LEADING IN
PRODUCTION
EFFICIENCY

EcoPump2 VP

Pneumatic Vertical Piston Pump

Operation manual

MPU00029EN, V01

N2417...

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:

N24170034 **Eco**Pump2 VP 40 230 SST PE	
N24170035 **Eco**Pump2 VP 80 120 SST PE	
N24170036 **Eco**Pump2 VP 80 300 SST PE	
N24170037 **Eco**Pump2 VP 120 80 SST PE	
N24170039 **Eco**Pump2 VP 120 200 SST PE	

Applicable documents

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

MCU00002* - **Eco**PUC 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.

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1 Product overview

1.1 Overview

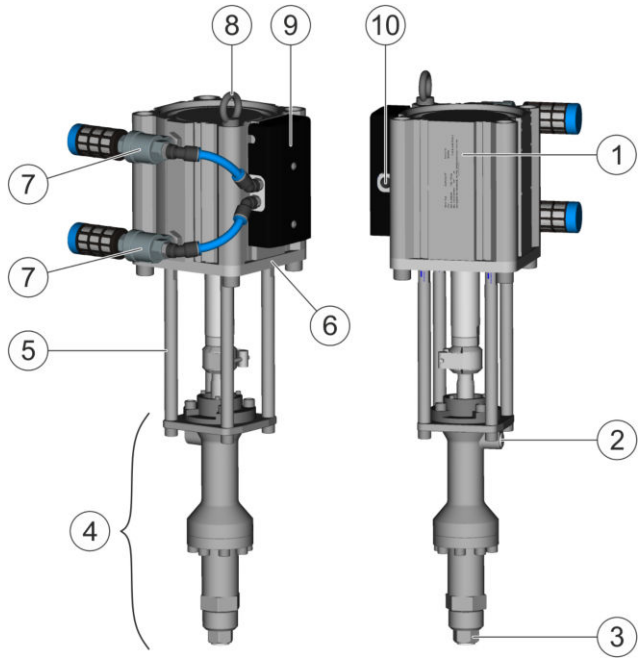

Fig. 1: Pump Overview (Example: N24170036)

1 Motor
2 Material outlet
3 Material inlet
4 Fluid part
5 Connecting rods
6 Ground connection
7 Quick escape valve
8 Transport eye bolt
9 Cover for control unit
10 Compressed air connection

1.2 Short description

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

The pump consists of a pneumatic drive. The drive consists of a pneumatic cylinder, a switchover valve, two pre-control valves and two quick escape valves with sound mufflers. The drive is connected with a fluid assembly. The pneumatic drive drives the fluid assembly forward and creates the conveying pressure of the medium.

The pump is mounted on a wall mount or a transport trolley. Hoses are attached to the material inlet or the material outlet. The operator is responsible for the installation of the pressure restriction or pressure shut-off for the connection air pressure P1 and media pressure.

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

Use

The pump is a pneumatically operated vertical piston pump.

The pump is designed for the conveyance of low viscosity to medium viscosity coating materials in explosion group IIB and their permitted detergents and cleaning agents.

The pump is used for the following applications:

- Airless applications with (ignitable and non-ignitable) water-based and solvent -based coating materials
- Air-assisted applications with (flammable and non-flammable) water-based and solvent-based coating materials

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” .

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 from Dürr Systems

EX labelling

Ex II 2G Ex h IIB T6 Gb X

II	-	Device group II: all areas except mining
2G	-	Device category 2 for gaseous atmosphere
Ex h	-	Mechanical explosion protection
IIB	-	Explosion group IIB
T6	-	Temperature class
X	-	The pump is designed for operation at 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 relevant safety data sheets.
- 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 craftmanship.

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:

- Directives, 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:

- Directives, 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 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.

+ additional qualification for high pressure

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

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

2.6 Personal protective equipment

Wear the required 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 ships 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

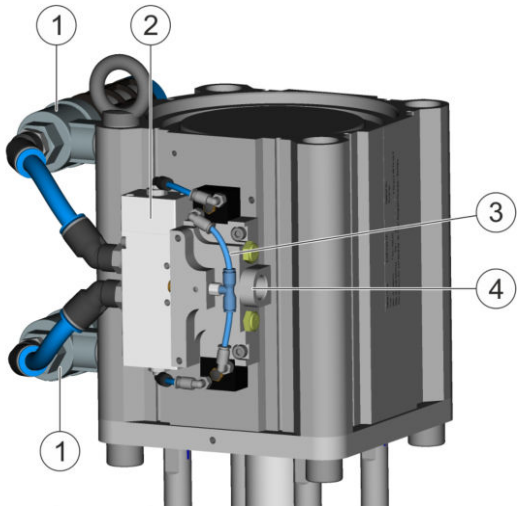

Fig. 2: Control Unit operation

Air reaches the distributor block (3) of the control unit via the compressed air connection (4). The switchover valve (2) controls the switching of the drive. The air outlet is routed through the two quick escape valves (1).

3.2 Motor

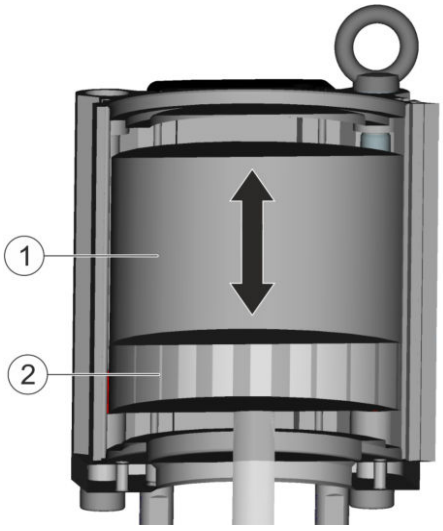

Fig. 3: Motor operation

The pneumatically operated motor drives the pump. The piston (2) of the motor separate the cylinder (1) into two air chambers. Compressed air moves the piston (2) back and forth in the cylinder (1).

When the piston reaches one end of the cylinder, the piston switches the switch valve. The switch valve causes the control unit to change the supply of engine air from one side of the piston to the other. The piston moves in the opposite direction.

3.3 Fluid part

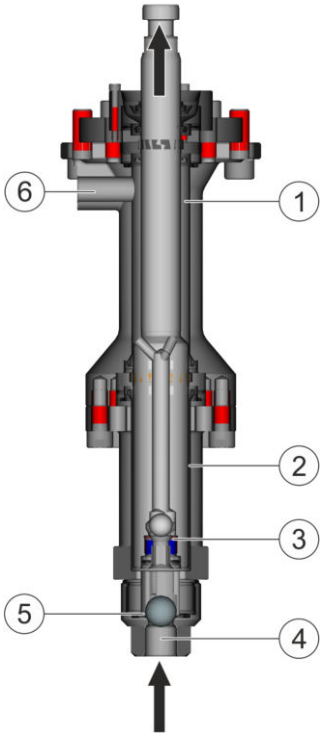

Fig. 4: Fluid part operation

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 (1) into the pressure line through the material outlet (6). At the same time, the non-return valve (5) on the material inlet (4) opens and sucks material into the lower piston chamber (2).

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 (4) closes. The material in the lower piston chamber (2) is pumped into the pressure line by the piston to the material outlet (6).

4 Transport, scope of supply and storage

4.1 Unpacking

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 pumpto fall and suffer damage.

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

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” .

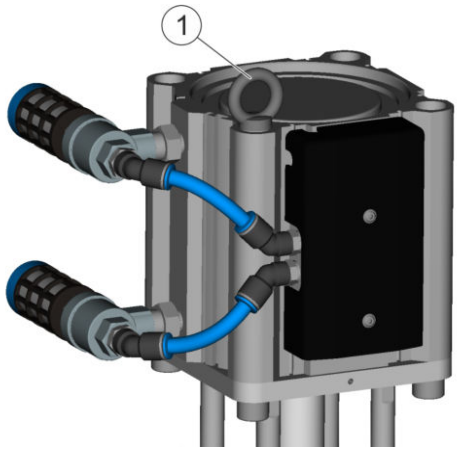

Fig. 5: Transport eye bolt

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 mufflers 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.
- Pump only store when in a clean and dry condition.
- Store in a 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 corresponding Ex approval.
  - Or ensure that at no time does an explosive atmosphere exist.

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 (at least PLr = b) that the technical data are maintained, in particular the maximum connection air pressure and the maximum output material pressure.

  Depending on the usage area, a higher Plr is necessary. The integrator must provide the necessary Plr as part of a risk assessment.

5.3 Assembly

5.3.1 Assembling the pump

Personnel:

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

Protective equipment:

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

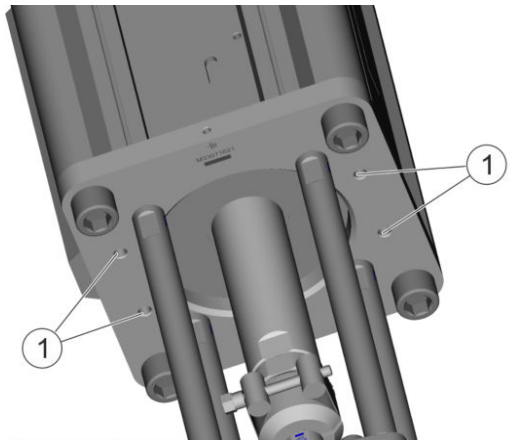

Fig. 6: Assembling the Pump

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

5.3.2 Assemble sound mufflers and compressed air connection

Personnel:

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

Protective equipment:

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

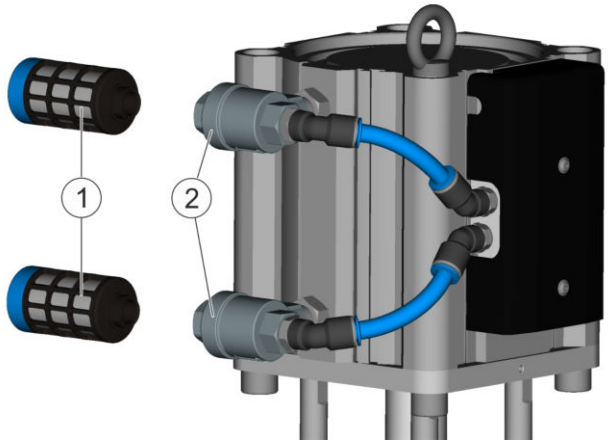

Fig. 7: Assemble the sound muffler

1. Screw in the sound muffler (1) into the quick-bleed valve (2).

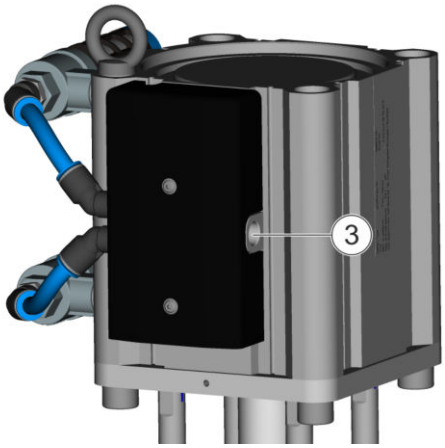

Fig. 8: Install compressed air connection

2. Screw in the compressed air connection (3).

5.3.3 Assemble **Eco**PUC (optional)

Personnel:

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

Protective equipment:

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

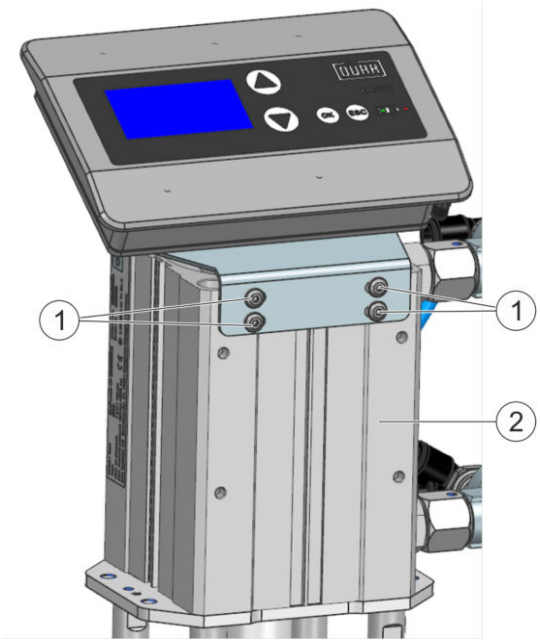

Fig. 9: Assemble **Eco**PUC (optional)

1. Tighten the **Eco**PUC with four screw (1) above on the motor (2).

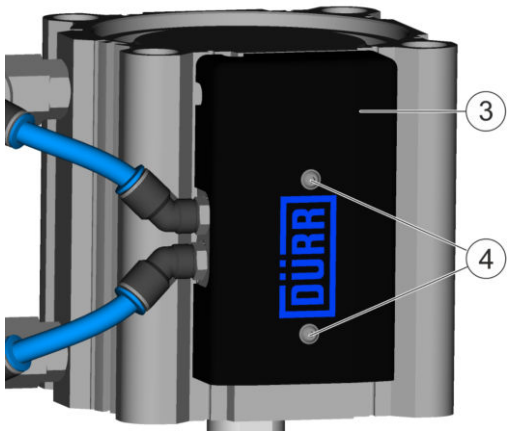

Fig. 10: Disassemble cover

2. Loosen two screws (4). Remove the cover (3) from the control unit.

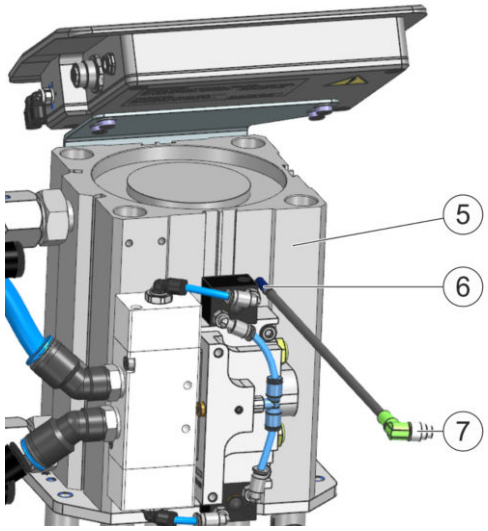

Fig. 11: Assemble sensor

3. Loosen the sensor plug (7) from the **Eco**PUC.
4. Remove nipple insert from the sensor (6). The nipple insert is not needed.
5. Screw the sensor (6) into the provided thread in the motor (5) up to the hilt. Lock.
6. Connect the sensor again with **Eco**PUC.

