VACUUBRAND®

Chemistry diaphragm pump
Chemistry vacuum system
Chemistry pumping unit

ME 2C NT
ME 4C NT
ME 4C NT +2AK
ME 8C NT
ME 8C NT +2AK
MZ 2C NT
MZ 2C NT +2AK
MZ 2C NT +AK+M+D
MZ 2C NT +AK+EK
MZ 2C NT +AK SYNCHRO+EK
MD 4C NT
MD 4C NT +2AK
MD 4C NT +AK+EK
MD 4C NT +AK SYNCHRO+EK
PC 101 NT
PC 201 NT

Instructions for use

Original instructions EN

OI No.: 20901002

Original instructions for use
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.

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*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

These instructions for use is part of your product. The instructions for use applies to all variants of the pumping unit and is intended in particular for laboratory staff.

1.1 User information

Safety

Instructions for use and safety

- Read these instructions for use thoroughly and completely before using the product.
- Keep these instructions for use in an easily accessible location.
- Correct use of the product is essential for safe operation. Observe all safety information
- In addition to these instructions for use, adhere to the accident prevention regulations and industrial safety regulations applicable in the country of use.

General

General information

- For ease of reading, in place of the product names ***Mx xC NT Chemistry Diaphragm Pump*** or ***PC x01 NT Chemistry Pumping Unit***, the general terms ***diaphragm pump***, ***vacuum pump***, ***pumping unit***, and ***pump*** are used.
- If passing the product on to a third party, also give them this instructions for use.
- The figures and drawings are examples and are intended only to assist in comprehension.
- We reserve the right to make technical changes in the course of continuous product improvement.

Copyright

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Contact

Contact us

- Additional languages for the instructions for use are available on our download portal: www.vacuubrand.com
- If your instructions for use is incomplete, you can request a replacement. You can also use our download portal.
- You are welcome to contact us at any time in writing or by telephone if you would like more information, have questions about our products or wish to share feedback with us.
- When contacting our Service Department, please have the serial number and product type at hand → *see **Rating plate** on the product.*

1.2 About this manual

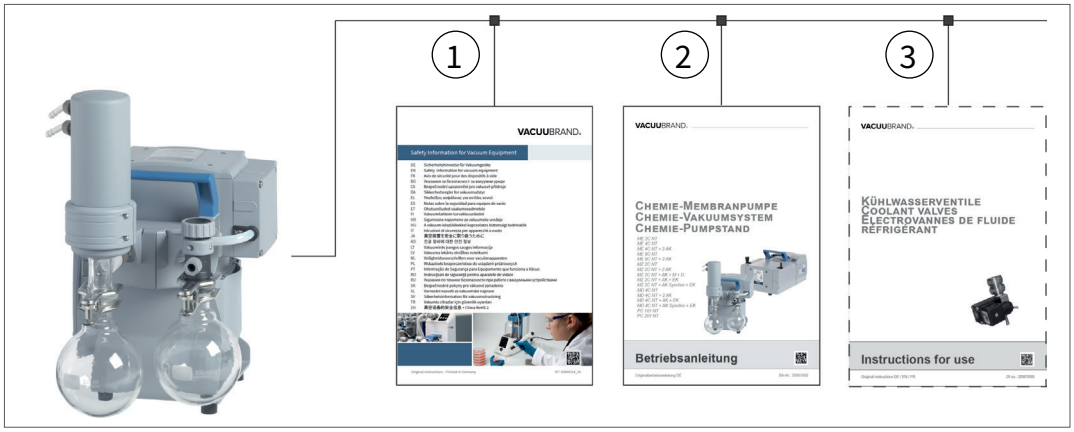
1.2.1 Layout of instructions for use

Modular instructions for use

The instructions for use has a modular structure with separate instruction modules for the vacuum pump and any accessories.

Instruction modules

Pump series and instructions for use



1	Safety information for vacuums
2	Description: Vacuum pump – connection, operation, maintenance
3	Optional description: Accessories

1.2.2 Display conventions

Warning messages

Display conventions

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.

Failure to comply may result in minor injuries or property damage.

⇨ Take appropriate action to avoid dangerous situations!

NOTE

Reference to a potentially harmful situation.

Non-observance may result in material damage.

Additional instructions

IMPORTANT!

⇨ Description that you must adhere to when performing actions.

⇨ Important information for the proper operation of your product.

⇨ Tips + tricks

⇨ Helpful information

1.2.3 Symbols and pictograms

These instructions for use uses symbols and icons. Safety symbols indicate specific risks associated with handling the product. Symbols and pictograms are designed to help you identify risks more easily.

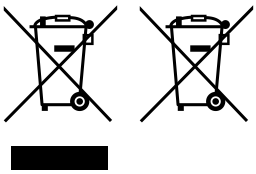
Safety symbols

Explanation of safety symbols

	Hazardous substance - hazards to human health.		General prohibition symbol.
	General warning sign.		Danger: hot surface.
	Danger: electricity.		
	General mandatory sign.		Disconnect power plug.
	Wear protective gloves.		Wear protective goggles.

Additional symbols and pictograms

Additional symbols

	Refers to content in other supplementary documents.		Ensure sufficient air circulation.
	Electric/electronic devices must not be disposed of in domestic waste at the end of their service life.		

1.2.4 Handling instructions (action steps)

Action instructions (easy)

Display of operating steps

⇨ You are requested to take action.

☑ Result of the action

Action instructions (multiple steps)

1. First action step
2. Next step

☑ Result of the action

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

1.2.5 Abbreviations

Abbreviations

abs.	Absolute
AK	Separator flask
ATM	Atmospheric pressure
D	Flow control diaphragm (e.g., at the inlet of the MZ 2C NT + AK +M + D)
d_i (di)	Inside diameter
DN	Diameter nominal
ECTFE	Ethylene chlorotrifluoroethylene
EK	Emission condenser
ETFE	Ethylene/tetrafluoroethylene
EX*	Outlet (exhaust, exit), exhaust gas connection
Ex	ATEX device marking
FFKM	Perfluoroelastomer
FPM	Fluoropolymer rubber
GB	Gas ballast
IN*	Inlet, vacuum connection
M	Pressure gauge (at the inlet of the MZ 2C NT + AK +M + D)
max.	Maximum
PBT	Polybutylene terephthalate
PC	Chemistry pumping unit

PET	Polybutylene terephthalate
PP	Polypropylene
PPS	Polyphenylene sulphide
PTFE	Polytetrafluorethylene
SW	Wrench size (tool)

** Labeling on vacuum pump or component*

1.2.6 Term definitions

Product-specific terms

Separator flask	Glass flask/separator installed at the inlet or outlet.
Flow control diaphragm	Manual control valve for regulating gas flow.
Emission condenser	Cooling condenser with collecting flask mounted at the outlet (pressure side); suitable only for condensing vapors.
Gas ballast	An external gas supply ensures that vapors do not condense in the vacuum pump but rather are expelled from it.
SYNCHRO	Two vacuum connections at the inlet of the vacuum pump separately adjustable via flow control diaphragms.

2 Safety information

The information in this chapter must be observed by all persons who work with the device described here.

The safety information is valid for the complete life cycle of the product.

2.1 Usage

The device may be used only in perfect technical condition. The device may be put into operation only if these instructions for use has been understood or if a technically correct translation of the instructions for use is available.

2.1.1 Intended use

Intended use

A chemistry diaphragm pump from the ***Mx xC NT*** product line or a chemistry pumping unit ***PC x01 NT*** is a vacuum pump used to generate rough vacuum in systems designed for that purpose (e.g., for vacuum drying).

An emission condenser is intended exclusively for the condensation of vapors and the collection of liquids.

The vacuum pump may be used only indoors and only in a non-explosive, dry environment.

Intended use also includes:

- **following the instructions in the document Safety information for vacuum devices**

- observing the instructions for use
- observing the instructions for use of the connected components
- following the instructions for correct vacuum connection; → *see Section: 4.3 Connection on page 45*
- operating the vacuum pump only within its operating limits; → *see Section: Observe limitation of use on page 44*
- always ensuring a sufficient supply of fresh air for cooling, especially if the vacuum pump is installed in a cabinet or enclosure, and providing external forced ventilation if necessary
- maintaining the maximum permissible gas temperature at the inlet

- observing the inspection and maintenance intervals and having inspections and maintenance carried out by qualified personnel
- regularly replacing wear parts
- using only **VACUUBRAND** original parts and original accessories/approved accessories or original replacement parts The validity of the CE mark and certification for the USA/Canada (see rating plate) may expire if original parts are not used. The function and safety as well as the electromagnetic compatibility of the device may be impaired if non-original parts are used.

Any other use is considered improper use.

2.1.2 Improper use

Improper use

Improper use or any use that does not correspond with the technical data can lead to personal or material damage.

Improper use includes:

- use that contradicts the proper use
- use of the product in non-commercial environments unless the necessary protective measures and precautions have been taken by the company
- operation in impermissible ambient and operating conditions
- operation despite obvious faults or defective safety devices
- operation in the event of damage or defect
- unauthorized extensions or conversions, in particular when these impair safety
- the use of unauthorized accessories
- the use of unauthorized replacement parts
- use despite incomplete assembly
- operation by insufficiently trained or qualified personnel
- switching on/off with tools or one's foot
- operation with sharp-edged objects
- pulling of plug-in connections on the cable out of the socket
- the aspiration, conveying, or compression of solids or fluids.

