

EcoPump9 GW20

Gear wheel pump

Operation manual

MPU00021EN, V07

K18660006V, N24190001V



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 products:

| | |
|-----------------------------|-----------------------------------------------------------------------------------|
| K18660006V EcoPump9 GW20 |  |
| N24190001V EcoPump9 GW20 |  |

Applicable documents

- | | |
|------------------------------|-----------------------------------------------------------------------------|
| MPU00004* | - Gear unit GW20 without drive (without charging or with external charging) |
| MPU00011* | - Gear unit GW 20 without drive, with insulating shaft (direct charging) |
| MCV00001* | - Diaphragm valve |
| Manufacturer's documentation | - Pressure sensor |

 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

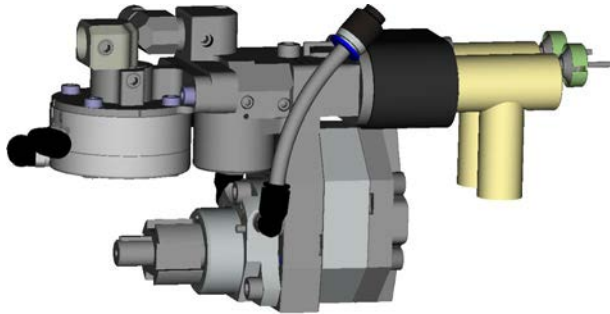


Fig. 1: EcoPump9 (example)

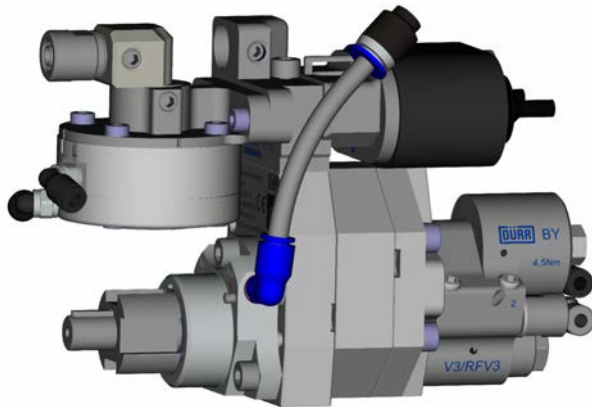


Fig. 2: EcoPump9 purge-optimized (example)

1.2 Short description

The pump is to be used for continuous volumetric metering of paints, hardeners and cleaning media (called “Material” below). The displacement volume is in direct proportion to the rotational speed of the gear wheels.

The pump can be configured in two variants:

- EcoPump9
- EcoPump9, purge-optimized

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 EcoPump9 GW 20 is intended exclusively for metering in industrial low pressure application stations, within a painting booth, approved according to EN 16985.

The EcoPump9 GW 20 is approved for use in Ex zones 1 and 2.

The EcoPump9 GW 20 may only operated within the technical data ↪ 12 “Technical data”.

The EcoPump9 GW 20 may only operated with the following fluids:

- With flammable fluid coating materials of the explosion group IIA and their approved purging agents
- With non-flammable fluid coating materials and their approved purging agents

Misuse

Incorrect use can cause serious injuries or death.

Examples of wrong use are:

- Use in explosive areas Ex zone 0
- Use outside the approved technical data
- Use of unapproved materials
- Unauthorized modifications

Ex labeling

Ⓔ II 2G Ex h IIA T4 Gb X

- II - Device group
- 2G - Device category
- Ex h - Ignition protection category
- IIA - Explosion group
- T4 - Temperature class T4: Surface temperature, max. 135°C
- Gb - Device protection level
- X - Additional conditions: Ambient temperature 15°C to 40°C

Safety related devices provided by the operator

The pump must be integrated in the potential equalization of the total system and in a higher level safety concept ensuring secure operation in potentially explosive areas.

Safety related devices are, for example:

- Entry protection
- Emergency stop concept for the total system
- Fire Protection Measures
- Process engineering to prevent generation of toxic and explosive atmospheres
- Emergency stop switches in all areas of the actuated components, which are not visible for the operator

An entry protection is required if the pump is operated with high voltage. The high voltage must be switched off and dangerous discharge energy must be dissipated before the pump can be touched.

2.3 Safety devices

2.3.1 Pressure gage



Fig. 3: Pressure sensor

The pressure sensors convert the input pressure and output pressure on the pump into an electrical signal. If the pressure sensors are installed jointly with a fail-safe isolating switch amplifier, they may also be installed in the Ex area of the Ex Zone 1.

Isolating switch amplifier can be ordered as accessory ↪ 13.2 "Accessories".

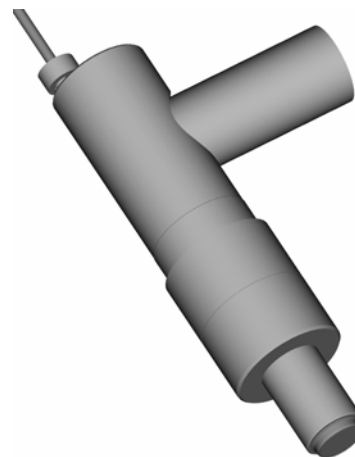


Fig. 4: Pressure sensor high voltage-proof

High voltage-proof pressure sensors measure the input pressure and output pressure on the pump. The determined pressures are conducted through fiber optic cable via an R/O converter. The R/O converter transfers the electrical signal to the superior control.

R/O converter can also be ordered as accessory ↪ 13.2 "Accessories".

! NOTICE!

If the pump configuration does not include any pressure sensor, pressure monitoring devices must be installed in the material-carrying lines on the material inlet and material outlet.

2.3.2 Bypass

A protective function is integrated in the diaphragm valve for protecting the system. The bypass is opened at a pressure above 17bar. Further pressure build-up is not possible.

The bypass function is integrated in two components:

- Connection block with bypass ↪ 3.3 “Connection block”
- Bypass block ↪ 3.4 “Bypass block”

2.4 Installation schematic

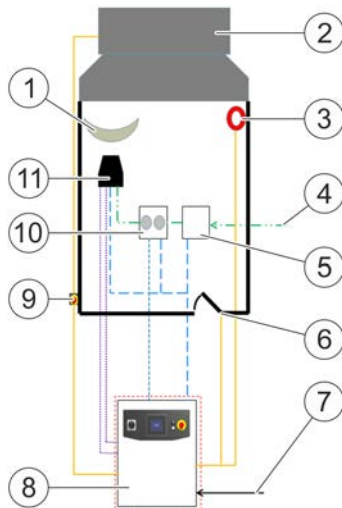


Fig. 5: Installation plan

- Emergency stop circuit
- Cabin wall
- ⋯ High voltage
- ⋯ Media
- ⋯ Pneumatic
- - - Motor
- 1 Work piece
- 2 Technical ventilation
- 3 infrared flame detector
- 4 Paint supply
- 5 Color changer
- 6 Entry protection
- 7 Power supply and air supply
- 8 Control cabinet
- 9 Emergency Stop button outside the booth
- 10 Pump
- 11 Atomizer

2.5 Residual risks

Danger of fire and explosion

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 sources of ignition and open light.
- Do not smoke.
- Ground Pump.
- Wear suitable protective equipment.

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.
- Observe explosion group of the coating materials and their detergents and cleaning agents.
- Follow the safety data sheet.
- Ensure that technical ventilation and fire protection equipment are in operation.
- Do not use sources of ignition and open light.
- Do not smoke.
- Ground Pump.
- Wear suitable protective equipment.

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 equipment.

Leaking fluids and compressed air:

When working on the product, spurted material and leaking compressed air can cause irreversible damage to the eyes.

Before working on the product:

- Rinse the system.
- Disconnect the system from compressed air and material supply system.
- Secure the system against being switched on again.
- Depressurize the lines.
- Wear eye protection.

Rotary Drive Shaft

You could suffer injury on contact with the rotating drive power shaft and the moving coupling elements.

- Do not try to catch rotating drive shaft.
- Always carry out work on the pump only with drive shaft at rest and secured against restarting.
- Secure pump against intervention in operation, e. g. with a housing.

2.6 Property damage

Dry run

If the pump runs without material (dry run), the pump will be damaged.

- Always operate the pump only with material.
- Carry out functional checks on the motor with disconnected clutch with the pump.

2.7 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

System operator

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

The system operator has knowledge in the following specialized areas:

- System-specific process engineering
- Knowledge of the application processes regarding the application medium used
- Local technical measures for occupational safety and health

The system operator is responsible for the following tasks on equipment and components:

- Operate and monitor the system.
- Introduce measures in the event of faults.
- Clean the system.

+ 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”.

2.8 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.

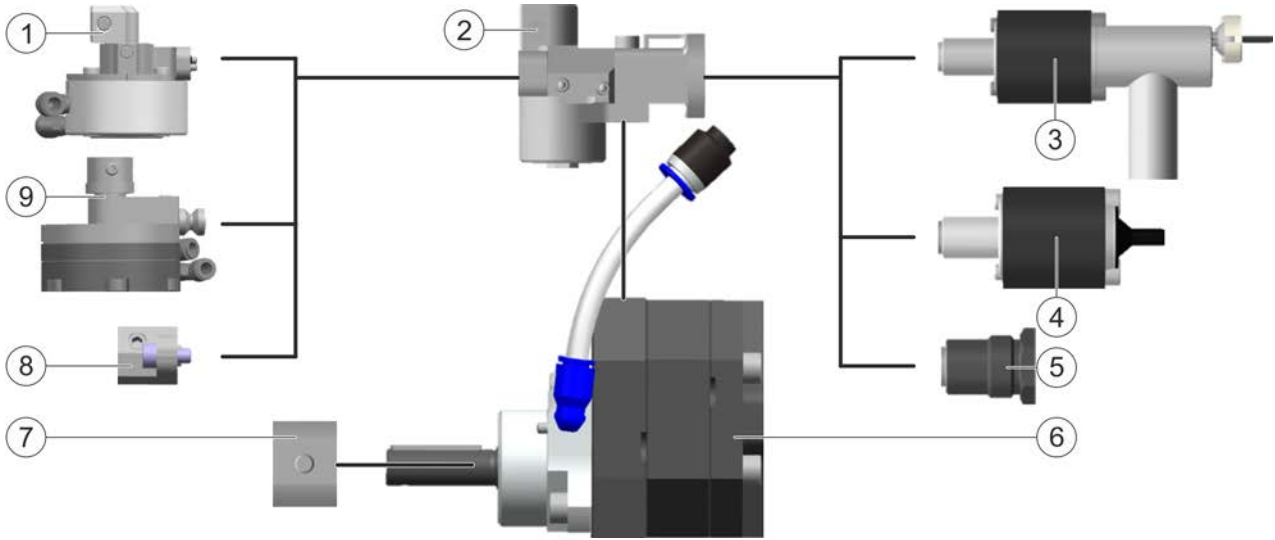


Fig. 6: Possible assemblies **EcoPump9**

- | | | | |
|---|------------------------------|---|------------------------------|
| 1 | Paint pressure regulator 1:1 | 6 | Pump |
| 2 | Connection block with bypass | 7 | Spacer ring |
| 3 | Pressure sensor HS | 8 | Hose connection |
| 4 | Pressure sensor IP | 9 | Paint pressure regulator 2:1 |
| 5 | Plugs | | |

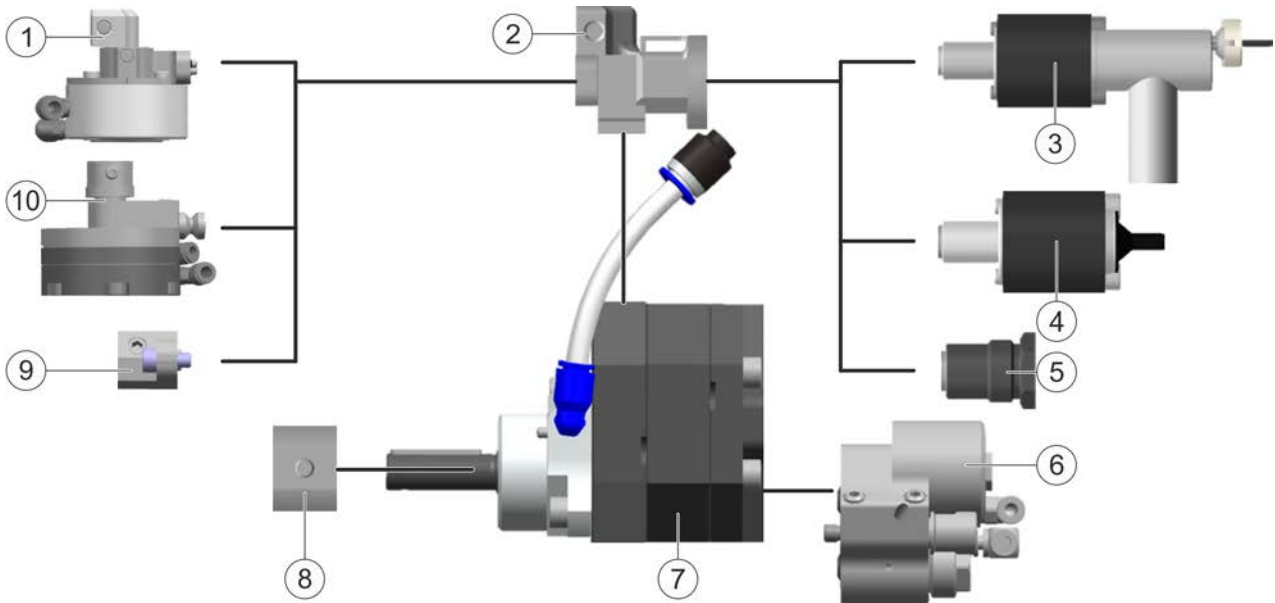


Fig. 7: Possible assemblies **EcoPump9** purge-optimized

- | | | | |
|---|------------------------------|----|------------------------------|
| 1 | Paint pressure regulator 1:1 | 6 | Bypass block |
| 2 | Connection block | 7 | Pump |
| 3 | Pressure sensor HS | 8 | Spacer ring |
| 4 | Pressure sensor IP | 9 | Hose connection |
| 5 | Plugs | 10 | Paint pressure regulator 2:1 |