5.3.4 Assemble bracket

The pump can be assembled onto the wall on a rack with the console.

Personnel:

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

Protective equipment:

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

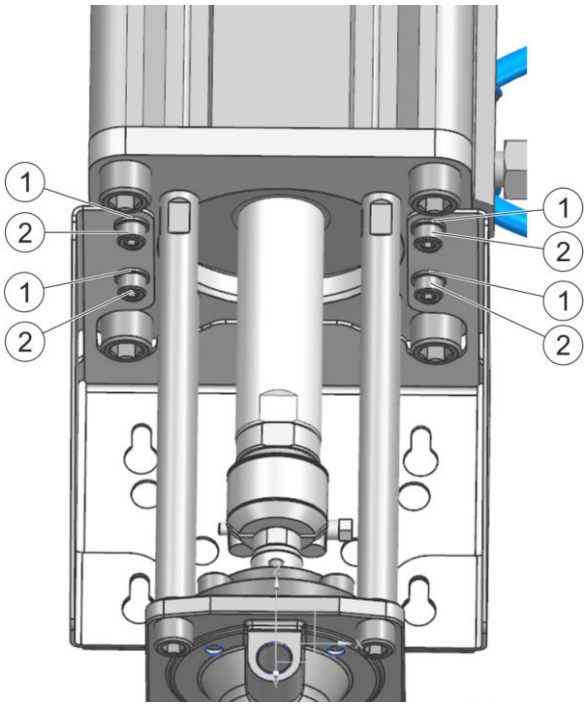

Fig. 12: Assemble bracket

Use the bores in the console to screw in.
Motor ∅100 mm: Use rear bores in the console.
Motor ∅160 mm: Use front bores in the console.

1. Assemble console onto the pump with four disks (1) and four screws (2).
2. Assemble the pump using the console and four bores on the wall or rack.

5.3.5 Assemble the overflow, circulation and separation chamber

An overflow pipe, a circulation purge system or a buffer tank can be assembled onto the optional separation chamber.

Personnel:

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

Protective equipment:

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

Assemble the separation chamber

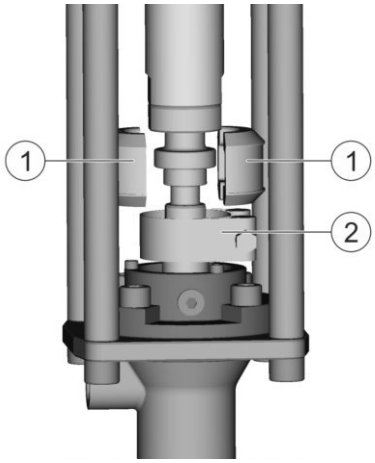

Fig. 13: Disassemble the mounting clips and half shells

1. Disassemble the half shells (2).
2. Loosen the half shells (1).

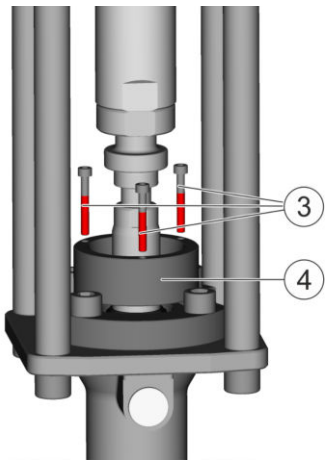

Fig. 14: Disassemble the funnel

3. Remove three screws (3). Remove the funnel (4).

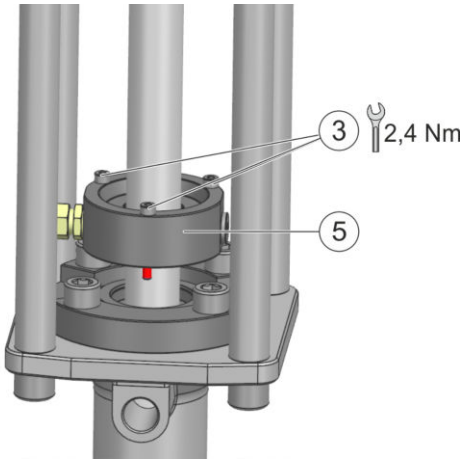

Fig. 15: Assemble the separation chamber

4. Insert the seoaration chamber (5).
5. Tighten with three screws (3). Observe tightening torque.
6. Reassemble the half shells (1) and mounting clips (2).

Connect the overflow pipe

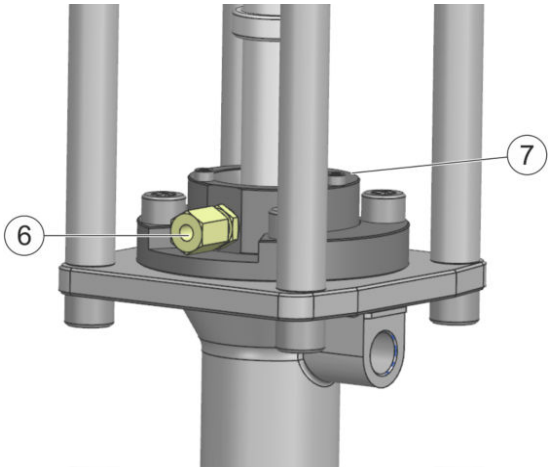

Fig. 16: Connect the hose

7. Connect a ∅6 mm hose to the screw connection (6).
8. Direct the hose to a suitable overflow container.

Connect the circulation

9. Remove the plug (7) on the opposite side.
10. Assemble the connection screws.

11. Assemble circulation hoses onto the connection screws.

Connect the buffer tank to the separation chamber

The screw connection of the sealing bush (8) with the separation chamber (5) must face forward.

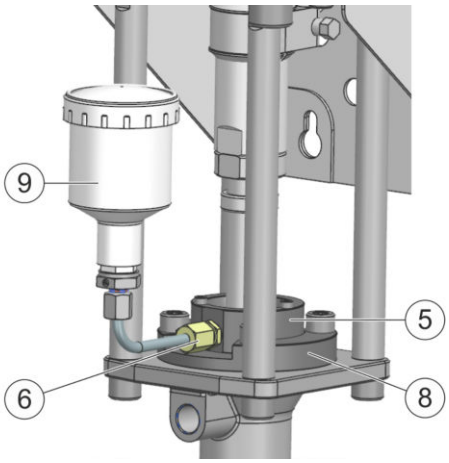

Fig. 17: Assemble the buffer tank

12. Screw in the buffer tank (9) to the screw connection (6) on the separation chamber (5). Tighten.

5.3.6 Rotate fluid part

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

Personnel:

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

Protective equipment:

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

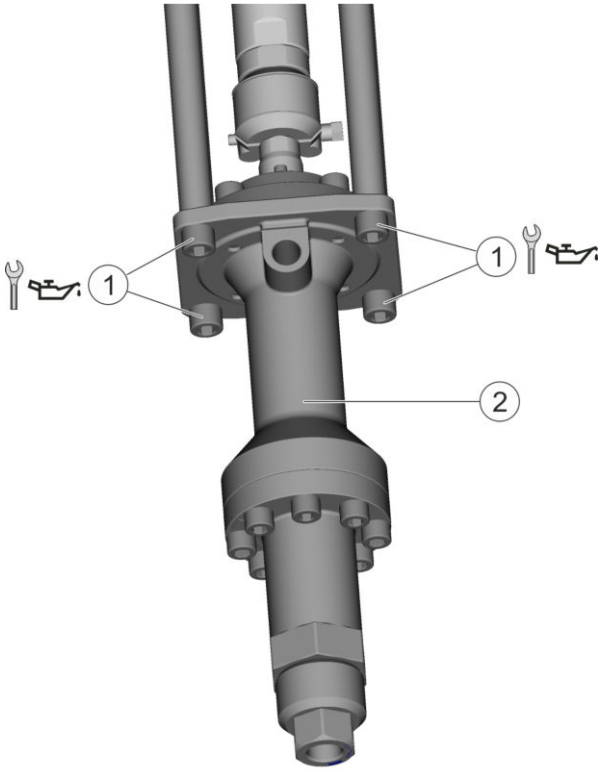

Fig. 18: Rotate fluid part

Molykote TP-42 Paste
N24170034: 14 Nm
N24170035, N24170036: 25Nm
N24170037, N24170039: 45Nm

1. Rotate the fluid part (2) in 90° increments in whichever direction.
2. Tighten four screws (1).
   ⇨ The fluid part (2) is assembled.

5.4 Connecting

5.4.1 Connecting the Pump

Personnel:

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

Protective equipment:

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

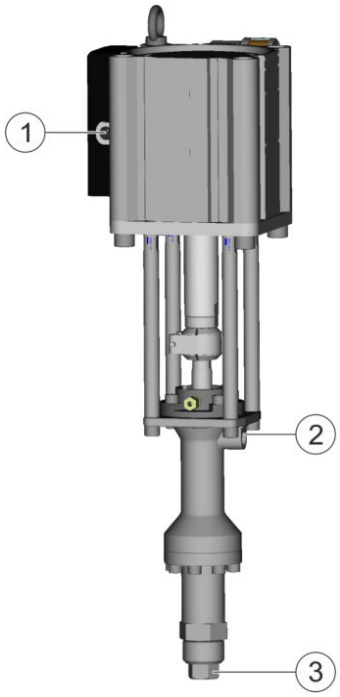

Fig. 19: Connecting the Pump

1. Grease all O-rings and threads of the pipelines.
2. Assemble thte material inlet (3).
3. Screw-in high pressure hose into the material outlet (2).
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 for high pressure

Protective equipment:

- Anti-Static Safety Boots

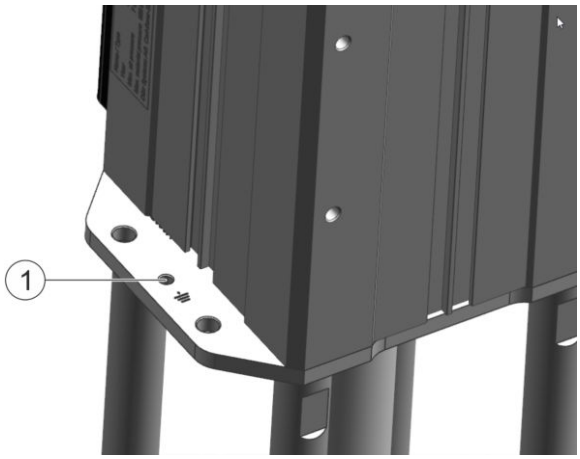

Fig. 20: N24170034, 0035, 0037: Connecting grounding cable

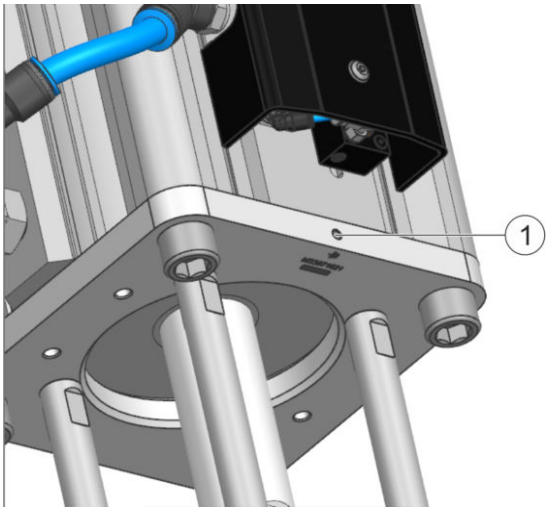

Fig. 21: N24170036, 0039: Connecting grounding cable

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

6 Commissioning

6.1 Safety notes

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 relevant safety data sheets.
- Wear specified protective equipment.

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!

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 corresponding Ex approval.
  - Or ensure that at no time does an explosive atmosphere exist.

CAUTION!

Escaping compressed air

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

- Wear specified protective equipment.

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” .
- Ensure that air pressure of a maximum 7 bar is not exceeded.

Put pump into operation

Personnel:

- Mechanic
- + additional qualification explosion protection
- + additional qualification for 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 “Purging” .

   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 for 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 relevant safety data sheets.
- Wear specified protective equipment.

7.2 General notes

Personnel:

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

Protective equipment:

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

1. 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.
   - The appropriate safety valve and safety switches (at least PLr = b) are installed to ensure that the technical data are observed, in particular the maximum connection air pressure and the maximum output material pressure.
     At 6 bar connection air pressure, the valve opens.
     Depending on the usage area, a higher Plr is necessary. The integrator must provide the necessary Plr as part of a risk assessment.