2.1.3 Foreseeable misuse

Foreseeable misuse

In addition to improper use, certain types of use are prohibited when handling the product:

Forbidden types of use are primarily:

- use on humans or animals
- use in non-vacuum-resistant equipment or containers
- installation and operation in potentially explosive atmospheres
- use in mines or underground
- use of the product to generate pressure
- fully exposing vacuum equipment to the vacuum
- Immersion of vacuum devices in liquids or exposure to splashing water
- the conveyance of oxidizing and pyrophoric gases, liquids, or solids
- the conveyance of media that is hot, unstable, potentially explosive or explosive
- the conveyance of self-igniting substances
- the conveyance of substances that are flammable without air supply
- the conveyance of substances that may react explosively under impact and/or elevated temperature without an air supply
- the conveyance of substances that can form deposits in the vacuum pump
- the conveyance of liquids and solids
- operation with the pump outlet closed.

IMPORTANT! **The user must prevent the penetration of foreign bodies, hot gases, and flames.**

2.2 Obligations

2.2.1 Operator obligations

Operator obligations

The operator defines the responsibilities and ensures that only trained or qualified personnel work on the vacuum system. This applies in particular to connection, assembly and maintenance work, and troubleshooting.

Users of the competence areas listed in the ***Responsibility matrix*** must have the appropriate qualifications for the listed activity. In particular work on electrical equipment must be performed only by qualified electricians.

2.2.2 Personnel obligations

Personnel obligations

In the case of activities that require protective clothing, personal protective equipment specified by the operator must be worn.

If the vacuum system is not in proper working order, secure it against accidental restarting.

⇨ Always be conscious of safety and work in a safe manner.

⇨ Observe instructions issued by the operator, and national regulations on accident prevention and industrial safety.

The way individuals act can help to prevent accidents at work.

2.3 Target group description

Target groups

The instructions for use must be read and observed by every person who is tasked with the activities described below.

Personnel qualification

Qualification description

Operator [1]	Laboratory staff (e.g., chemists, laboratory technicians)
Specialist [2]	Person with professional qualification in mechanics, electrical equipment or laboratory devices
Responsible specialist [3]	Person such as specialist only with additional specialist, departmental, or divisional responsibility

Responsibility matrix

Responsibility matrix

Task	Operator	Specialist	Responsible specialist
Installation	x	x	x
Initial operation	x	x	x
Operation	x	x	x
Error report	x	x	x
Troubleshooting	*(x)*	x	x
Maintenance		x	x
Repair[1]		x	x
Repair order			x
Cleaning, simple	x	x	x
Shutdown	x	x	x
Decontamination[2]		x	x

1 See also homepage:
VACUUBRAND > Service > Repair instructions

2 Alternatively, arrange for decontamination by a qualified service provider

2.4 General safety information

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.

2.4.1 Protective clothing

Protective clothing

Special protective clothing is not required for operation of the vacuum pump. Follow the operator's instructions for your workplace.

For cleaning, maintenance, and repair work, we recommend wearing fully adequate protective gloves, clothing, and glasses.

IMPORTANT!

⇨ Wear your personal protection equipment when handling chemicals.

2.4.2 Safety measures

Safety precautions

⇨ Use your vacuum device only if you have understood the instructions for use and the operation.

⇨ Replace defective components immediately (e.g., broken power cords, defective hoses, or flasks).

⇨ Use only original accessories and components that are designed for the vacuum technology (e.g., vacuum hose, separator, vacuum valve)

⇨ When handling contaminated parts, follow the relevant regulations and safety precautions. This also applies to repair shipments.

IMPORTANT!

Before sending in a repair, please send a completed clearance certificate **form to: Service@vacuubrand.com.**

⇨ Fill out the clearance certificate form in full.

2.4.3 Laboratory and work materials

DANGER

Release of hazardous substances at the outlet.

The outlet of the pump always contains the pumped-out gas or vapors. When operating the vacuum device, hazardous, toxic substances can leak into the ambient air at the outlet.

⇨ Please observe the safety regulations for handling hazardous materials and media.

⇨ Please note that residual process media may pose a danger to people and the environment.

⇨ Mount and use suitable separators, filters or fume hood devices.

Leaks in the tubing or a torn diaphragm can cause pumped substances to escape into the environment, the pump housing, or the motor.

At high suction pressures, because of the high compression of the pump, pumped substances may escape through the gas ballast valve when it is open.

⇨ Prevent the release of hazardous, toxic, explosive, corrosive, health-damaging, or environmentally harmful fluids, gases, or vapors by using suitable laboratory equipment with a fume hood and ventilation control.

DANGER

Occurrence of explosive mixtures in the vacuum pump or at the outlet.

Mechanically generated sparks, hot surfaces, or static electricity can ignite explosive mixtures (e.g., in the event of a diaphragm rupture).

⇨ Prevent explosive mixtures in the pump chamber or at the outlet of the vacuum pump.

⇨ Connect inert gas for ventilation and gas ballast supply.

⇨ Discharge or extract potentially explosive mixtures from the pump outlet in a suitable manner.

⇨ Dilute potentially explosive mixtures at the pump outlet to non-explosive mixtures.

⇨ Dispose of chemicals in accordance with the relevant regulations, taking into account any contamination from substances pumped out.

⇨ Use your personal protective equipment and take precautions to avoid skin contact, inhalation, and possible irritation.

Dangers posed by different substances

Conveyance of different substances

Conveying different substances or media can cause the materials to react with one another.

⇨ Observe the interactions and possible chemical reactions of the pumped media pumped.

⇨ Purge the vacuum pump with ambient air or inert gas before changing the pumped medium. This will remove any residues from the vacuum pump and prevent reactions between the substances or with the materials of the vacuum pump.

2.4.4 Chemical compatibility of materials

⚠	**CAUTION** **Deposits and condensate in the vacuum pump.** Deposits and condensate inside the pump can increase temperatures to the point of exceeding the maximum permissible limits. ⇨ Check the inlet and outlet of the vacuum pump for deposits. ⇨ Regularly check the pump chamber if there is a risk of deposits forming in the vacuum pump. Clean the pump chamber if necessary.

Work materials that leak into the vacuum pump with the gas flow can damage the vacuum pump. Hazardous substances can form deposits in the vacuum pump.

⇨ Protect the inside of the vacuum pump from deposits or humidity (e.g., by using a gas ballast supply).

⇨ Check the compatibility of the pumped substances with the wetted materials of the pumping unit. → *see Chapter: Wetted materials on page 114.*

⇨ Contact us if you have concerns about using your vacuum pump with special work materials or media.

2.4.5 Eliminate sources of danger

Consider mechanical stability

Note mechanical load capacity

Because of the high compression ratio of the pump, the outlet may reach pressures that exceed the mechanical stability of the system.

⇨ Always ensure that the exhaust line is open and free of pressure. To guarantee an unobstructed emission of gases, the outlet must remain unblocked.

⇨ Prevent uncontrolled overpressure caused by a blocked or obstructed pipe system, a clogged exhaust pipe, or condensate.

⇨ Check the pressure relief valve on the emission condenser regularly, and replace it if necessary.

- ⇨ At the gas connections, the connections for inlet ***IN*** and outlet ***EX*** should not be confused.
- ⇨ Be aware of the maximum pressures at the inlet and outlet of the pump as well as the maximum permissible differential pressure between the inlet and outlet in accordance with ***8.1.1 Technical data on page 105***
- ⇨ Observe the maximum permissible overpressure of 0.2 bar (0.02 MPa) when connecting gas or inert gas to the vacuum pump, gas ballast, or venting valve.
- ⇨ The system to be evacuated and all hose connections must be mechanically stable.
- ⇨ Attach coolant hoses to the hose nozzles so that they cannot come loose unintentionally.

Prevent condensate return

Prevent backup in the exhaust gas line

Condensate can damage the pump head. Condensate must not flow back into the outlet ***EX*** or pump head through the hose line. Liquid is not allowed to collect in the exhaust line.

- ⇨ Avoid condensate return by using a separator (accessory). Condensate is not allowed to enter the inner housing through the hose lines.
- ⇨ Lay the exhaust gas hose so that it descends from the outlet (i.e., position it running downward so that no backup forms).
- ⇨ Prevent excess pressure in the suction hose.

Preventing foreign bodies inside the pump

Observe vacuum pump dimensioning

Particles, liquids, and dust may not enter the vacuum pump.

- ⇨ Do not convey any substances that can form deposits inside the vacuum pump.
- ⇨ Install suitable separators and/or filters upstream of the inlet. Suitable filters are chemically resistant, clog-proof and have a reliable flow rate, for example.
- ⇨ Replace porous vacuum hoses promptly.

Dangers during venting

Be aware of risks during venting

Depending on the process, a potentially explosive mixture can form in installations, or other dangerous situations can occur.

⇨ When flammable substances are present, use only inert gas (e.g., nitrogen) for venting (max. 1.2 bar/900 Torr abs.).

Dangers from residual energy

Possible residual energies

After the vacuum pump has been switched off and disconnected from the power supply, there may still be dangers from residual energy:

- Thermal energy: motor waste heat, hot surface, compression heat.

⇨ Allow the vacuum pump to cool down.

