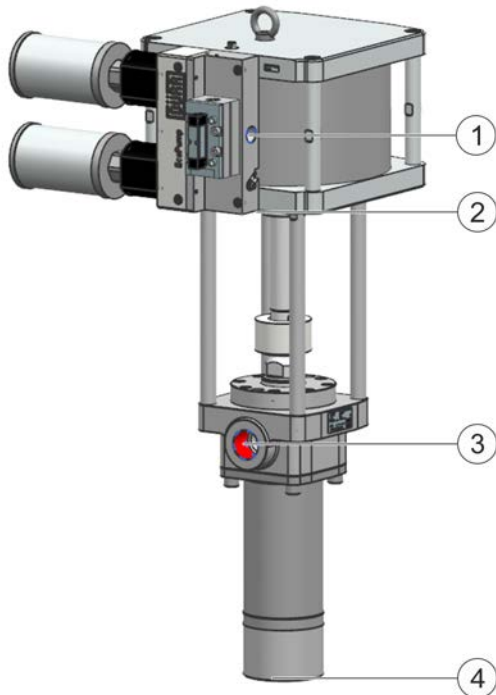


Fig. 41: Disassembling Connections

1. Disconnect compressed air supply to the pump. Secure against reconnection.
2. Relieve the pressure from compressed air line.
3. Disconnect the compressed air hose from the compressed air connection (1).
4. Unscrew and remove material connection line from the material outlet (3).

5. Separate material inlet (4) from the material supply.
6. Collect material residue from pump and the connection lines in collecting vessel.
7. Disconnect grounding cable from the grounding hole (2).

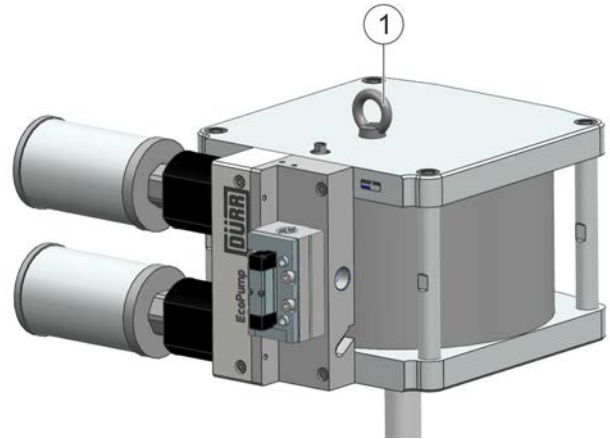


Fig. 42: Eyebolt

8. Fix stoppers on the eye bolts (1).
9. Hinge a sling gear on the hoist.
⇒ Pump is secured against toppling.

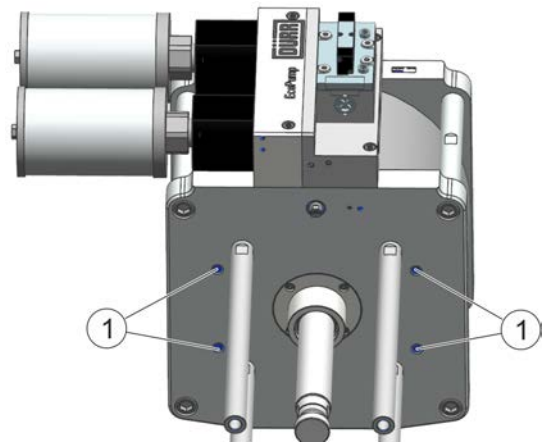


Fig. 43: Disassembling the Pump

10. Unscrew the screws on the frame from the bores (1).
11. Transport pump using a hoist.

11.3 Disposal

ENVIRONMENT!

Improper waste disposal

Improper waste disposal threatens the environment and prevents re-use and recycling.

- Clean components before their disposal.
- Always dispose of components in accordance with their characteristics.
 - ↳ 12.8 “Materials used”
- Collect leaked out utilities and auxiliaries completely.
- Dispose of work equipment soaked in coating materials or operating substances according to the disposal provisions in force.
- Dispose of utilities and auxiliaries according to the disposal provisions in force.
- In case of doubt, refer to the local disposal authorities.