3.2 Pump block with bearing housing

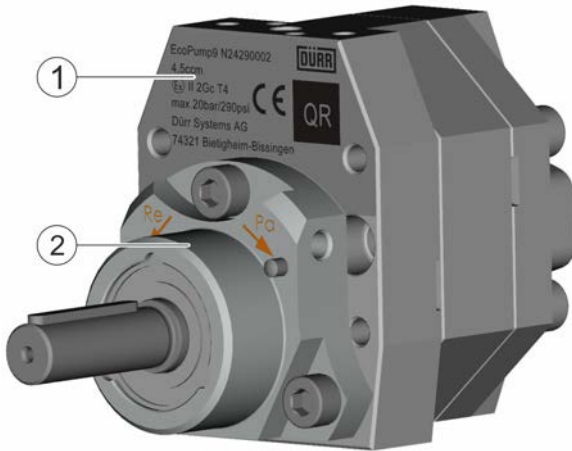


Fig. 8: Pump block with bearing housing

- 1 Pump block
- 2 Bearing housing

Pump block

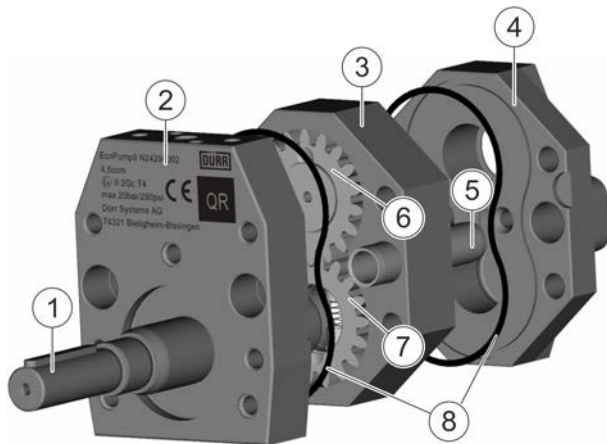


Fig. 9: Pump block

- 1 Drive shaft
- 2 Front plate
- 3 Central plate
- 4 Back plate
- 5 Centering insert
- 6 Follower gear wheel
- 7 Driving gear
- 8 O-rings

The front plate (2) guides the drive shaft (1) of the driving gear wheel (7), the driving gear wheel (7) is permanently connected with the drive shaft (1). The driven gear wheel (6) is supported on a tap in the back plate (4). In the central plate (3), the two gear wheels rotate and pump the material. Two centering bushes (5) maintain the mutual position of the three plates. The three plates are kept together with four screws and sealed from each other with O-rings (7).

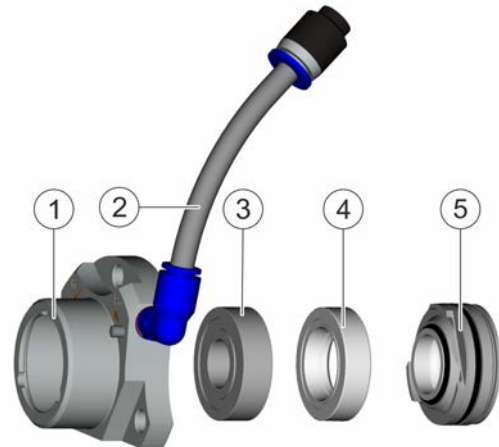


Fig. 10: Exploded View Bearing Housing

- 1 Bearing housing
- 2 Hose with an end cap
- 3 Ball bearing
- 4 Radial shaft seal
- 5 Seal Kit

The sealing kit (5) seals the drive shaft to the interior of the pump. The shaft seal (4) seals off the release agent. The fill level of the release agent can be checked and topped up on the transparent hose (2). If the release agent has become turbid or discolored, the shaft seal (4) is defective.

3.3 Connection block

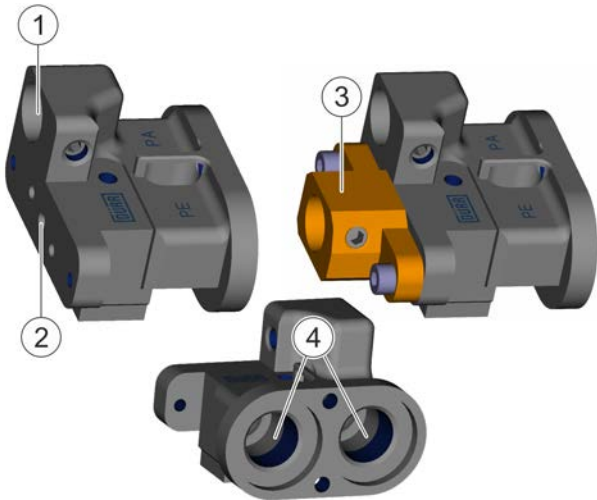


Fig. 11: Connection block without bypass

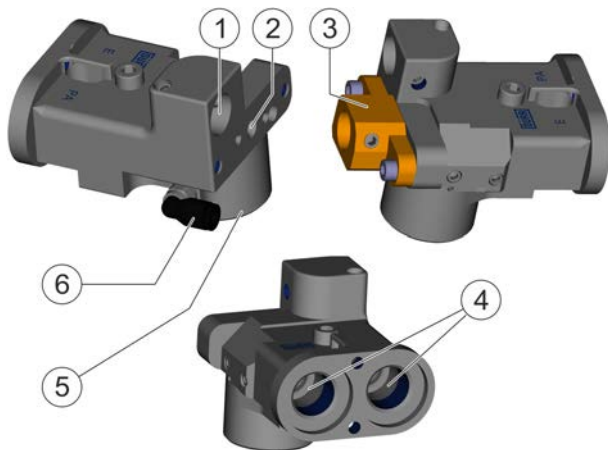


Fig. 12: Connection block with bypass

The connection block is screwed on the pump block. The material flows through the material inlet (2) into the pump block and is taken out from the material outlet (1) in a metered manner.

In the case of pumps with a 1:1 paint pressure regulator, the paint pressure regulator is screwed directly on the connection block.

In the case of pumps with a 2:1 paint pressure regulator or with hose connection, the connecting piece (3) must be assembled.

Pressure sensors can be inserted in the holes (4). On pumps without pressure sensor, the holes must be blocked.

Connection block with bypass

The connection block with bypass has additionally a diaphragm valve (5) and a control air connection (6). The diaphragm valve (5) makes it possible to quickly push in the material. The diaphragm valve is opened via the air connection (6) for the pushing process. In addition, the diaphragm valve (5) offers a protection function against overpressure. Above a pressure of 17bar, the diaphragm valve opens automatically the bypass.

3.4 Bypass block

The bypass block is the module for the purge-optimized pump.

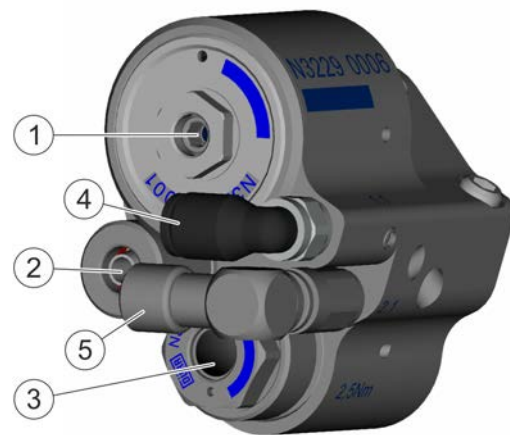


Fig. 13: Bypass block

The diaphragm valve (1) makes it possible to quickly push in the material. The diaphragm valve is opened via the air connection (4) for the pushing process. In addition, the diaphragm valve (1) offers a protection function against overpressure. Above a pressure of 17bar, the diaphragm valve opens automatically the bypass.

The control valve (3) is actuated by using the air connection (5). When the control valve (3) opens, the detergent present at the connection (2) is guided into the pump block. The diaphragm valve also opens for efficient purging of the pump.

3.5 Paint pressure regulator

Paint pressure regulator (1:1)

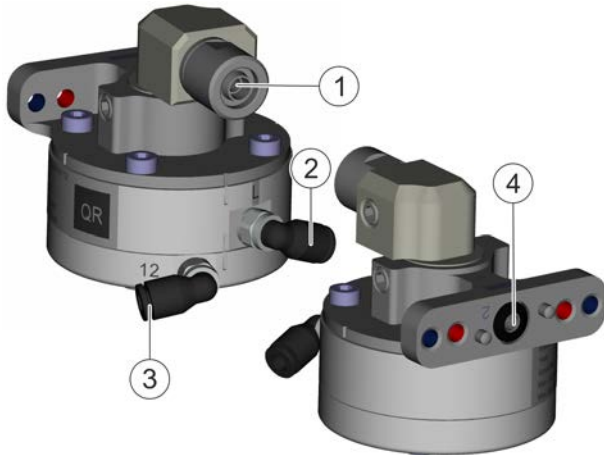


Fig. 14: Paint pressure regulator 1:1 (Example)

The paint pressure regulator 1:1 limits the pressure of the material supply. The paint pressure regulator 1:1 is screwed on to the connection block; this connects the material outlet of the paint pressure regulator to the material inlet of the connection block. The material supply is connected to the paint connection (1). The pressure of the material supply can be limited through the control air connection (3). The higher the control air on the paint pressure regulator, the more material flows into the pump.

Leakages can be detected at the connection (2):

Air outlet - Control air diaphragm is defective

Material leak - Paint diaphragm is defective.

EcoFlow LPF P 16 (2:1)

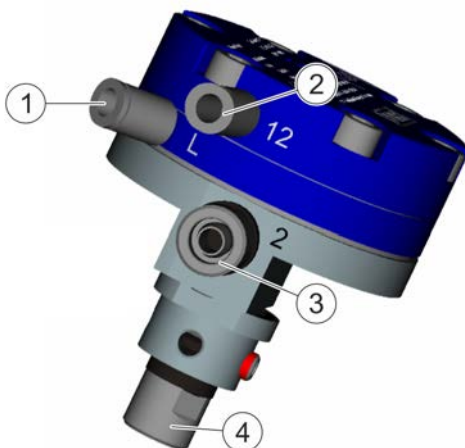


Fig. 15: Paint pressure regulator 2:1 (Example)

The paint pressure regulator 2:1 reduces the pressure of the material supply. The paint pressure regulator 2:1 is assembled with the material outlet (4) on the connection block; this connects the material outlet (4) of the paint pressure regulator to the material inlet of the connection block. The material supply is connected to the paint connection (3). The pressure of the material supply can be limited through the control air connection (2). The higher the control air on the paint pressure regulator, the more material flows into the gear wheel pump.

Leakages can be detected at the connection (1):

Air outlet - Control air diaphragm is defective

Material leak - Paint diaphragm is defective.

3.6 Pressure gage

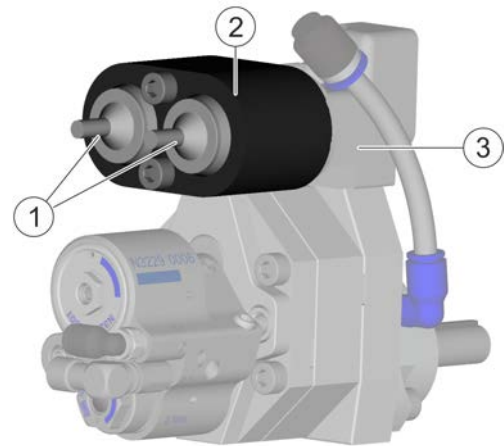


Fig. 16: Pressure sensor (example)

Pressure sensors (1) on the pump inlet and outlet sides record the operating pressures present. The pressure sensors are connected to the parent control. If the pressure is not measurable or if the defined pressure ranges were exceeded, this must make the pump stop immediately.

The pressure sensors (1) are fastened to the connection block (3) by means of a clamping plate (2).

3.7 Connections

EcoPump9

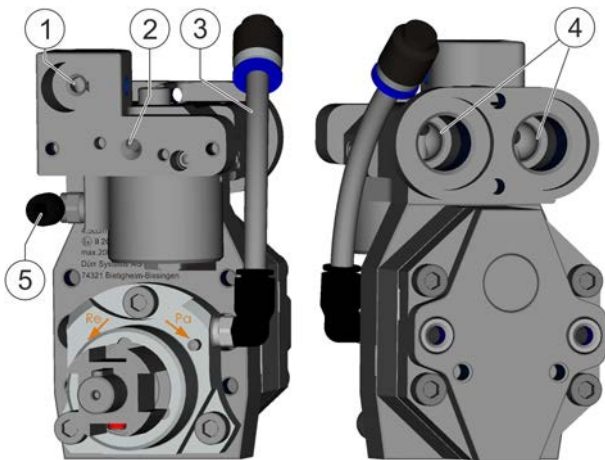


Fig. 17: Connections (example)

- 1 Material outlet "PA"
- 2 Material inlet "PE"
- 3 Fluid receiver
- 4 Bore for pressure sensor
- 5 Control air for diaphragm valve

EcoPump9, purge-optimized

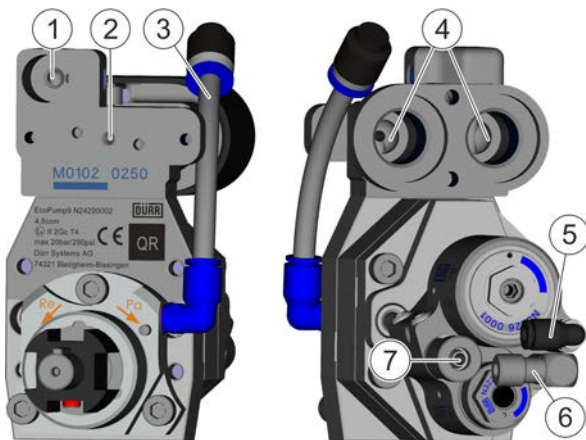


Fig. 18: Pump connections, purge-optimized (example)

- 1 Material outlet "PA"
- 2 Material inlet "PE"
- 3 Fluid receiver
- 4 Bore for pressure sensor
- 5 Control air for diaphragm valve
- 6 Control air for series 7 valve
- 7 Detergent connection

3.8 Directions of rotation



Fig. 19: Directions of rotation

The direction of rotation of the drive shaft defines the direction of conveyance of the material:

"Re" = reflow - Reflow mode, the material is conveyed back.