- Electrical energy: Motor capacitors have a discharge time of up to 5 s.

⇨ Wait until the condensers have discharged.

⇨ Ensure that the device is disconnected from the power supply before performing any work on it.

Dangers posed by automatic restart

Risks associated with the automatic restart of the vacuum pump ( )

The vacuum pump starts automatically after the power supply has been interrupted and then restored, for example:

- after a power failure,
- after switching the vacuum pump off and on,
- after disconnecting and reconnecting the power plug.

An ongoing process starts automatically when the power supply is disconnected and reconnected.

⇨ Ensure that the automatic restart of the process does not pose any danger to persons or equipment.

⇨ Take appropriate safety precautions (e.g., shut-off valve, relay switch, protection against restart) if an automatic restart of the vacuum pump can lead to a dangerous situation.

Dangers from hot surfaces or overheating

Hot surfaces
Overheating

CAUTION

Risk of burns on hot surfaces.

Depending on the operating and ambient conditions, hot surfaces may pose a hazard.

- ⇨ Eliminate any risk due to hot surfaces.
- ⇨ Use protection against accidental contact if the surface temperature is elevated.
- ⇨ Avoid direct contact with the surface or wear heat-resistant safety gloves if contact cannot be excluded.
- ⇨ Allow the vacuum pump to cool down before performing maintenance tasks.

⇨ Keep power cords away from hot surfaces.

⇨ Keep power cords away from heated surfaces.

Overheating

The vacuum pump can become damaged as a result of overheating. Possible causes include insufficient air supply to the fan, failure to maintain minimum clearances, or ambient temperatures outside the specified operating conditions.

⇨ When installing the device, ensure that there is a minimum distance of 5 cm between the fan and adjacent parts (e.g., housing, walls).

⇨ Always ensure that there is sufficient air supply; if necessary, provide an external forced ventilation system.

⇨ Place the device on a stable surface. A soft surface (e.g., foam as sound absorber) can impair and block the supply of air.

⇨ Clean dirty ventilation slots.

⇨ Remove any covers not belonging to the product from the device before putting it into operation.

⇨ Avoid applying too much heat due to hot process gases.

⇨ Observe the maximum permissible media temperature;
→ *see Section: 8.1.1 Technical data on page 105.*

Ensure that signs are readable

Warning signs and labels

Keep the notices and labels attached to the device in a legible condition:

⇨ Connection labeling
⇨ Warning signs and notice labels
⇨ Motor data and rating plates

2.5 Motor protection

CAUTION

Limited winding protection with supply voltages less than 115 V AC.

With supply voltages less than 115 V AC, the self-locking mechanism of the winding protection can be limited. After cooling, this can cause the pump to start automatically.

⇨ In the event of overheating, switch off the vacuum pump or disconnect the vacuum pump from the power supply in order to prevent automatic restarting.

Overheating protection

The pump motor has a self-locking thermal winding mechanism to protect it against overload. The vacuum pump switches off in the event of excessive temperature.

If the vacuum pump is switched off because of these safety measures, the fault must be reset manually: Disconnect the vacuum pump from the power supply → Eliminate the cause of the fault → Allow the vacuum pump to cool down before switching it back on

2.6 ATEX device category

Installation and explosive environment

Installation and operation in areas where an explosive atmosphere can occur in dangerous quantities is not permitted.

The user is responsible for assessing the hazards for the device so that any protection measures can be implemented for the installation and safe operation.

ATEX approval applies only to the internal, wetted parts of the of the product and not to its surroundings.

ATEX device marking

ATEX equipment category

Vacuum equipment labeled with Ex has ATEX certification in accordance with the ATEX marking on the rating plate.

⇨ Use the product only if it is in perfect working order.

⇨ The devices are designed for a low level of mechanical stress and must be installed in such a way that they cannot sustain mechanical damage from the outside.

Vacuum pumps and measuring devices in Category 3 are designed for connection to equipment in which, during normal operation, an explosive atmosphere caused by gases, vapors, or mists does not normally occur or is likely to occur only briefly and infrequently.

Devices in this category ensure the required level of safety during normal operation.

ATEX equipment category and peripheral equipment

The ATEX equipment category of the product depends on the components and peripheral devices connected. Components and peripheral devices must have the same or higher ATEX classification.

Prevent ignition sources

The use of gas ballast and/or venting valves is permitted only if it is ensured that no explosive mixtures are normally generated in the interior of the device or only for a short time or rarely.

⇨ If necessary, vent with inert gas.

⇨ After work on the device (e.g., repair/maintenance), the ultimate vacuum of the pump must be checked. Only when the specified ultimate vacuum of the pump is reached is a low leak rate of the device ensured, thereby preventing explosive mixtures from forming inside the pump.

Information on the ATEX equipment category is also available on our website at: www.vacuubrand.com/…/Information-ATEX

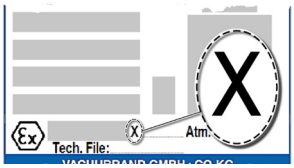
Restrictions on operating conditions

Meaning for devices marked with X:

Explanation of usage/operating conditions X

- The devices have a low mechanical protection and must be installed so that they cannot be mechanically damaged from the outside (e.g., installing pumping units with impact protection, attaching shatter protection for glass flasks because of potential implosion)
- The devices are designed for an ambient and media temperature of 10–40°C during operation. These ambient and media temperatures may never be exceeded. When conveying/measuring non-explosive gases, extended gas suction temperatures apply; see chapter: Technical information, media temperature

Example section rating plate



The user may operate the devices described only if they understand this manual or have a technically accurate translation of the complete manual. The instructions for use must be read and understood in full before the devices are put into operation. The required measures must be complied with or may be replaced by equivalent precautions at your own responsibility.

2.7 Disposal

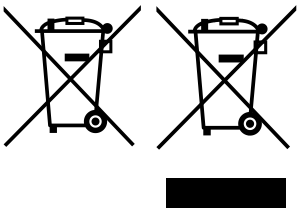
NOTE

Electronic components and batteries may not be disposed of in the domestic waste at the end of their service life.

Used electronic devices and batteries contain harmful substances that can cause damage to the environment or human health. Discarded electronic equipment also contains valuable raw materials, which can be recovered if properly disposed of for recycling.

End users are legally obliged to take used electric and electronic devices to a licensed collection point and to return spent batteries.

- ⇨ It is your responsibility to save and delete any data before disposing of your electronic device.
- ⇨ If the device contains batteries: Remove spent batteries before disposal. You can return them free of charge to an authorized collection point.
- ⇨ Please properly dispose of electrical waste and electronic components at the end of their service life.
- ⇨ Observe the national regulations regarding disposal and environmental protection.



3 Product description

The chemical diaphragm pumps described consist of a diaphragm pump and optional attachments such as a separator flask (AK) or emission condenser (EK). In a further expansion stage, the vacuum at the inlet of the vacuum pump can be regulated using a flow control diaphragm.

3.1 Diaphragm pump series

Mx xC NT chemistry diaphragm pumps

Mx xC NT chemistry diaphragm pumps

Chemistry diaphragm pump	AK	EK	GB	D	Stages
ME 2C NT	-	-	-	-	1
ME 4C NT	-	-	-	-	1
ME 4C NT+2AK	2	-	-	-	1
ME 8C NT	-	-	-	-	1
ME 8C NT +2AK	2	-	-	-	1
MZ 2C NT	-	-	1	-	2
MZ 2C NT +2AK	2	-	1	-	2
MZ 2C NT +AK+M+D	1	-	1	1	2
MZ 2C NT +AK+EK	1	1	1	-	2
MZ 2C NT +AK SYNCHRO+EK	1	1	1	2	2
MD 4C NT	-	-	1	-	3
MD 4C NT +2AK	2	-	1	-	3
MD 4C NT +AK+EK	1	1	1	-	3
MD 4C NT +AK SYNCHRO+EK	1	1	1	2	3
PC 101 NT	1	1	1	1	2
PC 201 NT	1	1	1	1	3