Requirements:

- Pump has been cleaned ↳ 8.2 “Cleaning” and purged ↳ 7.3 “Rinsing”.
- Pump has been disassembled ↳ 11.2 “Disassembly”.

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Protective gloves
- Face protection
- Anti-Static Safety Boots

1. Dispose of material residue from pump professionally.
2. Remove the seals. Ensure professional disposal.
3. Dispose of individual parts of the pump professionally.

12 Technical data

12.1 Dimensions and weight

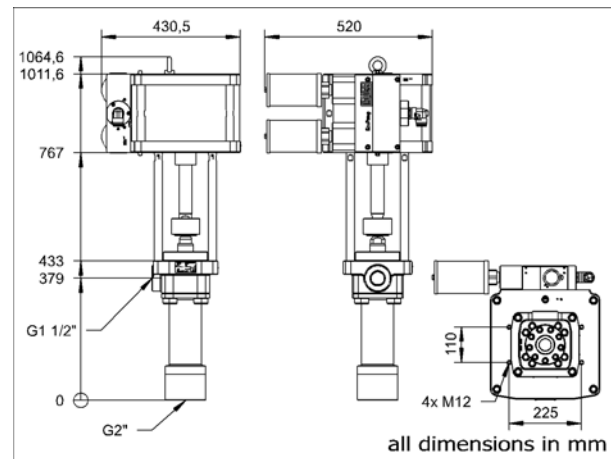
N24170028, N24170040


Fig. 44: Dimensions N24170028, N24170040

Detail	Value
Height	1064.6mm
Width	520.0mm
Depth	430.5mm
Weight	103.4kg

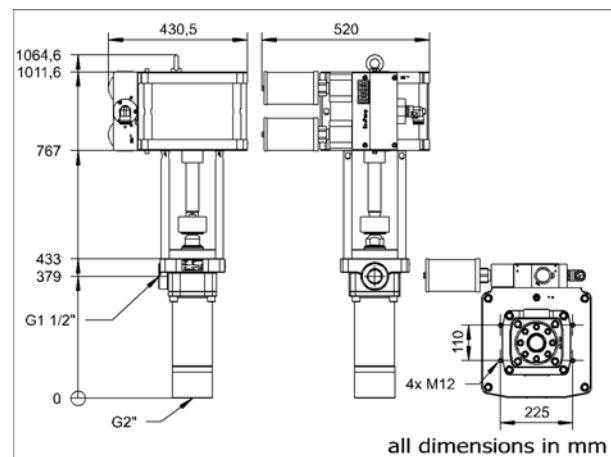
N24170030


Fig. 45: Dimensions N24170030

Detail	Value
Height	1064.6mm
Width	520.0mm
Depth	430.5mm
Weight	123.0kg

12.2 Connections

Detail	Value
Material inlet	G2"
Material outlet	G1 1/2"
Compressed air	G3/4"

12.3 Operating conditions

Detail	Value
Operating temperature, min.	10°C
Operating temperature, max.	60 °C
Media temperature, min.	10°C
Media temperature, max.	60 °C
Ambient temperature, min.	15°C
Ambient temperature, max.	40°C
Relative humidity, min.	35%
Relative humidity, max.	90%

12.4 Emissions

Detail	Value
Sound pressure level, including sound muffler	85dB(A)
Sound power level	96dB(A)

12.5 Operating values

Displacement volume and flow rate	
N24170028, N24170040	Value
Displacement volume	500 cm ³ /cycle
Recommended number of cycles for continuous running duty	0 - 10 cycles/min = 0 - 5L/min
Recommended number of cycles for short-time duty	11 - 15 cycles/min = 5.5 - 7.5L/min
Translation ratio	45 : 1

N24170030	Value
Displacement volume	1000cm ³ /cycle
Recommended number of cycles for continuous running duty	0 - 10 cycles/min = 0 - 10L/min
Recommended number of cycles for short-time duty	11 - 15 cycles/min = 11 - 15L/min
Translation ratio	23 : 1

