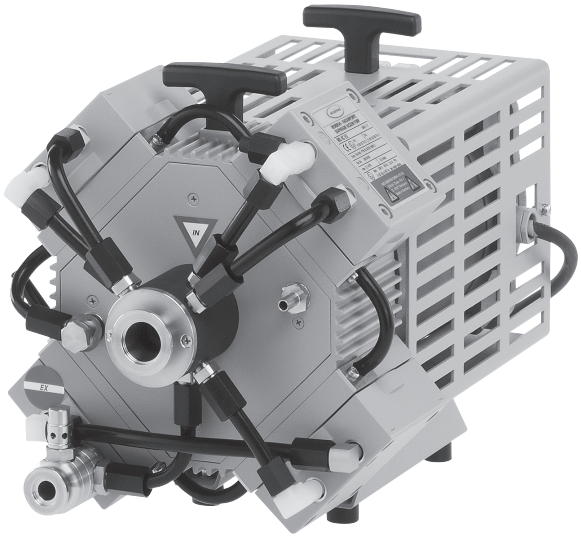
VACUUBRAND®

Chemistry diaphragm pumps with ATEX compliance

Category 2 (Zone 1)

MZ 2C EX
MD 4C EX
MV 10C EX
MZ 2C EX + AK + EK
MZ 2C EX + IK + EK
MD 4C EX + AK + EK
MV 10C EX + AK + EK
MD 4C EX VARIABLE
MV 10C EX VARIO
MD 4C EX VARIO + AK + EK
MV 10C EX VARIO + AK + EK



Maintenance instructions

Original instructions EN

OI No.: 20900030

Original instructions
Keep for future use!

This document may be used and distributed only in its complete and original form. It is the user's responsibility to ensure the validity of this document with respect to the product.

Manufacturer:

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
GERMANY

Tel.:
Head office: +49 9342 808-0
Sales: +49 9342 808-5550
Service: +49 9342 808-5660

Fax: +49 9342 808-5555
E-mail: info@vacuubrand.com
Web: www.vacuubrand.com

*Thank you for purchasing this product from **VACUUBRAND GMBH + CO KG** . You have chosen a state-of-the-art, high-quality product.*

TABLE OF CONTENTS

1 Introduction

Familiarize yourself with your product.
Use this guide as a reference for repairing your product.

1.1 User information

Safety

Instructions and safety

- Read the instructions thoroughly before starting repairs. Keep the instructions accessible and handy at all times.
- Please observe all safety instructions, including those in the operating instructions for the devices and in the document “Safety instructions for vacuum devices”. The document “Safety information for vacuum devices” is part of the operating instructions.
- In addition to these instructions, adhere to the accident prevention regulations and industrial safety regulations applicable in the country of use.

General

General information

- The figures and drawings are examples and are intended only to assist in comprehension.
- Products are subject to technical and design changes without notice in the context of continuous product improvement.

Copyright

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Contact

Contact us

- If the instructions are incomplete, you can request a replacement. Alternatively, you can use our download portal: www.vacuubrand.com.
- Please contact us with any questions, requests for further information, or feedback about the product.
- When contacting our service department, please have the information from the type plate of the device ready.

1.2 About this document

1.2.1 Symbols and pictograms

Safety symbols


General hazard signs.


Danger: electricity.


Disconnect power plug.


Follow the instructions.

Other symbols


Attention!
Observe the precautions when handling equipment that is sensitive to electrostatic discharge.


Hazard from contaminated components.

Display of additional information


Refers to content of other supplementary documents.

Additional instructions

IMPORTANT! Information or description that you must observe.


⇨ Tips
⇨ Additional information

1.2.2 Display conventions

Warning messages

Display of warning messages

DANGER

Warns of an imminent hazard.

Disregarding the situation will result in serious and even fatal injury or death.

⇨ Take appropriate action to avoid dangerous situations!

WARNING

Warns of a potentially hazardous situation.

Disregarding the situation could result in serious, even fatal injury or massive damage to property.

⇨ Take appropriate action to avoid dangerous situations!

CAUTION

Indicates a potentially hazardous situation.

Disregarding the situation could result in slight or minor injury or damage to property.

⇨ Take appropriate action to avoid dangerous situations!

Handling instruction (simple)

Principle of presenting instructions

⇨ You are requested to take action.

☑ Result of the action

Handling instructions (multiple steps)

Graphic

1. First step
2. Next action step

☑ Result of the action

Action instructions that require several steps must be followed in the order described.

2 Safety information

The information in this chapter must be observed by everyone who works with the product described here.

Maintenance and repair should ensure that the functional condition is maintained or restored in the event of failure.
Repair includes troubleshooting and repair.

2.1 Target groups

Trained personnel

Maintenance and repairs may be carried out only by specially trained personnel.
Qualified personnel must carry out the necessary work in accordance with legal requirements (e.g., occupational safety, environmental protection).
The function and safety of the device may not be impaired.
Specialized personnel must be informed of the risks associated with the work.
Specialized personnel must be informed of any hazardous substances that may be present in the device.

2.2 Intended use

Qualifications and personal responsibility

Maintenance work on diaphragm pumps with ATEX conformity (category 2 / zone 1) may only be carried out by competent, knowledgeable, trained personnel.
We recommend training by VACUUBRAND, which covers the special requirements for maintenance and the use of the head clearance measuring device for ATEX pumps.
Training content includes, for example:

- ⇨ Correct use of the specified measuring equipment
- ⇨ Disassembly and assembly for maintenance work
- ⇨ Correct use of sealing tape
- ⇨ Tests
- ⇨ Helium leak detection

- The head clearance measuring device for ATEX pumps is required for diaphragm replacement on ATEX and ATEX-VARIO pumps (category 2 / zone 1).
- The measuring device is used to measure the top dead center of the diaphragm clamping disc when replacing the diaphragms and thus to mount the pump head in such a way that the diaphragm clamping disc does not strike the head cover.
- Maintenance work may only be carried out by qualified, knowledgeable, trained individuals.
- Replaced parts must be disposed of properly because of possible contamination.
- The head clearance diaphragm measuring device may be used only for chemistry diaphragm pumps with a diaphragm diameter of 90 mm.

2.3 Improper use

- Improper use is defined as the use of the head clearance measuring device for ATEX pumps by persons who are not qualified, knowledgeable, and trained.
- The use of any aids not specified by VACUUBRAND is considered improper use.
- Failure to comply with VACUUBRAND specifications is considered improper use.

2.4 Safety precautions

Quality standards and safety

Products from **VACUUBRAND GMBH + CO KG** are subject to stringent quality testing with regard to safety and operation. Each product undergoes a comprehensive test program prior to delivery.

Despite this, when using the product unforeseen problems might occur that could result in injury or damage to property. Therefore, please observe the following chapters, and take the necessary safety measures.

2.4.1 Personal responsibility

Ensure that only qualified personnel work on the device. This applies in particular to troubleshooting and fault rectification.

- ⇨ Read the instructions carefully before starting work.
- ⇨ Regularly replace wear parts.
- ⇨ Do not operate defective or damaged equipment.

Health risks

- ⇨ The safety and protection of individuals has top priority.
- ⇨ Always be conscious of safety and work in a safe manner.
- ⇨ Observe instructions issued by the operator, and national regulations on accident prevention, safety, and occupational health and safety.

2.4.2 Eliminate sources of danger

Operation only in perfect condition

Vacuum pump systems may be operated only in technically sound condition.

- ⇨ Perform maintenance and repairs outside the danger zone (i.e., outside potentially explosive atmospheres).
- ⇨ The head clearance measuring device for ATEX pumps and the case for the measuring device may only be used outside the hazardous area, i.e., outside potentially explosive atmosphere

Work safely

If work must be carried out within the danger zone, the operator must specify additional protective measures to ensure personal safety.

- ⇨ Observe the operating instructions provided by the operator.
- ⇨ Switch off the device before maintenance and repair.
- ⇨ Secure the device against being switched back on.

Dangerous voltage

Even when the device is switched off, parts may remain live for several minutes.

To prevent life-threatening injuries, no work on the device may be carried out during this period.

- ⇨ Mark activities on the device (e.g., with a sign). This sign must remain in place, even if work is temporarily interrupted.
- ⇨ If safety functions or protective devices are deactivated because of maintenance or repair work, immediately reinstall the protective devices.
- ⇨ Replace defective components with new ones of the same part number or with approved equivalents.
- ⇨ Prevent liquids and dust from entering the device.

The device may be contaminated with substances that are harmful to health or otherwise dangerous.

- ⇨ If necessary, decontaminate or clean the device before maintenance or repair.
- ⇨ Observe the safety and protective measures when handling hazardous substances.
- ⇨ Regularly request updated safety data sheets.
- ⇨ Observe the operator's instructions for handling hazardous substances.
- ⇨ Wear your personal protective equipment.

2.5 Environmental protection

Observe environmental protection regulations

Please observe national and international regulations when disposing of your product and replacement parts. In particular valid for all components which are contaminated with hazardous substances (e. g. diaphragms).

Dispose of chemicals (e.g., cleaning agents) in accordance with the relevant regulations.

Scrapping and disposal

Ordered disposal

Growing environmental awareness and stricter regulations require proper disposal of products that can no longer be used or repaired.

If you wish to dispose of a VACUUBRAND electrical or electronic device, it must be separated from unsorted municipal waste. This is indicated by the symbol of a crossed-out trash can.

VACUUBRAND will gladly dispose of your device with this label.

Please contact our service department for more information.

Please also observe the data protection rules, and delete all data from the devices before returning them.

service@vacuubrand.com

Tel.: +49 9342 808 5660

3 Repair instructions

IMPORTANT! Replace defective parts in all cases.

3.1 Service life of diaphragms and valves when used as intended

The diaphragms and valves are wear parts.

Service life of diaphragms and valves

- The diaphragms and valves must be replaced at the latest when they have reached 90% of their typical service life or immediately if the noise level increases.
- The typical diaphragm service life is 15,000 operating hours in non-corrosive and non-condensing conditions.

⇨ Use an operating hours counter.

- The service life of the diaphragms can be considerably reduced by condensing media, high temperatures, high gas flow rates, or deposits.

⇨ Check the diaphragms regularly to ensure they are in good condition.

- Continuous pumping of liquids and dust damages diaphragms and valves.

⇨ Avoid condensation in the pump as well as fluid hammering and dust.

⇨ If corrosive gases or vapors that can cause deposits (e.g., crystallization) are pumped or if deposits may form in the pump because of particles in the gas, perform maintenance more frequently based on your experience.

- To check that the diaphragm is functioning correctly, a gas-specific detector can be installed at the outlet of the inert gas purge. If the detector is activated, this indicates a diaphragm tear.

⇨ When the detector is triggered, immediately switch off the pump, and check the diaphragms.

- Regularly check the final pressure and suction capacity.

⇨ Check the diaphragms and valves if the pressure values or suction capacity drop.

⇨ Clean the scoop chamber, hose connections, diaphragms, and valves.

⇨ Check the diaphragms and valves for cracks. Immediately replace defective parts.

DANGER

Hazard from defective wear parts

Defective wear parts can cause the device to fail and pose an explosion hazard.

⇨ Replace wear parts in good time.

WARNING

Risk of injury when device is dismantled.

When open, moving pump parts are accessible.

Operating a disassembled device may result in crushing or cutting injuries.

⇨ Never operate the device when it is open or disassembled.

⇨ Ensure that the device cannot start up accidentally when open.

WARNING

Hazard from electrical voltage.

⇨ Switch the device off before cleaning or maintenance work.

⇨ Disconnect the power plug from the power outlet.

⇨ After unplugging the device, wait at least 2 min for the capacitors to discharge.

⇨ Check that there is no voltage.

WARNING

Hazard from contaminated components.

Pumping hazardous media can result in hazardous substances adhering to internal parts of the pump.

⇨ Wear your personal protective equipment (e.g., safety gloves, eye protection and, if required, a respirator).

⇨ Decontaminate the vacuum pump before coming into contact with parts that may be contaminated with substances harmful or hazardous to health.
If required, have the vacuum pump decontaminated by an external service provider.

⇨ Take safety precautions when handling hazardous materials, in accordance with your operating instructions.

NOTE

Damage possible if work is performed incorrectly.

⇨ Have maintenance work carried out by a trained specialist.

⇨ Before carrying out maintenance for the first time, please read through all the instructions in order to get an overview of the required service work.

DANGER

Risk of electric shock.

Improper repairs may result in electric shock.

⇨ Check the electrical safety of the device after repair in accordance with IEC 61010 and national regulations.

⇨ Check the protective conductor resistance.

⇨ Check the insulation resistance.

⇨ Perform a high voltage test.

⇨ Check the leakage current.

3.2 Before maintenance or repair

Preparation

Use original replacement parts

➪ Use only original parts and original accessories.

The use of components from other manufacturers may impair the function and safety of the device and its electromagnetic compatibility.

The validity of the CE mark and certification for the USA/Canada (see type plate) may expire if original parts are not used.

ATEX conformity is void if original parts are not used.

➪ Check whether the necessary tools and original parts to be replaced are available.

➪ First, use the exploded view, spare parts lists, and, if necessary, the electrical circuit diagrams to check the work in your mind with regard to feasibility, occupational safety, and possible effects on the safety and function of the device.

Disconnect the device from the mains

➪ Ventilate the device.