Abbreviations

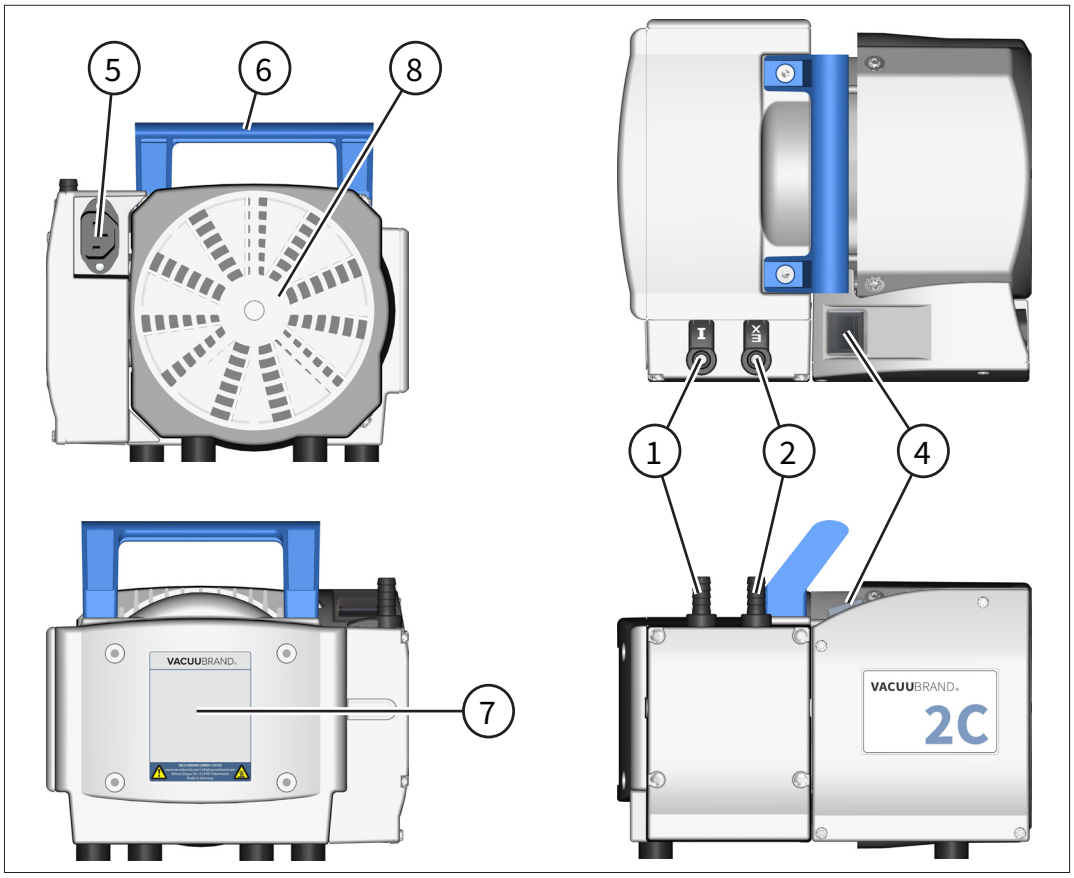
AK	Separator flask
D	Flow control diaphragm
EK	Emission condenser
GB	Gas ballast

3.2 Pump views and designations

Meaning	
1	Inlet (IN, I)
2	Outlet (EX)
3	Gas ballast valve (GB)
4	On/off switch
5	Power connection
6	Carrying handle
7	Pump rating plate
8	Fan
9	Separator/round bottom flask
10	Emission condenser (EK)
11	Pressure relief valve at EK
12	Coolant supply line at the EK
13	Coolant return line at the EK
14	Flow control diaphragm
15	Valve block
16	Manometer
17	Distributor head
18	Blind plate
19	Voltage selector switch