Material pressure and air pressure

N24170028, N24170040	Value
Inlet material pressure, max.	30 bar
Outlet material pressure, max.	270bar
Permissible air pressure, max.	6bar

N24170030	Value
Inlet material pressure, max.	30 bar
Outlet material pressure, max.	135 bar
Permissible air pressure, max.	6 bar

12.6 Compressed air

Quality of compressed air

ISO 8573-1:2010 Class 1:3(≤ -20°C):1

12.7 Type plate

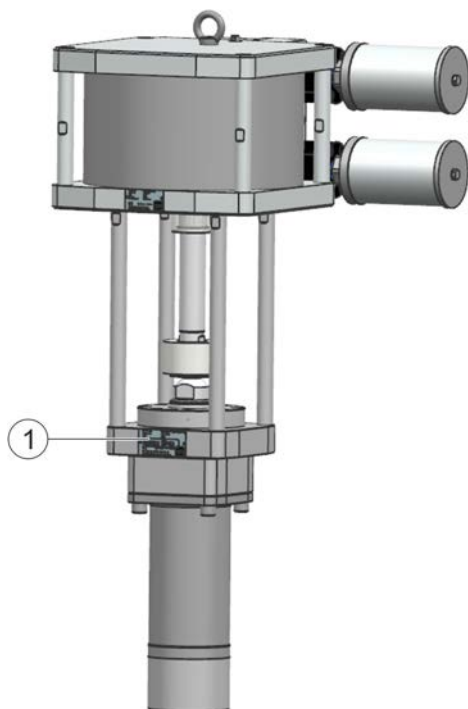


Fig. 46: Position of type plate

The type plate of the pump (1) contains the following details:

- Product name
- Material number
- Year of manufacture
- Serial number
- Maximum air pressure
- Maximum material pressure
- CE labeling
- EX labelling
- Manufacturer
- QR Code

12.8 Materials used

Detail	Material
Motor	Aluminum
Components in contact with material	Stainless steel
Housing	Aluminum
Ball	Stainless steel
Ball seat	Stainless steel
Seals	PU

12.9 Operating and auxiliary materials

Specification	Material	Material number
Klüber Syntheso GLEP 1 1kg	Seal lubricant	W32020009
Molykote TP-42 Paste 1kg	Lubricant for screws	W32020044
Loctite 222	Thread protection	W31010001

Cleaning agents

Only use approved cleaning agent that meet the following conditions:

- Suitable for use in explosive areas.
- Compatible with the materials used

Detergent

Only use approved rinsing agents that meet the following conditions.

- Suitable for use in explosive areas.
- Compatible with the pumped material
- Compatible with the materials used

12.10 Material specification

Requirements for delivered media	
Detail	Value
Allowable material depends on inserted seal:	
Seal PU	Non-solvent-containing media, e.g. PVC, wax
Flashpoint	>100°C
Viscosity, min.	200mPa s
Viscosity, max.	5000mPa s
Diameter of the solids contained, max.	500µm
Conductivity, min.	1000pS/m