7.3 Purging

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 General notes

When purging, use fluid to remove inner soiling from components.

7.3.3 Flush the pump

Personnel:

- Mechanic
- + additional qualification explosion protection
- + additional qualification for 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:

- Purge the system, in which the product is installed.
- Switch off compressed air and material supply of the main system and secure personally against switching on again.
- Relieve pressure on cables.
  – Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.
- Ensure that the pump is unpressurized.

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 an injuries due to parts flying around.

Before working on the product:

- Purge the system, in which the product is installed.
- Switch off compressed air and material supply of the main system and secure personally against switching on again.
- Relieve pressure on cables.
  - Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.
- Ensure that the pump is unpressurized.

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 corresponding Ex approval.
  - Or ensure that at no time does an explosive atmosphere exist.

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 the cleaning areas with active technical ventilation.
- Only electrically conductive containers may be used for the cleaning fluid. Containers must be grounded.
- Note explosion group of the fluid.
- Observe safety data sheets of all media used.
- 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 relevant safety data sheets.
- Wear specified protective equipment.

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.

Personnel:
- Cleaning staff

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

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

Observe requirements for the cleaning agent
↳ 12.9 “Operating and auxiliary materials” .

2. Clean pump carefully using a moist cloth.

9 Maintenance

9.1 Safety notes

WARNING!

Unsuitable spare parts in explosive areas

Spare parts not compliant with the specifications of the ATEX directives can cause explosions in an explosive atmosphere. Serious injury and death could be the consequence.
- Use exclusively original spare 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 corresponding Ex approval.
  - Or ensure that at no time does an explosive atmosphere exist.

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:
- Purge the system, in which the product is installed.
- Switch off compressed air and material supply of the main system and secure personally against switching on again.
- Relieve pressure on cables.
  - Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.
- Ensure that the pump is unpressurized.

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 an injuries due to parts flying around.

Before working on the product:
- Purge the system, in which the product is installed.
- Switch off compressed air and material supply of the main system and secure personally against switching on again.
- Relieve pressure on cables.
  - Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.
- Ensure that the pump is unpressurized.

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 the number of dual 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 visually.
	Check the tightness and condition of the connections and lines visually.
	Check tightness and state of the pump visually.
	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. 9.3.1 “Replacem the rod seal and piston seal of the fluid part”
	Replace piston seal of the fluid part. 9.3.1 “Replacem the rod seal and piston seal of the fluid part”
	Replace quick escape valves. 9.3.6 “Replace quick escape valve”
after about 6.1 million cycles (corresponding to 10 dual strokes /min. in a single shift operation for 3.5 years)	Replace control valve. 9.3.4 “Replace valve of the control unit”
after about 10 million cycles (corresponding to 10 dual strokes /min. in a single shift operation for 5 years)	Replace worn out parts:
	Replace the piston seal of the motor. 10.2.1 “Replace piston seal of the air motor”
	Replace non-return valves,. ■ 9.3.2 “Replace non-return valve in the piston” ■ 9.3.3 “Replace non-return valve in the material inlet”
	Replace changeover valve 9.3.5 “Replace switchover valve” .

9.3 Maintenance work

9.3.1 Replacem the rod seal and piston seal of the fluid part

The rod seal and piston seal of the fluid part are always replaced together.

Personnel:

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

Protective equipment:

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

Disassemble fluid part and connecting rods.

The rod seal can also be replaced with the assembled motor. Continue with Step 7.

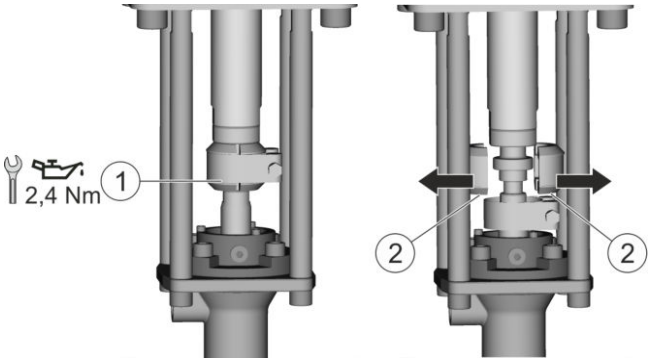

Fig. 22: Disassembling Coupling

Molykote TP-42 Paste

1. Loosen the mounting clips (1). Push downwards.
2. Remove half shells (2)
3. Secure fluid part against falling down.

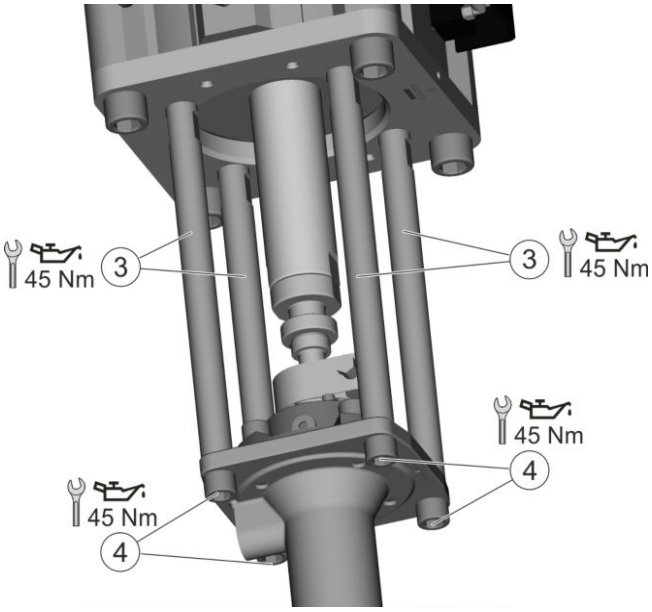

Fig. 23: Disassemble fluid part and connecting rods.

Molykote TP-42 Paste

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

Disassemble seal set

6. Clamp the fluid part at the lower hexagon (14) in a vice.

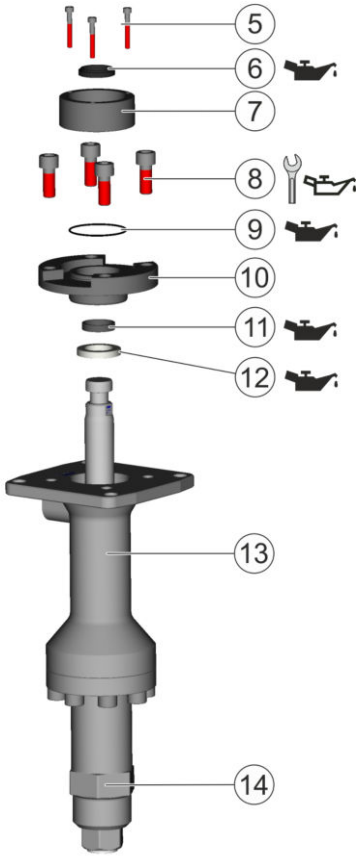

Fig. 24: Disassemble seal set

N24170034: 14 Nm
N24170035, N24170036: 25Nm
N24170037, N24170039: 45Nm
Molykote TP-42 Paste
Klüber Syntheso GLEP 1

7. Unscrew three screws (5).
8. Remove funnel lid (7) with stripper (6).
9. Thread off four screws (8).
10. Remove the O-ring (9) from the sealing bush (10).
11. Remove the sealing bush (10) from the material outlet housing (13).
12. Remove the guide ring (11) from below out of the sealing bush (10).
13. Remove the guide rod seal (12) from below out of the sealing bush (10).

Disassemble piston rod

Ensure that the piston rod is not damaged.

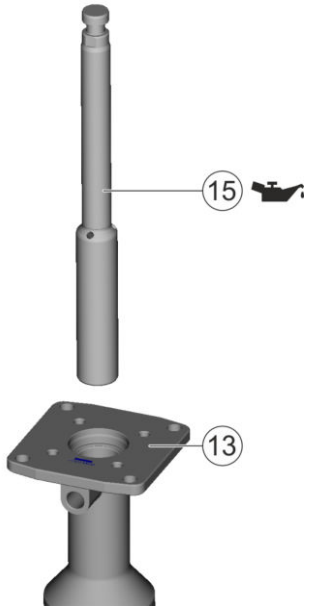

Fig. 25: Disassemble piston rod

Klüber Syntheso GLEP 1

14. Pull the piston rod (15) out of the material outlet housing (13).

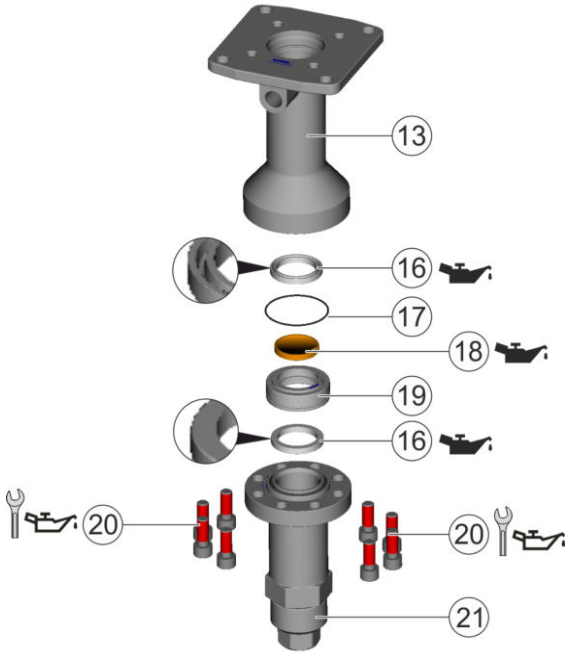

Fig. 26: Disassemble the piston seal.

N24170034: 14 Nm
N24170035, N24170036: 25Nm
N24170037, N24170039: 45Nm
Molykote TP-42 Paste
Klüber Syntheso GLEP 1

15. Unscrew eight screws (20) from the material inlet housing (21).
16. Remove the material outlet housing (13).

Disassemble the seal set of the piston seal

17. Remove the piston seals (16), O Ring (17), guide belt (18) and guide bush (19).

Assemble the seal set of the piston seal

18. Observe installation position of the piston seal (16).

    Insert piston seal (16) into the material inlet housing (21).
19. Assemble the O-ring (17) into the guide bush (19). Insert into the material inlet housing (21).
20. Insert the guide belt (18).
21. Observe installation position of the piston seal (16).

    Insert the piston seal (16).

Assemble piston rod

Ensure that the piston rod is not damaged.

22. Insert the piston rod (15) into the material outlet housing (13).
23. Place material outlet housing (13) onto the material inlet housing (21).
24. Tighten eight screws (20).

Assemble new seal set for the rod seal

25. Insert guide ring (11) and rod seal (12) into the sealing bush (10).
26. Insert sealing bush (10) into the material inlet housing (13).
27. Insert O-ring (9) into the sealing bush (10).
28. Tighten four screws (8).
29. Install new stripper (6) in the funnel lid (7).
30. Assemble the funnel cover (7) onto the sealing bush (10).
31. Tighten three screws (5).

Assemble fluid part and connecting rods

32. Screw four connecting rods (3) into key surfaces.
33. Tighten fluid part using four screws (4).
34. Use half shells (2).
35. Secure half shells (2) with fastening clips (1).

9.3.2 Replace non-return valve in the piston

Personnel:

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

Protective equipment:

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

Disassemble fluid part and connecting rods.

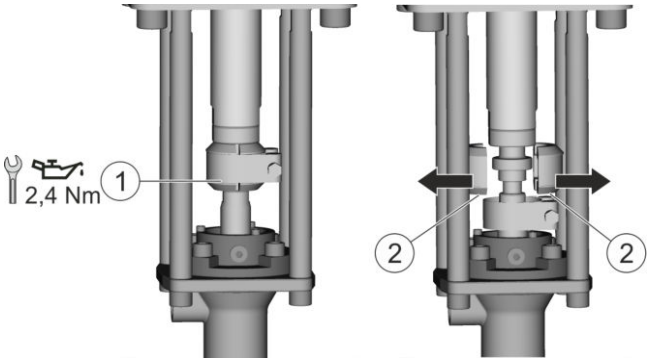

Fig. 27: Disassembling Coupling

Molykote TP-42 Paste

1. Loosen the mounting clips (1). Push downwards.
2. Remove half shells (2)
3. Secure fluid part against falling down.

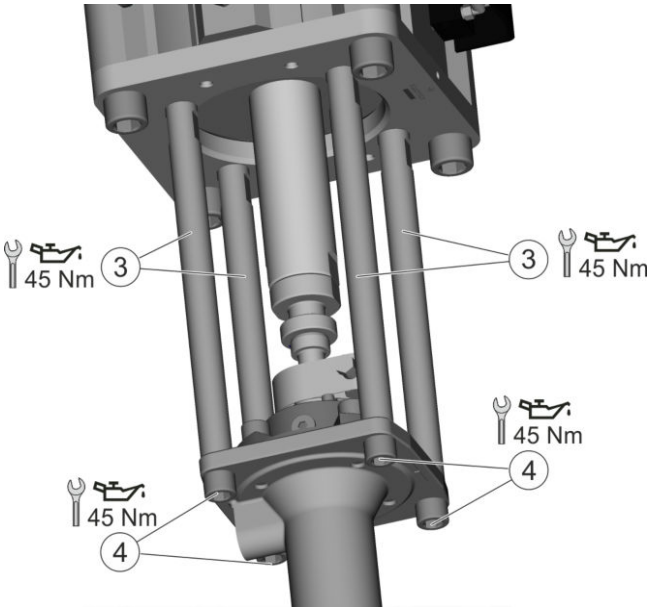

Fig. 28: Disassemble fluid part and connecting rods.