➪ Allow the device to cool down.

➪ Disconnect the device from the mains before maintenance or repair. Switch off the device, and disconnect the power plug.

➪ Wait until live parts have discharged.

➪ Ensure ESD protection measures are in place in the workplace.

3.3 After maintenance or repair

Inspections

After maintenance or repair

Perform a functional and safety check after maintenance and repair.

➪ Check the safety of the device in accordance with IEC 61010 and national regulations.

➪ Check the leak rate of the pump after maintenance and repair.

➪ Check the electrical conductivity of the pump after maintenance and repair.

➪ Check the final vacuum of the pump after maintenance and repair.

3.3.1 Inspection of the electrical safety

After maintenance and/or repair, the electrical safety of the diaphragm pump must be checked.

⇨ Use only measuring equipment that is subject to test equipment monitoring for the tests.

DANGER

Risk of electric shock.

Improper repairs may result in electric shock.

⇨ Check the electrical safety of the device after repair in accordance with IEC 61010 and national regulations.
⇨ Check the protective conductor resistance.
⇨ Check the insulation resistance.
⇨ Perform a high voltage test.
⇨ Check the leakage current.

3.3.2 Leak test

After maintenance and/or repair, the leak rate of the diaphragm pump must be checked.

⇨ For the leak test, use a suitable method (e.g., a helium leak detector) that can measure an integral leak rate of < 0.1 mbar l/s.
⇨ Use only measuring equipment that is subject to test equipment monitoring for testing.

DANGER

Hazard from excessive leak rate

If the diaphragm and valve are replaced incorrectly, there is a risk of excessive leakage. Risk of explosion!

⇨ Check the leak rate of the entire pump after each intervention on the device.
⇨ The integral leak rate must be less than 0.1 mbar l/s.

3.3.3 Conductivity test

After maintenance and/or repair, the conductivity must be measured on the stainless steel fittings sealed with thread seal tape.

⇨ Use a suitable, tested measuring device for the conductivity test.

DANGER

Hazard from non-conductive connections

Improperly sealed fittings may result in non-conductive connections. Risk of explosion!

⇨ Check the conductivity of the connections after each intervention on the device.

⇨ The measured resistance must be less than 20 MΩ.

4 Maintenance of the pump

4.1 Changing the diaphragm and valve

⇨ Always perform maintenance or repairs outside the danger zone (i.e., outside potentially explosive atmospheres).

⇨ The head clearance measuring device for ATEX pumps and the case for the measuring device may only be used outside the danger zone, i.e., outside potentially explosive atmospheres.

⇨ When replacing the diaphragm, always replace both diaphragms in a pump head.

⇨ Always disassemble and assemble only one pump head before opening the next pump head.

- When servicing the diaphragm pump, we recommend replacing all diaphragms and valves.
- Some of the illustrations show pumps in other versions. This does not affect the diaphragm and valve replacement.
- The individual parts of a pump head are measured at the factory to prevent the clamping disc from knocking.

If problems arise, you can send the device to the factory for inspection or repair.

⇨ Please refer to the “Service” section.

4.2 Tools

- Diaphragm wrench SW 66 (order number 20636554)
- Blade
- Forceps
- Phillips-head screwdriver size 2
- Screwdriver with flat blade
- Hexagon socket SW 5
- Open-end wrench SW 10/15/17
- Open-end wrench SW 19, 4.5 mm thick
- Torque wrench
  - tested torque wrench for 6 N·m
  - tested torque wrench for 12 N·m

- Head clearance measuring device for 90 mm diaphragms (order number 20680000)

Attention: In addition to the diaphragm head clearance measuring device 90 mm, a dial gauge with a flat measuring plate is required. This is not included in the scope of delivery of the measuring device.

4.3 Dial gauge

Use a dial gauge that complies with the technical specifications below and the requirements of DIN EN ISO 463:2006 (exception from DIN EN ISO 463:2006: diameter of measuring contact).

Examples of suitable dial gauges

- Mahr dial gauge, type MarCator 1086 / MarCator 1086 R
- Garant dial gauge, type 434330_25

⇨ Examples of dial gauges: Status as of March 5, 2026

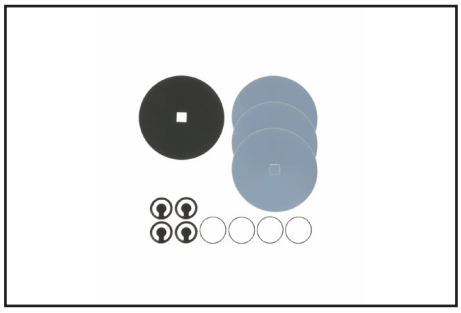
⇨ The user must ensure that the dial gauge is suitable for the application.

Specification of dial gauge	
Measuring span	25 mm (1 inch)
Digit increment	0.01 mm
Error limit	0.02 mm
Repeatability	0.01 mm
Measuring force	0.65 to 1.15 N
Shaft holder	d = 8h6
Measuring contact	Flat plate, diameter ≥ 8 mm
Diameter range of the outer ring D1*	51 to 70 mm
Diameter of the clamping shaft D2*	8h6 mm
Thread diameter D4*	M2,5-6H mm
Thread diameter D5*	M2,5-6g mm
Length of the clamping shaft L1*	≥ 12 mm
Length L2*	≤ 34 mm
Thread length L3*	≤ 5 mm
Thread length L4*	≥ 6 mm
Distance L5 of the center line from the rear wall*	≤ 10 mm

* Information in accordance with DIN EN ISO 463:2006

IMPORTANT! Observe the operating instructions for the dial gauge.
Do not use a lens-shaped probe tip.

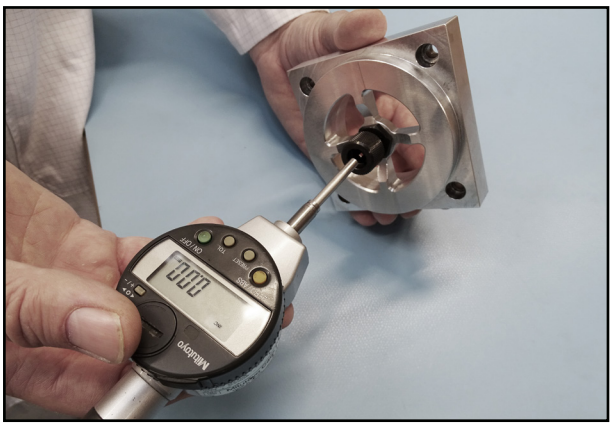
4.4 Replacement parts



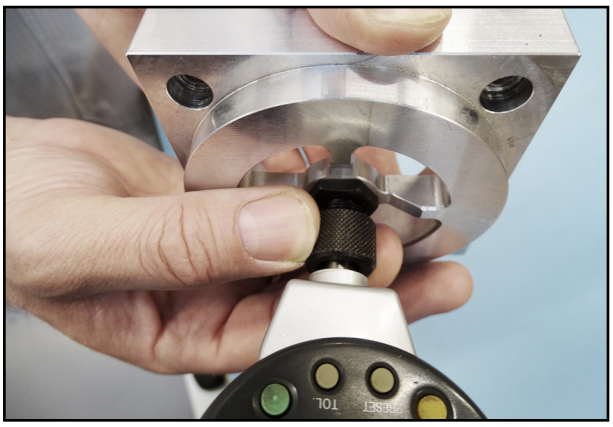
Seal kit (diaphragms, valves, O-rings, thread seal tape)	
MZ 2C EX MZ 2C EX + AK + EK MZ 2C EX + IK + EK	1 × 20696837
MD 4C EX MD 4C EX + AK + EK	2 × 20696837
MV 10C EX MV 10C EX + AK + EK	4 × 20696837
MD 4C EX VARIABLE MD 4C EX VARIO + AK + EK	2 × 20696837
MV 10C EX VARIO MV 10C EX VARIO + AK + EK	4 × 20696837

Thread seal tape (PTFE)	20637514
Valve individually (internal pressure relief valve in MD 4C EX, MD 4C EX + AK + EK, MV 10C EX, MV 10C EX + AK + EK, MD 4C EX VARIO, MD 4C EX VARIO + AK + EK, MV 10C EX VARIO, MV 10C EX VARIO + AK + EK)	20637225
Shim 0.1 mm	20638456
Shim 0.15 mm	20638547
Shim 0.2 mm	20638545
Shim 0.4 mm	20637710
Flat seal for the pressure relief valve	20637081
Compression spring of the pressure relief valve	20637065
O-ring, 32 mm × 3 mm (distribution block)	20611101

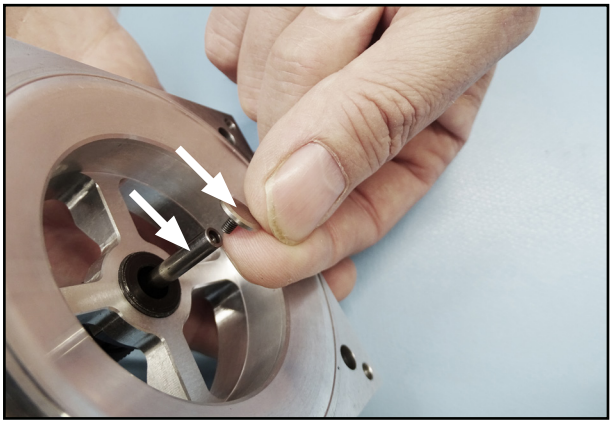
4.5 Setup and calibration of the dial gauge



1. Insert the dial gauge into the dial gauge holder.

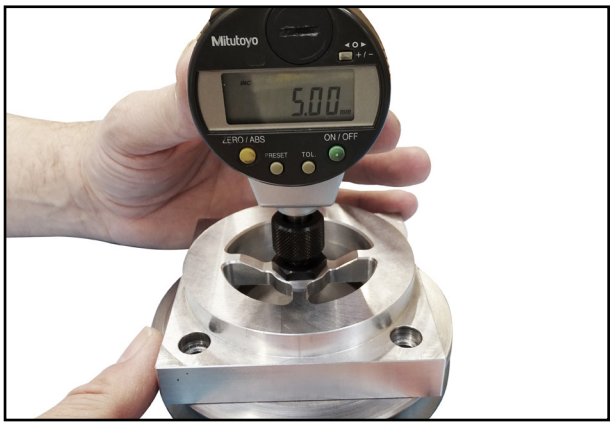


2. Lightly screw the dial gauge so that it can still be moved within the measuring frame.



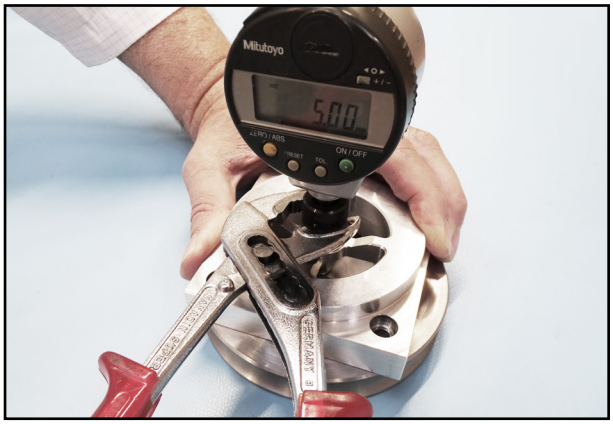
3. First screw the 10 mm extension and then screw the measuring plate into the dial gauge.

4. Place the dial gauge holder with the dial gauge on the alignment plate.

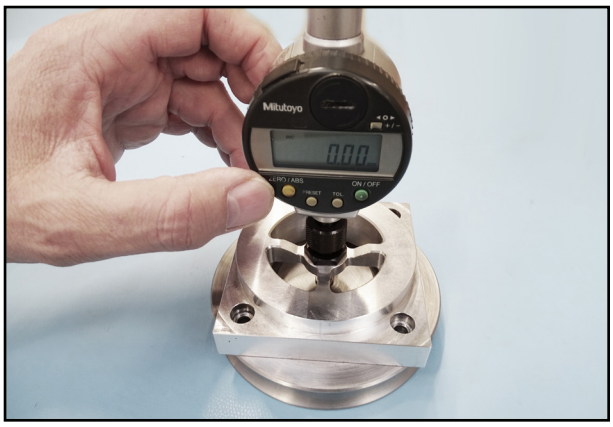


5. Slide the dial gauge upward until 5.00 mm is displayed.

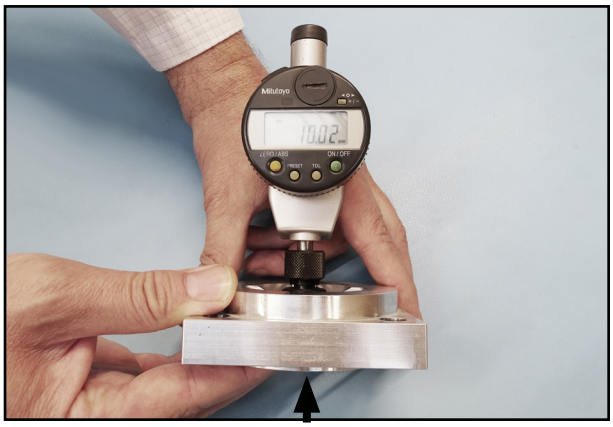
6. Tighten the dial gauge by hand.