"Pa" = painting - Painting operation, the material is conveyed in the forward direction.

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.

1. Check packaging for damage.
 - ⇒ If there is any damage, notify the customer service immediately.
2. Remove all plastic wrapping before entering potentially explosive areas.

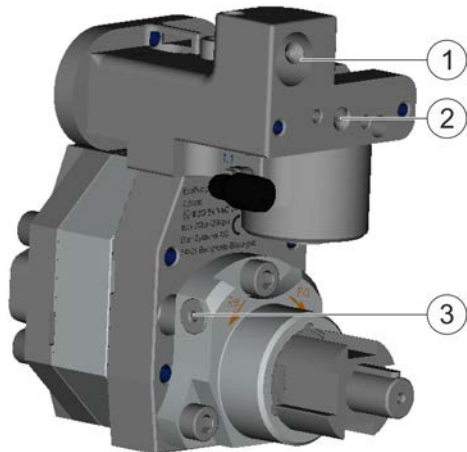


Fig. 20: Transport plugs (example)

3. Check the seat of transport plugs of the following bores:
 - Paint outlet PA (1)
 - Paint outlet PE (2)
 - Fluid receiver connection (3)

i Transport plugs protect the pump chamber from soiling and ensure that there is no leakage of conservation oil.

4. Check the unpacked pump for integrity.
 - ⇒ If there is any damage, notify the customer service immediately.

4.2 Scope of delivery

The scope of supply includes the following components:

- Pre-assembled gear wheel pump **EcoPump9** GW20

4.3 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.

4.4 Storage

Conserve

Personnel:

- Mechanic
- + additional qualification explosion protection

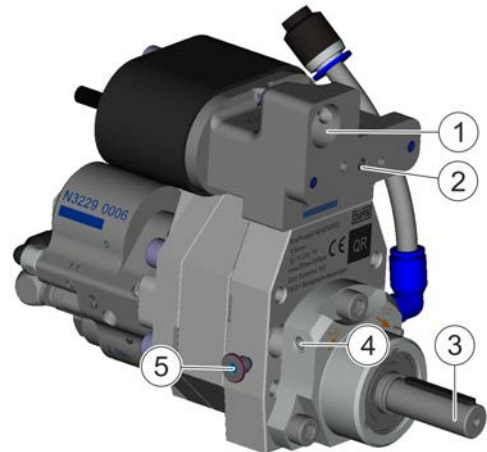


Fig. 21: Conservation (Example)

1. Unscrew sealing screw (5).
2. Rotate the drive shaft (3) slowly, while filling conservation mineral oil in the material inlet (2), until it is visible on the paint outlet (1) ↪ 12.10 “Operating and auxiliary materials”.
3. Screw in sealing screw (5).
4. Lock material outlet (1) and material inlet (2) with plugs, ↪ 13.2 “Accessories”.
5. Grease pump body using non-resin conservation oil.

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.
- Temperature: 15°C to 25°C
- Relative humidity: max. 60%

4.5 Transport

Requirements:

- Pump has been disassembled ↪ 11.1 “Disassembly”.
- Pump has been cleaned.
- Connections are cleaned ↪ 8 “Cleaning”.

1. Pack the pump.

i If the original packaging is not available or is damaged, the new packaging must fulfill the following criteria:

- Protection from dirt and dust
- Protection from moisture
- Protection from mechanical vibration

5 Assembly

5.1 Safety recommendations

DANGER!

Explosive atmosphere

The product is installed in potentially explosive atmospheres. Disregarding the safety regulations of these areas may cause death due to explosion.

- Stop the system before carrying out any work.
- Disconnect the system from compressed air and material supply system.
- Secure the system against being switched on again.
- Relieve the lines.
- Check for an explosive atmosphere prior to entering into a potentially explosive area.
- Observe all general safety instructions for handling the total system.

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!

High discharge energy

Touching heavily charged surfaces can release > 350 mJ of discharge energies. Sparks can lead to scarring and skin burns. Current flowing over the heart can be deadly.

- Use an ionizer to discharge heavily charged surfaces at various locations.

NOTICE!

Unsuitable tool

An open-end wrench could damage the key surfaces.

- Assemble valve using a box wrench.

NOTICE!

Sealed leakage bores

If all leakage bores are sealed with sealing screws or due to dirt, the material cannot escape if there are leakages. Leakages are not detected. Material can harden up in the valve. This can result in irreparable damage.

- Keep at least one leakage bore free.
- Remove leaking material immediately.
 - Check seals, replace if necessary.

5.2 Requirements for the Installation point.

- Not freely accessible for persons (e. g. locked switch cabinet).
- The high voltage in the loaded area around the pump may bear maximum 100 kV.
- The pump must be protected from impacts.
- No ultrasonic waves and ionizing radiation should be allowed to fall on the pump.
- No adiabatic compression may occur in the area of pump connections.
- Do not allow pressure waves to be led to the pump.
- In the event of faults, the down-time on the used motor must not exceed 100 ms.

5.3 Preparation

5.3.1 Blowing out Conservation Oil

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

If the pump is filled with conservation oil, the conservation oil must be drained before assembly.

1. Place pump in or above a collecting tray.
2. Remove plugs:
 - Material inlet "PE"
 - Material outlet "PA"
 - Detergent connection
 ⇒ The conservation oil flows out.
3. Wipe down pump using a moist cloth.
4. Dispose of the conservation oil in an environmentally appropriate manner.

ENVIRONMENT!

Environmental damage due to wrong disposal

5.3.2 Checking ease of movement

1. Place a suitable boss on the drive shaft.
2. Rotate drive shaft by hand.
⇒ Assemble only a smoothly operating pump.

5.3.3 Pouring in release agent

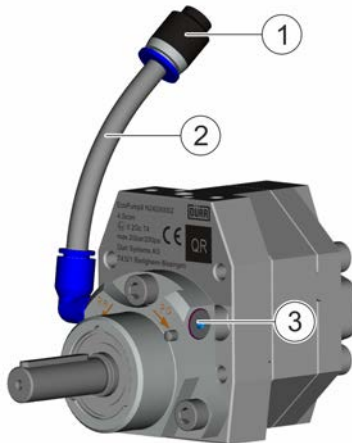


Fig. 22: Pouring in release agent

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

1. Pull off end cap (1).
2. Unscrew sealing screw (3).
3. Place collecting tray under the pump.
4. Fill release agent slowly into the hose (2), until it comes out without bubbles.
5. Screw in sealing screw (3).
Tightening torque: 2.5Nm
6. Wipe down pump using a moist cloth.
7. Fill in release agent until the hose (2) is filled to 3/4 level.
8. Fit end cap (1).
End cap must engage perceptibly.

5.4 Assembly

! NOTICE!

Radial forces

Property damage can result if there are radial forces acting on the drive shaft.

- Ensure that the drive shaft of the pump is aligned with the motor shaft.

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves
- Safety boots

Requirements:

- The whole system is switched off and secured against restart.
 - Electrical lines are discharged.
 - Material-carrying lines are depressurized and locked.
 - Lines carrying compressed air are depressurized and locked.
- Direction of rotation of the motor is checked.

i The pump can be mounted on a gear unit GW 20 or directly on the robot arm 2. Observe corresponding operating instructions.

Operation during direct charging

During coating with direct charging, the pump must be assembled as follows:

- With isolation length
 - Isolation length between applicator and pump, e.g. by the length of the media line
The high voltage must be dissipated before it reaches the pump.
 - Pump is grounded.
- Without isolation length
 - Use of drive unit with isolating shaft from Dürr Systems
 - Pump is attached isolated from the system.
Pump has no connection to ground potential.

5.5 Connecting

5.5.1 Grounding

EX WARNING!

Sparks due to electrostatic discharge

The pump will electrostatically charge if it is not grounded properly. Electrostatic discharge can cause sparks that in explosive atmosphere can cause a fire or an explosion. Serious injury and death could be the consequence.

- The pump must be grounded through the system in which the pump is installed.

The pump must be grounded in the following applications:

- In case of integration into an external charging system
- In case of integration into a direct charging system with isolation length
- In case of integration into a system without high voltage

The total electrical resistance between the pump and all connected components and connections must be $>10^{12}$ ohms.

If the pump is integrated in a direct charging system without isolation length, the pump must not be grounded. The pump must be attached isolated from the system.

5.5.2 Connecting the material supply

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

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

Requirements:

- The whole system is switched off and secured against restart.
 - Electrical lines are discharged.
 - Material-carrying lines are depressurized and locked.
- Pump has been assembled.
- Connections are cleaned.

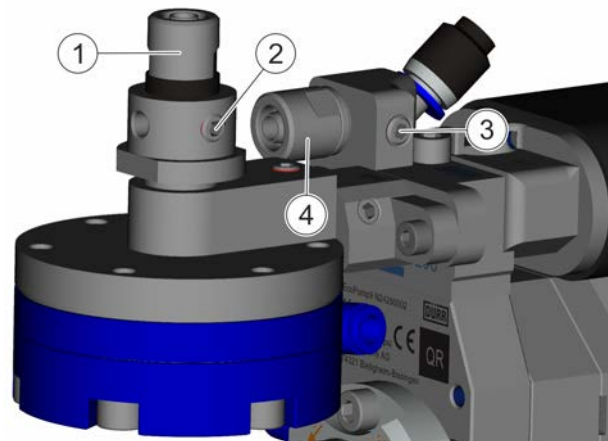


Fig. 23: Connect material supply (example)

Material inlet

1. Loosen threaded pin (2) on the material input.
2. Pull out plug connection (1).

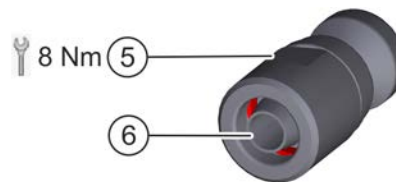


Fig. 24: Plug connection

3. Screw on cap nut (5) of the nipple (6).
4. Lightly grease the thread of the cap nut (5).
5. Guide hose through the cap nut (5).
6. Push hose with the straight cut edge on the nipple of the plug connections (1) up to the mechanical stop.
7. Tighten cap nut (5) by hand.
8. Hold the nipple counter using a hexagon socket spanner. Tighten cap nut (5).
 - Observe tightening torque.
 - ⇒ The cap nut (5) jams the hose and seals it.
9. Pull off hexagon socket spanner.

10. Insert plug connection (1) into the material inlet.
Check O-rings for correct seat.
11. Tighten threaded pin (2).
Tightening torque 8Nm
⇒ Hose is fixed.

Material outlet

1. Loosen threaded pin (3) on the material output.
2. Pull out plug connection (4).

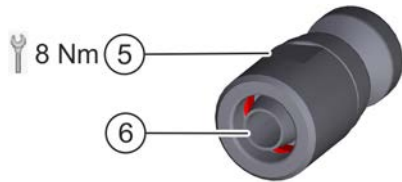


Fig. 25: Plug connection

3. Screw on cap nut (5) of the nipple (6).
4. Lightly grease the thread of the cap nut (5).
5. Guide hose through the cap nut (5).
6. Push hose with the straight cut edge on the nipple of the plug connections (4) up to the mechanical stop.
7. Tighten cap nut (5) by hand.
8. Hold the nipple counter using a hexagon socket spanner. Tighten cap nut (5).
 - Observe tightening torque.
 - ⇒ The cap nut (5) jams the hose and seals it.
9. Pull off hexagon socket spanner.
10. Insert plug connection (4) into the material outlet.
Check O-rings for correct seat.
11. Tighten threaded pin (3).
Tightening torque 8Nm
⇒ Hose is fixed.

5.5.3 Connecting detergent supply

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

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

Requirements:

- The whole system is switched off and secured against restart.
 - Electrical lines are discharged.
 - Material-carrying lines are depressurized and locked.
- Pump has been assembled.
- Connections are cleaned.



Fig. 26: Connect detergent supply (example)

1. Loosen threaded pin (1) on the detergent connection.
2. Pull out plug connection (2).

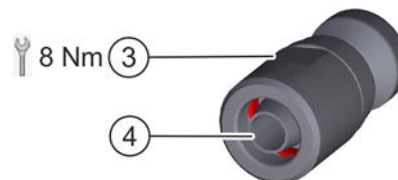


Fig. 27: Plug connection

3. Screw on cap nut (3) of the nipple (4).
4. Lightly grease the thread of the cap nut (3).
5. Guide hose through the cap nut (3).
6. Push hose with the straight cut edge on the nipple (4) of the plug connections (2) up to the mechanical stop.
7. Hand-tighten cap nut (3).
8. Hold the nipple counter using a hexagon socket spanner. Tighten cap nut (5).
 - Observe tightening torque.
 - ⇒ The cap nut (3) jams the hose and seals it.
9. Pull off hexagon socket spanner.

10. Insert plug connection (2) into the detergent connection.
Check O-rings for correct seat.
11. Tighten threaded pin (1).
Tightening torque 8Nm
⇒ Hose is fixed.

5.5.4 Connect compressed air supply

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

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

5.5.5 Connect pressure gage.

Personnel:

- Electrician
- + additional qualification explosion protection

Requirements:

- The whole system is switched off and secured against restart.
 - Electrical lines are discharged.
 - Material-carrying lines are depressurized and locked.
 - Lines carrying compressed air are depressurized and locked.
- Pump has been assembled.