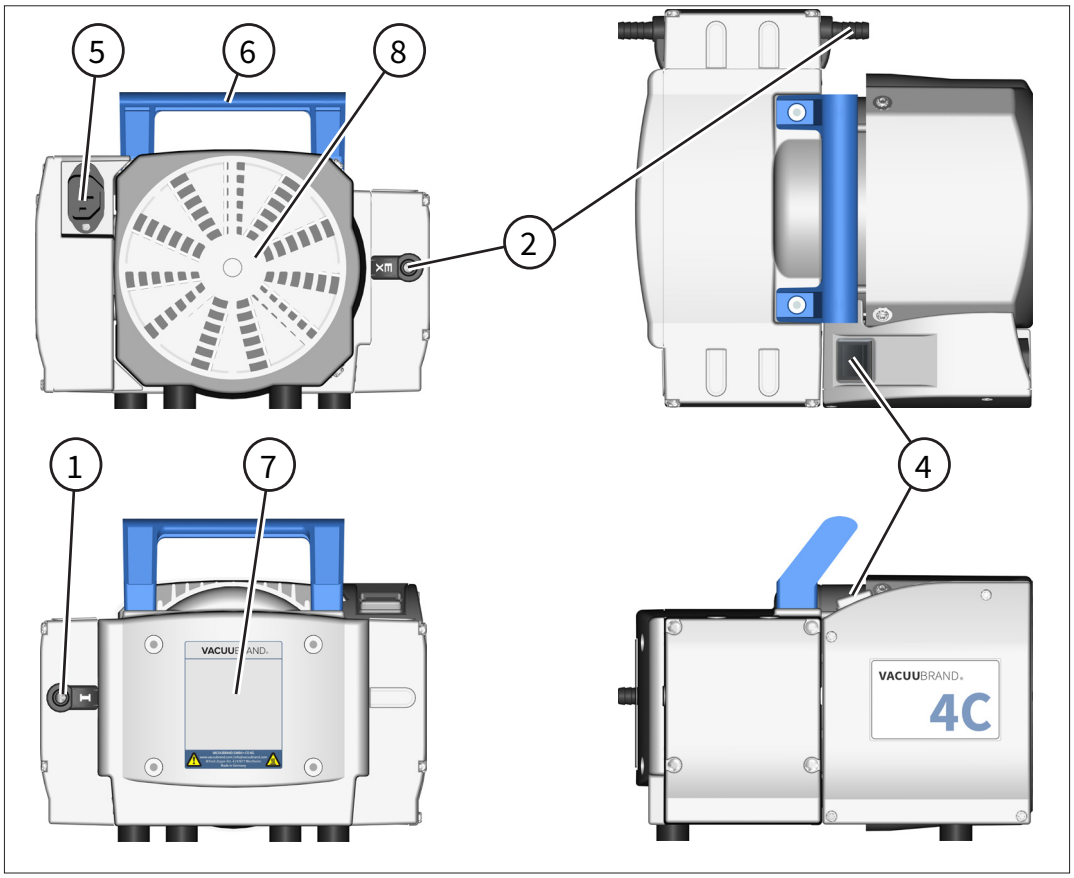
ME 2C NT

Views
ME 2C NT



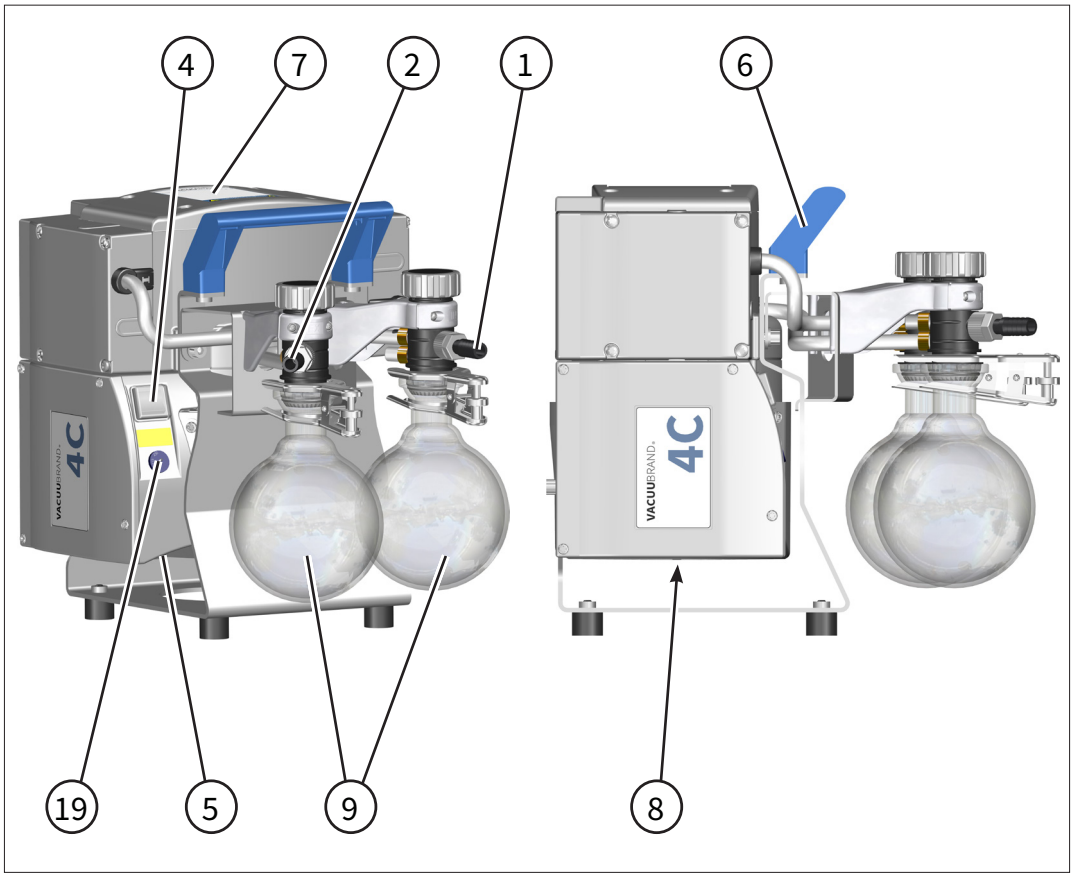
ME 4C NT

Views
ME 4C NT



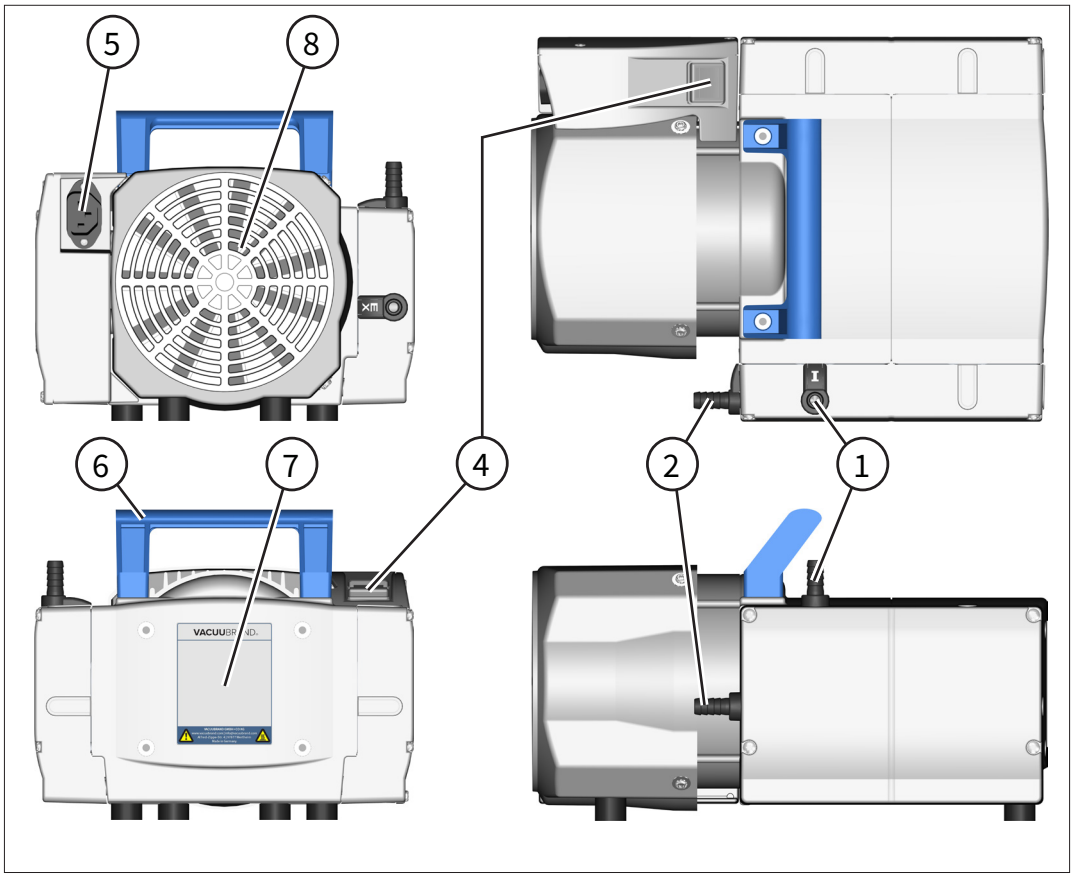
ME 4C NT +2AK

Views
ME 4C NT +2AK



ME 8C NT

Views
ME 8C NT



ME 8C NT +2AK

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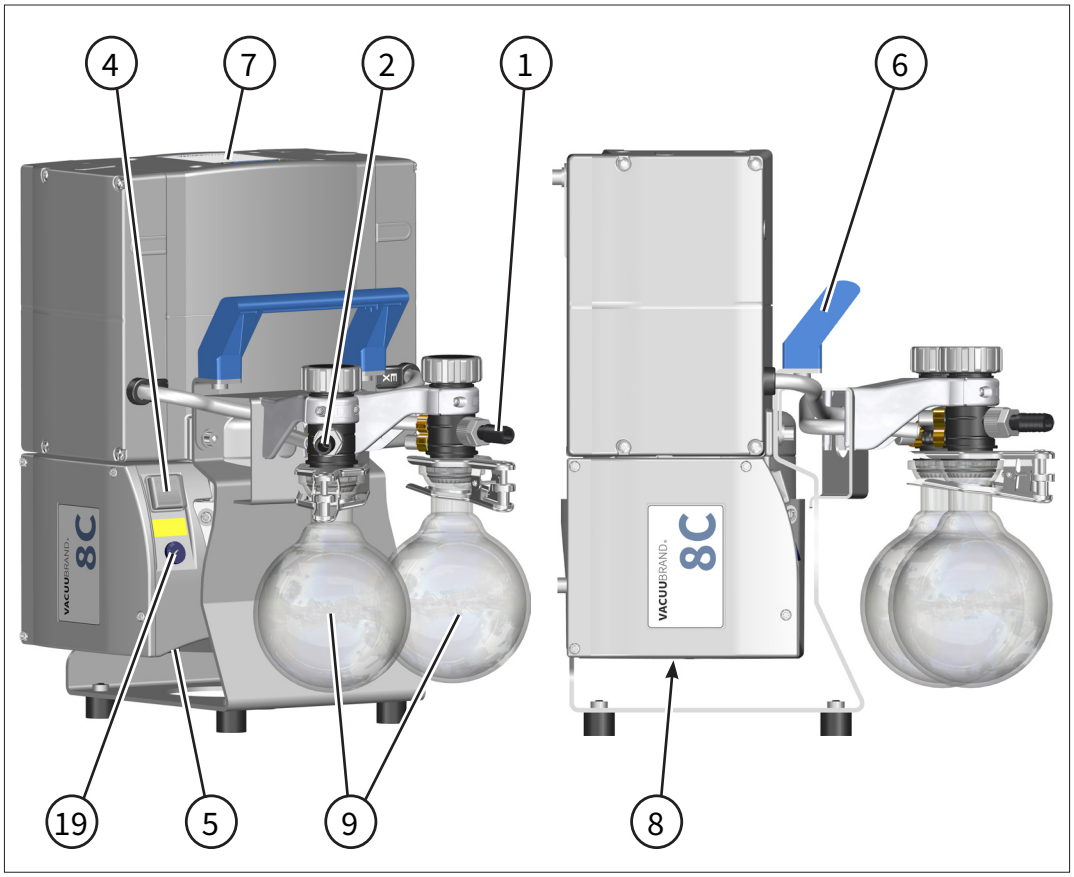
ME 8C NT +2AK



MZ 2C NT

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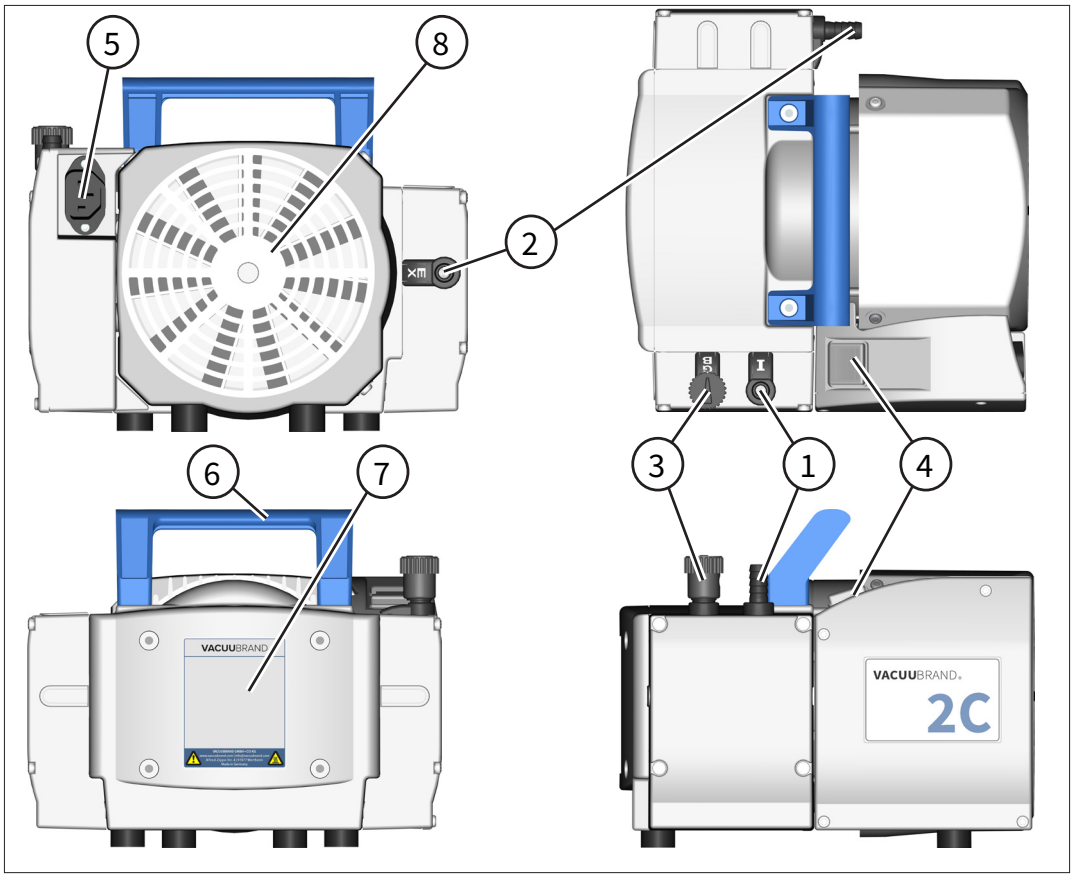