13 Replacement parts, tools and accessories

13.1 Replacement parts

13.1.1 Control Unit

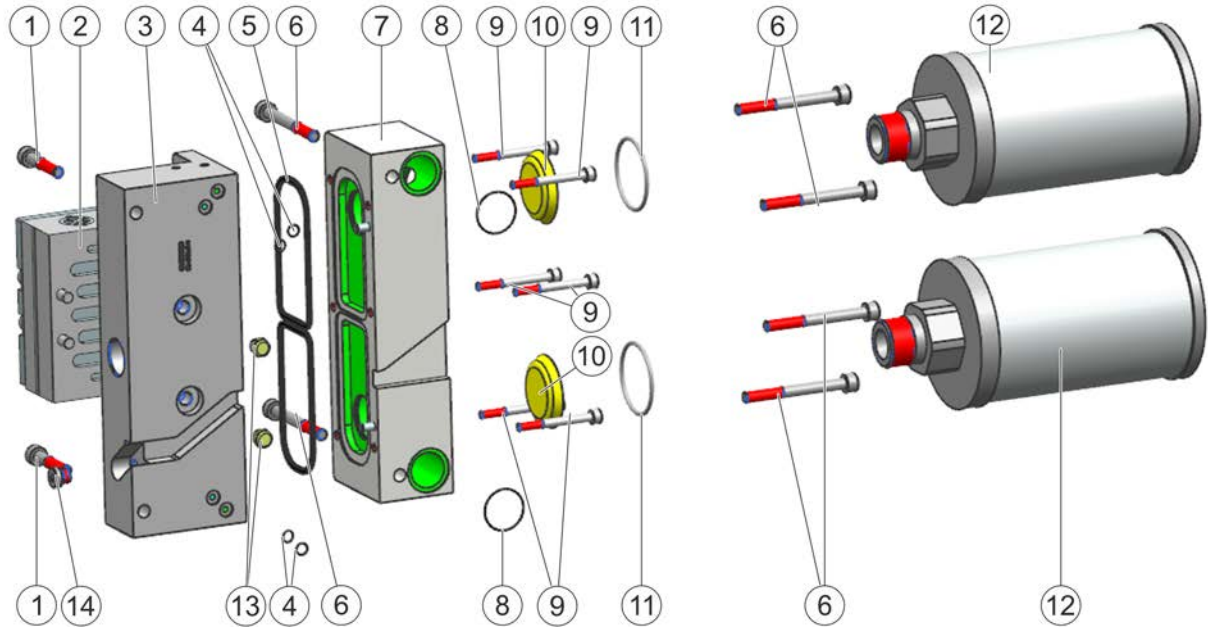


Fig. 47: Control unit replacement parts

Item	Denomination	Quantity	Repair kit
1	Screw	2	
2	Directional control valve	1	N24960135 Included in N32230010
3	Valve distributor block	1	Included in N32230010
4	O-ring 6x2	4	M08030707 Included in N32230010
5	Flat seal	2	Included in N32230010
6	Cylinder screw M8x75	6	Included in N32230010
7	Diaphragm distributor block	1	Included in N32230010
8	O-ring 27x2	2	M08030232 Included in N32230010
9	Cylinder screw M6x55	6	Included in N32230010
10	Membrane	2	Included in Kit N24960075
11	O-ring 46x3	2	Included in Kit N24960075
12	Sound muffler G1"	2	M54610065 Included in N32230010
13	Sound muffler G1/8" L11.8 short	2	M54610071
14	Sealing screw	1	Included in N32230010