7. Secure the dial gauge with pliers.



8. Set the dial gauge to 0.00 mm.



9. Check the measuring range of the dial gauge by pressing on the measuring dial.

⇨ A value of at least 10 mm should be achievable.

IMPORTANT!

Before each use of the dial gauge, check that the extension is fitted.

Before each use of the dial gauge, check that the measuring dial is securely seated.

DANGER

Hazard from a dial gauge that does not meet specifications

Faulty measuring equipment can lead to measurement errors and thus to the top dead center being exceeded. Risk of explosion!

- ⇨ Use only dial gauges that meet the specifications.
- ⇨ Include the dial gauge in the test equipment monitoring.
- ⇨ To determine the thickness of the shims, use a digital caliper gauge that is subject to test equipment monitoring.
- ⇨ Before each measurement, set the zero point of the dial gauge using the alignment plate.
- ⇨ Follow the instructions provided by the measuring device manufacturer.

DANGER

Hazard from damaged dial gauge holder

A damaged dial gauge holder can lead to incorrect measurement results. Improper handling and storage may cause damage to the contact surfaces (underside of the dial gauge holder) between the dial gauge holder and the diaphragm pump. Risk of explosion!

- ⇨ Check the dial gauge holder for damage before each use.
- ⇨ Store the dial gauge holder on a soft surface or in the storage case.

DANGER

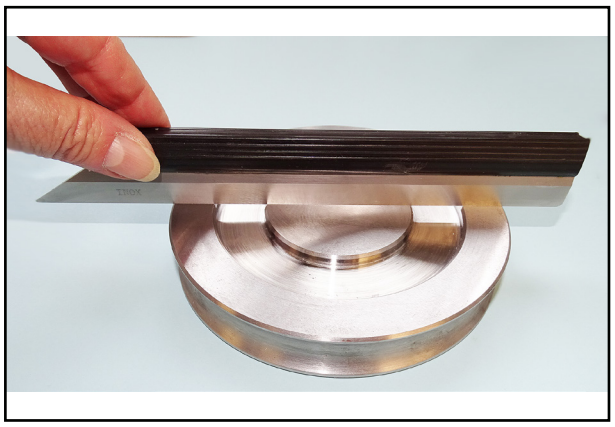
Hazard from damaged alignment plate

If the alignment plate is damaged, there is a risk of misalignment of the dial gauge and, as a result, incorrect installation. Risk of explosion!

- ⇨ Ensure that the alignment plate is free of corrosion and damage and is level.
- ⇨ Check the flatness of the alignment surface (side with ring-shaped indentation) using a hairline ruler. A flatness of less than 0.005 mm must be measured. If flatness is not achieved, the alignment plate must be ground down or replaced.
- ⇨ Clean the alignment plate after each use (e.g., with methylated spirits).
- ⇨ Preserve the alignment plate with corrosion protection after use.
- ⇨ Remove the corrosion protection agent before use (e.g., with methylated spirit).

4.6 Checking the head clearance measuring device for ATEX pumps

4.6.1 Checking the levelling surface for flatness

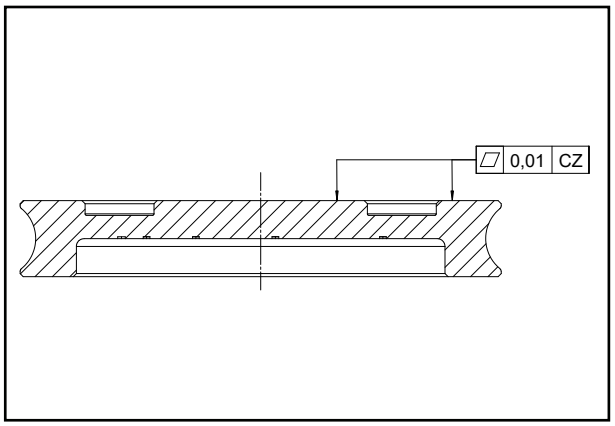


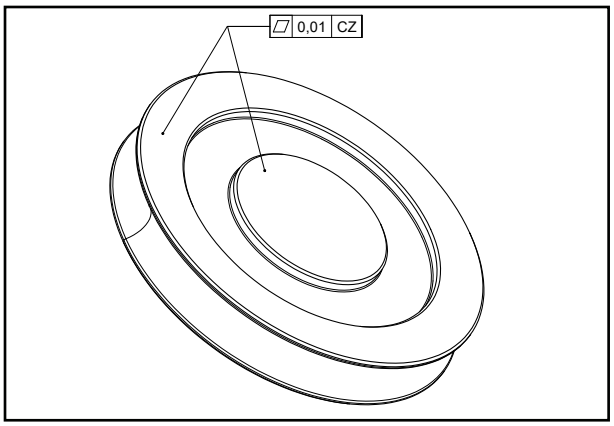
Check the flatness of the alignment surface (side with ring-shaped indentation) using a hairline ruler.

⇨ A flatness of less than 0,01 mm must be measured.

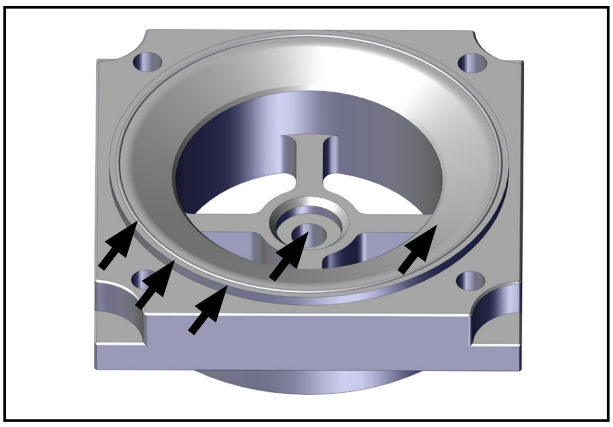
⇨ If there are any abnormalities, the levelling plate must be checked using measuring equipment.

⇨ If the flatness is not achieved, the levelling plate must be sanded down or replaced, for example.





4.6.2 Checking the dial gauge holder for damage



Check the dial gauge holder for damage before each use.

In particular, the areas marked with an arrow in the illustration must be checked.

⇨ Failure to do so may result in incorrect measurements.

⇨ Store the dial gauge holder on a soft surface and in the storage case when not in use.

⇨ If damaged, the dial gauge holder must be replaced.

4.7 Shims

DANGER

Hazard from using incorrect number or thickness of shims

If too many or too thick shims are used, this can lead to increased temperatures and the clamping disc hitting the head cover. Risk of explosion!

- ⇨ To determine the thickness of the shims, use a digital caliper gauge that is subject to test equipment monitoring.
- ⇨ Mount the diaphragm pump heads only using the VACUUBRAND measuring device for diaphragm head clearance.
- ⇨ Use the correct number and thickness of shims.

Maintenance is explained using the example of an MD 4C EX diaphragm pump

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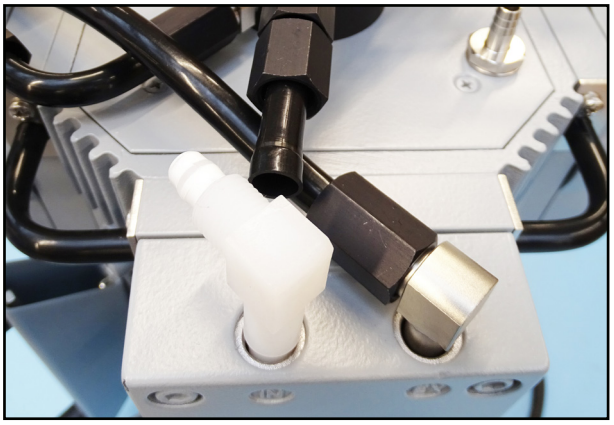
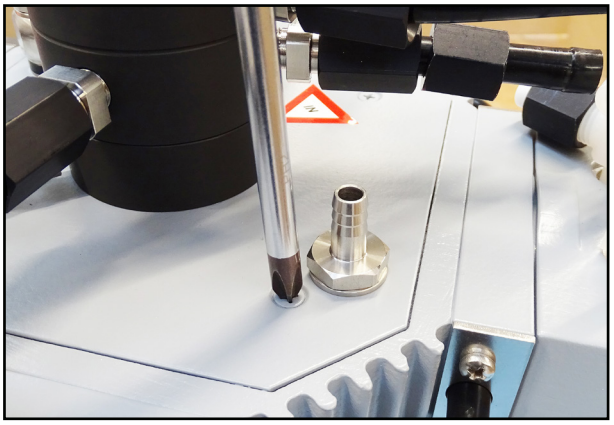
- ⇨ Perform maintenance on other pump models in the same way.

4.8 Maintenance

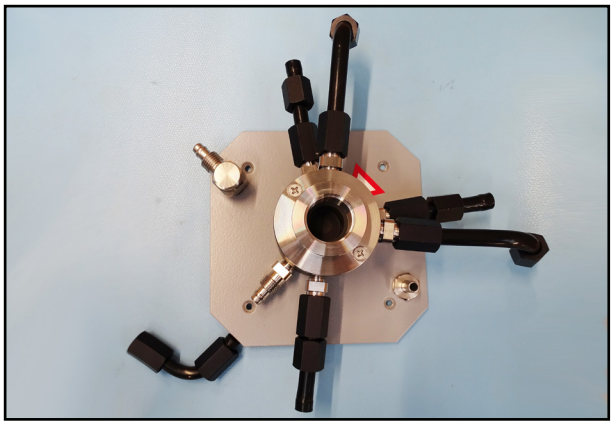
1. Place the pump on the motor.
2. Loosen all union nuts on the hoses on the pump heads that lead to the inlet block.



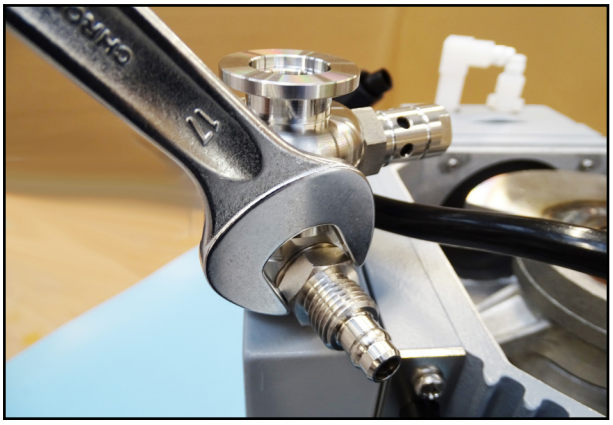
3. Unscrew the angle fittings from the hoses.



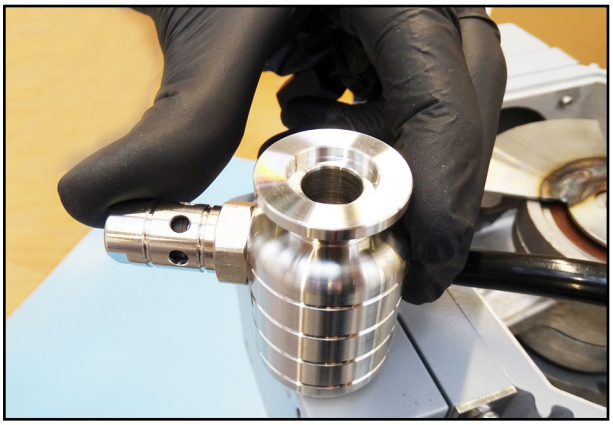
4. Unscrew the pump housing plate.



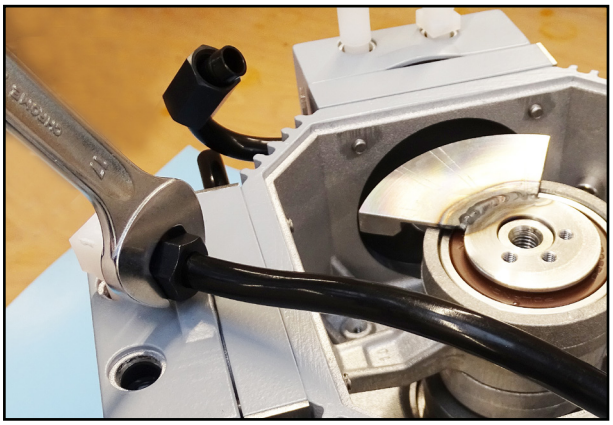
5. Remove the housing plate.



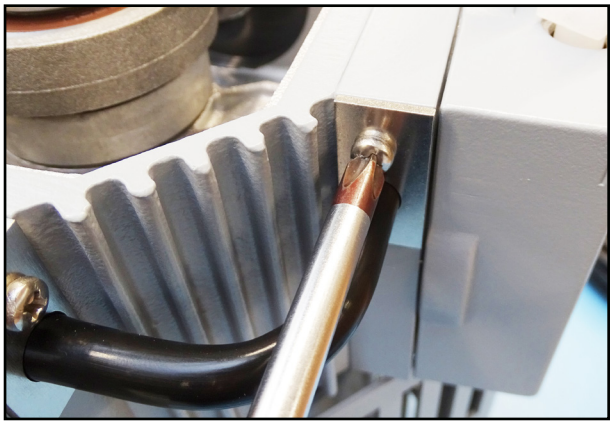
6. Unscrew the outlet connection.