MZ 2C NT KF

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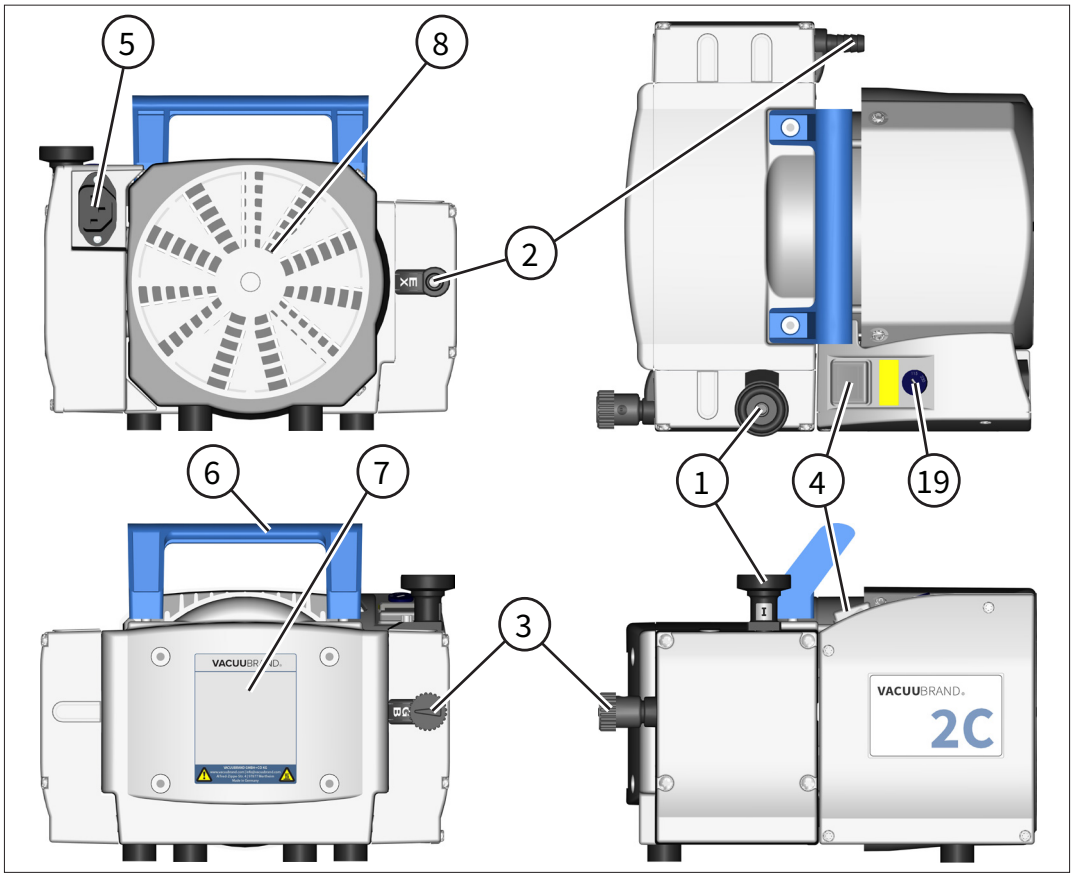

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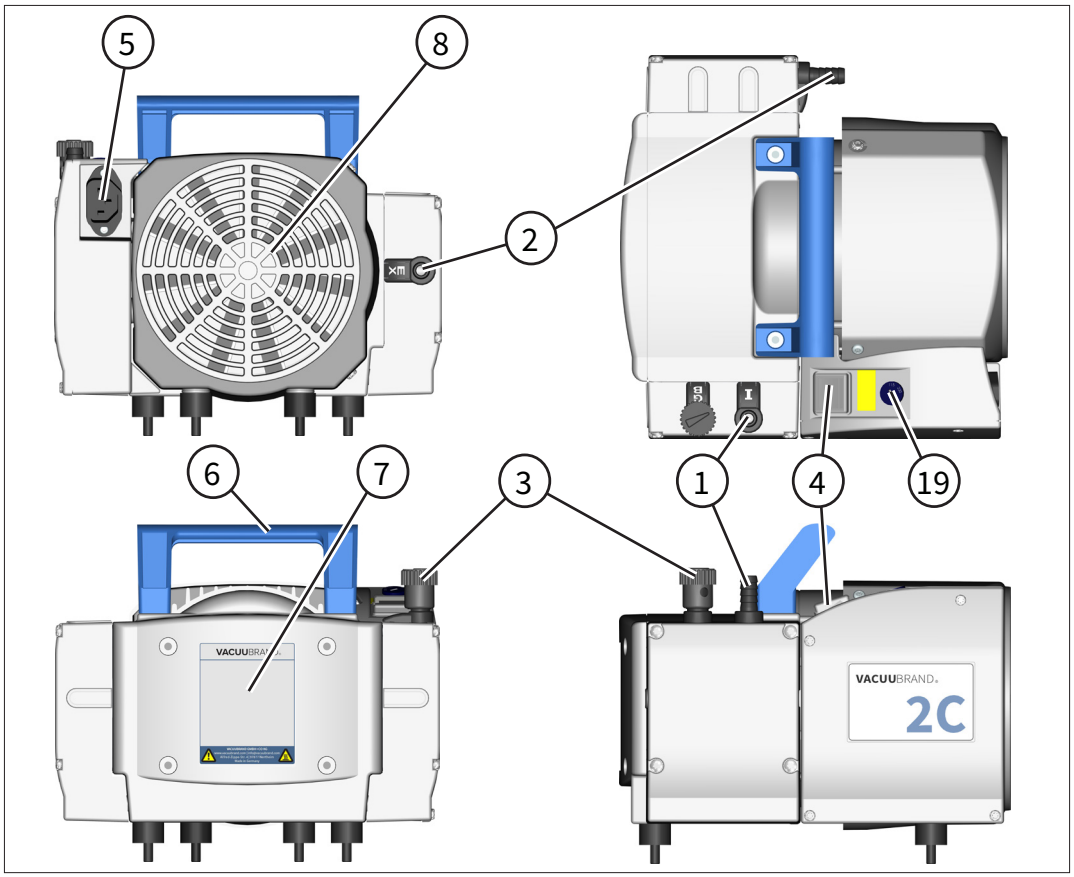
(22614856)



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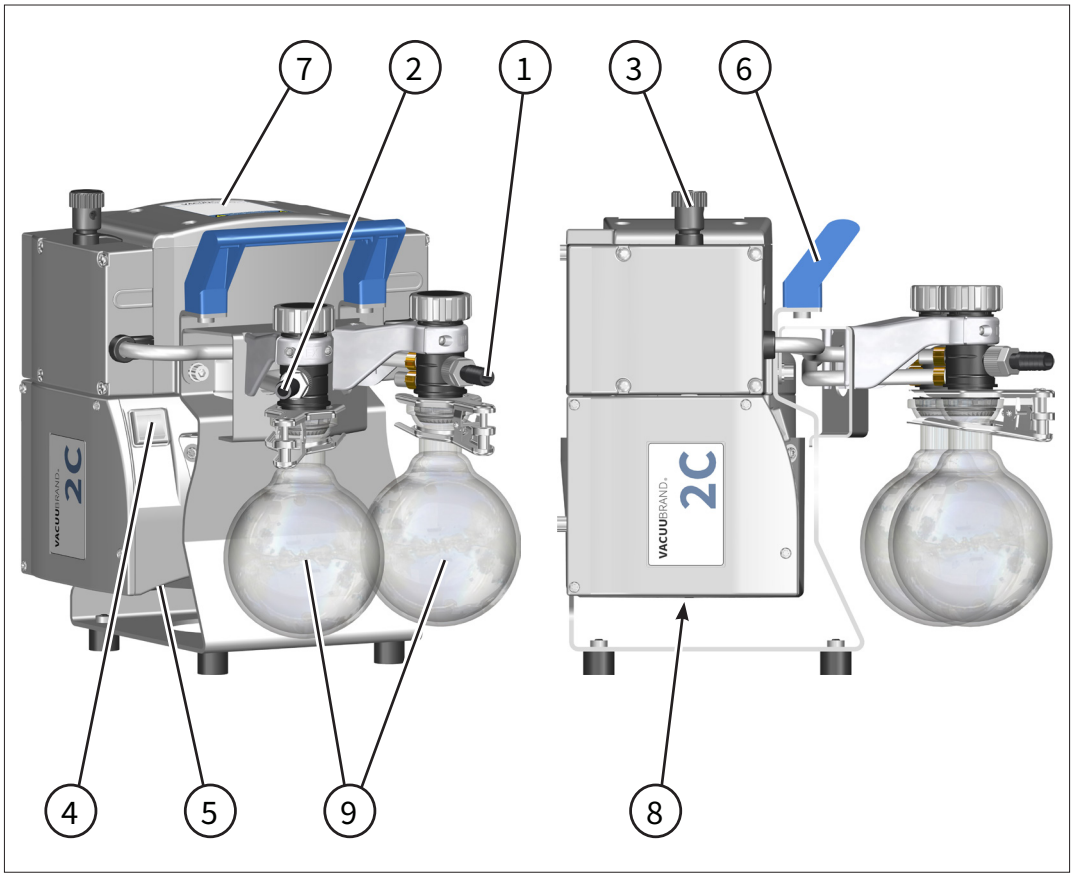
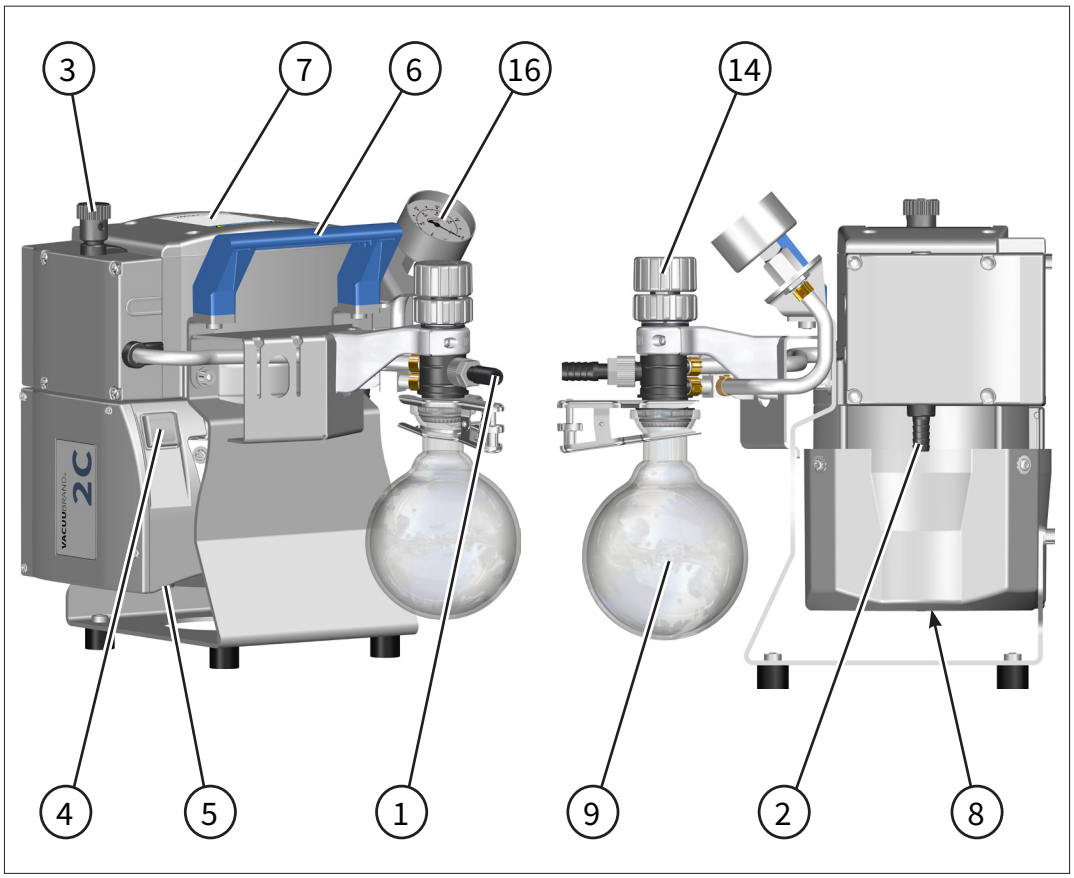