Depending on the pump configuration, different control air hoses need to be connected. Control air hoses are all connected the same way:

- Control air bypass valve
- Control air for detergent
- Control air for paint pressure regulator

1. Insert control air hose into the plug connection.
⇒ The hose must engage perceptibly.

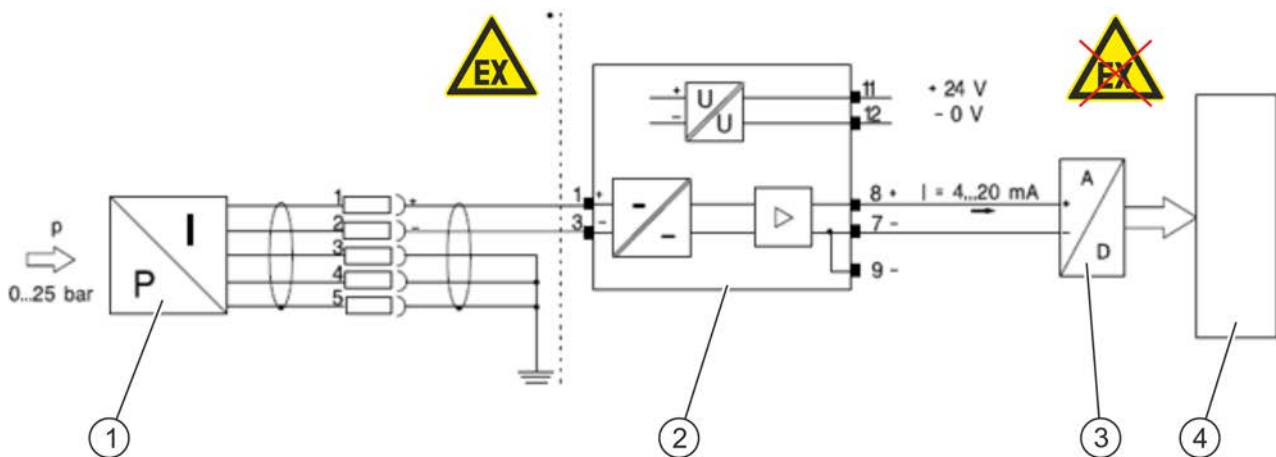


Fig. 28: Exemplary installation for ex-zone 1

- | | |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1 Pressure sensor 2 Transmitter feed unit | <ol style="list-style-type: none"> 3 Analog installation assembly for power (4... 20 mA) 4 Parent control |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|

6 Commissioning

6.1 Safety Instructions

WARNING!

Rotary drive shaft

There is a risk of injury on contact with the rotating drive power shaft and the moving coupling elements.

- Secure drive shaft against intervention in operation, e.g. with a housing.
- Do not try to catch rotating drive shaft.
- Always carry out work only with drive shaft at rest and secured against restarting.
- In case of an open housing, do not actuate the drive shaft if persons are present in the danger zone of the drive shaft.

WARNING!

Bursting hoses

If the material hoses on the material inlet and material outlet are interchanged or the motor has been connected with the polarity reversed, hoses can burst. There is a risk of injury.

- Pay attention to the assignment of the material hoses.
- Check the direction of rotation of the motor

WARNING!

Danger from harmful or irritant substances

Contact with hazardous liquids or vapors can result in serious injury or death.

- Follow safety data sheets.
- Wear specified protective clothing.

NOTICE!

Dry run

If the pump runs without material (dry run), the pump will be damaged.

- Always operate the pump only with material.
- Carry out functional checks on the motor with disconnected clutch with the pump.

NOTICE!

Property damage caused by foreign bodies in the pump

If foreign bodies reach into the pump during the painting process, this can cause damage to property.

- Use filters to ensure that conveyed material does not contain any foreign bodies.

NOTICE!

Production disruption due to conservation oil

Operating the pump with conservation oil can cause production disruption.

- Purge the pump with three to four standard purging cycles before initial or re-commissioning.

6.2 General notes

Requirements for commissioning:

- Pump is fully assembled.
- All screw connections are tightened using the specified tightening torque.

In the case of the initial commissioning and the recommissioning after longer down times, do the following:

- Increase material pressure gradually to the maximum pressure.
- Start with 2bar.
- Increase gradually to:
 - 6bar
 - 10bar
 - 14bar

This procedure helps recognize a possible leakage early on.

At every commissioning, carry out a trial run with checking of the process parameters and all safety related device.

6.3 Set the operating pressure

Personnel:

- System operator

For the greatest metering accuracy, the pressure at the material inlet PE should be higher than at material outlet PA by 0.5bar.

The following factors influence the operating pressure at the material outlet PA:

- Feed rate
- Viscosity
- Geometry of the subsequent installations (e.g. hose length, hose cross section, nozzle size)

Requirements:

1. Determine the minimum and maximum material quantities of the painting process.
2. Set the paint pressure regulator or on-site pressure regulator to the expected mean counter pressure.

If the expected counter pressure cannot be estimated, first set the pressure regulator to 4bar.

3. Measure successively with the maximum and minimum material quantity needed. Note the pressure readings.
4. Calculate the mean value from the pressure readings.
5. Measure the average material quantity required.
6. When calibrating, set the paint pressure regulator or on-site pressure regulator to the determined mean pressure.
7. Check the entire application area. Ensure that the allowable limit value for the pressure differential (PE to PA) is not exceeded ($\Delta P = \pm 3\text{bar}$).

7 Operation

7.1 Safety recommendations

WARNING!

Squirting material

Escaping compressed material can cause serious injury.

- Check the product for leakage before commissioning.
- Put the product into operation only if the connections are made professionally.

WARNING!

Rotary drive shaft

There is a risk of injury on contact with the rotating drive power shaft and the moving coupling elements.

- Secure drive shaft against intervention in operation, e.g. with a housing.
- Do not try to catch rotating drive shaft.
- Always carry out work only with drive shaft at rest and secured against restarting.
- In case of an open housing, do not actuate the drive shaft if persons are present in the danger zone of the drive shaft.

7.2 General notes

In application stations, a parent control switches the pump on and off. During the normal production process, operator intervention can cause interruptions in the operating procedure.

7.3 Checks

Check for unusual noises during operation and regularly carry out visual inspections:

- **Cleanliness**
Ensure there are no material residues and other soiling. Damage and leaks can only be seen on clean components.
- **Tightness**
Check the tightness of the connections at regular intervals.
- **Temperature**
Check the operating temperature at regular intervals ↪ 12 "Technical data".
- **Operating pressure**
Check the operating pressure on the control unit at regular intervals ↪ 12 "Technical data".

Perform further checks during down time, if you notice unusual or loud noises.

7.4 Purging

7.4.1 Flush the pump

Personnel:

- System operator

Protective equipment:

- Eye protection

NOTICE!

Production disruption due to conservation oil

Operating the pump with conservation oil can cause production disruption.

- Purge the pump with three to four standard purging cycles before initial or re-commissioning.

1. Start purge program on the control system.
Purge the pump with three to four standard purging cycles.

8 Cleaning

8.1 Safety recommendations

DANGER!

Explosive atmosphere

The product is installed in potentially explosive atmospheres. Disregarding the safety regulations of these areas may cause death due to explosion.

- Stop the system before carrying out any work.
- Disconnect the system from compressed air and material supply system.
- Secure the system against being switched on again.
- Relieve the lines.
- Check for an explosive atmosphere prior to entering into a potentially explosive area.
- Observe all general safety instructions for handling the total system.

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 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).

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

Personnel:

- System operator
- Cleaning staff

Protective equipment:

- Eye protection
- Protective gloves
- Protective workwear
- Respirator mask

Requirements:

- The whole system is switched off and secured against restart.
- No explosive atmosphere is present in potentially explosive zones.
- Technical ventilation is switched on.
- The temperature of the cleaning agent is maximum 60°C
- All connection lines are depressurized and locked.
- Pump has been purged.

1. Use approved cleaning agents to wet a piece of plastic-fiber-free cloth.
2. Damp wipe surfaces.
3. Wipe surfaces dry using a plastic-fiber free cloth.
4. Check pump for damage:
 - Scoring
 - Grooves
 - Denting
 - Impact points and burrs

9 Maintenance

9.1 Safety notes

DANGER!

Explosive atmosphere

The product is installed in potentially explosive atmospheres. Disregarding the safety regulations of these areas may cause death due to explosion.

- Stop the system before carrying out any work.
- Disconnect the system from compressed air and material supply system.
- Secure the system against being switched on again.
- Relieve the lines.
- Check for an explosive atmosphere prior to entering into a potentially explosive area.
- Observe all general safety instructions for handling the total system.

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 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!****Risk of injury due to escaping material**

Escaping compressed material can cause serious injury.

Before working on the product:

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

 **WARNING!****Risk of injury due to escaping compressed air**

If hoses under compressed air are disassembled, it can cause serious injuries.

Before carrying out any work:

- Disconnect compressed air supply. Secure against reconnection.
- Depressurize the lines.

 **WARNING!****Risk of injury due to moving parts**

Contact with the rotating drive shaft or the moving clutch elements can cause serious injury.

- Disassemble housing exclusively for commissioning, servicing and maintenance work.
- Do not touch moving parts.
- Perform your work only during downtime and system secured against restarting.

 **WARNING!****High discharge energy**

Touching heavily charged surfaces can release > 350 mJ of discharge energies. Sparks can lead to scarring and skin burns. Current flowing over the heart can be deadly.

- Use an ionizer to discharge heavily charged surfaces at various locations.

 **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.

9.2 Maintenance schedule

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

| Interval | Maintenance work |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| semi-annually | Check connections for tightness ↪ 9.5 “Checking connections”. Clean the pump ↪ 8 “Cleaning”. Check shaft seal for tightness ↪ 9.4 “Check radial shaft seal”. Check release agent ↪ 9.3 “Checking release agent”. In case of turbidity of the release agent: <ul style="list-style-type: none"> ▪ Replace bearing housing ↪ 9.6 “Replacing Bearing Housing”. ▪ Replace seal kit ↪ 9.7 “Replacing seal kit”. |
| as necessary | Replacing seal kit ↪ 9.7 “Replacing seal kit” Replacement intervals depending on the paint conveyed: <ul style="list-style-type: none"> Hardener - semi-annually Primer - semi-annually Base coat paint - annually Clear coat - every 2 years |
| every 2 years | Replace bearing housing ↪ 9.6 “Replacing Bearing Housing”. |

Observe maintenance intervals and document maintenance work.

9.3 Checking release agent

Check fill level

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection

Requirements:

- Material supply system is switched off and secured against reconnection.
 - Material-carrying lines are depressurized.
- Power supply is switched off and secured against being switched on again.
 - Checked that no current is present in the electrical lines.
- Compressed air supply is switched off.
 - Compressed air lines are depressurized.

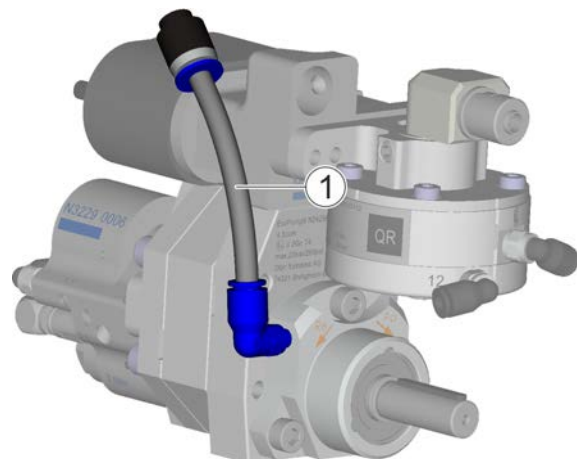


Fig. 29: Check fill level

1. Check fill level in the hose (1). Fill release agent into the hose (1) to 3/4 level.
 - ⇒ If the fill level is low, top it up.

i If the fill level has fallen distinctly or the release agent has acquired discoloration, the seal set needs to be replaced ↪ 9.7 “Replacing seal kit”.

Top up release agent

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- Material supply system is switched off and secured against reconnection.
 - Material-carrying lines are depressurized.
- Power supply is switched off and secured against being switched on again.
 - Checked that no current is present in the electrical lines.
- Compressed air supply is switched off.
 - Compressed air lines are depressurized.

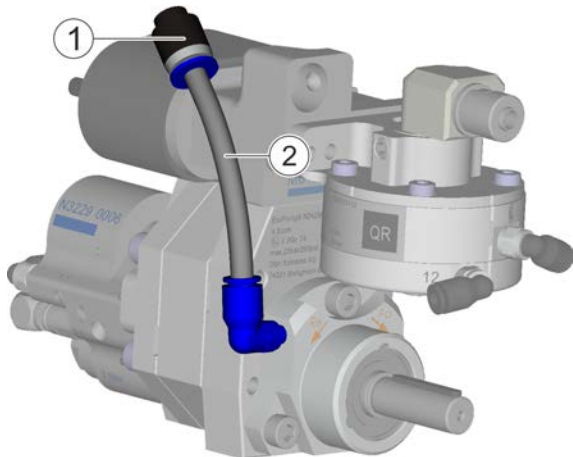


Fig. 30: Pouring in release agent

1. Pull off end cap (1) from the hose (2).
2. Pull up release agent using a gun.
3. Fill in release agent until the hose (2) is filled to 3/4 level.
4. Fit end cap (1).
End cap must engage perceptibly.

9.4 Check radial shaft seal

EX WARNING!

Ball-bearing heats up

If the shaft seal is defective, soiling of the ball bearing in the bearing housing cannot be ruled out. Soiling can cause the bearings to heat up and can cause explosions in explosive atmospheres.

- If the shaft seal is replaced, the bearing housing must also be replaced.

Personnel:

- System operator

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- The system is switched off and secured against restart.
- No explosive atmosphere is present in potentially explosive zones.
- Technical ventilation is switched on.

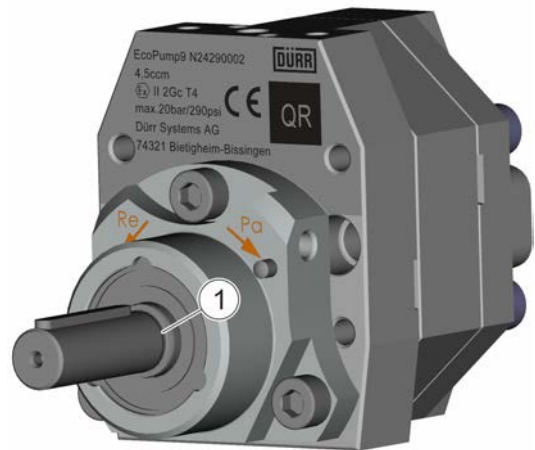


Fig. 31: Check radial shaft seal.