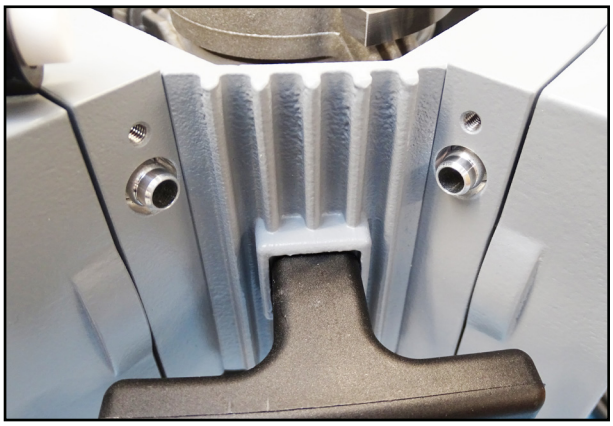
7. Turn the outlet block out.



8. Loosen the union nuts on the tubing between the pump heads, and pull off the tubing.



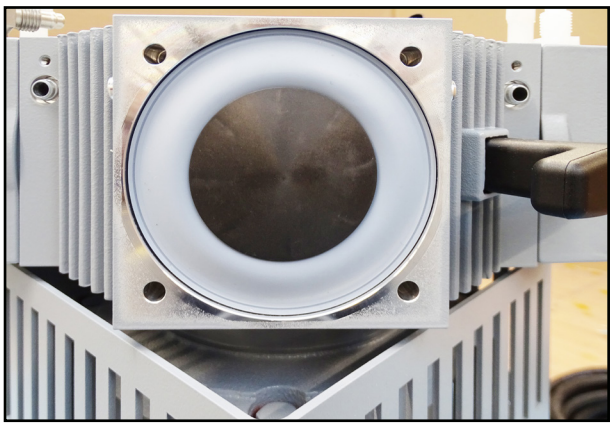
9. Loosen the retaining plates on the inert gas purge hoses.



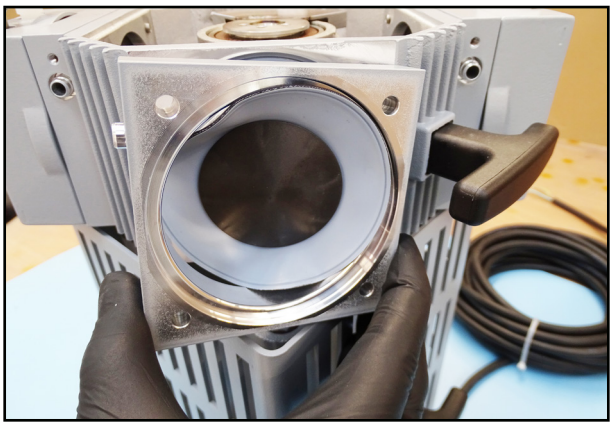
10. Remove the retaining plates and the tubing.

11. Unscrew the housing cover.

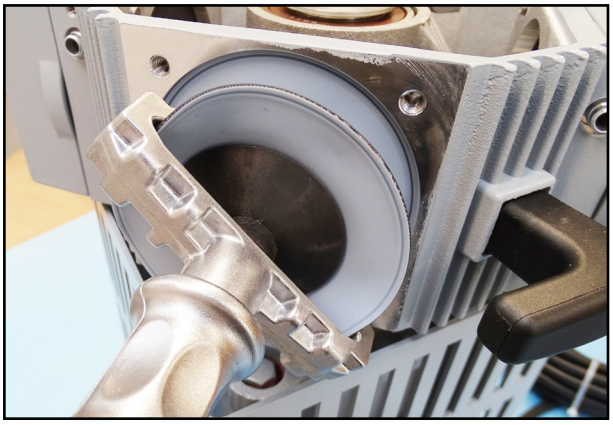
⇨ We recommend opening only one pump head at a time.



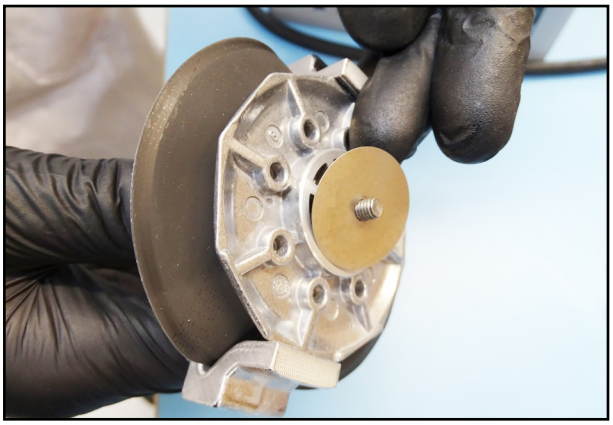
12. Remove the housing cover with the housing cover insert, valves, O-rings, and head cover.



13. Remove the intermediate flange.

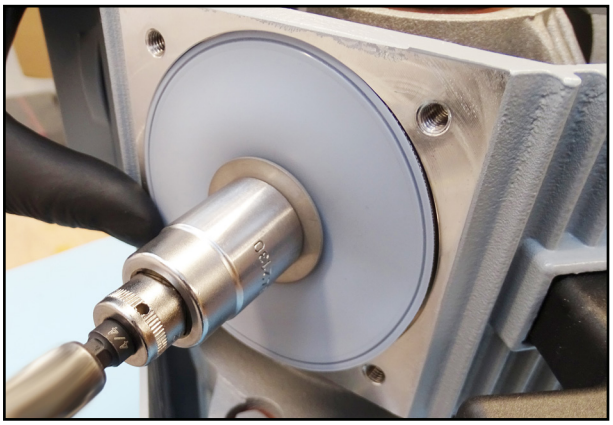


14. Carefully lift the working diaphragm to the side.
15. Insert the diaphragm key under the diaphragm onto the diaphragm support disc.
16. Turn out the diaphragm support disc with diaphragm and diaphragm clamping disc.

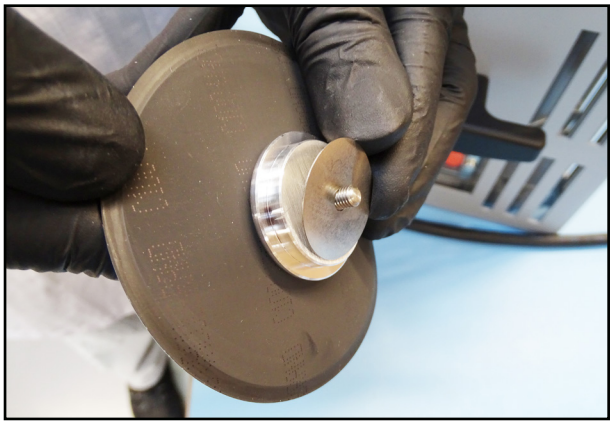


17. Pay attention to the shims under the support disc.

⇨ Ensure that no shims fall into the pump enclosure.



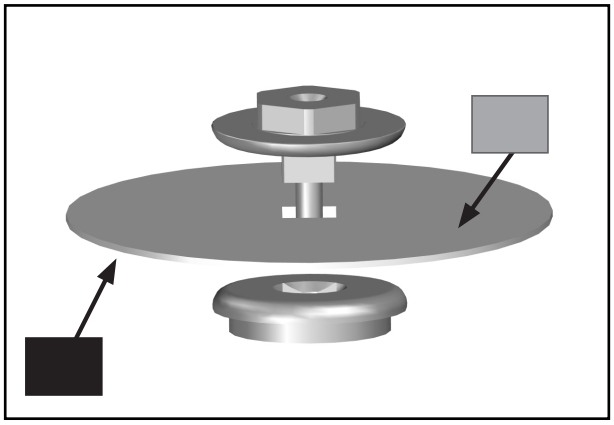
18. Loosen the diaphragm clamping disc on the safety diaphragm.
19. Remove the diaphragm clamping disc with the diaphragm and diaphragm support disc.



20. Pay attention to the shim under the support disc.

⇨ Ensure that no shim falls into the pump enclosure.

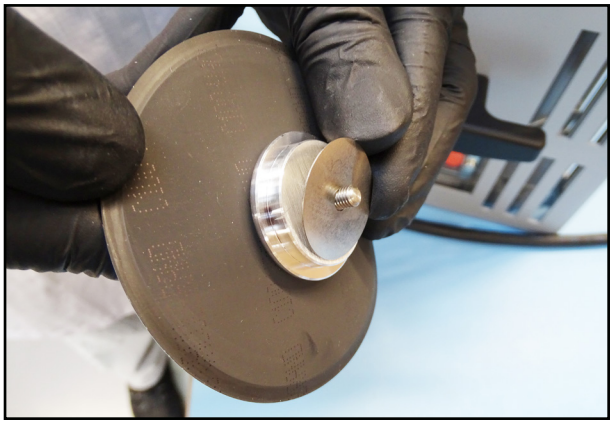
⇨ Before assembly, ensure that all parts are clean, dry, and free of lint.



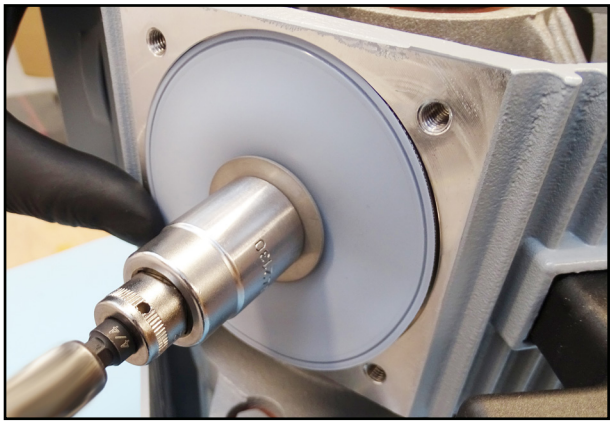
21. Insert the new diaphragm between the diaphragm support disc and the diaphragm clamping disc.

⇨ Ensure that the diaphragm is inserted with the light-colored side facing the clamping disc.

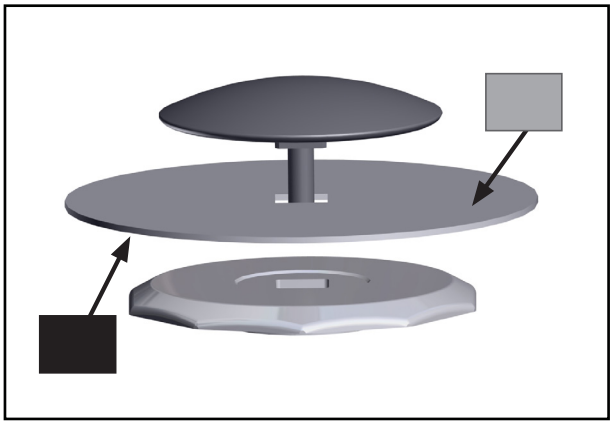
⇨ Ensure that the square connection screw of the diaphragm clamping disc is correctly positioned in the guide of the diaphragm support disc.



22. Insert the shim onto the thread of the clamping disc.



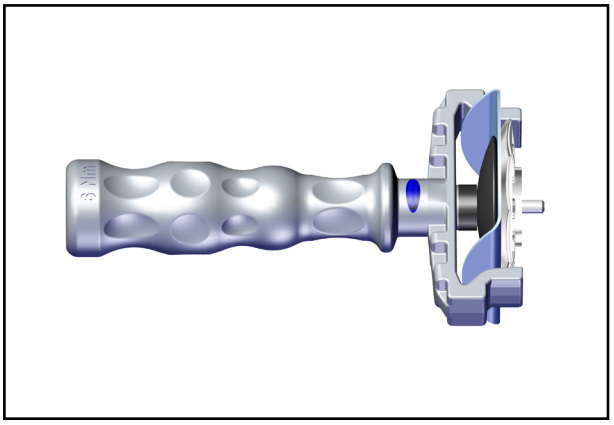
23. Tighten the clamping disc with diaphragm, support disc, and shim with a torque of 6 N·m.



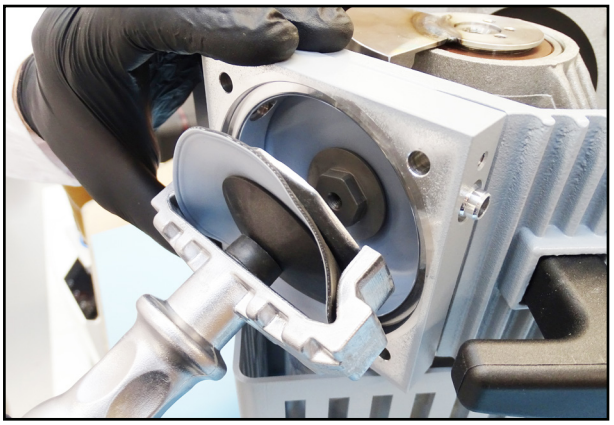
24. Insert the new diaphragm between the diaphragm support disc and the diaphragm clamping disc.

⇨ Ensure that the diaphragm is inserted with the light-colored side facing the clamping disc.