Molykote TP-42 Paste

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

Disassemble the seal set of the fluid part

6. Clamp the fluid part at the lower hexagon (14) in a vice.

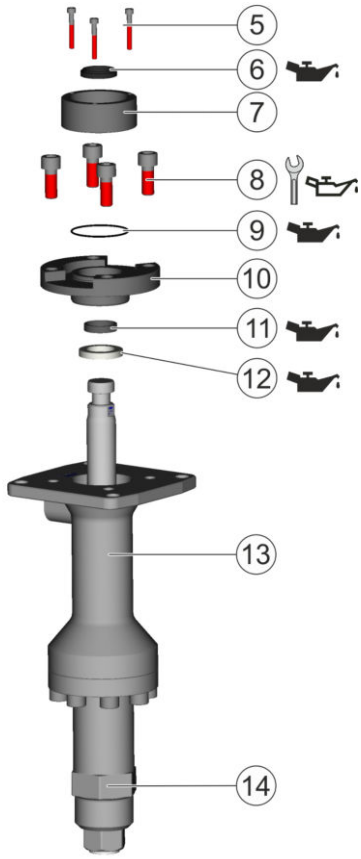

Fig. 29: Disassemble seal set

N24170034: 14 Nm
N24170035, N24170036: 25Nm
N24170037, N24170039: 45Nm
Molykote TP-42 Paste
Klüber Syntheso GLEP 1

7. Unscrew three screws (5).
8. Remove funnel lid (7) with stripper (6).
9. Thread off four screws (8).
10. Remove the O-ring (9) from the sealing bush (10).
11. Remove the sealing bush (10) from the material outlet housing (13).
12. Remove the guide ring (11) from below out of the sealing bush (10).
13. Remove the guide rod seal (12) from below out of the sealing bush (10).

Disassemble piston rod

Ensure that the piston rod is not damaged.

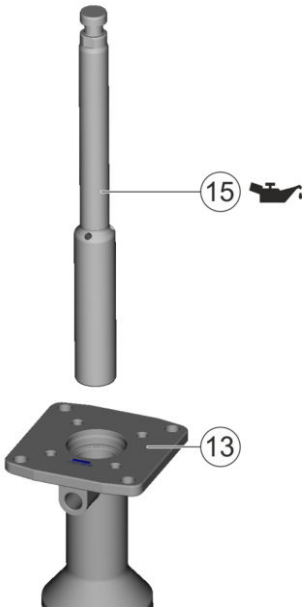

Fig. 30: Disassemble piston rod

Klüber Syntheso GLEP 1

14. Pull the piston rod (15) out of the material outlet housing (13).

Disassemble the non-return valve

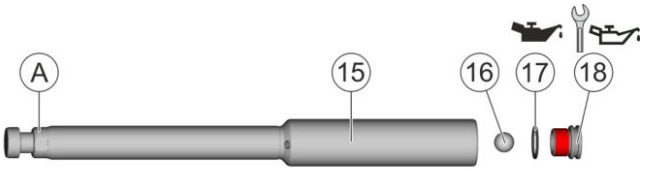

Fig. 31: Disassemble the non-return valve

N24170034: 14 Nm
N24170035, N24170036: 25Nm
N24170037, N24170039: 45Nm
Molykote TP-42 Paste
Klüber Syntheso GLEP 1

15. Unscrew the valve ball guide (18) from the piston rod (15).
16. The open-end wrench can be clamped in the vise. Do not clamp the piston rod directly in the vise.

    Hold against the wrench gap (A) with a suitable open-end wrench.
17. Remove the O Ring (17) from the valve ball guide (18).
18. Remove the ball (16) from the piston rod (15).

Assemble the non-return valve

Use an inlet for the mounting assembly for installation.

19. Insert ball (16) into the piston rod (15).
20. Insert O-ring (17) into the valve ball guide (18).
21. Screw the valve ball guide (18) together with the piston rod (15).

Assemble piston rod

Ensure that the piston rod is not damaged.

22. Insert the piston rod (15) into the material outlet housing (13).
23. Grease screws with Molykote TP-42 paste.
    Tightening torque:
    - N24170034: 14 Nm
    - N24170035, N24170036: 25Nm
    - N24170037, N24170039: 45Nm

    Place material outlet housing (13) onto the material inlet housing. Tighten with eight screws.

Assemble the seal set of the fluid part

24. Insert rod seal (12) from underneath into the sealing bush (10).
25. Insert the guide ring (11) from underneath into the sealing bush (10).
26. Insert O-ring (9) into the sealing bush (10).
27. Attach the sealing bush (10) to the material outlet housing (13) using screws (8).

Assemble fluid part and connecting rods

28. Screw four connecting rods (3) into key surfaces.
29. Tighten fluid part using four screws (4).
30. Use half shells (2).
31. Secure half shells (2) with fastening clips (1).

9.3.3 Replace non-return valve in the material inlet

Personnel:
- Mechanic
- + additional qualification explosion protection
- + additional qualification for high pressure

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

Requirements:
- Material supply line is disassembled.

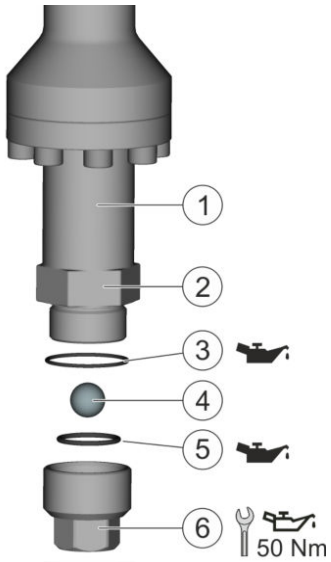

Fig. 32: Disassemble the non-return valve in the material inlet

Molykote TP-42 Paste
Klüber Syntheso GLEP 1

1. Clamp the fluid part at the hexagon (2) in a vise.
2. Unscrew the flange (6) from the material inlet housing (1).
3. Take out flange (6) with O-rings (3,5) and ball (4).

Assemble the non-return valve

4. Insert the O-ring (3) in the slot of the material inlet housing (1).
5. Insert O-ring (5) and new ball (4) into the new flange (6).
6. Tighten flange (6) on the material inlet housing (1).

9.3.4 Replace valve of the control unit

Personnel:

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

Protective equipment:

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

Disassemble control unit

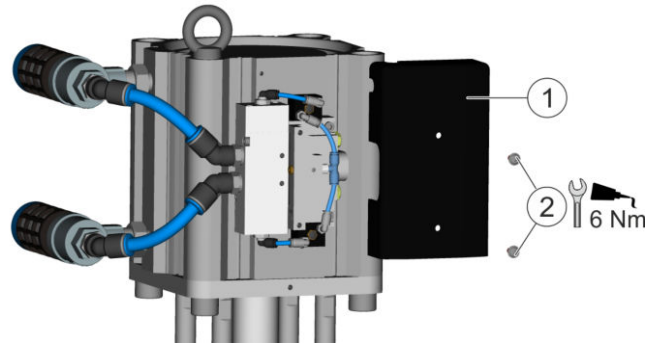

Fig. 33: Disassemble cover

Loctite 222

1. Remove screws (2). Remove cover (1).

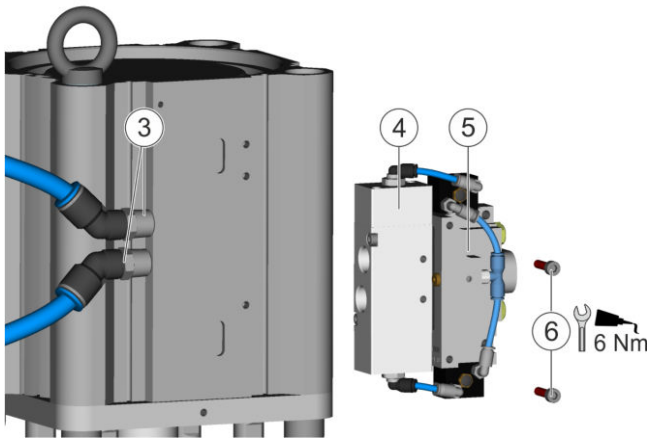

Fig. 34: Disassemble control unit

Loctite 222

2. Unscrew plug-in connections (3) from the control unit valve (4).
3. Unscrew the screws (6) from the connection plate (5).
   ⇨ Control unit is disassembled.

Disassemble valve

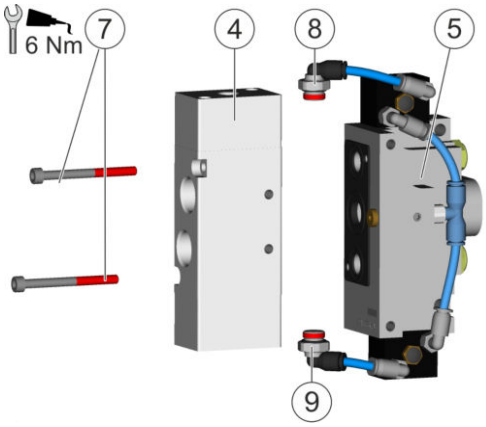

Fig. 35: Disassemble control unit valve

4. Unscrew screws (8) from the control unit valve (4).
5. Unscrew plug-in connections (9) from the valve (4).

Assemble new valve

6. Firmly attach valve (4) to the connector plate (5) with screws (7).
7. Screw the plug-in connections (8) into the valve of the control unit (4).

Assemble control unit

8. Firmly attach the control unit valve (4) and the connection plate (5) onto the housing with screws (6).
9. Screw the plug-in connections (3) into the valve of the control unit (4).
10. Tighten cover (1) using screws (2).

9.3.5 Replace switchover valve

Personnel:

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

Protective equipment:

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

Disassemble control unit

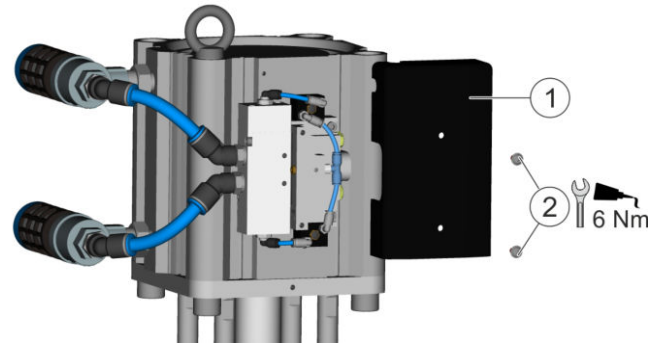

Fig. 36: Disassemble cover

Loctite 222

1. Remove screws (2). Remove cover (1).

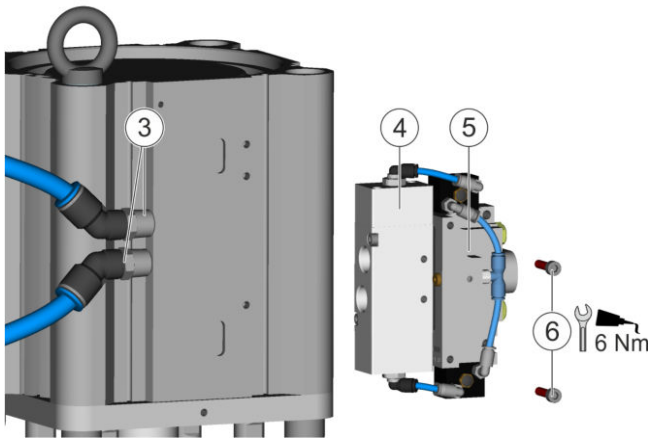

Fig. 37: Disassemble control unit

Loctite 222

2. Unscrew plug-in connections (3) from the control unit valve (4).
3. Unscrew the screws (6) from the connection plate (5).
   ⇨ Control unit is disassembled.

Disassemble switchover valve

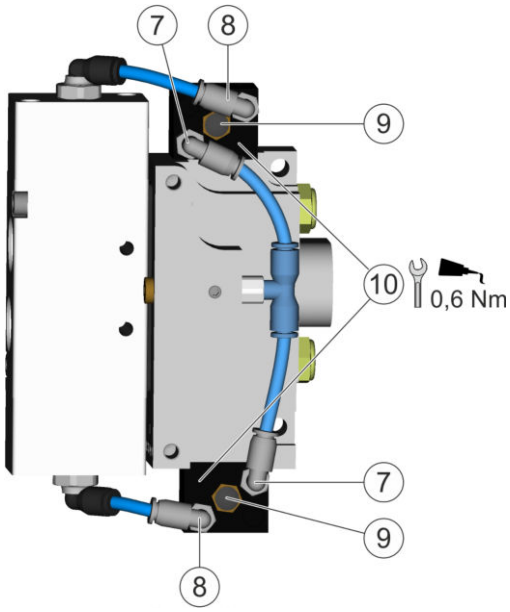

Fig. 38: Disassemble switchover valve

Loctite 222

4. Unscrew plug-in connections (7, 8) from the switchover valve (10).
5. Unscrew sound damper (9) from the switchover valve (10).
6. Unscrew the switchover valve (10) from the connection plate (5).