1. Check area (1) between drive shaft and ball bearing for leaking material.
2. In case of a leakage, replace the bearing housing ↪ 9.6 “Replacing Bearing Housing”.

9.5 Checking connections

Personnel:

- System operator

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- The system is switched off and secured against restart.
- No explosive atmosphere is present in potentially explosive zones.
- Technical ventilation is switched on.

1. Check the following connections and components every week for tightness:

- Hose connection of material outlet PA
- Hose connection of material inlet PE
- Release agent collecting tray
- If available:
 - Purging connection
 - Control air for diaphragm valve
 - Control air for V3/RFV3 valve
 - Pressure sensor

9.6 Replacing Bearing Housing

9.6.1 Disassemble the bearing housing

! NOTICE!

Damages due to detergent

Leaking detergent can damage bearings and seals.

- Prior to disassembly, blow the section from the color changer to the recirculation in the atomizer empty while the bypass is open.
Duration: at least 3 seconds
- Wrap disassembled connection block into a dry cloth.
The dry cloth can take up residual liquid.
- Take up leaked liquid in the area of the pump.

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- The system is switched off and secured against restart.
- No explosive atmosphere is present in potentially explosive zones.
- Technical ventilation is switched on.
- Pump has been disassembled ↪ 11.1 “Disassembly”.

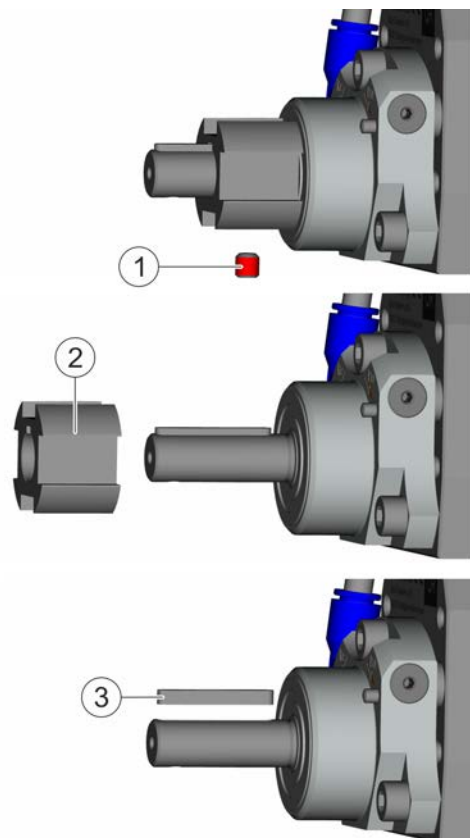


Fig. 32: Clutch and parallel Key

1. Unscrew threaded pin (1).
2. Pull out clutch plate (2).
3. Remove the parallel key (3) from the groove applying a tap.

4. The release agent runs off at the disassembly of the bearing housing. Collect release agent and dispose of it in a professional manner.

Position pump above a collecting tray.

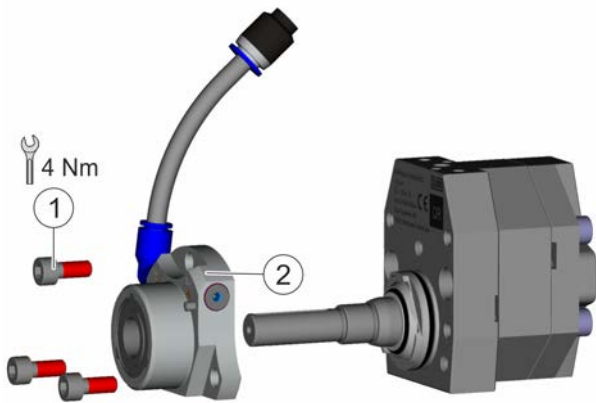


Fig. 33: Disassemble bearing housing

5. Remove screws (1).
6. Pull off bearing housing (2) or push it out carefully.

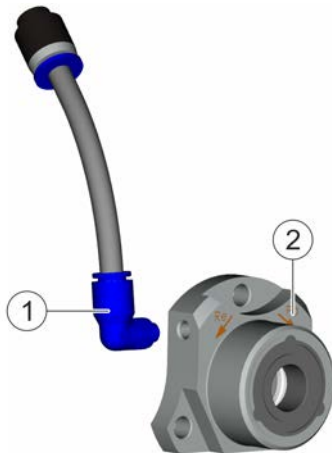


Fig. 34: Release agent hose

7. Unscrew elbow (1) with hose and protective cap from the bearing housing (2).

9.6.2 Assemble the bearing housing

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- Pump has been disassembled ↪ 11.1 “Disassembly”.

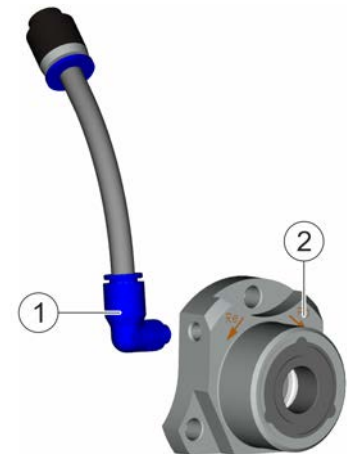


Fig. 35: Release agent hose

1. Screw elbow (3) with hose and protective cap to the bearing housing (2).

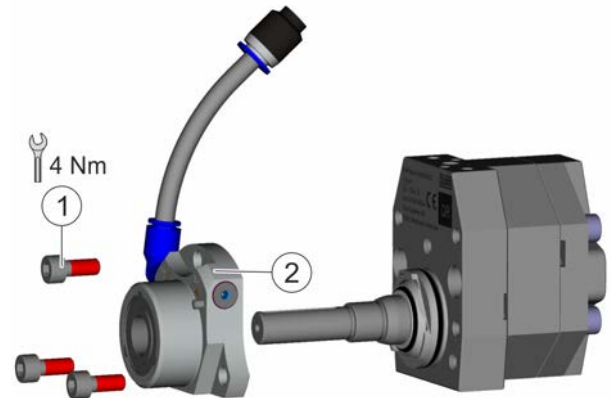


Fig. 36: Assemble bearing housing

2. Push bearing housing (2) onto the shaft up to the mechanical stop.
3. Screw on bearing housing (2) using the screws (1). Observe tightening torque.

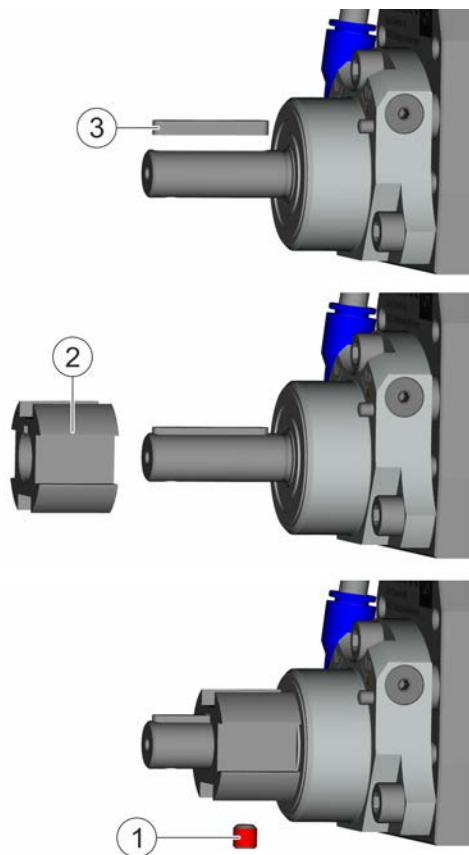


Fig. 37: Clutch and parallel Key

4. Insert parallel key (3) into the groove of the drive shaft.
5. Push clutch plate (2) onto the drive shaft up to the mechanical stop.
6. Screw on and tighten threaded pin (1).
⇒ Clutch plate (2) is fixed.

Top up release agent after assembly of the bearing housing.
↳ 5.3.3 "Pouring in release agent"

9.7 Replacing seal kit

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- Bearing housing is disassembled ↳ 9.6.1 "Disassemble the bearing housing".

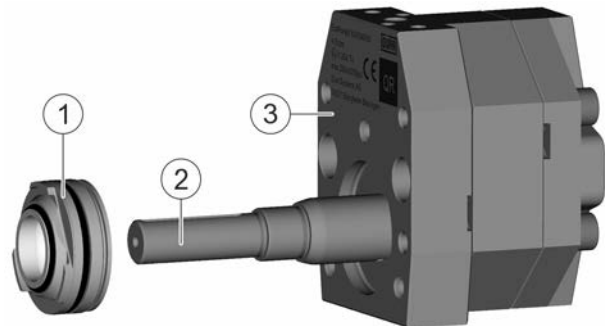


Fig. 38: Replacing seal kit

1. Pull off seal kit (1) from the drive shaft (2) or push back carefully from the front plate (3).
Do not damage the front plate.

2. Check drive shaft for damage.

The complete pump block must be replaced if the drive shaft is damaged.

3. Plug new seal set on the drive shaft (2) up to the mechanical stop.

4. Assemble bearing housing ↳ 9.6.2 "Assemble the bearing housing".

10 Faults

10.1 Defects table

| Fault description | Cause | Remedy |
|---------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Falling delivery rate (pressure and quantity). | No free throughput into the supply line. | <ul style="list-style-type: none"> ▪ Check material lines, replace if necessary. ▪ Check diaphragm valve, replace if necessary. ↳ 10.2.1 "Replacing diaphragm valve" ▪ Check paint pressure regulator or on-site regulator, replace if necessary. ↳ 10.5 "Paint pressure regulator" |
| Pump does not deliver. | Supply line to the pump is clogged | Check cables, replace if necessary. |
| | Hoses on material inlet and material outlet interchanged. | Check hoses, connect them correctly if necessary ↳ 5.5 "Connecting". |
| | Pump in reflow mode ↳ 3.8 "Directions of rotation". | Check functioning and direction of rotation of the on-site motor. |
| Leakage on the drive shaft | Seal set worn out. | <ul style="list-style-type: none"> ▪ Replace seal set. ↳ 9.7 "Replacing seal kit" ▪ Replace bearing housing. ↳ 9.6 "Replacing Bearing Housing" |
| | No free outflow from the pump. | <ul style="list-style-type: none"> ▪ Check the line between pump and atomizer. ▪ Check pump pressure at material outlet PA. ▪ Check customer-provided atomizer-nozzle. ▪ Check customer-provided main needle valve of the atomizer. |
| Damage to the drive shaft | Wear or assembly errors | Replace complete pump block. |
| Leakage on diaphragm valve | Screw connection on the diaphragm valve loose. | Tighten threaded pin. ↳ 10.2.1 "Replacing diaphragm valve" |
| | Diaphragm valve defective | Replace diaphragm valve. ↳ 10.2.1 "Replacing diaphragm valve" |
| Leakage on control valve | Screw connection on the control valve loose. | Tighten threaded pin. ↳ 10.2.2 "Replace control valve" |
| | Control valve defective | Replace control valve. ↳ 10.2.2 "Replace control valve" |
| Leakage between connection block and pump block | Seals defective. | Replace seals ↳ 10.3 "Replacing sealing ring" |
| Leakage between bypass block and pump block | Sealing ring defective | Replace sealing ring. ↳ 10.3 "Replacing sealing ring" |
| Leakage between paint pressure regulator and connection block | Sealing ring defective | Replace sealing ring. ↳ 10.5 "Paint pressure regulator" |
| Leakage between the plates on the pump block | Screws loosened | Tighten screws. |
| | O-ring defective | Replace O-ring. ↳ 10.4 "Pump block" |

10.2 Bypass block

10.2.1 Replacing diaphragm valve

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- The whole system is switched off and secured against restart.
 - Electrical lines are discharged.
 - Material-carrying lines are depressurized and locked.
 - Lines carrying compressed air are depressurized and locked.
- Pump has been purged.

! NOTICE!

Danger of damage to the diaphragm valve

The membrane can suffer damage during assembly and disassembly of the valve.

- Only assemble and disassemble the valve with the locking screw mounted.
- Use a box wrench with sufficient depth.



Fig. 39: Replace diaphragm valve

1. Screw in and hand-tighten the retaining screw (2) into the valve cap.
2. Unscrew diaphragm valve (1) with assembled locking screw (2).
 - The socket wrench must reach over the locking screw (2) right up to the key surface (3) of the valve cap.

Depth of the socket wrench $\geq 8\text{mm}$

3. Screw new diaphragm valve (1) into the bypass block using a safety bolt (2).
Tightening torque: 4.5 Nm
4. Unscrew locking screw (2).

10.2.2 Replace control valve

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- The whole system is switched off and secured against restart.
 - Electrical lines are discharged.
 - Material-carrying lines are depressurized and locked.
 - Lines carrying compressed air are depressurized and locked.
- Pump has been purged.

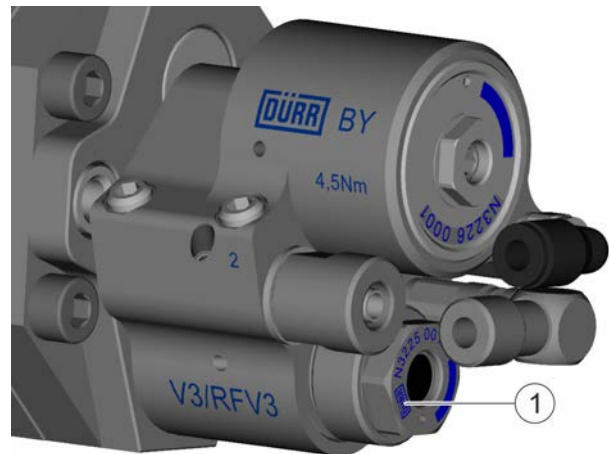


Fig. 40: Replace control valve

1. Unscrew control valve (1) using a socket wrench.
2. Screw new control valve (1) into the bypass block.
Tightening torque: 2.5Nm

10.3 Replacing sealing ring

! NOTICE!

Damages due to detergent

Leaking detergent can damage bearings and seals.

- Prior to disassembly, blow the section from the color changer to the recirculation in the atomizer empty while the bypass is open.
Duration: at least 3 seconds
- Wrap disassembled connection block into a dry cloth.
The dry cloth can take up residual liquid.
- Take up leaked liquid in the area of the pump.