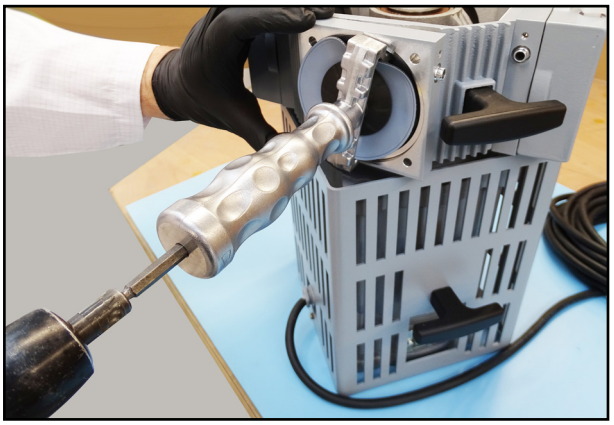
⇨ Ensure that the square connection screw of the diaphragm clamping disc is correctly positioned in the guide of the diaphragm support disc.



25. Lift the diaphragm sideways and insert the clamping disc, diaphragm, support disc, and shims into the diaphragm key.

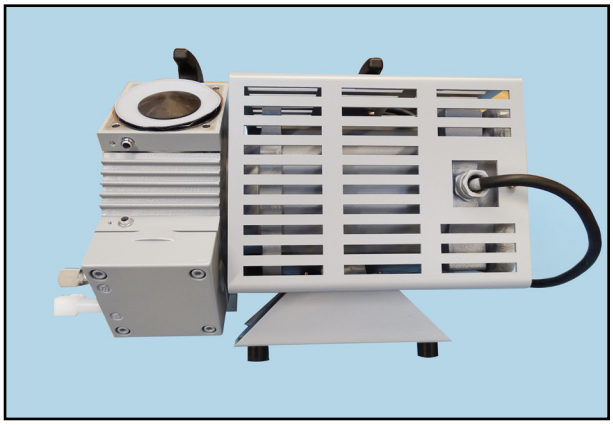


26. Place the intermediate flange on the enclosure.
27. Tighten the clamping disc with the diaphragm, support disc, and shims using the diaphragm wrench.

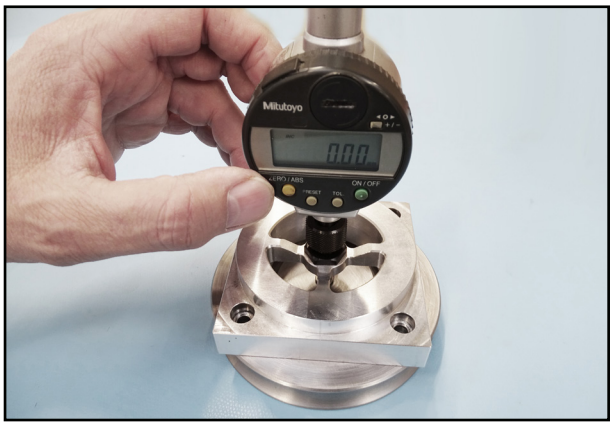


28. Insert a torque wrench into the diaphragm key, and tighten the clamping disc with diaphragm, support disc, and shims to a torque of 6 N·m.

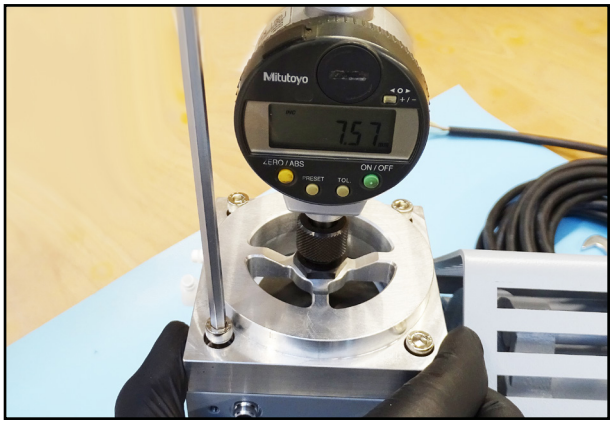
⇨ Never use the diaphragm key with additional tools such as pliers or a hexagon socket wrench without torque limitation.



29. Put the pump down.

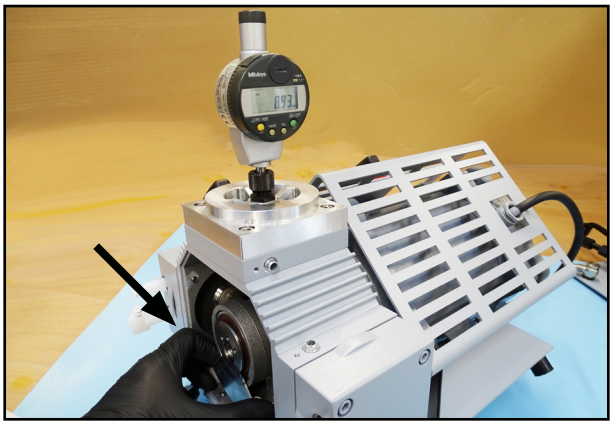


30. Set the dial gauge on the alignment plate to 0.00 mm.



31. Remove the dial gauge frame with the dial gauge from the alignment plate.
32. Place the dial gauge frame with dial gauge on the intermediate flange of the pump head.
33. Lightly attach the dial gauge frame using the screws from the diaphragm head clearance measuring device.

34. Tighten the dial gauge frame with a torque of 12 N·m.



35. Set the top dead center (maximum deflection of the connecting rod) by turning the connecting rod by hand.

⇨ The value displayed for the clamping disc height at top dead center above the enclosure contact surface must be 9.00 mm ±0.10 mm.

Displayed measured value is not within the range of 9.00 mm ± 0.10 mm

⇨ Disassemble the measuring device.

⇨ Remove the intermediate flange.

⇨ Unscrew the working diaphragm with the clamping disc, support disc, and shims.

⇨ Select the appropriate number and thickness of shims.

- If the measured values are too small, the total height of the shims must be increased.
- If the measured values are too high, the total height of the shims must be reduced.

⇨ To determine the thickness of the shims, use a digital caliper gauge that is subject to test equipment monitoring.

⇨ Insert the shims under the support disc onto the connecting screw of the clamping disc.

⇨ Ensure that the diaphragm clamping disc of the safety diaphragm is still tightened to 6 N·m. Check the torque with a torque wrench.

⇨ Place the intermediate flange on the enclosure.

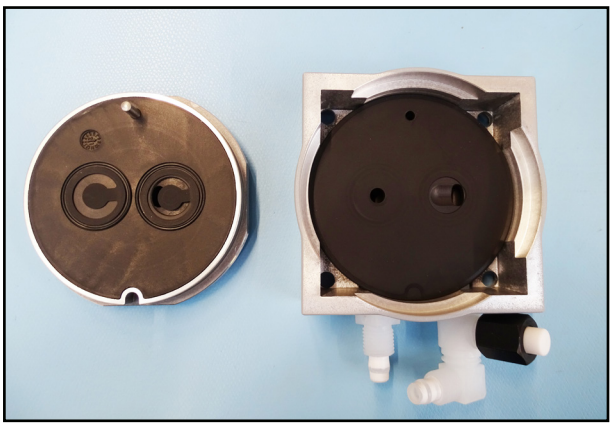
⇨ Mount the working diaphragm with the clamping disc and support disc and with the appropriate number and thickness of shims (torque 6 N·m).

⇨ Set the dial gauge on the alignment plate to 0.00 mm.

⇨ Install the measuring device.

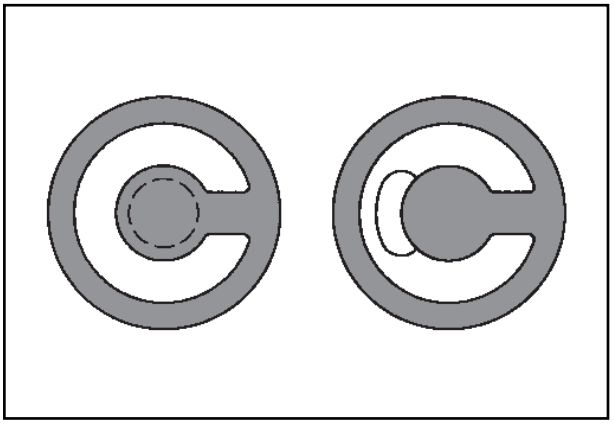
⇨ Measure the top dead center.

Displayed measured value is within the range 9.00 mm ± 0.10 mm



36. Remove the head cover with valves and O-rings from the housing cover insert and the housing cover.

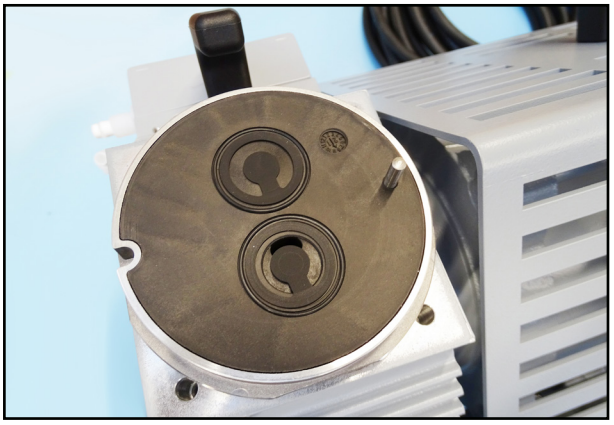
⇨ Before assembly, ensure that all parts, especially the valve seats, are clean, dry, and free of lint.



37. Replace the valves and O-rings.

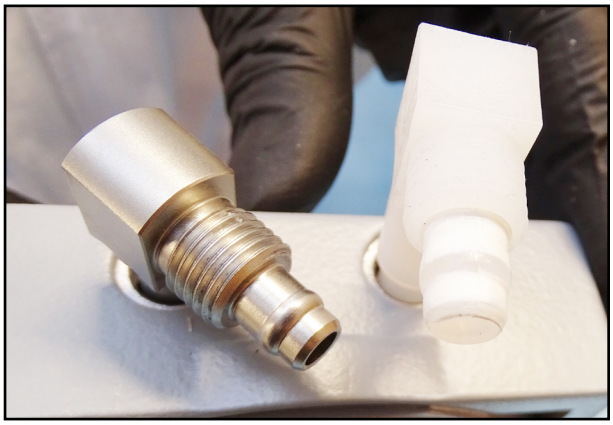
⇨ Ensure that the valves are correctly aligned.

⇨ The outlet side has a round, centric opening below the valve while the inlet side has a kidney-shaped opening next to the valve.

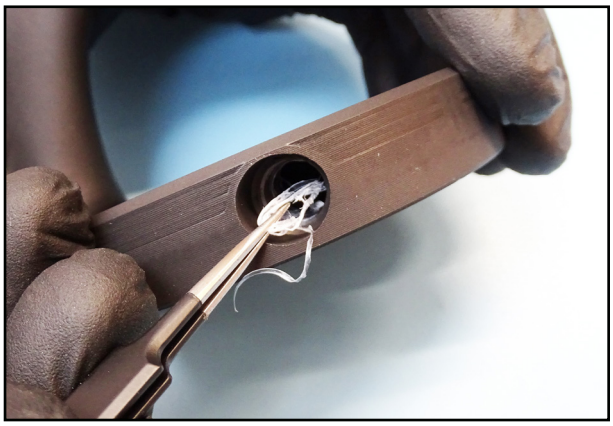


⇨ Ensure that the diaphragm is centered so that it is clamped evenly between the intermediate flange and the head cover.

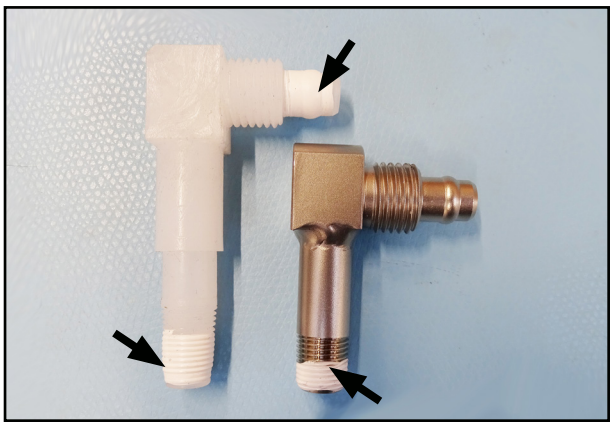
38. Place the head cover with valves and O-rings on the intermediate flange.



39. Unscrew the connectors from the housing cover.



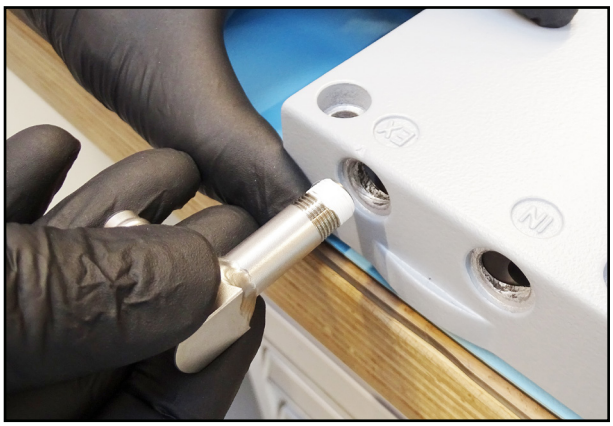
40. Remove the housing cover insert from the housing cover.
41. Remove the remaining thread seal tape from the holes in the housing cover insert.



42. Remove the used thread seal tape, and wrap new thread seal tape around the threads.

IMPORTANT!