Assemble new switchover valve

7. Screw the switchover valve (10) into the connection plate (5).
8. Screw the sound muffler (9) into the switchover valve (10).
9. Connect the plug-in connection (7) (air supply) to Connection 1 of the switchover valve.
   Connect the plug-in connection (8) (control cable) to Connection 2 of the switchover valve.
   Screw the plug-in connections (7, 8) into the switchover valve (10).

Assemble control unit

10. Firmly attach the control unit valve (4) and the connnection plate (5) onto the housing with screws (6).

11. Screw the plug-in connections (3) into the valve of the control unit (4).
12. Tighten cover (1) using screws (2).

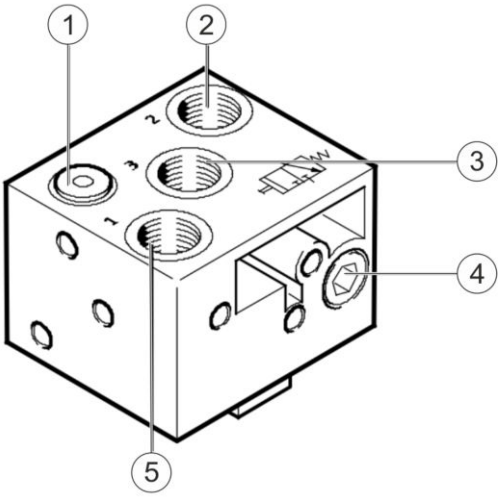

Fig. 39: Switchover valve - Details

1 Switching status indicator
2 Outlet 2
3 Venting 3
4 Through bore for fastening with attachment component
5 Compressed air connection 1

9.3.6 Replace quick escape valve

Personnel:

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

Protective equipment:

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

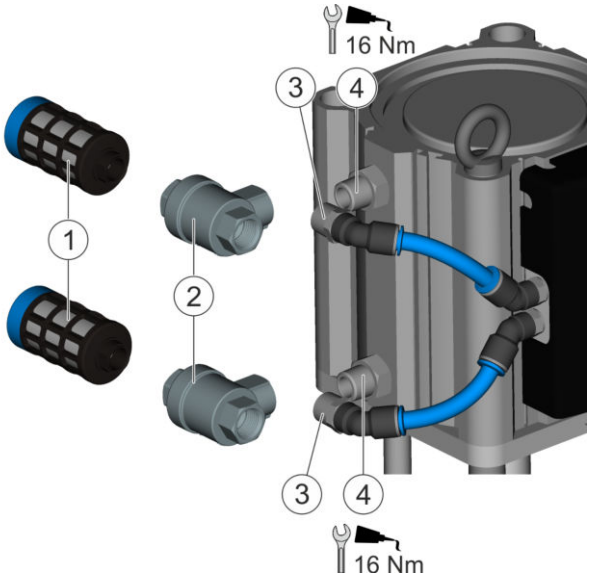

Fig. 40: Replace quick escape valve

Loctite 577

Disassemble quick escape valve

1. Unscrew sound muffler (1) from the quick escape valve (2).
2. Unscrew screw-in plug connection (3) from the quick escape valve (2).
3. Unscrew quick escape valve (2) from the double nipple (4).

Assemble new quick escape valve

4. Insert quick escape valve (2) into the double nipple (4).
5. Screw screw-in plug connection (3) into the quick escape valve (4).
6. Screw sound muffler (1) into the quick escape valve (2).

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.
	Defective switchover valve	Replace changeover valve ↳ 9.3.5 “Replace switchover valve” .
	Valve in the control unit defective	Replace valve in the control unit ↳ 9.3.4 “Replace valve of the control unit” .
	One or more ball valves on the suction side or pressure side closed	Open all ball valves.
	The sound mufflers are frosted from inside.	Check and change compressed air conditions ↳ 12.6 “Compressed air quality” , ↳ 10.2.2 “Assembling ice reduction” .
Pump is not running.	Material supply interrupted	Check the connection and operation of the material supply system. Check material viscosity and fluidity.
	Air has penetrated the suction line.	▪ 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 ↳ 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
	Rod seal is defective	Replace rod seal ↳ 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
	Non-return valve in piston or material inlet does not seal properly or is stuck.	Check the non-return valves, if needed, replace: ▪ ↳ 9.3.2 “Replace non-return valve in the piston” ▪ ↳ 9.3.3 “Replace non-return valve in the material inlet”
Operating pressure is not reached.	No or insufficient compressed air or material supply	Check connection air pressure and flow rate of the 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 ↳ 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
	Defective switchover valve	Replace changeover valve ↳ 9.3.5 “Replace switchover valve” .

Fault description	Cause	Remedy
	Non-return valve in piston or material inlet does not seal properly.	Check the non-return valves; replace if necessary. ▪ 9.3.2 “Replace non-return valve in the piston” ▪ 9.3.3 “Replace non-return valve in the material inlet”
	The sound mufflers are frosted from inside.	Check and change compressed air conditions 12.6 “Compressed air quality” , 10.2.2 “Assembling ice reduction” .
	Rod seal of the fluid part defective	Replace rod seal of the fluid part 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
	Piston seal of the motor defective	Replace valve in the control unit 9.3.4 “Replace valve of the control unit” .
	Piston seal of the motor defective	Replace piston seal of the motor 10.2.1 “Replace piston seal of the air motor” .
	Piston of quick escape valve defective	Replace quick escape valves 9.3.6 “Replace quick escape valve” .
Major material leak on the piston rod.	Rod seal of the fluid part defective	Replace rod seals of the fluid part 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
	Piston rod damaged	Replace piston rod 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
The pump does not remain at rest.	Piston seal defective or incorrect installation position	Check installation position, replace piston seals if defective 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
	Seal washer or balls of the non-return valves soiled or defective	Clean or replace seal washers or balls: ▪ 9.3.2 “Replace non-return valve in the piston” ▪ 9.3.3 “Replace non-return valve in the material inlet”
Motor skips at the top end of the stroke.	Bottom changeover valve defective	Replace changeover valve 9.3.5 “Replace switch-over valve” .
Motor skips at the bottom end of the stroke.	Top changeover valve defective	Replace changeover valve 9.3.5 “Replace switch-over valve” .
Motor switches over slowly.	Defective switchover valve	Replace changeover valve 9.3.5 “Replace switch-over valve” .
	Valve in the control unit defective	Replace valve in the control unit 9.3.4 “Replace valve of the control unit” .
	The sound mufflers are frosted from inside.	Check and change compressed air conditions 12.6 “Compressed air quality” , 10.2.2 “Assembling ice reduction” .
	Defective membrane on the quick escape valve	Replace quick escape valve 9.3.6 “Replace quick escape valve” .
Air streams continuously through the sound muffler.	Defective membrane on the quick escape valve	Replace quick escape valve 9.3.6 “Replace quick escape valve” .
	Piston seal of the motor defective	Replace piston seal of the motor 10.2.1 “Replace piston seal of the air motor” .

Fault description	Cause	Remedy
	Valve in the control unit defective	Replace valve in the control unit ↳ 9.3.4 “Replace valve of the 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 ↳ 9.3.3 “Replace 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 ↳ 9.3.2 “Replace non-return valve in the piston” .
	Piston seals worn out	Replace piston seals ↳ 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
Significant pressure fluctuations during normal operation	Air in material system	▪ 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 ↳ 9.3.1 “Replacem the rod seal and piston seal of the fluid part” .
	Defective switchover valve	Replace changeover valve ↳ 9.3.5 “Replace switchover valve” .
	Valve in the control unit defective	Replace valve in the control unit ↳ 9.3.4 “Replace valve of the control unit” .
	Defective membrane on the quick escape valve	Replace quick escape valve ↳ 9.3.6 “Replace quick escape valve” .
	Initial material pressure too high.	Check material viscosity and fluidity.

10.2 Troubleshooting

10.2.1 Replace piston seal of the air motor

Personnel:

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

Protective equipment:

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

Observe the associated repair sets for the air motor ↳ 13.3 “Repair kits” .

Disassemble the connecting rods

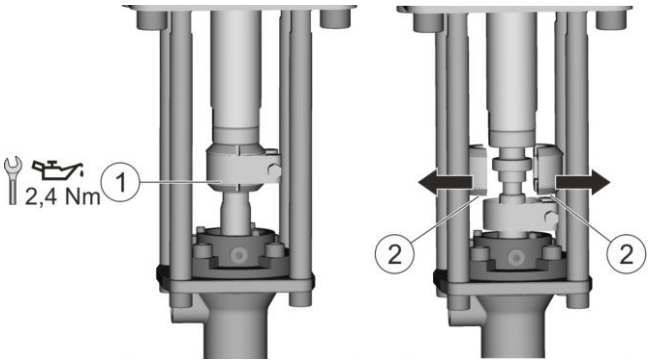

Fig. 41: Disassembling Coupling

Molykote TP-42 Paste

1. Loosen the mounting clips (1). Push downwards.
2. Remove half shells (2)

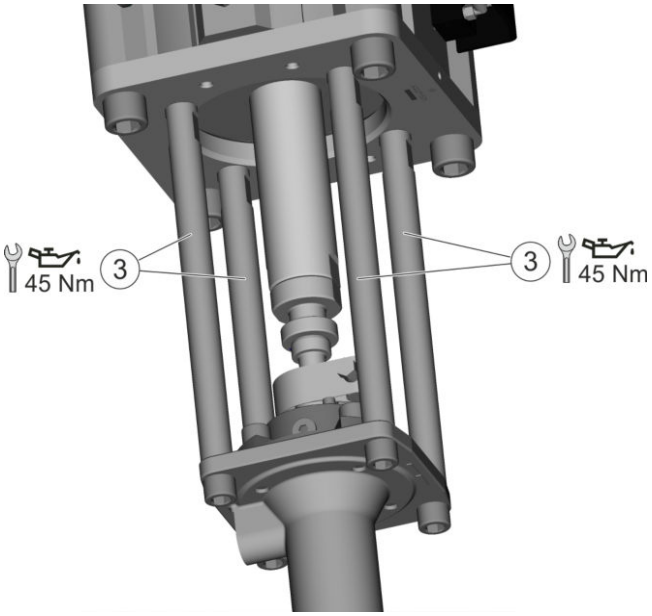

Fig. 42: Disassemble the connecting rods

Molykote TP-42 Paste

3. Unscrew four connecting rods (3) on key surfaces.
4. Set aside the fluid part with connecting rods.

Disassemble the piston seal

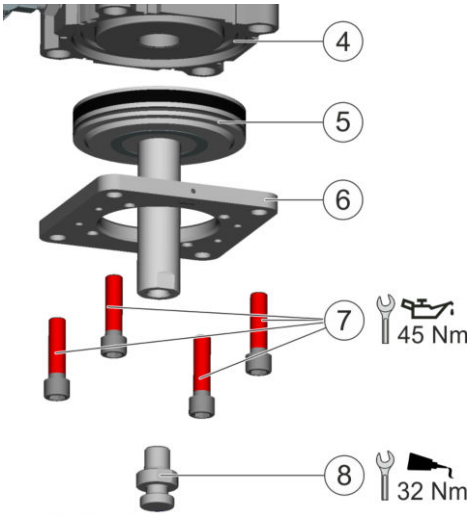

Fig. 43: Disassemble the piston seal

Molykote TP-42 Paste
Loctite 222

5. Unscrew the coupling (8).
6. Unscrew four screws (7) from the adapter plate (6).
7. Remove the adapter plate (6).
8. Remove piston seal (5) from the motor (4).

Assemble new piston seal

9. Insert piston seal (5) in the motor (4).
10. Firmly attach adapter plate (6) with four screws (7).
11. Firmly attach coupling (8).

Assemble the connecting rods

12. Screw in fluid part with connecting rods (3) onto key surfaces.

10.2.2 Assembling ice reduction

Personnel:

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

Protective equipment:

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

Material:

- Frost reducing accessories 13.2 “Accessories”

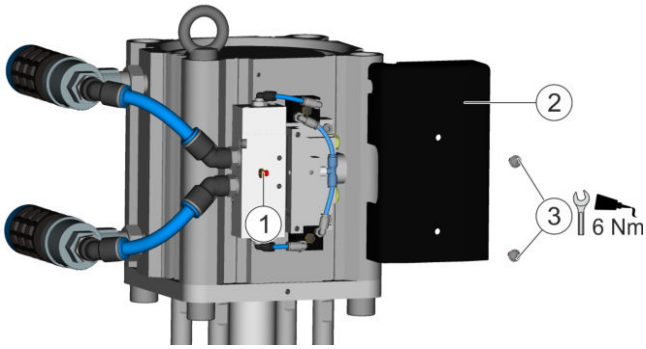

Fig. 44: Disassemble cover

Loctite 222

1. Remove screws (3). Remove cover (2).
2. Unscrew sealing screw (1).

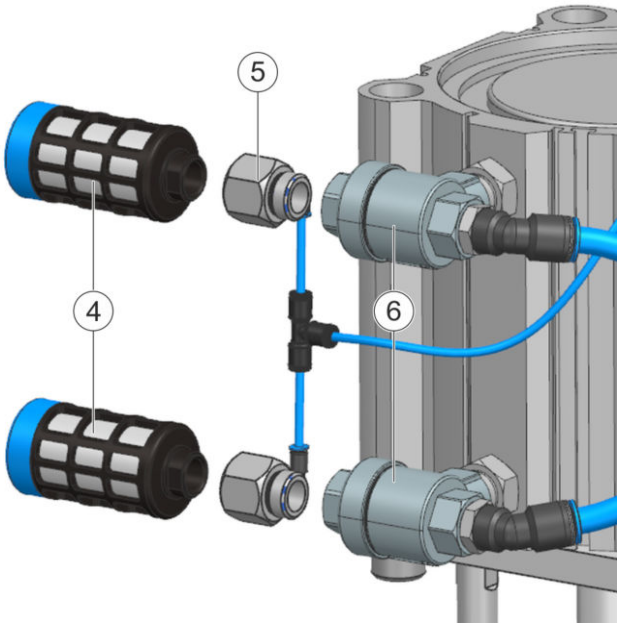

Fig. 45: Ice reducing connection

3. Disassemble the sound muffler (4).
4. Assemble ice reduction (5) onto the quick escape valves (6).
5. Reassemble sound muffler (4).