13.1.2 Fluid part

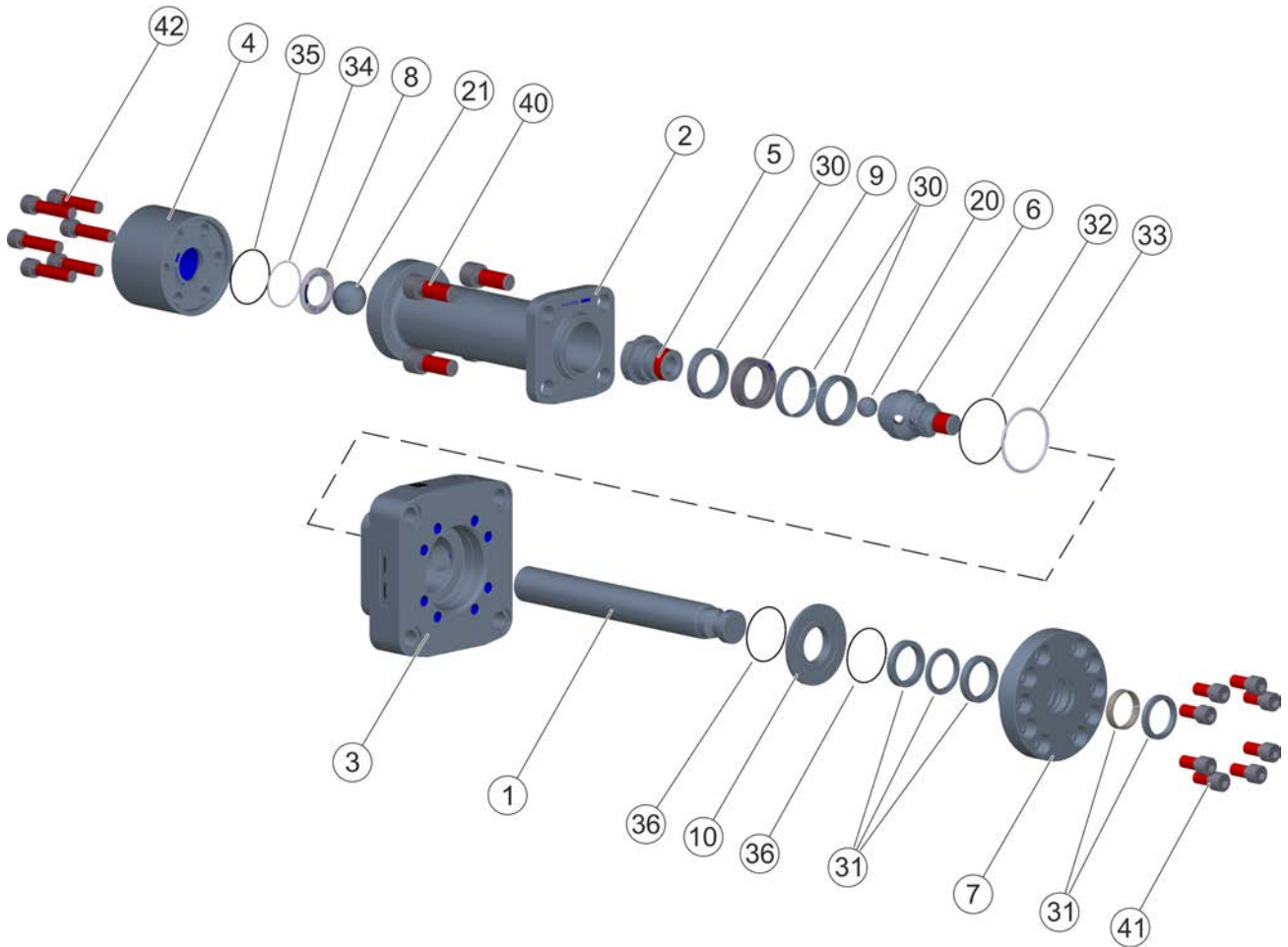


Fig. 48: Replacement parts fluid part

The illustration is only intended as an example, the number of screws and the appearance of the housing may vary.

N24170028, N24170040			
Item	Denomination	Quantity	Repair kit
1	Piston rod Ø47.5	1	N24170028: M12190052 N24170040: M121900092
2	Cylinder	1	N24170028: M16010546 N24170040: M16010643
3	Material outlet housing	1	
4	Cylinder flange	1	
5	Valve ball guide	1	Included in Kit N24960119
6	Piston seal inlet	1	
7	Sealing bush Ø47.5	1	
8	Sealing washer Ø63 ø37 s8 VA	1	Included in Kit N24960119
9	Guide bush	1	Included in Kit N24960119
10	Spacer Ø89.5 ø48.5 s14.5 VA	1	
20	Ball Ø31.75	1	Included in Kit N24960119
21	Ball Ø44.45	1	Included in Kit N24960119
30	Piston Seal set	1	Included in Kit N24960121
31	Rod seal set	1	Included in Kit N24960120
32	O-ring 86x2	1	Included in Kit N24960121
33	O-ring 83.5x3	1	Included in Kit N24960121
34	O-ring 58x2.5	1	Included in Kit N24960119 and N24960121
35	O-ring 80x1.5	1	Included in Kit N24960121
36	O-ring 71.12x2.62	2	Included in Kit N24960120
40	Cylinder screw M16x40	8	
41	Cylinder screw M12x35	9	
42	Cylinder screw M12x70	9	