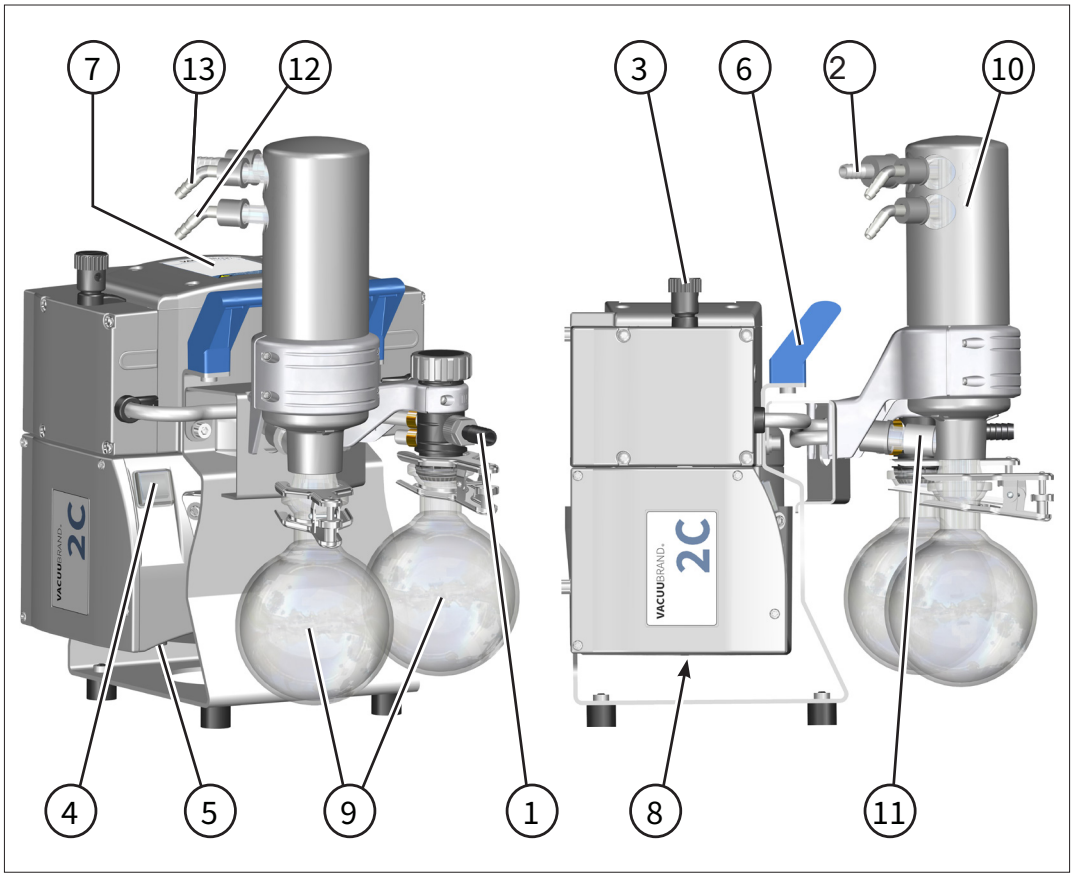
MZ 2C NT +AK+M+D

Views
MZ 2C NT +AK+M+D



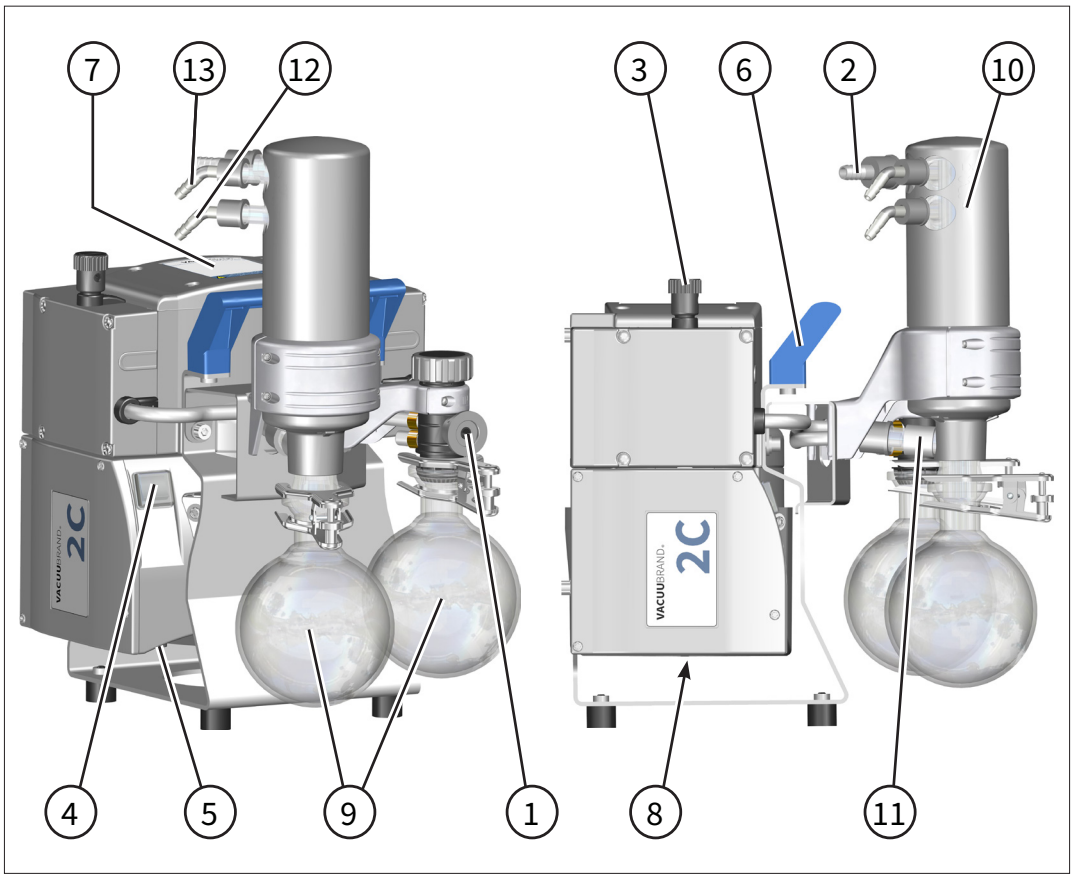
MZ 2C NT +AK+EK

Views
MZ 2C NT +AK+EK



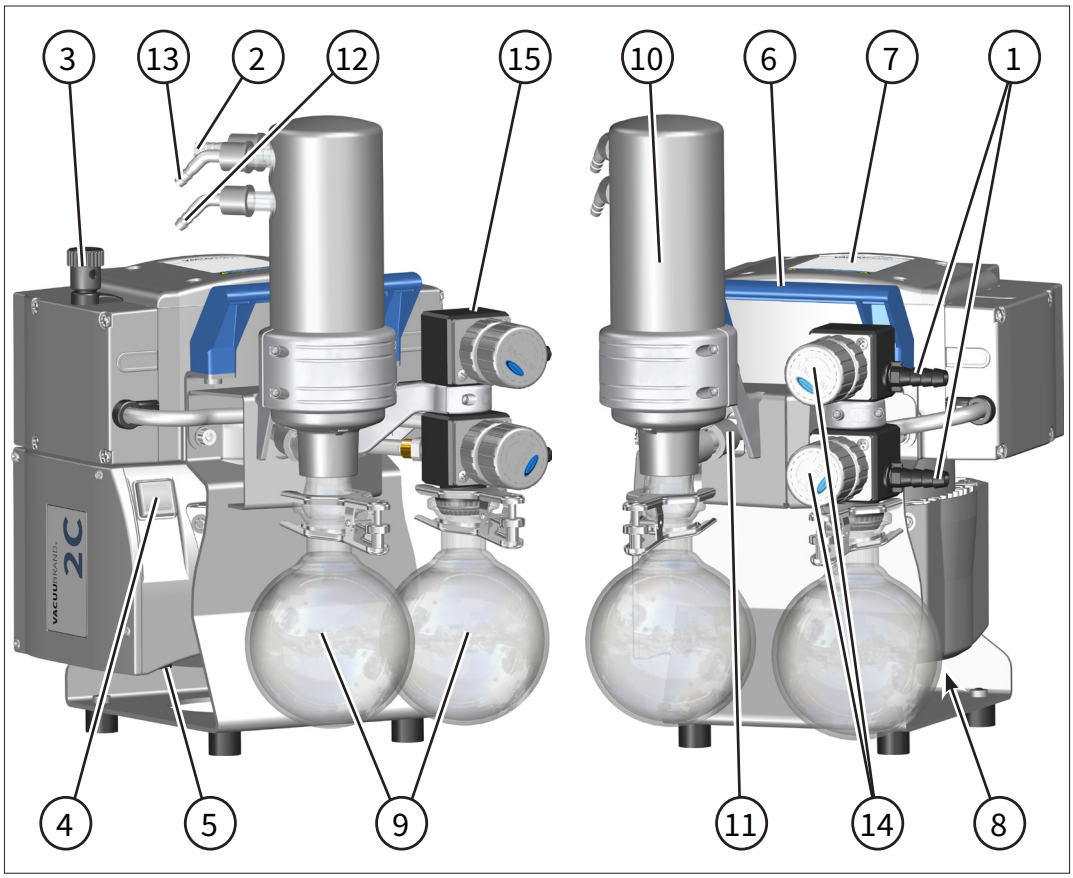