⇨ **Be sure to observe the information in the section “Notes on installing connection parts”.**



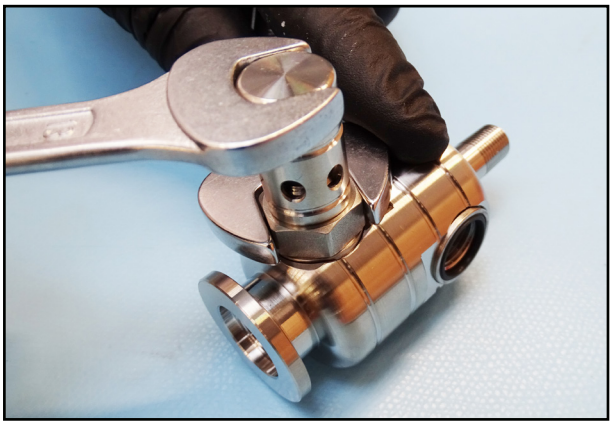
43. Place the housing cover insert into the housing cover.
44. Screw in the metal fitting.

45. Screw in the plastic fitting.

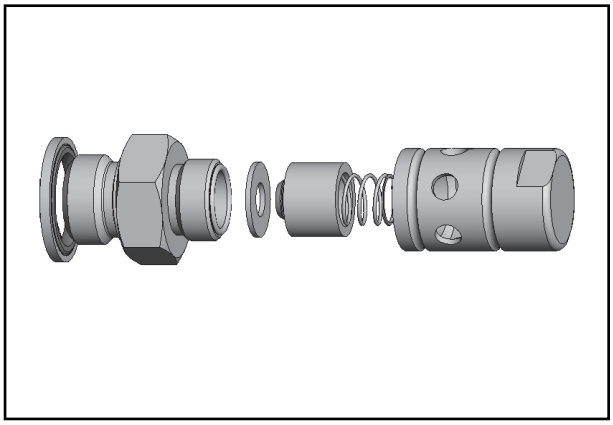
46. Place the housing cover with the housing cover insert on the head cover.
47. Screw the housing cover on lightly.

48. Tighten the housing cover with a torque of 12 N·m.

⇨ **Perform maintenance on all pump heads of the pump.**



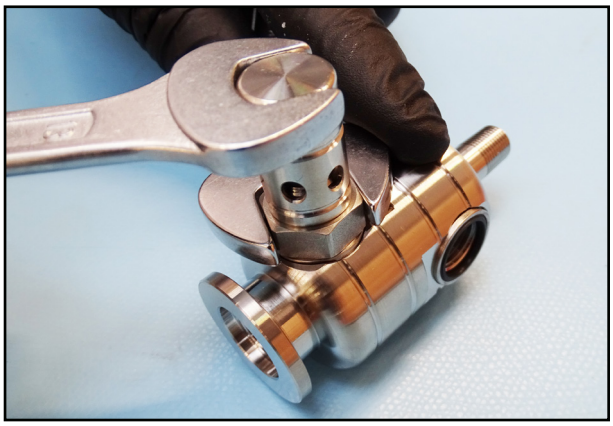
49. Unscrew the pressure relief valve from the outlet block.



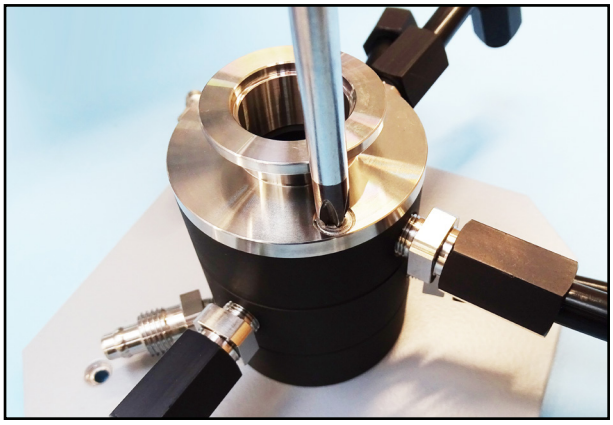
50. Disassemble the pressure relief valve.
51. Check the parts for defects.
52. Replace defective parts.

⇨ We recommend replacing the flat seal and pressure spring of the pressure relief valve.

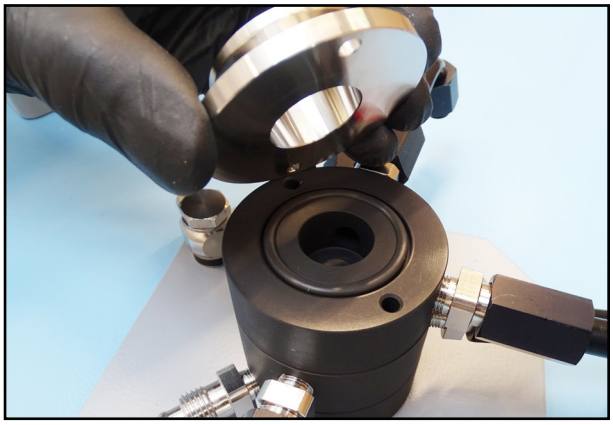
53. Assemble the valve correctly.



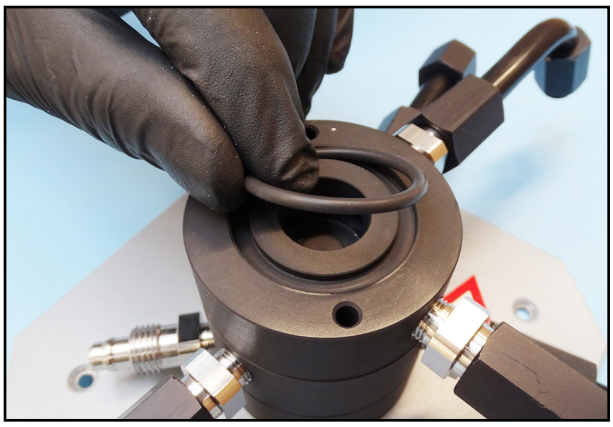
54. Screw the pressure relief valve onto the outlet block.



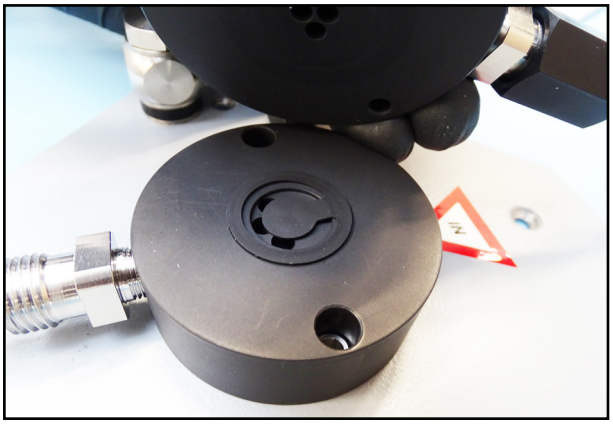
55. Unscrew the flange from the inlet block.



56. Remove the inlet flange.

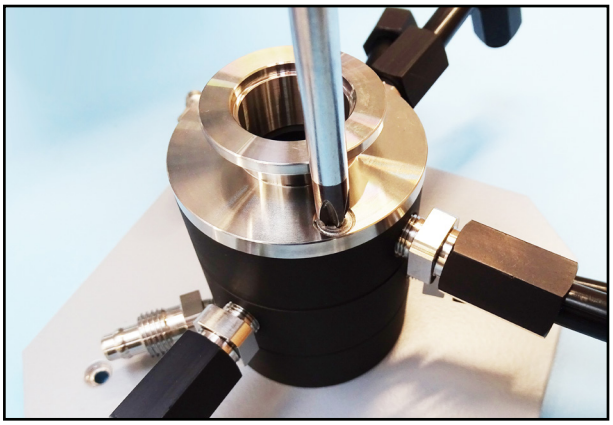


57. Replace the O-ring.

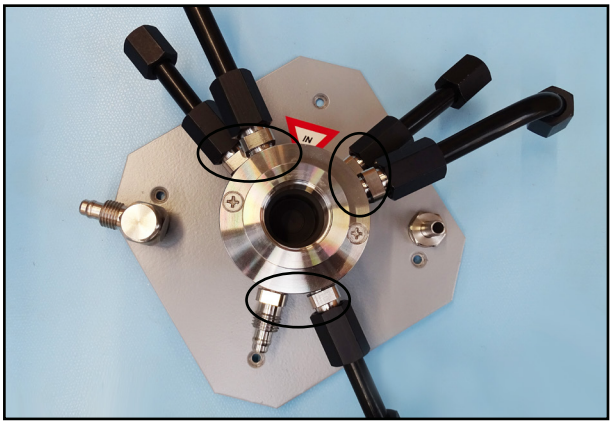


58. Remove the cover plate.
59. Replace the pressure relief valve.

⇨ Ensure that the valve is correctly aligned.



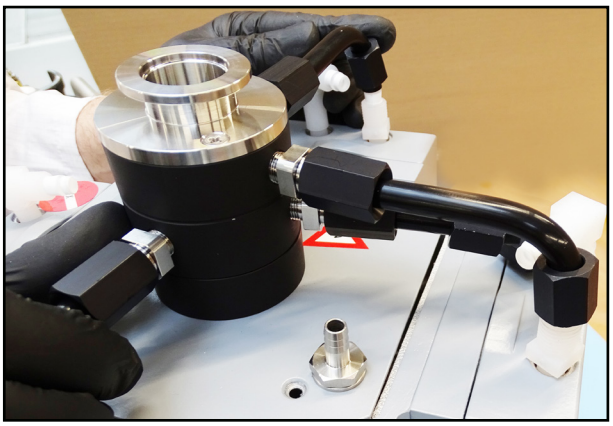
60. Screw the distributor block together.



61. Check all stainless steel fittings on the distributor head.
62. Unscrew the fittings if the hose connection is dirty or loose.
63. Clean dirty parts or replace them.
64. Remove the used thread seal tape, and wrap new thread seal tape around the threads.
65. Screw the fittings back in, and reattach the hoses.

IMPORTANT!

⇨ **Be sure to observe the information in the section “Notes on installing connection parts”.**

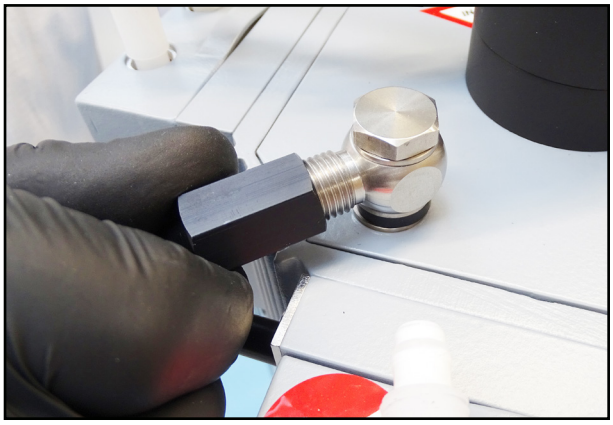


66. Place the housing plate with distributor block and tubing on the pump.

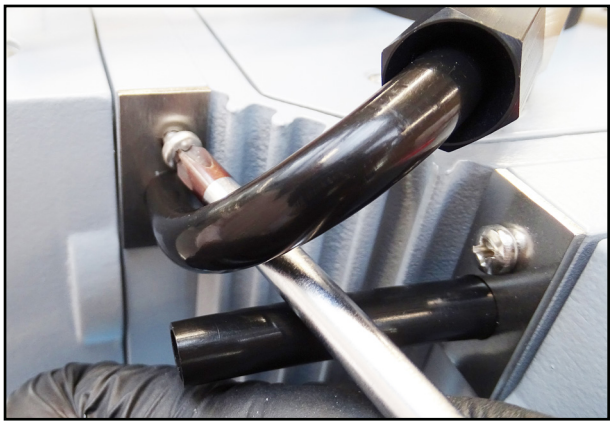
67. Turn the angles into the tubes.

68. Tighten the union nuts by hand.

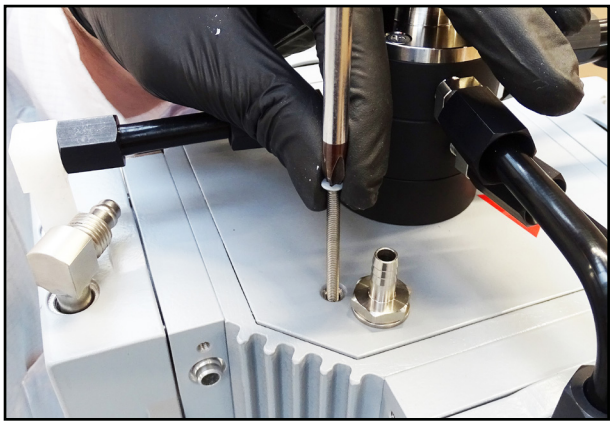
69. Tighten the union nuts with the open-end wrench.



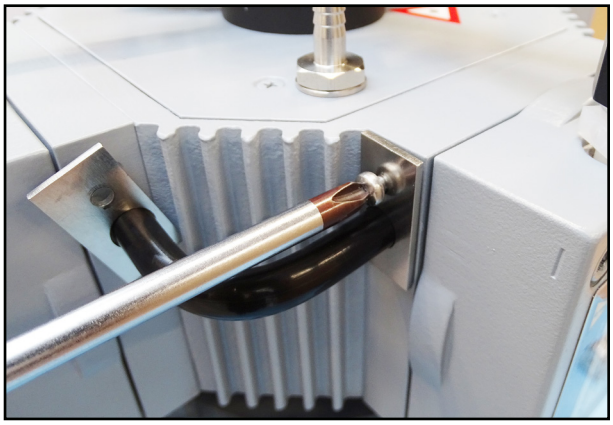
70. Screw the hose between the housing plate and the intermediate flange to the housing plate using the union nut.