N24170030			
Item	Denomination	Quantity	Repair kit
1	Piston rod Ø67	1	M12190051
2	Cylinder	1	M16010543
3	Material outlet housing	1	
4	Cylinder flange	1	
5	Valve ball guide	1	Included in Kit N24960116
6	Piston seal inlet	1	
7	Sealing bush Ø67	1	
8	Sealing washer Ø78 ø44 s12 VA	1	Included in Kit N24960116
9	Guide bush	1	Included in Kit N24960116
10	Spacer Ø116.5 ø68 S14.5 VA5	1	
20	Ball Ø44.45	1	Included in Kit N24960116
21	Ball Ø50.8	1	Included in Kit N24960116

Item	Denomination	Quantity	Repair kit
30	Piston Seal set	1	Included in Kit N24960118
31	Rod seal set	1	Included in Kit N24960117
32	O-ring 110 x 3.5	1	Included in Kit N24960118
33	O-ring 110.5x3	1	Included in Kit N24960118
34	O-ring 71.5x3	1	Included in Kit N24960116 and N24960118
35	O-ring 78x1.5	1	Included in Kit N24960118
36	O-ring 94.92x2.62	2	Included in Kit N24960117
40	Cylinder screw M16x40	4	
41	Cylinder screw M12x35	8	
42	Cylinder screw M12x70	8	