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- Pump has been disassembled → 11.1 “Disassembly”.

Bypass block

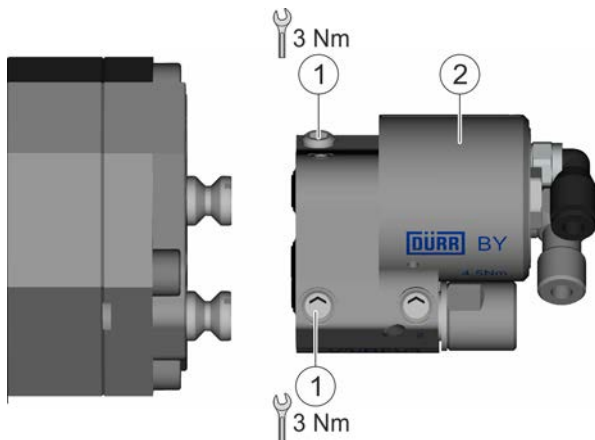


Fig. 41: Remove bypass block

1. Loosen threaded pins (1). Do not unscrew completely.
2. Pull off bypass block (2) from the pump block without tilting.



Fig. 42: Bypass block sealing rings

3. Remove sealing rings (3).
4. Grease new sealing rings (3).
5. Insert new sealing rings (3).
6. Insert bypass block (2) on the pump block without tilting.
7. Tighten threaded pins (1). Observe tightening torque.

Connection block

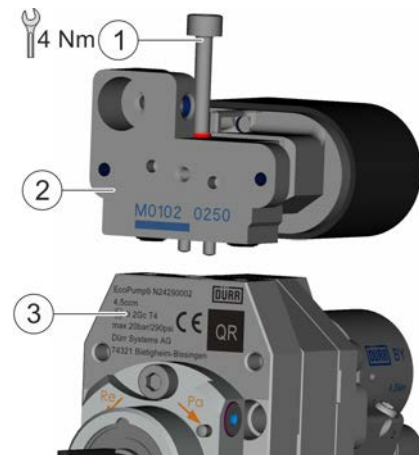


Fig. 43: Remove connection block.

1. Unscrew screw (1) until the threads are visible.
2. Pull off connection block (2) from the pump block without tilting.

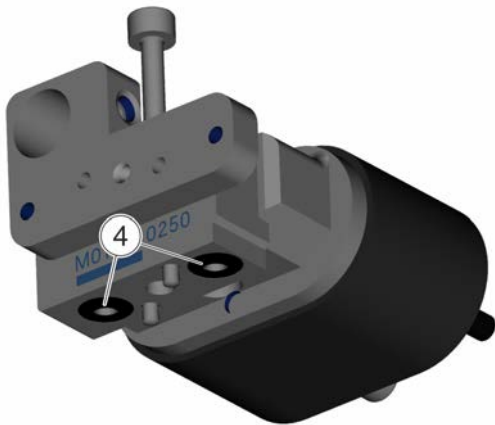


Fig. 44: Connection block sealing rings

3. Remove sealing rings (4).
4. Insert new sealing rings (3).
5. Fit connection block (2) on the pump block (3) without tilting. Insert cylindrical pins into the bores.
6. Tighten screw (1). Observe tightening torque.

10.4 Pump block

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- Pump has been disassembled ↪ 11.1 "Disassembly".
1. Disassemble paint pressure regulator. ↪ 10.5 "Paint pressure regulator"
 2. Disassemble connection block. ↪ 10.3 "Replacing sealing ring"
 3. Disassemble bypass block. ↪ 10.3 "Replacing sealing ring"
 4. Disassemble bearing housing. ↪ 9.6 "Replacing Bearing Housing"
 5. Disassemble seal kit. ↪ 9.7 "Replacing seal kit"

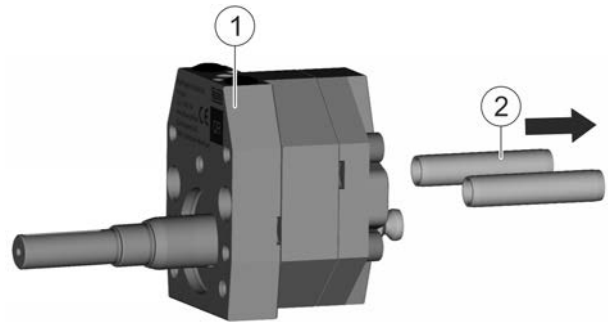


Fig. 45: Disassemble centering bushes

6. Press out centering bushes (2) with a suitable pressing pin, in the direction of the arrow. Do not damage front plate (1).

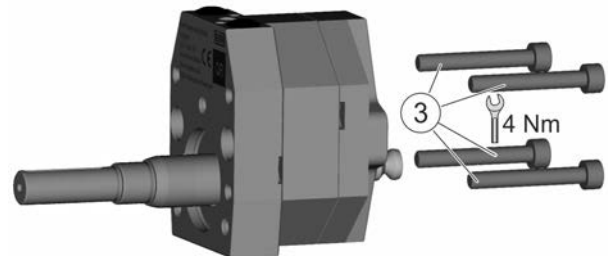


Fig. 46: Pump block screw connection

7. Remove screws (3).

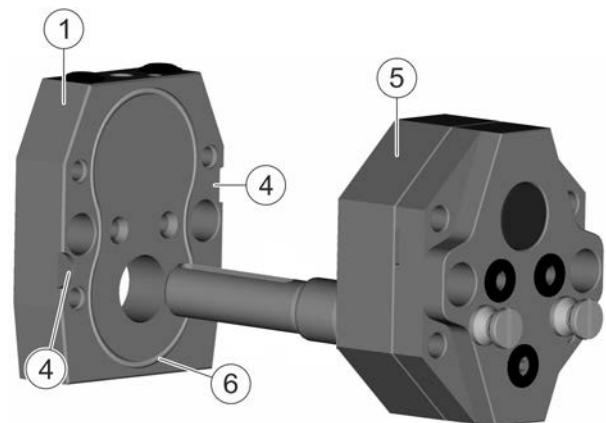


Fig. 47: Push out front plate

8. Push out central plate (1) on the recesses (4) of the central plate (5). Do not damage front plate (1) and central plate (5).
9. Remove O-ring (6).

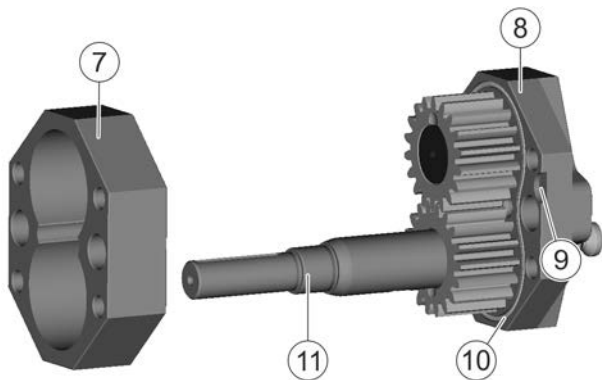


Fig. 48: Push out central plate

10. Push out central plate (7) on the recesses (9) of the back plate (8).
11. Remove O-ring (10).
12. Check drive shaft (11) for damage, e.g.:
 - Abrasion at bearing points
 - Abrasion on sealing faces of the shaft ring
 Replace complete pump block, if the drive shaft is damaged.
13. Grease new O-Ring (10). Insert in the back plate (8).
14. Plug central plate (7) on the back plate (8) via the drive shaft (11).
Do not jam O-rings between the plates.
15. Grease new O-Ring (6). Insert in the front plate (1).
16. Plug front plate (1) on the central plate (7) via the drive shaft (11).
Do not jam O-rings between the plates.
17. Screw in screws (3) evenly through the back plate (8). Do not tighten.
18. Screw in a screw (M6 x 60) as an assembling aid about 10 mm deep into the centering bush (2).
19. Drive centering bush (2) into the pump block with light taps on the screw head.
Centering bushes (2) must be flush with the back plate (8) or slightly countersunk (0.2 - 1mm).
20. Tighten screws (3).
Observe tightening torque.

10.5 Paint pressure regulator

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection

- Protective gloves

Requirements:

- Pump has been disassembled ↪ 11.1 “Disassembly”.

Paint pressure regulator 1:1

Disassembly

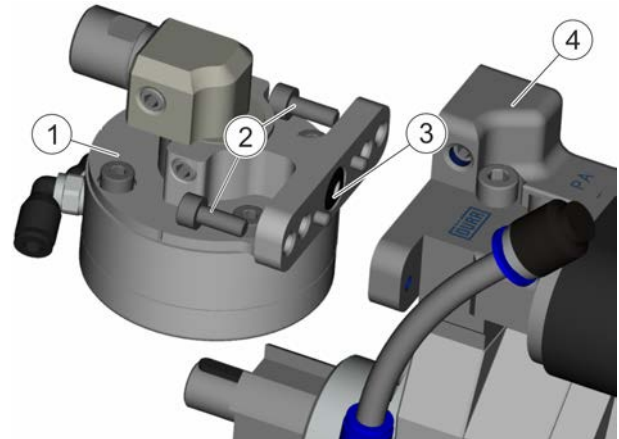


Fig. 49: Paint pressure regulator (example 1:1)

1. Remove screws (2). Remove the paint pressure regulator (1) from the connection block (4).
2. Screw on new paint pressure regulator (1) to the connection block (4) using the screws (2).

Replace seal

3. Replace seal (3) by a new seal.

Assembly

4. Bolt down paint pressure regulator (1) using the screws (2) to the connection block (4).
Tightening torque: 4Nm

Paint pressure regulator 2:1

Disassembly

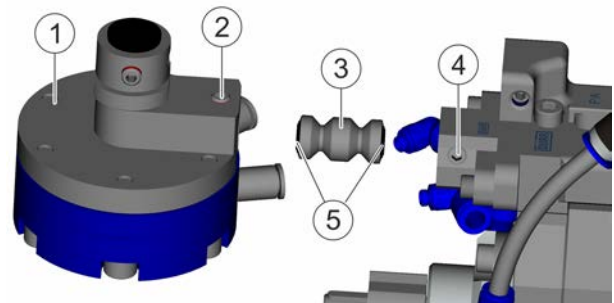


Fig. 50: Paint pressure regulator (example 2:1)

1. Loosen screw (2).

2. Pull off paint pressure regulator (1).
3. Loosen screw (4). Pull out double nipple (3) from the connection block.

Replace seal

4. Replace seals (5) by a new seal.

Assembly

5. Insert double nipple (3) into the connection block.
6. Tighten screw (4).
Tightening torque: 3 Nm
7. Fit paint pressure regulator (1) onto the double nipple (3).
8. Tighten screw (2).
Tightening torque: 3 Nm

10.6 Pressure gage

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- Pump has been disassembled ↪ 11.1 “Disassembly”.

Pressure sensor HS

Replace battery

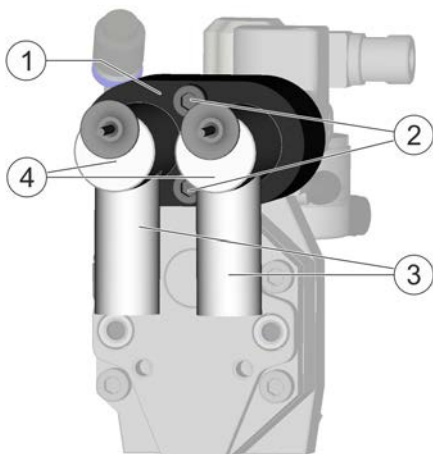


Fig. 51: Pressure sensor HS

1. Unscrew battery holder (3).
2. Remove battery.

3. Insert new battery.
⇒ Observe correct polarity.
Use this type of battery only ↪ 13.1 “Replacement parts”.
4. Tighten battery holder (3) by hand.

Disassembly

5. Unscrew screws (2) from the clamping plate (1).
6. Pull off pressure sensor (4) with clamping plate (1).
7. Remove clamping plate (1).

Assembly

8. **! NOTICE!**
Leakages on the pressure sensor
Used or damaged seals may cause leakages. This may lead to wrong readings. Assemble only pressure sensor with new seal. Fit pressure sensor (4) into the clamping plate (1). Use pressure sensor with new seal ↪ 13.1 “Replacement parts”.
9. Insert pressure sensor (4) with clamping plate (1).
10. Screw on clamping plate (1) using the screws (2) by hand.

Pressure sensor IP

Disassembly

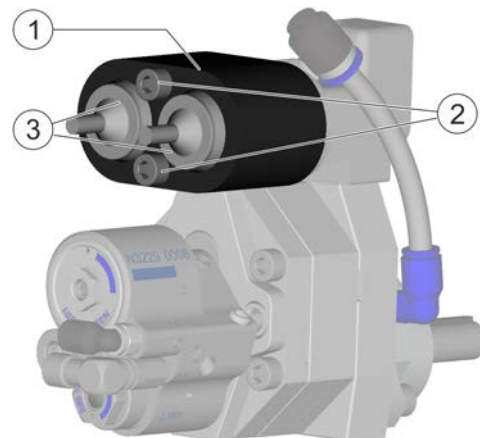


Fig. 52: Pressure sensor IP

1. Unscrew screws (2) from the clamping plate (1).
2. Pull off pressure sensor (3) with clamping plate (1).

- Remove clamping plate (1).

Assembly

4.

! NOTICE!

Leakages on the pressure sensor

Used or damaged seals may cause leakages. This may lead to wrong readings.

Assemble only pressure sensor with new seal.

Fit pressure sensor (3) into the clamping plate (1). Use pressure sensor with new seal ↪ 13.1 "Replacement parts".

- Insert pressure sensor (3) with clamping plate (1).
- Screw on clamping plate (1) using the screws (2) by hand.