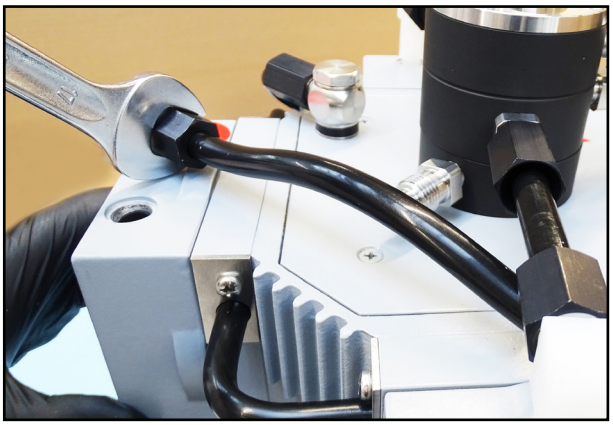
71. Insert the hose into the connection on the intermediate flange, and screw the retaining plate tightly into place.



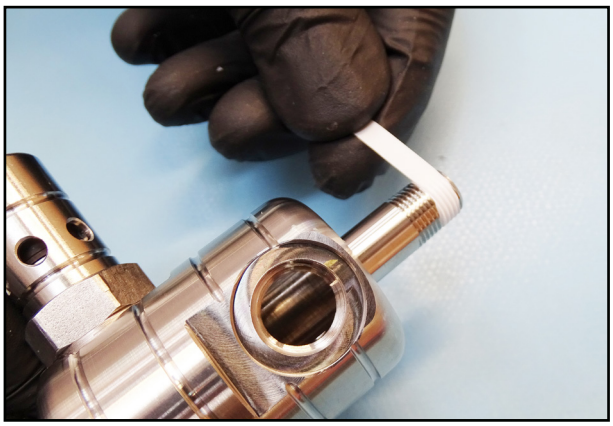
72. Screw the housing plate tightly in place.



73. Connect the inert gas purge hoses to the connections.
74. Screw the hoses tightly in place using the retaining plates.



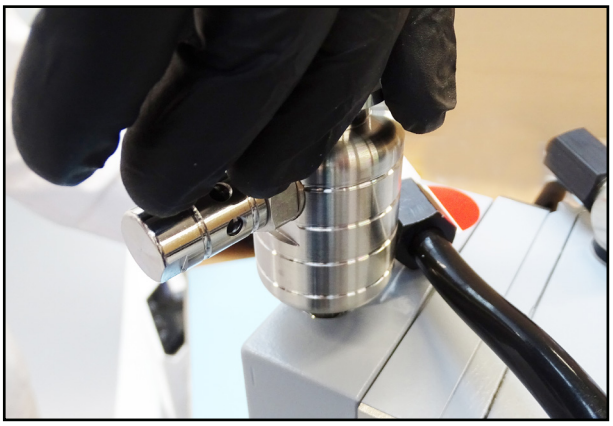
75. Connect the connecting hose between the pump heads.



76. Wrap thread seal tape around the thread of the outlet block.

IMPORTANT!

⇨ **Be sure to observe the information in the section “Notes on installing connection parts”.**



77. Screw in the outlet block.

78. Screw the outlet connection into the outlet block.

79. Screw the connecting hose between the distributor block and the outlet block onto the outlet block.

80. Secure the connection to the distributor block with a wrench to prevent it from turning.
81. Screw the connecting hose between the outlet block and the distributor block onto the distributor block.

DANGER

Risk of electric shock.

Improper repairs may result in electric shock.

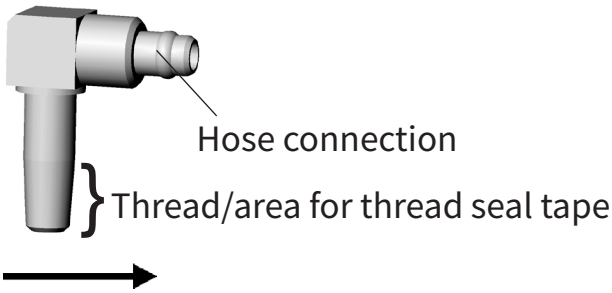
- ⇨ Check the electrical safety of the device after repair in accordance with IEC 61010 and national regulations.
- ⇨ Check the protective conductor resistance.
- ⇨ Check the insulation resistance.
- ⇨ Perform a high voltage test.
- ⇨ Check the leakage current.

5 Notes on installing connection parts

- The threads of the fittings can be sealed with thread seal tape (width 10 mm or 5 mm, thickness 0.1 mm).

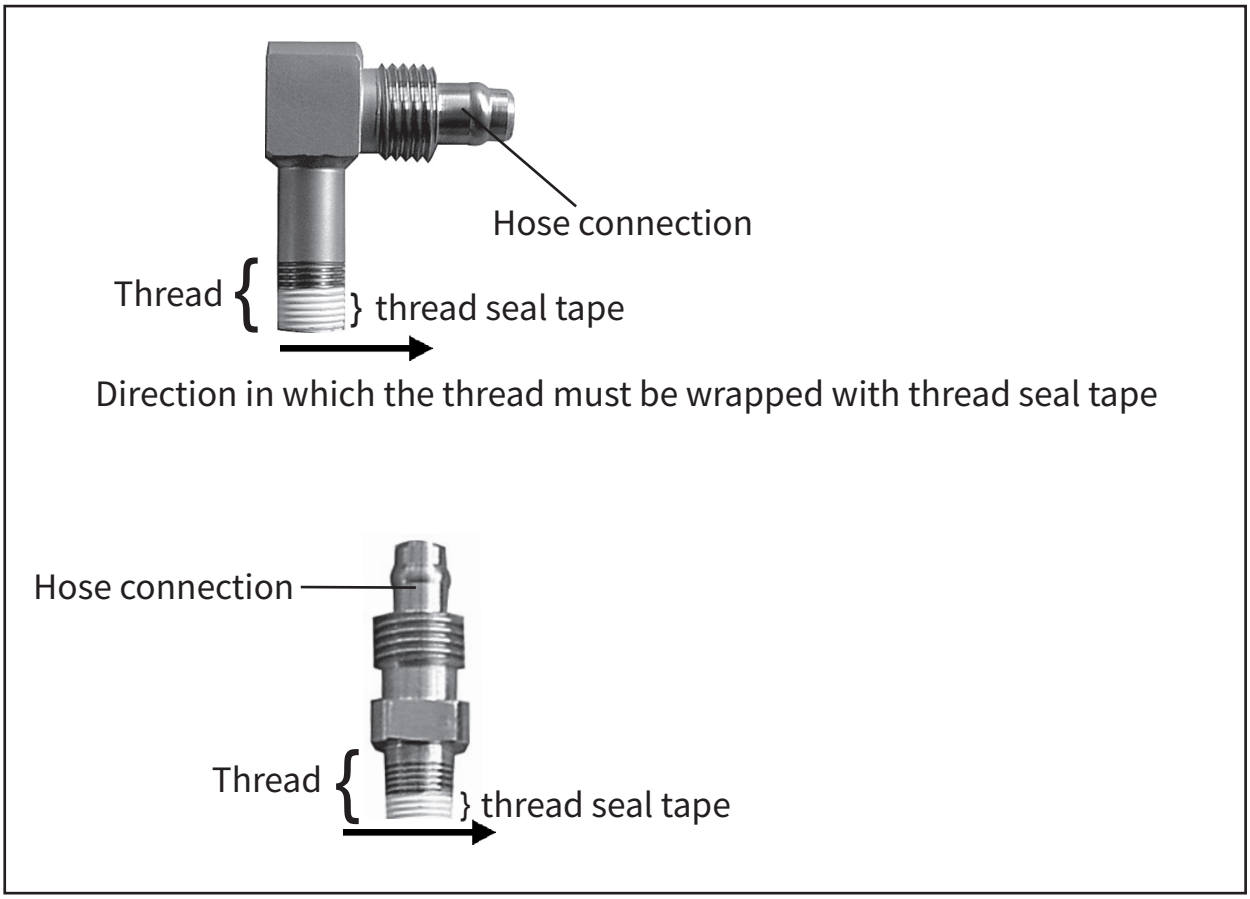
⇨ If the fittings have been turned or unscrewed, use new thread seal tape during assembly.
⇨ Clean the screw fittings to remove any old thread seal tape before reinstalling.
⇨ Remove any remaining thread seal tape from the holes before reinstalling the fittings.
⇨ Wrap the threads of the fittings twice with thread seal tape in the opposite direction of tightening (counterclockwise).
⇨ Firmly tighten the thread seal tape.
⇨ The thread seal tape must be flush with the connection parts.
⇨ Ensure that the thread seal tape does not cover the openings of the fitting.
⇨ Screw in the fittings (clockwise) until only half a thread turn remains visible.
⇨ Do not overtighten the fittings.
⇨ Prevent cross-threading of the threads.

5.1 Illustration of ETFE fitting (example)



Direction in which the thread must be wrapped with thread seal tape

5.2 Illustration of metal fitting (example)



DANGER

Hazard from non-conductive connections

Improperly sealed fittings may result in the conductive connection being interrupted.

- ⇨ Seal only stainless steel fittings in the lower half of the thread with thread seal tape (width 5 mm).
- ⇨ Do not use thread seal tape on the threads of stainless steel hose fittings.

6 Leak test

After maintenance and/or repair, the leak rate of the diaphragm pump must be checked.

⇨ The leak test by measuring the integral leak rate must be carried out using a suitable method.
⇨ The integral leakage rate must be < 0.1 mbar l/s.
⇨ If you have any questions about leak testing, please contact customer service.

DANGER

Hazard from excessive leak rate

If the diaphragm and valve are replaced incorrectly, there is a risk of excessive leakage. Risk of explosion!

⇨ Check the leak rate of the entire pump after each intervention on the device.
⇨ The integral leak rate must be less than 0.1 mbar l/s.

7 Conductivity test

After maintenance and/or repair, the conductivity must be measured on the stainless steel fittings sealed with thread seal tape.

⇨ Use a suitable measuring device for the conductivity test.
⇨ Observe the operating instructions for the measuring device.
⇨ Include the measuring device in the test equipment monitoring.

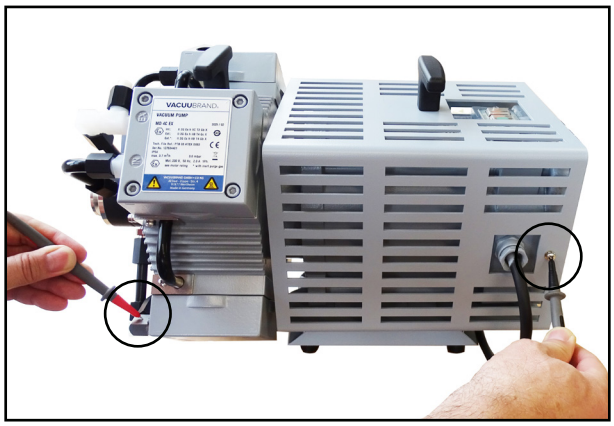
DANGER

Hazard from non-conductive connections

Improperly sealed fittings may result in non-conductive connections. Risk of explosion!

⇨ Check the conductivity of the connections after each intervention on the device.

⇨ The measured resistance must be less than 20 MΩ.