13.1.3 Motor

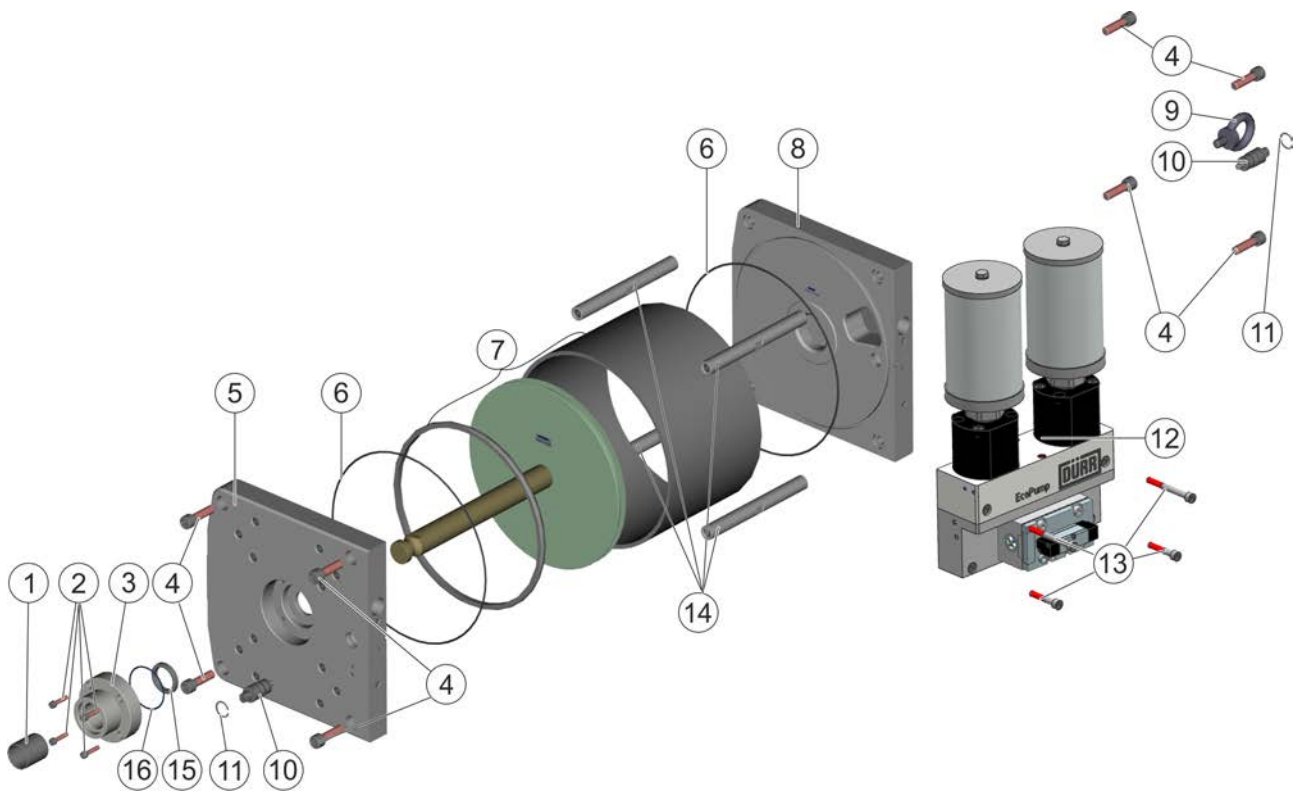


Fig. 49: Motor Replacement Parts

Item	Denomination	Quantity	Repair kit
1	Plain bearing Ø44 d40 L50	1	Included in N24960089
2	Cylinder screws M6x25	4	
3	Seal housing	1	
4	Cylinder screws M16x40	8	
5	End plate (open)	1	
6	O-Ring 295x3	2	Included in N24960089
7	Piston with piston seal Ø320	1	Included in N24960089
8	End plate closed	1	
9	Eye bolt	1	
10	Valve unit changeover valve	2	Included in Kit N24960017
11	Retainer ring	2	
12	Control unit	1	
13	Cylinder screws M8x75	4	
14	Tie rod	4	
15	Rod seal ø40	1	Included in N24960089
16	O-ring 62x2.5	1	Included in N24960089

13.1.4 Repair kits

N24170028, N24170040

Repair Kit Fluid Part N24960119

Denomination	Quantity
Valve ball guide	1
Ball Ø31.75	1
Ball Ø44.45	1
Sealing washer Ø63 ø37 s8 VA	1
Guide bush	1
O-ring 58x2.5	1

N24170030

Repair Kit Fluid Part N24960116

Denomination	Quantity
Valve ball guide	1
Ball Ø44.45	1
Ball Ø50.8	1
Sealing washer Ø78 ø44 s12 VA	1
Guide bush	1
O-ring 71.5x3	1

Repair Kit Drive Unit N24960017

Denomination	Quantity
Valve unit changeover valve	2

13.1.5 Seal sets

N24170028, N24170040
Seal set fluid rod Ø47.5 N24960120

Denomination	Quantity
Rod seal set Ø47.5 VP 500	1
O-ring 71.12x2.62	2

Seal set fluid piston Ø68 N24960121

Denomination	Quantity
Piston seal set Ø68	1
O-ring 86x2 70SH A	1
O-ring 83.5x3	1
O-ring 58x2.5	1
O Ring O-RING 80x1.5	1

N24170030
Seal set fluid rod Ø67 N24960117

Denomination	Quantity
Seal set 1 Rod Ø67	1
O-ring 94.92x2.62	2

Seal set fluid piston Ø95 N24960118

Denomination	Quantity
Seal set 1 Piston Ø95	1
O-ring 110 x 3.5	1
O-ring 110.5x3	1
O-ring 71.5x3	1
O-ring 78x1.5	1

Seal set drive unit for N24960089

Denomination	Quantity
Rod seal ø40	1
Plain bearing Ø44 d40 L50	1
O-Ring 295x3	2
O-ring 62x2.5	1
Piston seal air Ø320	1

Seal set drive unit for N24960075

Denomination	Quantity
Diaphragm ØN50	2
O-Ring 46x3	2

13.2 Tools

The following special tools are available for this product:

Assembly tool	Value
Assembly sleeve for piston rod VP 1000	W02020329
Assembly sleeve for piston rod VP 500	W02020330

13.3 Accessories

Ice reducing	
N24970038	Number / meter
Sound muffler G1" ice-free	2
Elbow plug-in connection D6 G1/8"	2
Elbow plug-in connection D6i-a	1
Throttle valve D6 G1/8", adjustable	1
O-ring 46x3 75-80SHORE FKM	2
Y plug connection D6	1
Hose 4x6 blue PA	0.060m
Hose 4x6 blue PA	0.060m
Hose 4x6 blue PA	0.170m

13.4 Order



WARNING!

Unsuitable replacement parts in explosive areas

Replacement parts not compliant with the specifications of the ATEX guidelines can cause explosions in an explosive atmosphere. Serious injury and death could be the consequence.

- Use exclusively original replacement parts.