11 Disassembly and Disposal

11.1 Disassembly

Personnel:

- Mechanic
- + additional qualification explosion protection

Protective equipment:

- Eye protection
- Protective gloves

Requirements:

- Material supply system is switched off and secured against reconnection.
 - Material-carrying lines are depressurized.
 - Power supply is switched off and secured against being switched on again.
 - Checked that no current is present in the electrical lines.
 - Compressed air supply is switched off.
 - Compressed air lines are depressurized.
 - Technical ventilation is switched on.
 - Explosive atmosphere has been eliminated.
- Loosen and remove material-carrying lines from the material inlet and material outlet.
 - Loosen and remove material-carrying line on the detergent connection.
 - Loosen and remove connected compressed air lines.



WARNING!

Hot surface

During operation, the surfaces of components can get extremely hot. Contact with it can cause burns.

- Do not touch hot surfaces.
- Before carrying out any work:
 - Let components cool down.
 - Wear protective hand gloves.



The disassembly depends on the system in which the pump is installed.

Follow operating instructions of the metering unit GW20 or of the robot.

11.2 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.
 - ↪ 12.9 "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 ↪ 7.4 “Purging”.
- Pump has been disassembled ↪ 11.1 “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

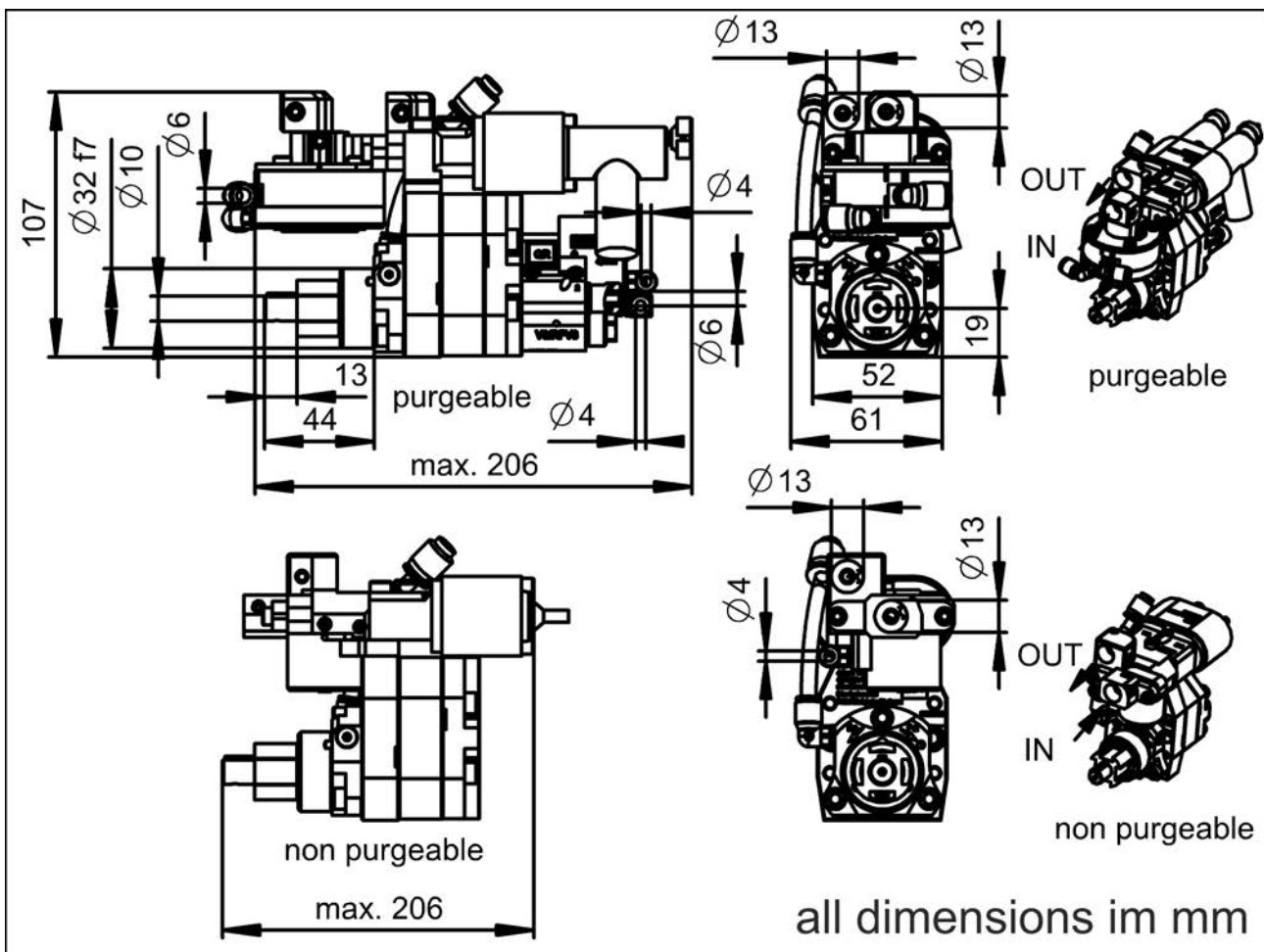


Fig. 53: Dimensions

| Maximum values | Length [mm] | Width [mm] | Height [mm] | Weight [kg] |
|-----------------------------------------------------------|-------------|------------|-------------|-------------|
| K18660012 FDR 1:1 purge-optimized | 107 | 64 | 176 | 2.5 |
| K18660013 Hose connection purge-optimized | 106 | 64 | 172 | 2.2 |
| K18660014 Paint pressure regulator 2:1 purge-optimized | 113 | 71 | 206 | 3.0 |
| K18660015 Paint pressure regulator 1:1 | 107 | 64 | 194 | 2.5 |
| K18660016 Hose connection | 107 | 64 | 172 | 2.2 |
| K18660017 Paint pressure regulator 2:1 | 113 | 64 | 225 | 3.0 |
| K18660018 Paint pressure regulator 1:1 | 107 | 64 | 176 | 2.2 |
| K18660019 Hose connection | 106 | 64 | 172 | 1.9 |
| K18660020 Paint pressure regulator 2:1 | 113 | 71 | 206 | 2.7 |

12.2 Operating conditions

| Detail | Value |
|------------------------------------------|-------|
| Max. ambient temperature | 40° C |
| Max. material temperature | 40° C |
| Temperature of the cleaning agent, max. | 60° C |
| Relative humidity during operation, min. | 35 % |
| Relative humidity during operation, max. | 90 % |

12.3 Operating values

Speeds

| Painting with non-abrasive paints | |
|-----------------------------------|----------------------------|
| Detail | Value |
| Optimal | 20 to 170min ⁻¹ |
| Allowable | 10 to 200min ⁻¹ |

| Painting with abrasive paints | |
|-------------------------------|----------------------------|
| Detail | Value |
| Optimal | 20 to 150min ⁻¹ |
| Allowable | 10 to 170min ⁻¹ |

| Purge | |
|---------|---------------------|
| Detail | Value |
| Optimal | 42min ⁻¹ |

| Pressing (bypass opened) | |
|--------------------------|---------------------|
| Detail | Value |
| Maximum | 42min ⁻¹ |

| Pressing (bypass closed, pump is filled) | |
|------------------------------------------|----------------------|
| Detail | Value |
| Optimal | 170min ⁻¹ |
| Allowable | 200min ⁻¹ |

Press

| Material pressure | |
|-------------------------|------------|
| Detail | Value |
| Optimal | 1 to 12bar |
| Maximum (briefly) | 20 bar |
| Overpressure protection | 17bar |

Set the material pressure for metering to maximum 15bar for protecting the system. The diaphragm valve opens the bypass at a pressure of 17bar. Further pressure build-up is not possible.

Inlet pressure (recommended)

| Detail | Value |
|---------|--------------|
| Minimum | 1bar dynamic |

Depending on the material viscosity and material quantity, the actual inlet pressure can deviate from the recommended value.

Allowable pressure differential between inlet and outlet

| Detail | Value |
|-----------|-------------|
| Optimal | 0 to 0.5bar |
| Permanent | 3 bar |
| Briefly | 7 to 8bar |

A higher pressure differential increases the wear on the pump.

Detergent pressure (V3)

| Detail | Value |
|---------|--------|
| Optimal | 7.5bar |

Control air pressure

| Detail | Value |
|------------------------------------|-------|
| Paint pressure regulator 1:1, min. | 1bar |
| Paint pressure regulator 1:1, max. | 8bar |
| Paint pressure regulator 2:1, min. | 1bar |
| Paint pressure regulator 2:1, max. | 8bar |
| Diaphragm valve, min. | 6bar |
| Diaphragm valve, max. | 10bar |
| Control valve, min. | 6bar |
| Control valve, max. | 10bar |

High voltage

| Detail | Value |
|--------------------------------------------------------|-------|
| High voltage, that is allowed to affect the pump, max. | 100kV |

Acceleration period

| Detail | Value |
|---------------------------|-------|
| Acceleration period, min. | 25ms |

Torques

| Detail | Value |
|--------------------|-------|
| Torque, max. | 18Nm |
| Rated torque, min. | 1.9Nm |
| Rated torque, max. | 3.2Nm |

12.4 Compressed air quality

- Purity classes following ISO 8573-1::2010 1:3:1 1:4:1
- Limitations for purity class 4 (pressure dew point max.):
 - $\leq -3^{\circ}\text{C}$ at 7bar absolute
 - $\leq +1^{\circ}\text{C}$ at 9bar absolute
 - $\leq +3^{\circ}\text{C}$ at 11bar absolute

12.5 Metering accuracy

| Metering quantity | Accuracy |
|-------------------|----------|
| 0.45 ccm/rev | ± 3.0 % |
| 1.0 ccm/r | ± 2.5 % |
| 2.0 ccm/r | ± 2.5 % |
| 3.0 ccm/r | ± 2.0% |
| 4.5 ccm/rev | ± 2.0% |

1. Determine the volumetric efficiency (ratio of actual to theoretical delivery rate) by measurement.
2. Replace pump if the volumetric efficiency is lower than 80%.

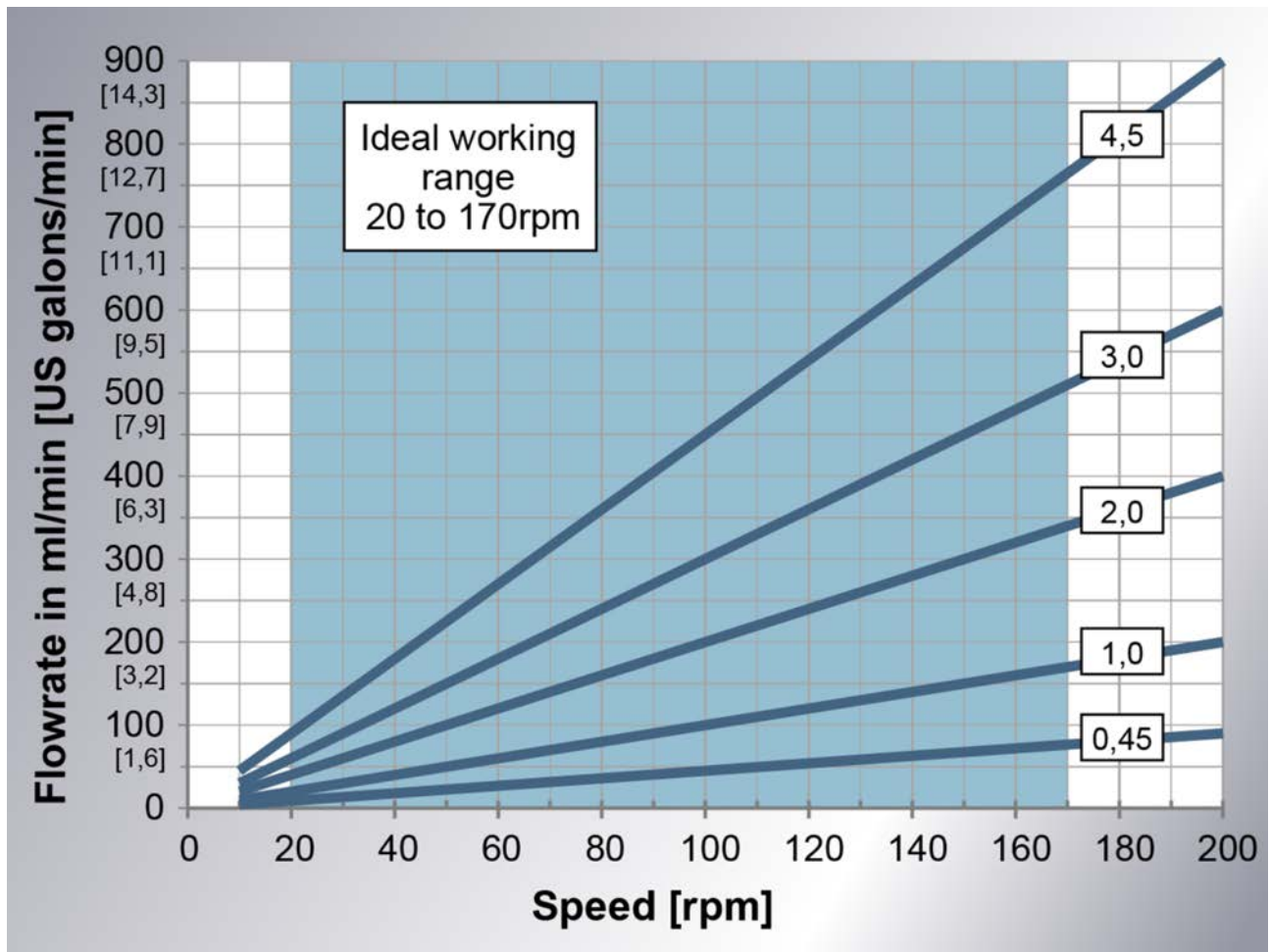


Fig. 54: Ideal working range

- To achieve the maximum accuracy, the requirements to be fulfilled are as follows:
- Pressure differential between material inlet and material outlet maximum ± 2 bar
 - The speed is in the range between 30 and 200 min⁻¹ (RPM).