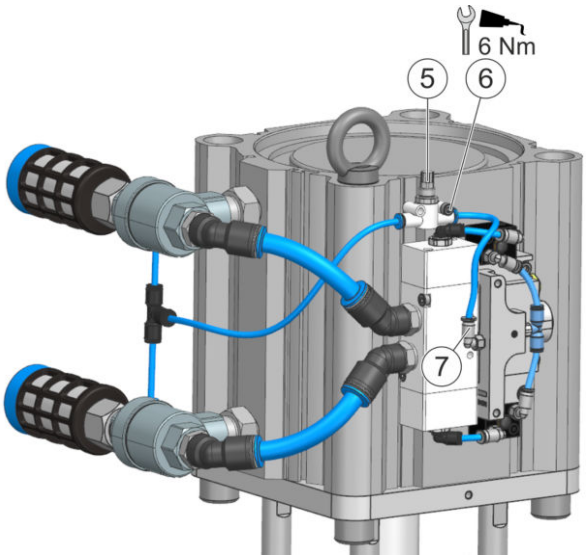

Fig. 46: Assemble connections

Loctite 222

6. Tighten throttle (5) with screw (6).
7. Screw in the screw-in plug connection (7).
8. Firmly attach cover (2) to the control unit with screws (3).

The air flow for ice reduction can be set using the throttle (5). Reduce the air flow far enough so that ice no longer develops on the sound muffler.

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:

- Purge the system, in which the product is installed.
- Switch off compressed air and material supply of the main system and secure personally against switching on again.
- Relieve pressure on cables.
  - Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.
- Ensure that the pump is unpressurized.

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 an injuries due to parts flying around.

Before working on the product:

- Purge the system, in which the product is installed.
- Switch off compressed air and material supply of the main system and secure personally against switching on again.
- Relieve pressure on cables.
  - Install appropriate pressure release device, e.g. valve or ball valve, to ensure safe depressurization.
- Ensure that the pump is unpressurized.

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 relevant safety data sheets.
- Wear specified protective equipment.
- 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 corresponding Ex approval.
  - Or ensure that at no time does an explosive atmosphere exist.

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 for 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 “Purging” .
- Ball valves are closed.
- Lines are depressurized.
- Collecting vessel is under the pump.

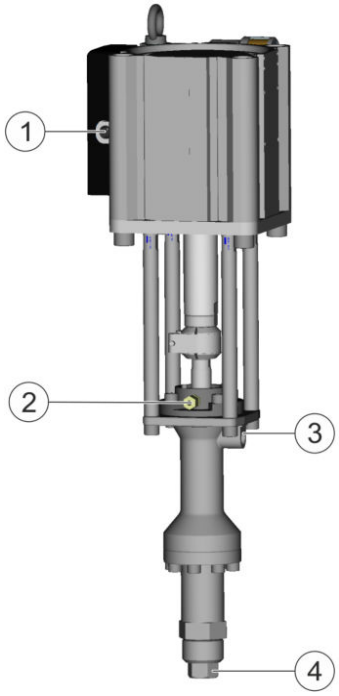

Fig. 47: Disassembling Connections

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. Separate the grounding cable from the grounding connection (2).

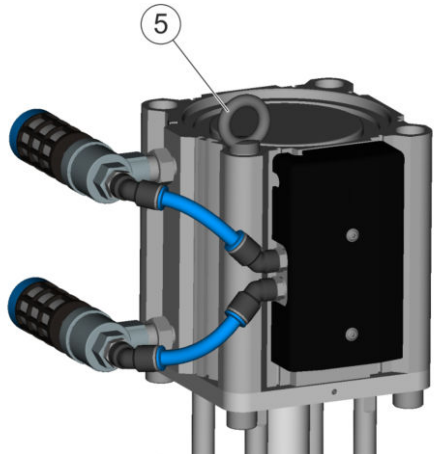

Fig. 48: Secure pump against falling down

8. Secure stoppers on the eye bolts (5).
9. Hinge a sling gear on the hoist.
   ⇨ Pump is secured against toppling.

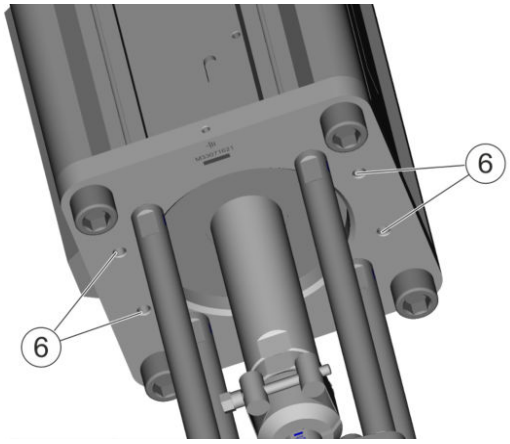

Fig. 49: Disassemble pump

10. Unscrew the screws on the frame out of the bores (6).
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 “Purging” .
- 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

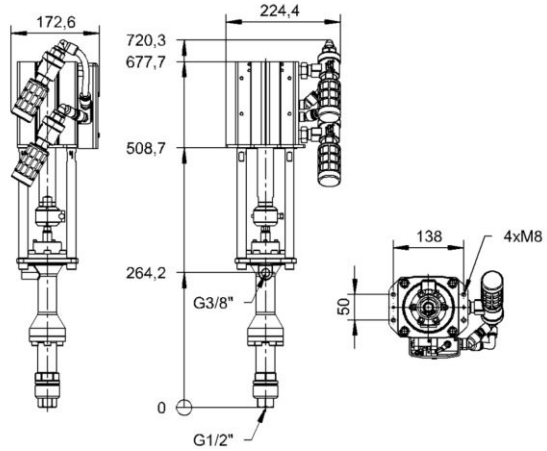

Fig. 50: Dimensions N24170034

N24170034	
Detail	**Value**
Height	720.3mm
Width	224.4 mm
Depth	172.6 mm
Weight	16.7 kg

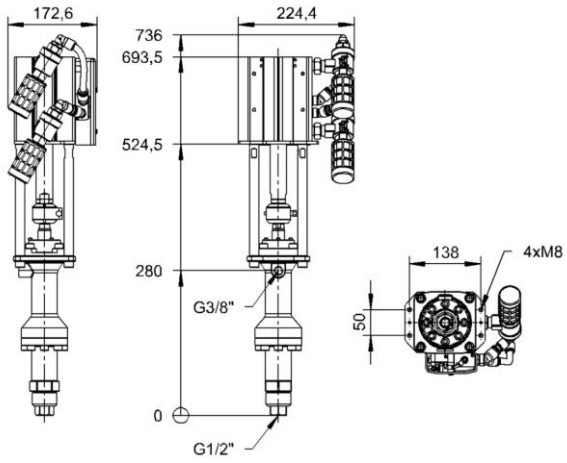

Fig. 51: Dimensions N24170035

N24170035	
Detail	**Value**
Height	736mm
Width	224.4 mm
Depth	172.6 mm
Weight	19.5 kg

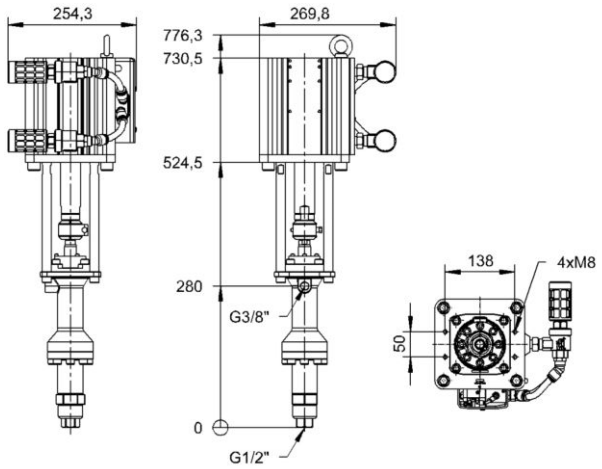

Fig. 52: Dimensions N24170036

N24170036	
Detail	**Value**
Height	776.3 mm
Width	269.8 mm
Depth	254.3 mm
Weight	28.5 kg

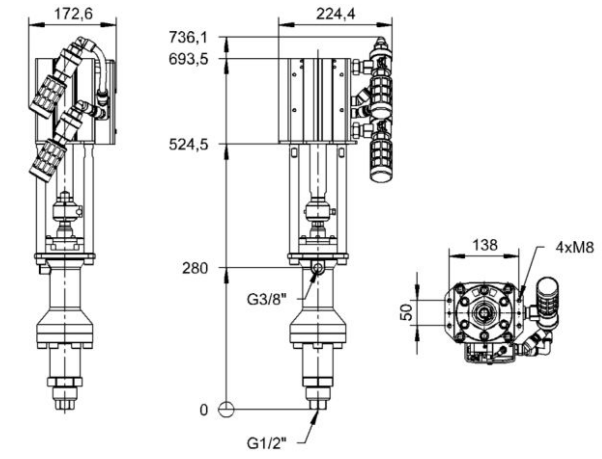

Fig. 53: Dimensions N24170037

N24170037	
Detail	**Value**
Height	736.1mm
Width	224.4 mm
Depth	172.6 mm
Weight	22.5 kg

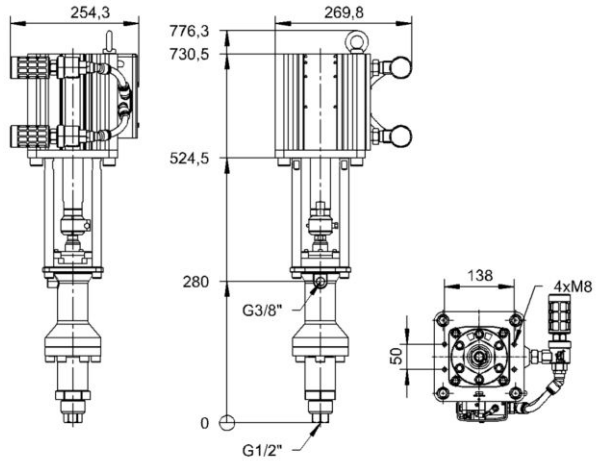

Fig. 54: Dimensions N24170039

N24170039	
Detail	**Value**
Height	776.3 mm
Width	269.8 mm
Depth	254.3 mm
Weight	31.5kg

12.2 Connections

Detail	Value
Material inlet	G1/2"
Material outlet	G3/8"

12.3 Operating conditions

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

12.4 Emissions

Detail	Value
Sound pressure level	< 80 dB(A)
Sound power level	< 94 dB(A)

12.5 Operating values

N24170034	
Detail	**Value**
Air entry pressure	2 bar to 7 bar
Stroke	90mm
Translation ratio	33:1
Output pressure, max.	230 bar
Volume per double stroke	40 cc/cycle
Flow rate continuous DH, maximum	0.8 l/min
Double strokes continuous, maximum	20 1/min
Double strokes short term, maximum	40 1/min

N24170035	
Detail	**Value**
Air entry pressure	2 bar to 7 bar
Stroke	90mm
Translation ratio	17:1
Output pressure, max.	120bar
Volume per double stroke	80cc/cycle
Flow rate continuous DH, maximum	1,6 l/min
Double strokes continuous, maximum	20 1/min
Double strokes short term, maximum	40 1/min

N24170036	
Detail	**Value**
Air entry pressure	2 bar to 7 bar
Stroke	90mm
Translation ratio	44:1
Output pressure, max.	300bar
Volume per double stroke	80cc/cycle
Flow rate continuous DH, maximum	1,6 l/min
Double strokes continuous, maximum	20 1/min
Double strokes short term, maximum	40 1/min

N24170037	
Detail	**Value**
Air entry pressure	2 bar to 7 bar
Stroke	90mm
Translation ratio	11:1
Output pressure, max.	80bar
Volume per double stroke	120 cc/cycle
Flow rate continuous DH, maximum	2.4 l/min
Double strokes continuous, maximum	20 1/min
Double strokes short term, maximum	40 1/min

N24170039	
Detail	**Value**
Air entry pressure	2 bar to 7 bar
Stroke	90mm
Translation ratio	29:1
Output pressure, max.	200bar
Volume per double stroke	120 cc/cycle
Flow rate continuous DH, maximum	2.4 l/min
Double strokes continuous, maximum	20 1/min
Double strokes short term, maximum	40 1/min

12.6 Compressed air quality

- Purity classes in accordance with ISO 8573-1: 1:4:1
- Limitations for purity class 4 (pressure dew point max.):
  - ≤ -3°C at 7bar absolute
  - ≤ +1°C at 9bar absolute
  - ≤ +3°C at 11bar absolute