WARNING!

Unsuitable replacement parts

Replacement parts of third-party suppliers may possibly not be able to hold the loads. Serious injury and death could be the consequence.

- Use exclusively original replacement parts.

Ordering replacement parts, tools and accessories as well as information on products that are listed without order number → "Hotline and Contact".

14 INDEX


A	
Advanced training	7
Assemblies	5
assembly	
Control unit	20
Membrane	20
Valve	19
Assembly	
Fluid part	28, 29
Housing	27
Motor	24
Non-return valve	28
Seal set	28
Auxiliary materials	40
C	
Cleaning	16
Safety notices	15
Commissioning	13
Compressed air	
Quality	39
Compressed air connection	39
assembly	11
Connect	
Control air inlet	12
Material inlet	12
Pump	12
Connect control air inlet	12
Connect material inlet	12
Connecting rods	
disassembly	21
Connections	39
Contact	2
Control unit	
assembly	20
Bring diaphragms in the home position	33
disassembly	18
Function	8
Install membrane	20
Installing Valve	19
Remove membrane	18
Removing the valve	19
Replacement parts	41
D	
Dimensions	38
disassembly	
Control unit	18
Piston seal	23
Pump	37
Valve	19
Disassembly	
Connecting rods	21
Fluid part	21
Membrane	18
Plain bearing	23
Rod seal	22
dismantling	
Housing	27
Seal sets	26
Dismantling	
Non-return valve	24, 26
Displacement volume	39
Disposal	
Handling packaging material	10
E	
Emissions	39
F	
Faults	
Defects Table	30
Fluid part	
assembly	29
disassembly	21
Function	8
Repair kit	45, 46
Replacement parts	42
rotate	11
G	
Grounding	
Pump	12
H	
Hotline	2
Housing	
assembly	27
dismantling	27
Humidity	39
I	
Ice reduction kit	
assembly	34
Information about the document	2
Intended use	5
L	
Lubricant	40
M	
Maintenance schedule	
Motor	17


Material number	2	Purging	14
Material pressure	39	Q	
Material specification	40	Qualification	7
Materials	40	Qualification of the personnel	7
M		R	
Membrane		Repair kit	
assembly	20	Fluid part	45, 46
disassembly	18	Replace switchover valve	33
Home position	33	Replacement parts	
Misuse	5	Control unit	41
Motor	8	Fluid part	42
assembly	24	Motor	44
Disassemble piston seal	23	Representation	
Removing plain bearing	23	Notes	5
Removing Rod Seal	22	Residual risks	6
Replacement parts	44	Grounding	6
N		Rod seal	
Noise emission	39	assembly	24
Non-return valve		disassembly	22
dismantling	24, 26	S	
Material inlet	26	Safety	
Piston	24	Misuse	5
Notes		Notes	5
Representation	5	Residual risks	6
O		Scope of Supply	9
Operating materials	40	Scope of the document	2
Operating pressure	39	Seal sets	
Order	47	Control unit	47
Other relevant support documents	2	dismantling	26
Overview	5	Drive unit	46
P		Fluid piston	46
Packaging		Fluid rod	46
Handling packaging material	10	Serial number	40
Personal protective equipment	7	Service	2
Piston seal		Setting operating parameters	13
assembly	24	Sound muffler	
disassembly	23	assembly	11
Plain bearing		Sound power level	39
assembly	24	Sound pressure level	39
disassembly	23	Storage	10
Pressure	39	T	
Protective equipment	7	Technical data	
Electrostatic discharge	7	Connections	39
Pump		Dimensions	38
assembly	10	Emissions	39
connect	12	Material specification	40
disassembly	37	Materials	40
grounding	12	Operating and auxiliary materials	40
Putting into operation	13		

Operating conditions	39	Use	5
Power values	39	V	
Technical Data		Valve	
Connections	39	assembly	19
Temperature	39	disassembly	19
Tools	47	Viscosity	40
Training	7	W	
Transport inspection	9	Weight	38
Transport ring bolt	9	Y	
Transportation	9	Year of manufacture	40
Type plate	40		
U			
Unpacking	9		



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