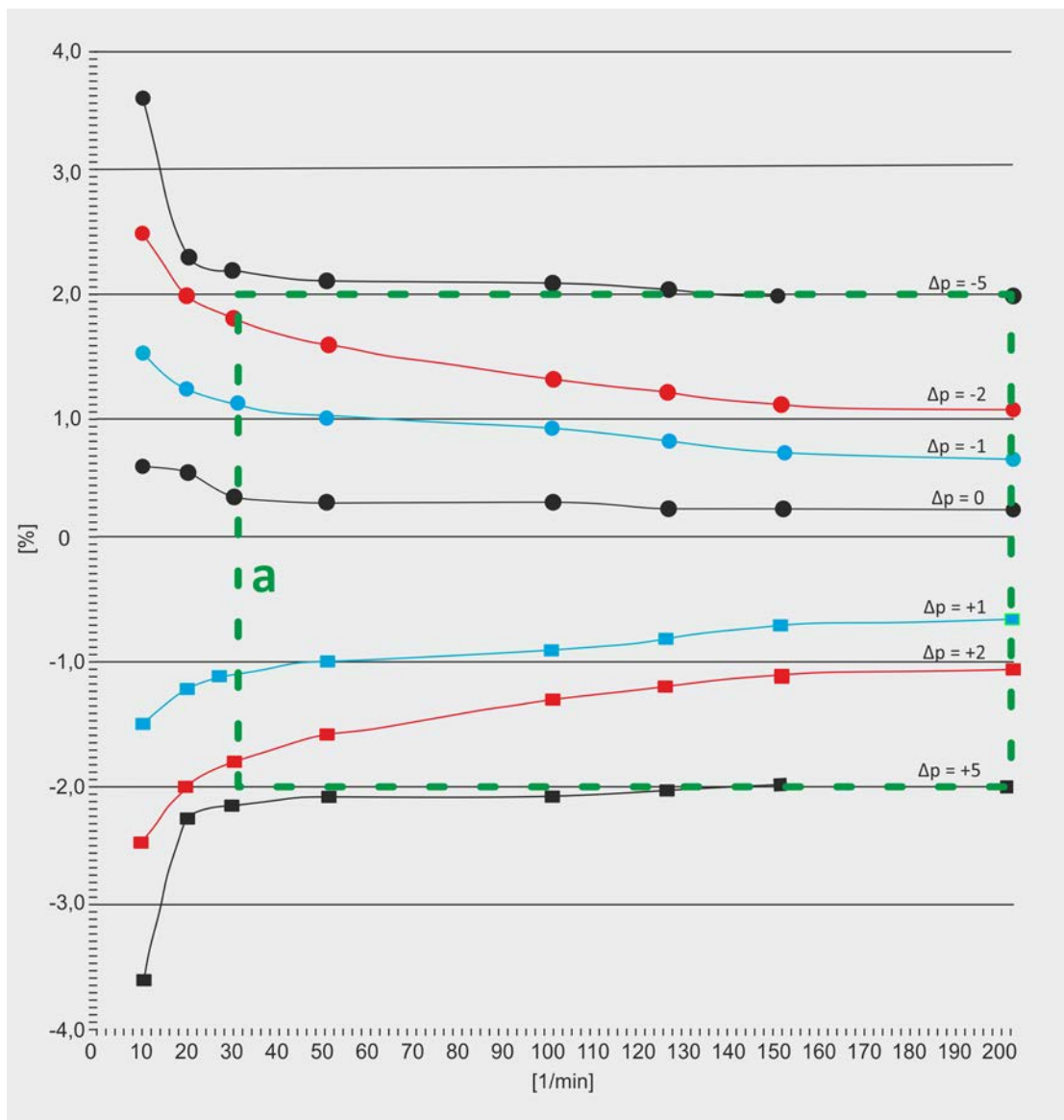


Fig. 55: Metering accuracy

[%] Deviation in %

[RPM] Speed in RPM

a Dür Standard

 PE > PA, (Δp negative) - Overpressure, over-supply

 PE = PA, ($\Delta p = 0$) - Equal pressure, metering accuracy very high

 PE < PA, (Δp positive) - Under-pressure, under-supply


The metering accuracy increases at low speeds ($< 30 \text{ min}^{-1}$ (RPM) and/or different material viscosity. The deviation of the viscosity has an effect on the metering accuracy at a reduced viscosity.

12.6 Life cycle

The cycle times common for proper use and application of non-abrasive paints are as follows:

| Detail | Value |
|----------------|-----------------|
| Basecoat paint | 1 to 2 years |
| Clear coat | approx. 4 years |
| Hardener | approx. 4 years |

Restricted life cycles are obtained:

- on using mica applications
- On using paints with Al₂O₃ (corundum), even in small proportion (e. g. Xirallic-Filler)
- On using primer paints with abrasive solids (e. g. SIC (ceramic) or Mg₃Si₄O₁₀ (Talcum))
- On using paints with additives with Moh's hardness > 6.5
- at high operating pressure ↪ 12.5 "Metering accuracy"
- on high pressure differential between inlet and outlet ↪ 12.3 "Operating values"

12.7 Dry run cycle times

| Detail | Value |
|--------------------------|------------------------------------------------|
| Dry run cycle time, max. | 0.5 to 1 s at 20 min ⁻¹ (RPM) |

12.8 Type plate

The type plate is laser-cut and features the following details:

- Manufacturer
- Product name
- Material number
- Year of manufacture
- Serial number
- ATEX marking
- Pressure, max.
- QR Code

12.9 Materials used

| Detail | Value |
|--------------------------------|-----------------|
| Parts in contact with material | Stainless steel |

12.10 Operating and auxiliary materials

| Material | Specification |
|-----------------------------------------------------|------------------------|
| Screw connections lubricant | Molykote TP-42 |
| Seal lubricant | Klüber Syntheso GLEP1 |
| Conservation oil | DTE 24 Mobil |
| Release agent flammable fluid coating materials | Mesamoll® W30070001 |
| Release agent non-flammable fluid coating materials | VE-BG-Amin |

12.11 Material specification

| Detail | Value |
|--------------------|----------------|
| Material viscosity | 20 to 250 mPas |

Conservation oil:

- 36 cSt (corresponds to basic water-based paint with 112 mPas, density 1.04 g/m³)

13 Replacement parts and accessories

13.1 Replacement parts

Pump block

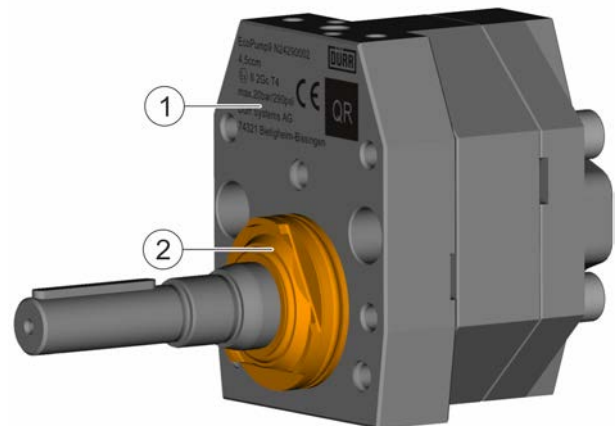


Fig. 56: Pump block (example)

- 1 Pump block
- 2 Seal Kit

| Denomination | Material number |
|--------------------------------------|-----------------|
| Pump block 3.00ccm (purge-optimized) | N24290001 |
| Pump block 4.50ccm (purge-optimized) | N24290002 |
| Pump block 0.45ccm | N24290003 |
| Pump block 1.00ccm | N24290005 |
| Pump block 2.00ccm | N24290006 |
| Pump block 3.00ccm | N24290007 |
| Pump block 4.50ccm | N24290008 |
| Pump block 3.00ccm (purge-optimized) | N24990031 |
| Pump block 4.50ccm (purge-optimized) | N24990032 |
| Pump block 0.45ccm | N24990033 |
| Pump block 1.00ccm | N24990035 |
| Pump block 2.00ccm | N24990036 |
| Pump block 3.00ccm | N24990037 |
| Pump block 4.50ccm | N24990038 |
| Seal Kit | M08810162 |

Pump block - seals

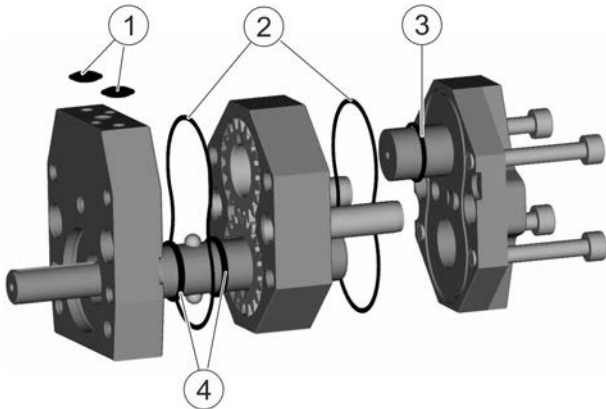


Fig. 57: Pump block - seals (example)

| Item | Denomination | Material number |
|------|-----------------------------|-----------------|
| 1 | Sealing ring d4,5 D9,9 s2,2 | M08010497 |
| 2 | O-ring 48 x 1.2 | M08030680 |
| 3 | O-ring 15 x 1.2 | M08030446 |
| 4 | O-ring 15 x 1.5 | M08030656 |

Bearing housing



Fig. 58: Bearing housing

| Denomination | Material number |
|-----------------|-----------------|
| Bearing housing | M16290001 |

Paint pressure regulator

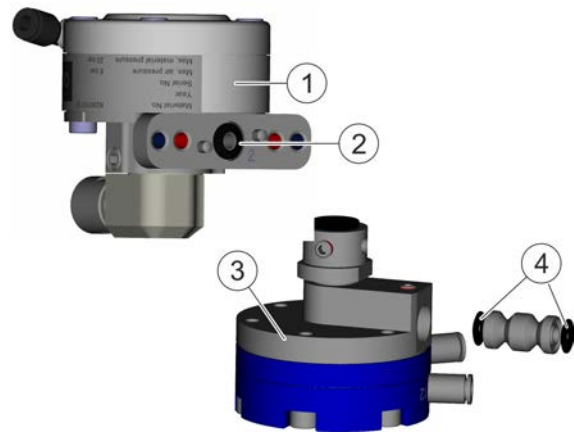


Fig. 59: Paint pressure regulator (example)

| Item | Denomination | Material number |
|------|-----------------------------------------|-----------------|
| 1 | Paint pressure regulator 1:1 | N26010112 |
| | Paint pressure regulator 1:1 (ceramics) | N26010120 |
| 2 | Sealing ring d4,5 D9,9 s2,4 | M08010497 |
| 3 | Paint pressure regulator 2:1 | N26210009 |
| 4 | Sealing ring d6,5 D11,9 s2,4 | M08010498 |

Valve unit

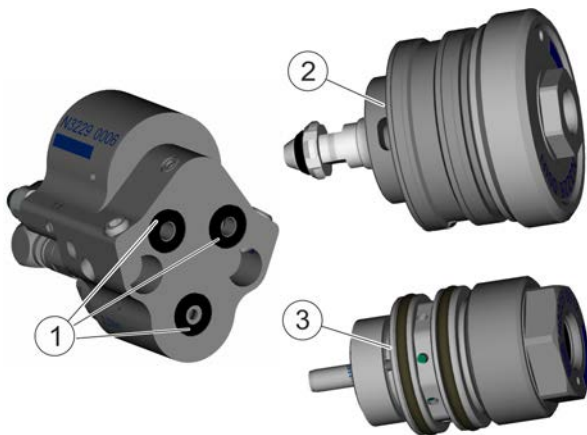


Fig. 60: Valve unit (example)

| Item | Denomination | Material number |
|------|------------------------------------------|-----------------|
| 1 | Bypass block sealing ring d4,5 D9,9 s2,2 | M08010497 |
| 2 | Diaphragm valve | N32260001 |
| 3 | Control valve | N32250012 |

Fluid receiver

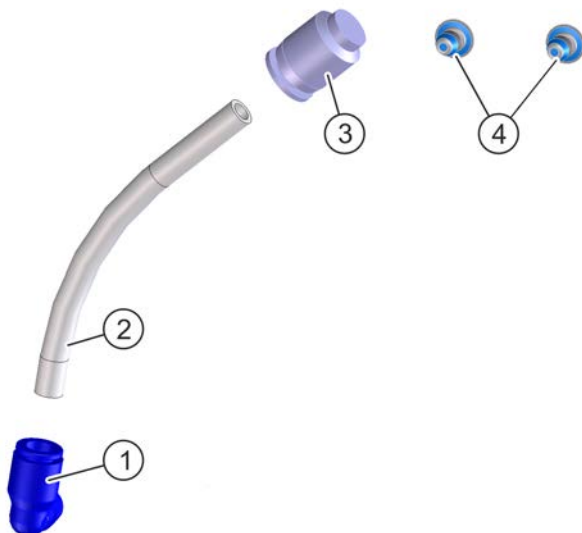


Fig. 61: Fluid receiver

| Item | Denomination | Material number |
|------|---------------------------|-----------------|
| 1 | Elbow plug-in connection | M57310016 |
| 2 | Hose 4 x 6 | W40030346 |
| 3 | End cap | M25010020 |
| 4 | Sealing screw with O-Ring | M08160024 |

Pressure sensor

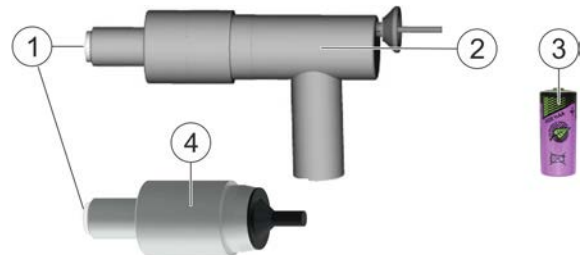


Fig. 62: Pressure sensor

| Item | Denomination | Material number |
|------|---------------------------------------------------|-----------------|
| 1 | Sealing ring d9 D9,9 s2 | M08010332 |
| 2 | Pressure sensor HS 0-25bar high voltage resistant | E22010011 |
| 3 | Battery for E22010011 | E36010028 |
| 4 | Pressure sensor IP 0-25bar 4-20mA | E22010016 |

13.2 Accessories

| Description | Material number |
|----------------------------|-----------------|
| Transport plugs D13 | M48010208 |
| Isolating switch amplifier | E26030027 |
| R/O converter | E34010029 |

13.3 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”.


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