12.7 Type plate

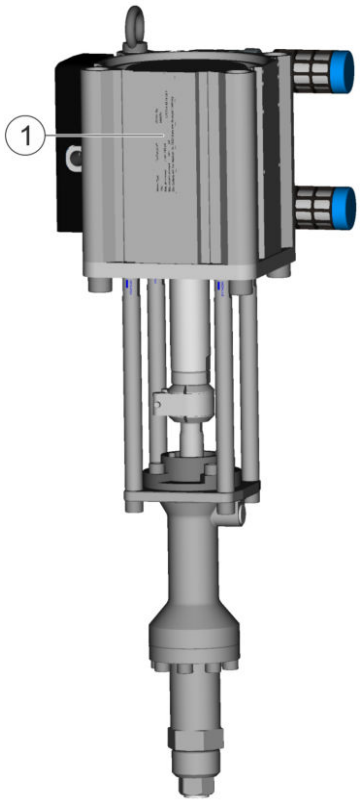

Fig. 55: Position of type plate

The type plate (1) is placed on the drive housing and contains the following details:

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

12.8 Materials used

Detail	Material
Parts in contact with material	Stainless steel
Seal	PE
Motor housing	Aluminum

12.9 Operating and auxiliary materials

Cleaning agents

Cleaning agents must meet the following requirements:

- Suitable for use in explosive areas.
- Compatible with the materials used
- Flashpoint of the cleaning agent at least 15K above ambient temperature
  or
  Cleaning of workplaces with technical ventilation, in painting booths according to EN 16985

Detergent

Only use approved detergents that meet the following requirements:

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

Auxiliary materials

Specification	Material	Material number
Klüber Syntheso GLEP 1	Lubricating grease	W32020009 W32020010
Molykote TP-42 Paste 1kg	Screws lubricant	W32020044
Loctite 222 10mL	Thread protection	W31010001
Loctite 577 50ml	Thread protection	W31010005

12.10 Characteristic curve of the outflow rate

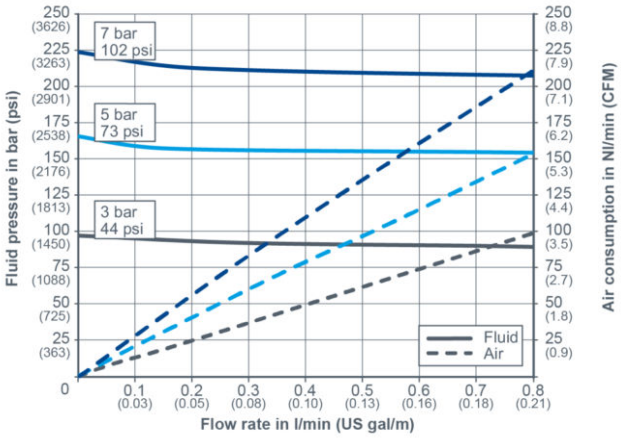

Fig. 56: Characteristic curve N24170034

Medium
Air

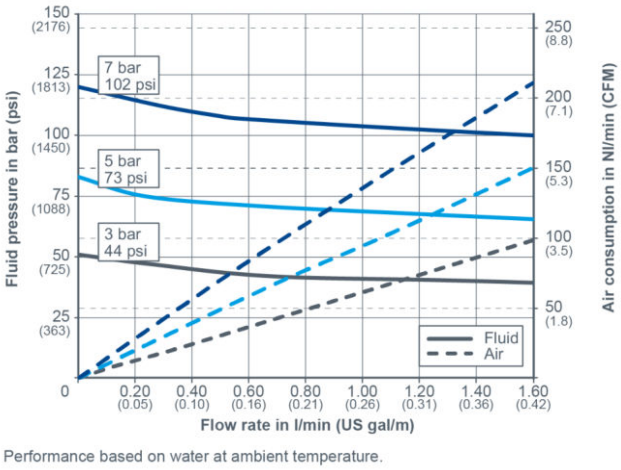

Fig. 57: Characteristic curve N24170035

Medium
Air

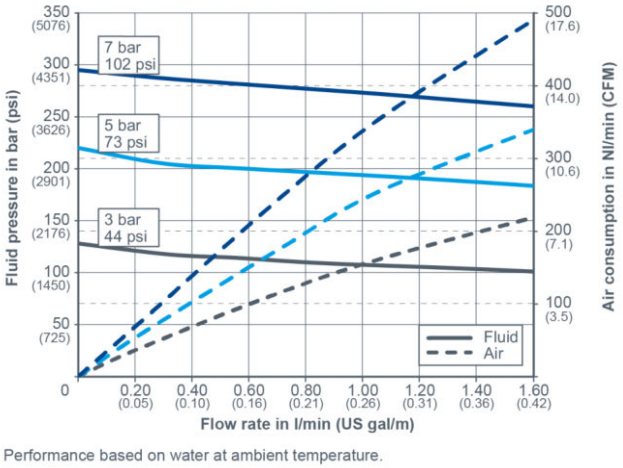

Fig. 58: Characteristic curve N24170036

Medium
Air

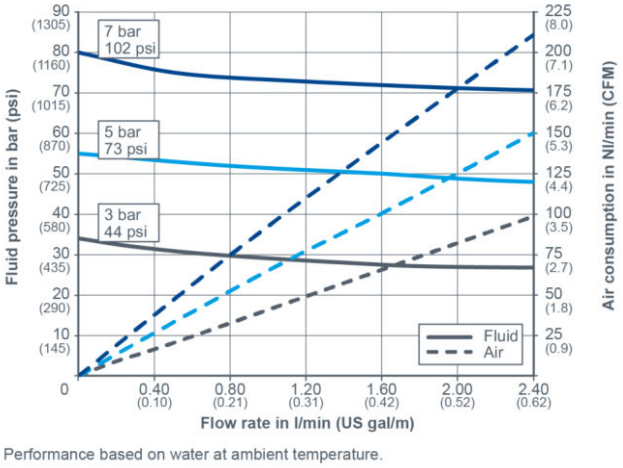

Fig. 59: Characteristic curve N24170037

Medium
Air

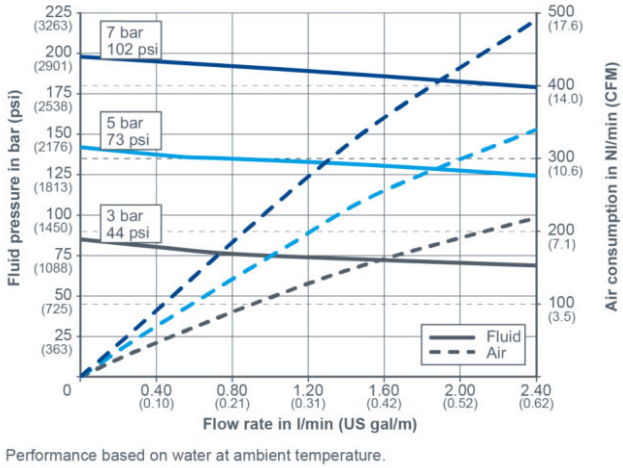

Fig. 60: Characteristic curve N24170039

Medium
Air

12.11 Material specification

Suitable Material:

- Flammable and non-flammable fluid coating materials and their detergents
- Materials such as adhesives, which do not attack the material of the pump.
- Coating materials of the Explosion group IIA

Material specifications:

- Temperature max. 60 °C, always 5 K below the flashpoint of the materials used
- Viscosity: 3 to 5000 mPas

13 Spare parts and accessories

13.1 Spare parts

13.1.1 Motor

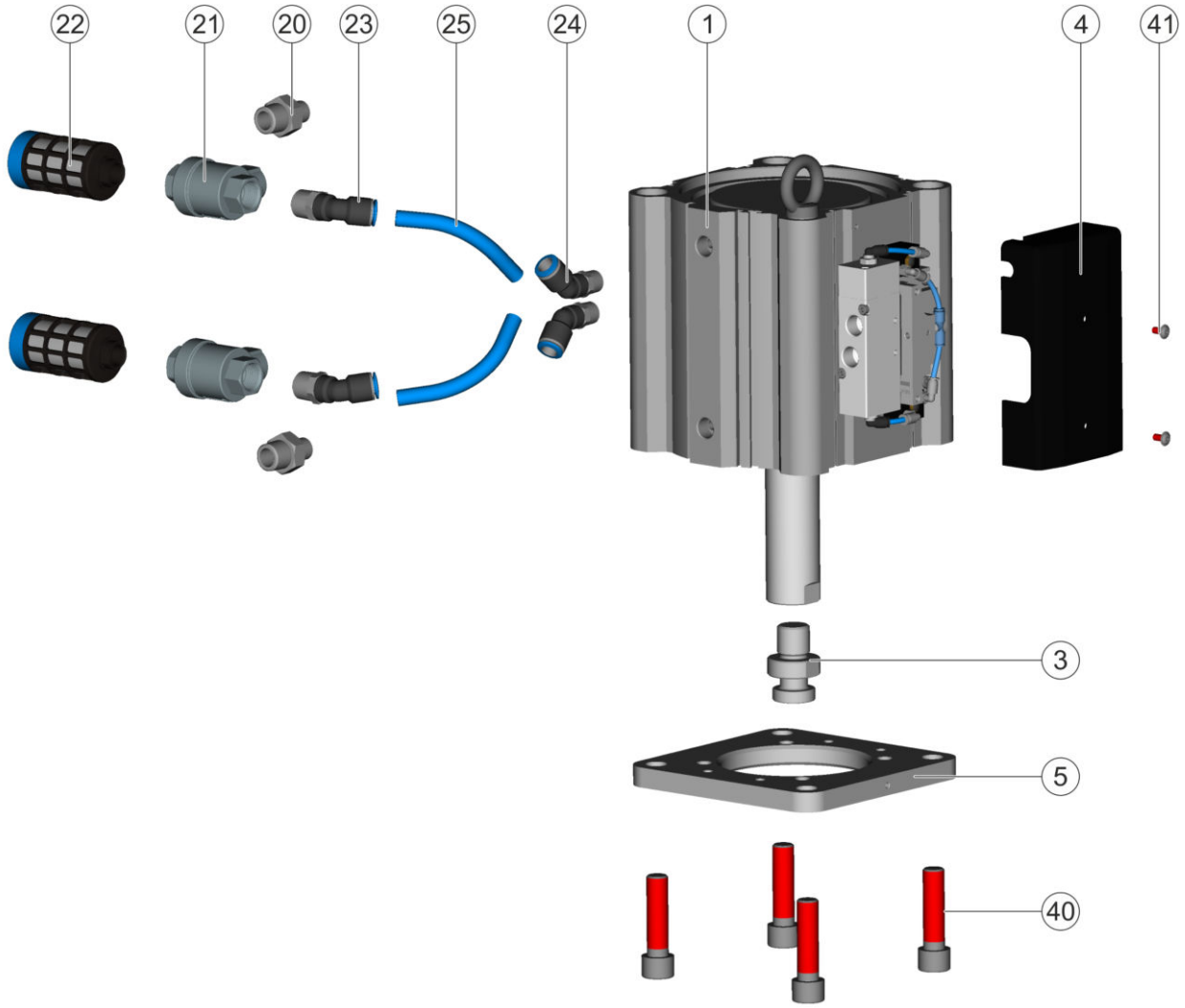

Fig. 61: Motor Spare parts

N24170034				
Item	Description	Quantity	Order number	Spare part/ Wear part
1	CYLINDER PNEUMATIC\D100 HUB100 G3/8	1	N41220318	N
3	BOLT\COUPLING M20 VP	1	M06010312	E
4	COVER\DRIVE D100 167x98x39 PE-EL	1	M59012427	N
20	Double nipple separable R1/2"-R3/8" N Ms	2	M56110580	E
21	QUICK RELIEF VALVE\G1/2	2	M54600032	V
22	SILENCER\G1/2"	2	M54610029	E
23	Screwed elbow push-in connection D12	2	M57310014	E
24	SCREWED ELBOW PUSH-IN CON-NECTION\D12	2	M57310133	E
25	Hose 9x12 blue PA	0,25 m	W40030019	N
41	RAISED COUNTERSUNK FLANGE HEAD SREW\M5x1	2	M41230002	N
5	MOUNTING PLATE\CYL. D100 155x117x6 AL	1	M33071565	N
40	Socket head screw M12x30 DIN912 1.4301	4	D09120521	N

N24170035, N24170036

Item	Description	Quantity	Order number	Spare part/ Wear part
1	CYLINDER PNEUMATIC\D100 HUB100 G3/8	1	N41220318	N
3	BOLT\COUPLING M20 VP	1	M06010312	E
4	COVER\DRIVE D100 167x98x39 PE-EL	1	M59012427	N
20	Double nipple separable R1/2"-R3/8" N Ms	2	M56110580	E
21	QUICK RELIEF VALVE\G1/2	2	M54600032	V
22	SILENCER\G1/2"	2	M54610029	E
23	Screwed elbow push-in connection D12	2	M57310014	E
24	SCREWED ELBOW PUSH-IN CON-NECTION\D12	2	M57310133	E
25	Hose 9x12 blue PA	0,25 m	W40030019	N
41	RAISED COUNTERSUNK FLANGE HEAD SREW\M5x1	2	M41230002	N
5	MOUNTING PLATE\CYL. D100 155x117x6 AL	1	M33071565	N
40	Socket head screw M12x30 DIN912 1.4301	4	D09120521	N