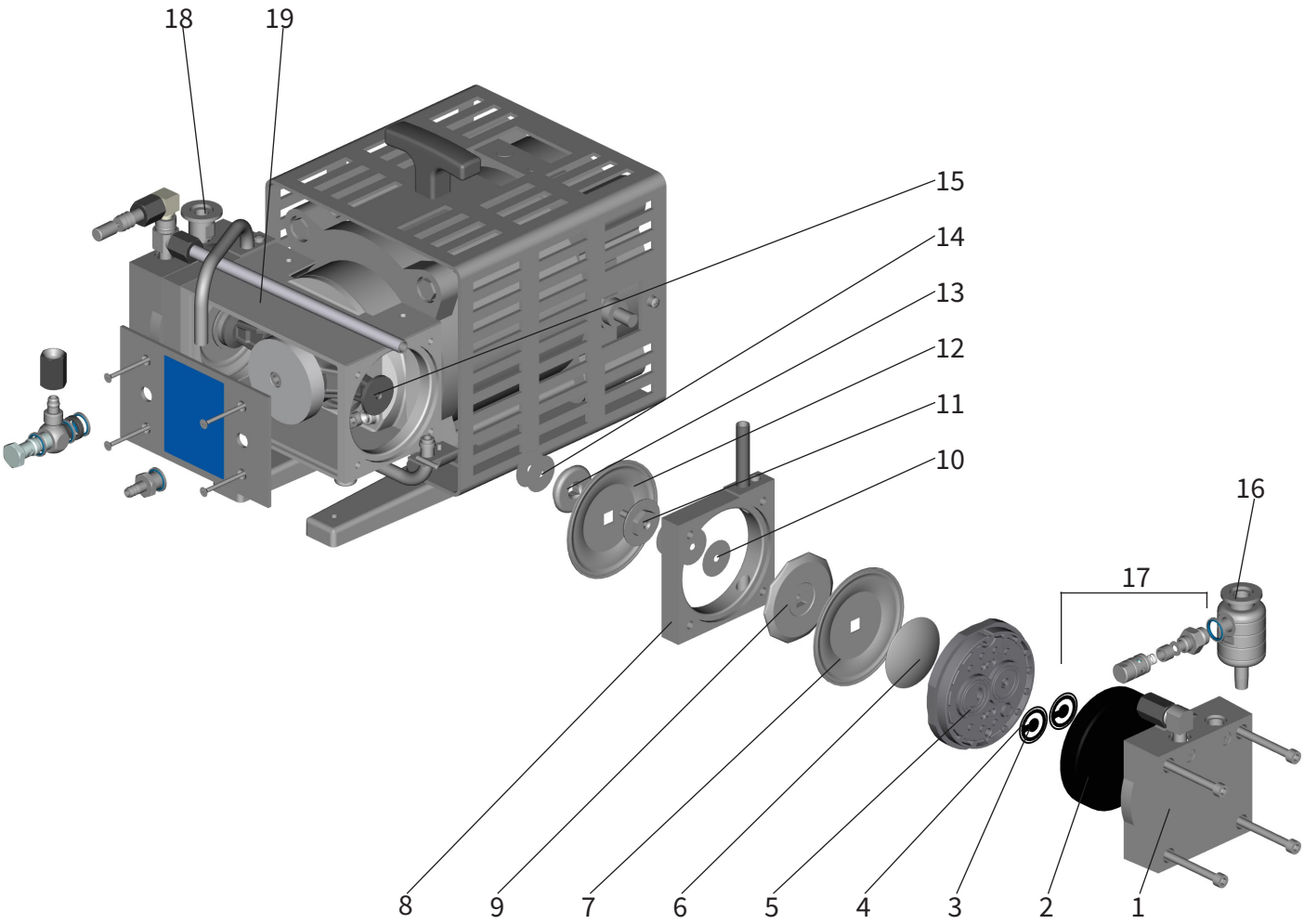
1. Measure the conductivity between the additional potential equalization/connection point for anti-static connection and the metal fittings sealed with thread seal tape on all pump heads and on the distributor block.

⇨ The measured resistance must be < 20 MΩ.

2. If resistance is too high, unscrew the wiring component, apply the thread seal tape correctly, and reinstall the connection part.
3. Repeat the conductivity test.

8 Exploded views

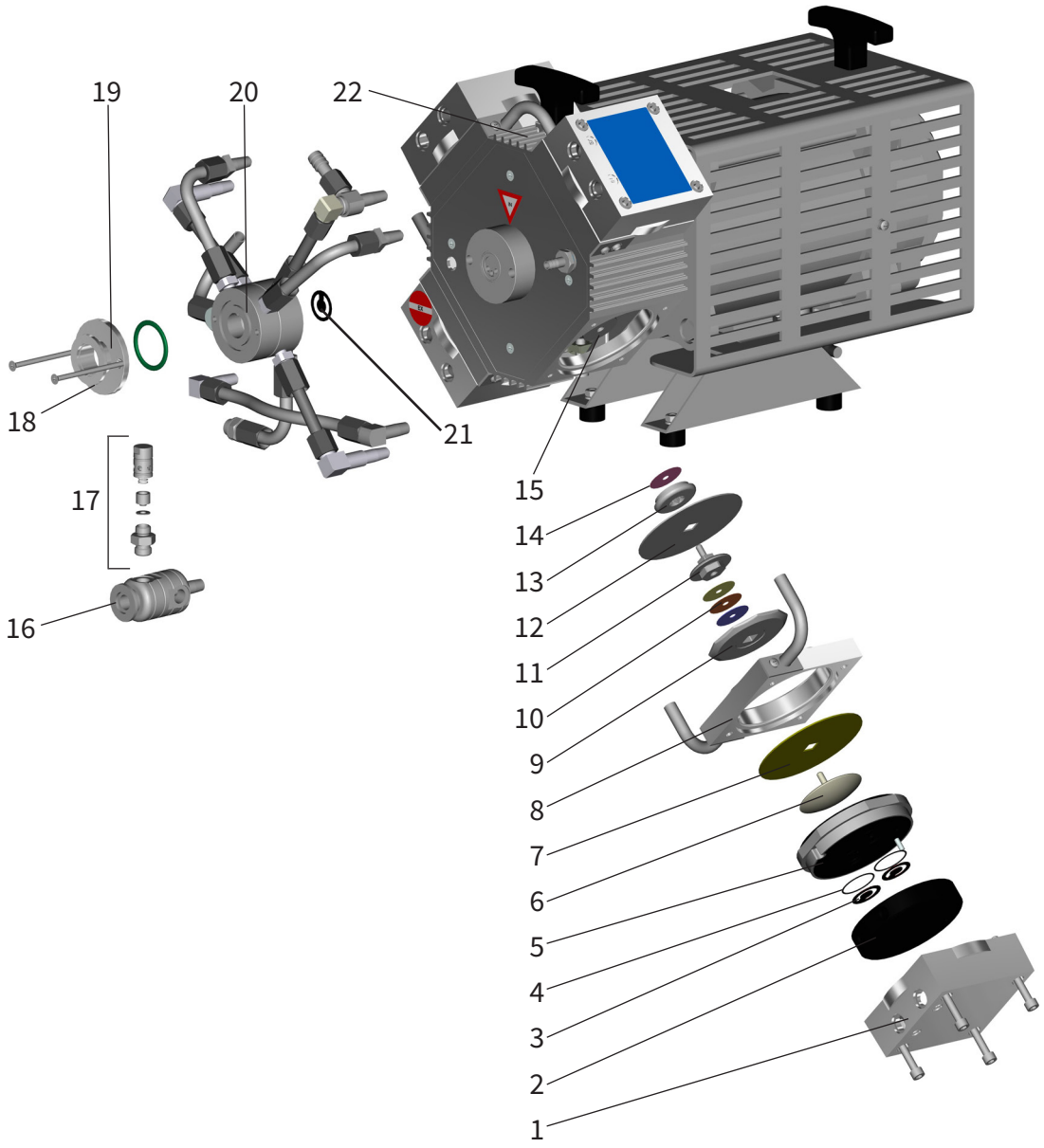
8.1 Exploded view of MZ 2C EX



Position	Name
1	Housing cover
2	Housing cover inside
3	Valve
4	O-ring
5	Head cover
6	Diaphragm clamping disc
7	Working diaphragm
8	Intermediate flange
9	Diaphragm support disc
10	Shims
11	Safety diaphragm clamping disc

Position	Name
12	Safety diaphragm
13	Safety diaphragm support disc
14	Shim
15	Connecting rod
16	Outlet
17	Pressure relief valve
18	Inlet
19	Housing

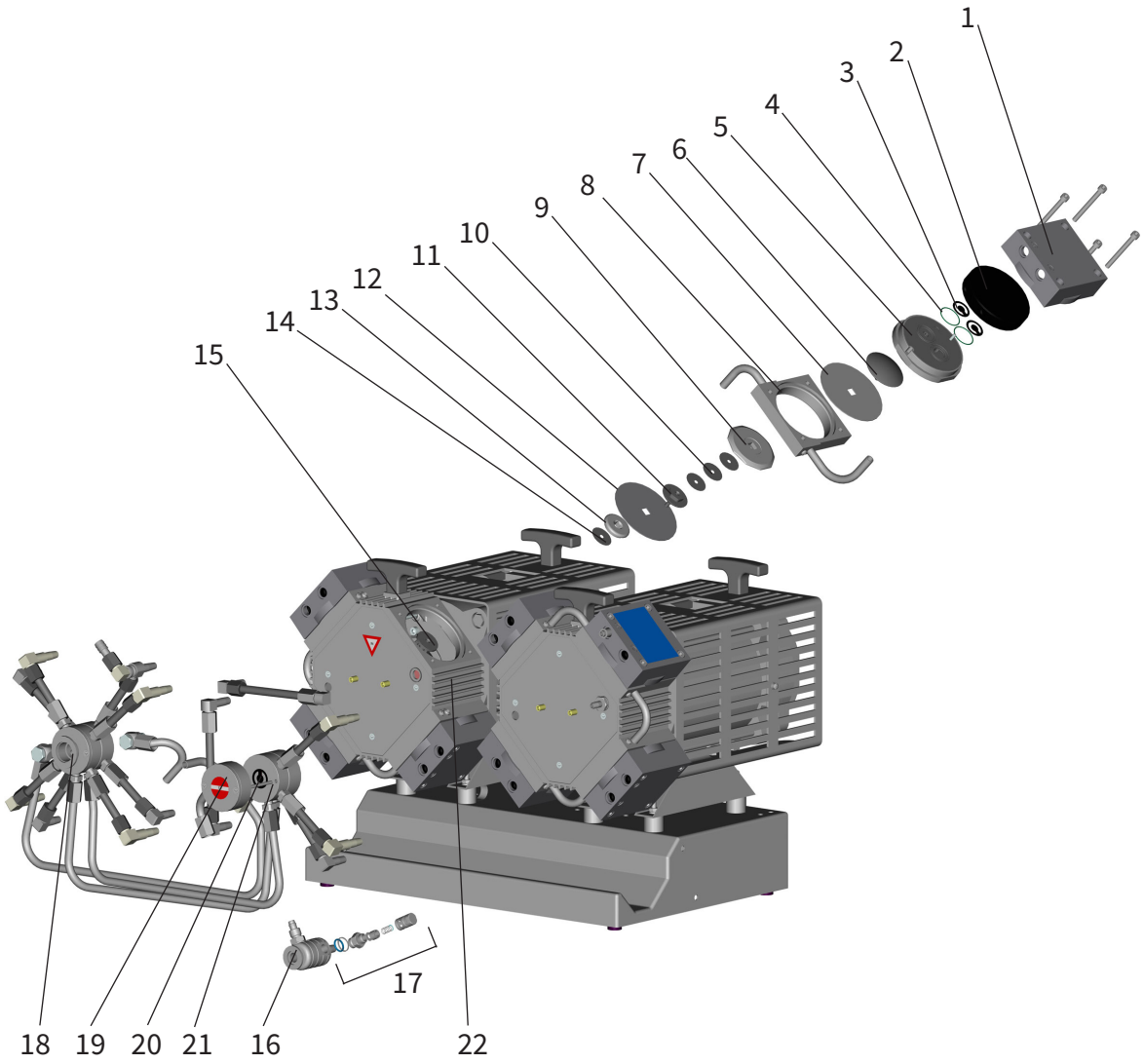
8.2 Exploded view of MD 4C EX/MD 4C EX VARIO



Position	Name
1	Housing cover
2	Housing cover insert
3	Valve
4	O-ring
5	Head cover
6	Diaphragm clamping disc
7	Working diaphragm
8	Intermediate flange
9	Diaphragm support disc
10	Shims
11	Safety diaphragm clamping disc

Position	Name
12	Safety diaphragm
13	Safety diaphragm support disc
14	Shim
15	Connecting rod
16	Outlet
17	Pressure relief valve
18	Inlet
19	Distribution panel
20	Distribution block
21	Internal pressure relief valve
22	Housing

8.3 Exploded view of MV 10C EX/MV 10C EX VARIO



Position	Name
1	Housing cover
2	Housing cover insert
3	Valve
4	O-ring
5	Head cover
6	Diaphragm clamping disc
7	Working diaphragm
8	Intermediate flange
9	Diaphragm support disc
10	Shims
11	Safety diaphragm clamping disc

Position	Name
12	Safety diaphragm
13	Safety diaphragm support disc
14	Shim
15	Connecting rod
16	Outlet
17	Pressure relief valve
18	Inlet
19	Distribution panel
20	Distribution block
21	Internal pressure relief valve
22	Housing

9 Service

Service offer and service range

Take advantage of the comprehensive range of services available from **VACUUBRAND GMBH + CO KG**.

Services in detail

- Product consultation and practical solutions
- Fast delivery of spare parts and accessories
- Professional maintenance
- Immediate repairs processing
- On-site service (on request)
- With Health and Safety Clearance form: return, disposal

⇨ Visit our website for further information: www.vacuubrand.com.

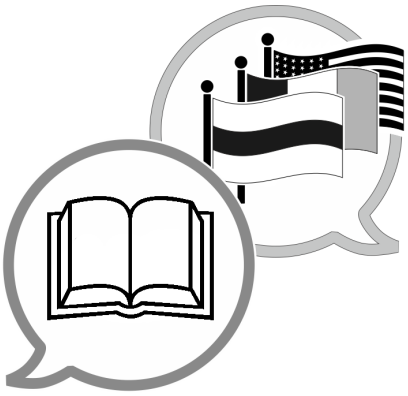
Service handling

Meet terms of service

⇨ Follow the instructions at: www.vacuubrand.com/repair

Reduce downtime, speed up processing. Please keep the required data and documents ready when contacting our Service Department.

- Your order can be quickly and easily processed.
- Hazards can be prevented.
- A brief description and/or photos will help locate the source of the error.



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Manufacturer:

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
GERMANY

Tel.:
Head office: +49 9342 808-0
Sales: +49 9342 808-5550
Service: +49 9342 808-5660

Fax: +49 9342 808-5555
E-mail: info@vacuubrand.com
Web: www.vacuubrand.com

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