N24170037, N24170039

Item	Description	Quantity	Order number	Spare part/ Wear part
1	CYLINDER PNEUMATIC\D100 HUB100 G3/8	1	N41220318	N
3	BOLT\COUPLING M20 VP	1	M06010312	E
4	COVER\DRIVE D100 167x98x39 PE-EL	1	M59012427	N
20	Double nipple separable R1/2"-R3/8" N Ms	2	M56110580	E
21	QUICK RELIEF VALVE\G1/2	2	M54600032	V
22	SILENCER\G1/2"	2	M54610029	E
23	Screwed elbow push-in connection D12	2	M57310014	E
24	SCREWED ELBOW PUSH-IN CONNECTION\D12	2	M57310133	E
25	Hose 9x12 blue PA	0,25 m	W40030019	N
41	RAISED COUNTERSUNK FLANGE HEAD SREW\M5x1	2	M41230002	N
5	MOUNTING PLATE\CYL. D100 155x117x6 AL	1	M33071565	N
40	Socket head screw M12x30 DIN912 1.4301	4	D09120521	N

13.1.2 Control Unit

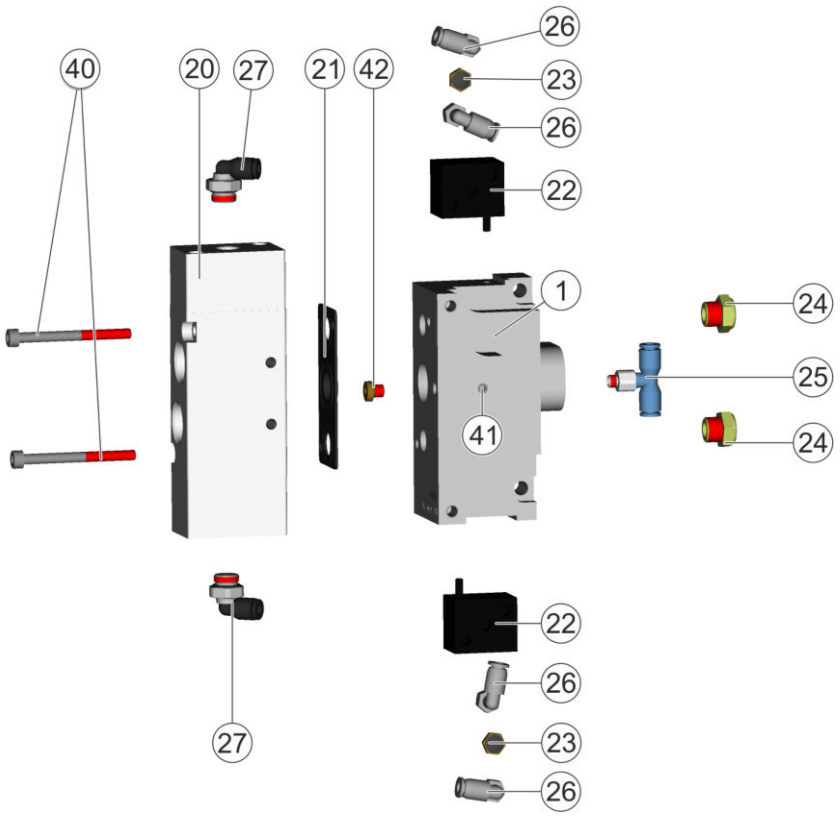

Fig. 62: Control unit spare parts

Control unit spare parts, included in N32230012

Item	Description	Quantity	Order number	Spare part/Wear part
1	CONNECTOR PLATE\5/2 VALVE 94x54x39 Al	1	M54020131	E
20	5/2 WAY VALVE\G3/8" 1,5-8BAR	1	M54430043	E
21	FLAT SEAL\F. 5/2 VALVE M54430043	1	M08090193	E
22	3/2 VALVE\MAGN.PROXIMITY SWITCH M5	2	M54410049	E
23	SOUND MUFFLER\1/8" SHORT	2	M54610043	E
24	SOUND MUFFLER\M5 W.WIRE MASH Ms	2	M54610056	E
25	SCREWED T PUSH-IN CONNEC-TION\D4 M5 MS/PA	1	M57300013	E
26	SCREWED ELBOW PUSH-IN CONNECTION\D4 M5	4	M57310020	E
27	Screwed elbow push-in connection D4 G1/8	2	M57310001	E
28	Hose 2,7x4 blue PA	0,5 m	W40030233	E
29	PLUG\D20 d15,6 h8 GPN300F PE	1	M48010218	N
40	SOCKET HEAD SCREW\M4x45 DIN912 8.8 Z St	2	D09120351	N
41	SET SCREW\M4x4 DIN913 1.4301	1	D09130055	N
42	PLUG SCREW\M5 I-HEXAGON.L7 SW2.5	1	M41090167	N

13.1.3 Fluid part

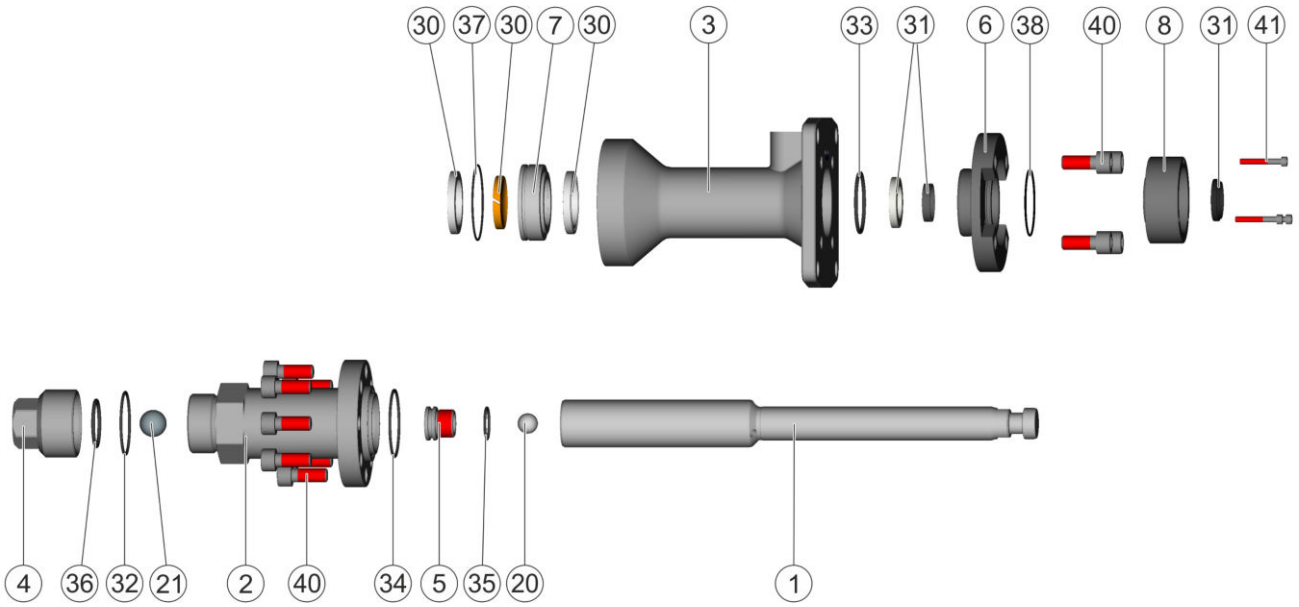

Fig. 63: Fluid part spare parts

N24170034				
Item	Description	Quantity	Order number	Spare part/Wear part
1	PISTON ROD\D17,4 D24 VP40	1	M12190091	E
2	HOUSING\CYLINDER VP40	1	M16010665	N
3	HOUSING\OUTLET VP40	1	M16010666	N
4	Flange inlet VP	1	M11010606	E
5	Guide valve ball piston VP40	1	M12290025	E
6	Packing bush basis VP 40	1	M08070100	N
7	GUIDE BUSH\VP40	1	M05150049	N
8	Cover funnel VP 40	1	M63011592	N
20	Ball D11,112 VA	1	M66100074	E
21	BALL\D19,05 EcoPump	1	M66100029	E
30	SEAL SET\PISTON D24 VP40 PE	1	N24960185	V
31	SEAL SET\ROD D17.4 VP40 PE	1	N24960186	V
32	O-RING\42x2 80Sh FPM	1	M08031054	V
33	O-RING\34,59X2,62 75SH FFKM VGR	1	M08030769	V
34	O-RING\34,59X2,62 75SH FFKM VGR	1	M08030769	V
35	O-RING\17x1,5 75SH FFKM VGR	1	M08030698	V
36	O-ring\29,82x2,62 FKM EXTREME	1	M08031113	V
37	O-ring 39,34x2,62 FKM EXTREME	1	M08031078	V
38	O-RING\34x1,5 80SH FPM	1	M08031091	V
40	Socket head screw M8x20 DIN912 SST	12	D09120175	N
41	SOCKET HEAD SCREW\M4x30 DIN912 1.4301	3	D09120300	N

N24170035, N24170036				
Item	Description	Quantity	Order number	Spare part/Wear part
1	PISTON ROD\D24 D33,7 VP80	1	M12190097	E
2	HOUSING\CYLINDER VP80	1	M16010721	N
3	HOUSING\OUTLET VP80	1	M16010720	N
4	Flange inlet VP	1	M11010606	E
5	Guide valve ball piston VP80	1	M12290026	E
6	Packing bush basis VP 80	1	M08070101	N
7	GUIDE BUSH\VP80	1	M05150053	N
8	Cover funnel VP 80	1	M63011596	N
20	Ball D13,494 VA	1	M66100084	E
21	BALL\D19,05 EcoPump	1	M66100029	E

Item	Description	Quantity	Order number	Spare part/Wear part
30	SEALING KIT\KOLBEN D33,7 VP80 PE	1	N24960190	V
31	Sealing kit1 rod STANGE D24 VP80 PE	1	N24960189	V
32	O-RING\42x2 80Sh FPM	1	M08031054	V
33	O-ring 39,34x2,62 FKM EXTREME	1	M08031078	V
34	O-ring\45x2 FKM EXTREME	1	M08031115	V
35	O-ring\20x2 FKM EXTREME	1	M08031116	V
36	O-ring\29,82x2,62 FKM EXTREME	1	M08031113	V
37	O-RING\50x1,5 FKM	1	M08030349	V
38	O-RING\45x1,5 80SHORE VITON	1	M08030914	E
40	SOCKET HEAD SCREW M10x25 DIN912 1.4301	12	D09120294	N
41	SOCKET HEAD SCREW\M4x30 DIN912 1.4301	3	D09120300	N

N24170037, N24170039

Item	Description	Quantity	Order number	Spare part/Wear part
1	PISTON ROD\D29,7 D41,3 VP120	1	M12190098	E
2	HOUSING\CYLINDER VP120	1	M16010723	N
3	HOUSING\OUTLET VP120	1	M16010722	N
4	Flange inlet VP	1	M11010606	E
5	Guide valve ball piston VP120	1	M12290027	E
6	Packing bush basis VP 120	1	M08070102	N
7	GUIDE BUSH\VP120	1	M05150054	N
8	Cover funnel VP 120	1	M63011600	N
20	BALL\D19,05 EcoPump	1	M66100029	E
21	BALL\D19,05 EcoPump	1	M66100029	E
30	SEAL SET\PISTON D41.3 VP120 PE	1	N24960194	V
31	SEAL SET\ROD D29.7 VP120 PE	1	N24960192	V
32	O-RING\42x2 80Sh FPM	1	M08031054	V
33	O-ring 58x2,5 FKM EXTREME	1	M08031025	V
34	O-ring 58x2,5 FKM EXTREME	1	M08031025	V
35	O-ring\29,82x2,62 FKM EXTREME	1	M08031113	V
36	O-ring\29,82x2,62 FKM EXTREME	1	M08031113	V
37	O-RING\64,77x2,62 FKM EXTREME	1	M08031213	V
38	O-RING\50x1,5 FKM	1	M08030349	V

Item	Description	Quantity	Order number	Spare part/Wear part
40	Socket head screw M12x30 DIN912 1.4301	10	D09120521	N
41	SOCKET HEAD SCREW\M4x30 DIN912 1.4301	3	D09120300	N

13.2 Accessories

For this product there are the following accessories:

Description	Order number
N24170034, N24170035, N24170037: PUMP ACCESSORIES ICE REDUCTION VP2 D100	N24970047
N24170036, N24170039: PUMP ACCESSORIES ICE REDUCTION VP2 D160	N24970046
LID CHAMBER COUPLING VP 40	M63011591
LID CHAMBER COUPLING VP 80	M63011594
LID CHAMBER COUPLING VP 120	M63011599
Buffer tank 125 ml EcoPump2 Only for use with LID CHAMBER COUPLING VP 40, VP 80 and VP 120 (M6301...)	N08060008
EcoPUC A for EcoPump2 VP	F30300001
EcoPUC RA for EcoPump2 VP	F30300002
EcoPUC RA BUS for EcoPump2 VP	F30300003
EcoPump2 VP console	M19110457

13.3 Repair kits

Description	Order number
∅100 mm Air motor	N24960212
∅160 mm Air motor	N24960213

13.4 Order

WARNING!

Unsuitable spare parts in explosive areas

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

- Use exclusively original spare parts.

WARNING!

Unsuitable spare parts

Spare 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 spare parts.

Ordering spare parts, tools and accessories as well as information on products that are listed without order number ↳ “Hotline and Contact” .

14 INDEX

LEADING IN
PRODUCTION
EFFICIENCY

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www.durr.com

Translation of the original operation manual
MPU00029EN, V01