MZ 2C NT +AK+EK with KF DN 16

Views
MZ 2C NT +AK+EK



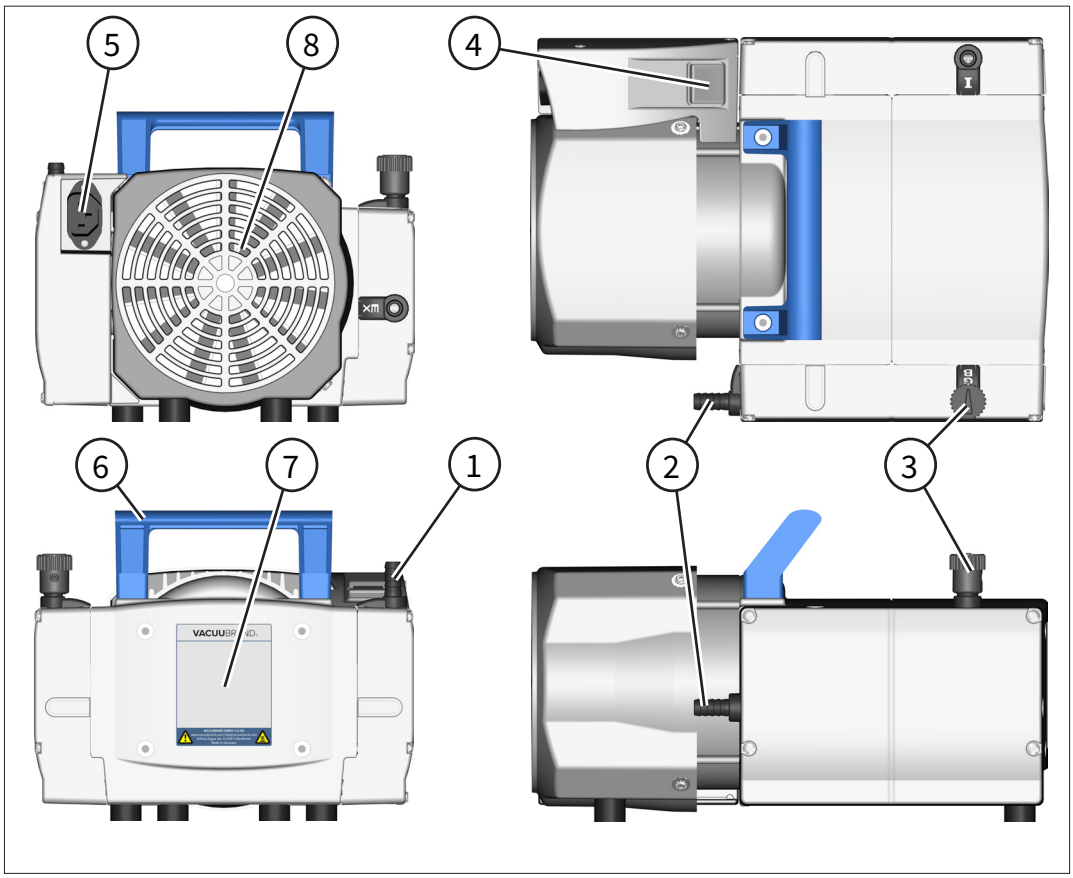
MZ 2C NT +AK SYNCHRO+EK

Views
MZ 2C NT
+AK SYNCHRO+EK



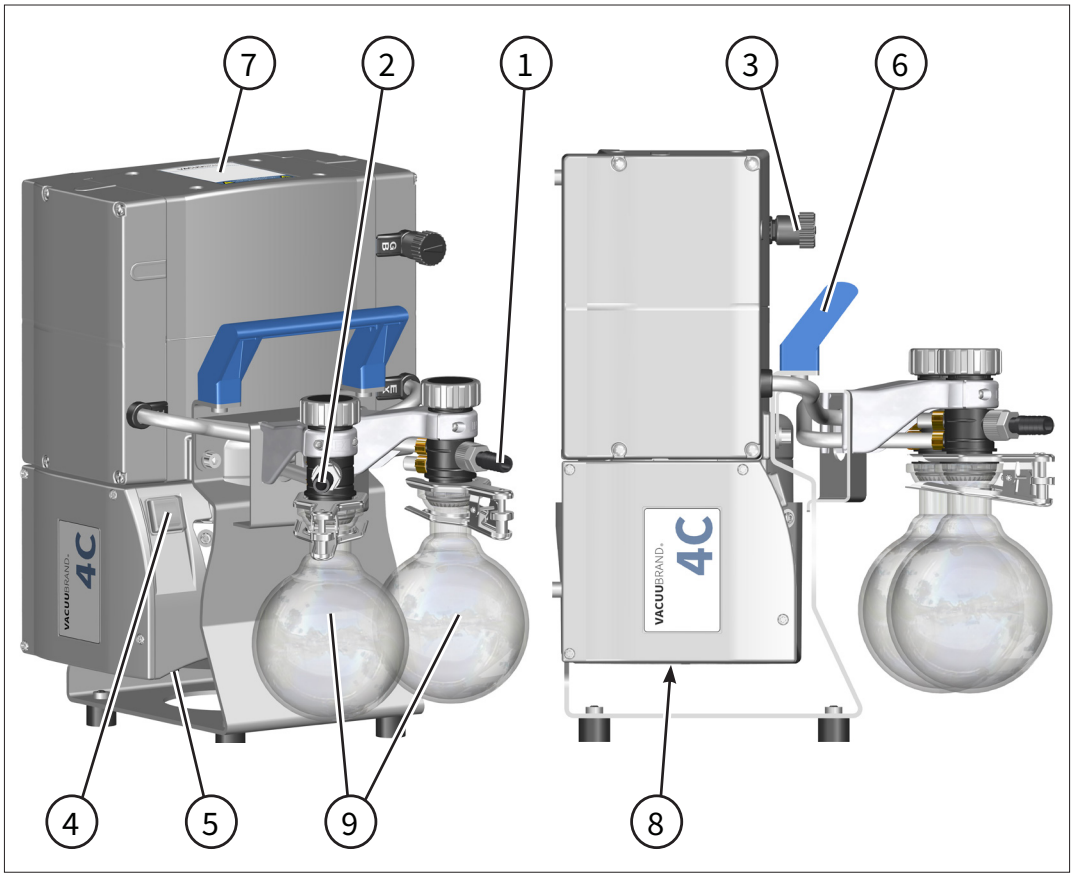
MD 4C NT

Views
MD 4C NT



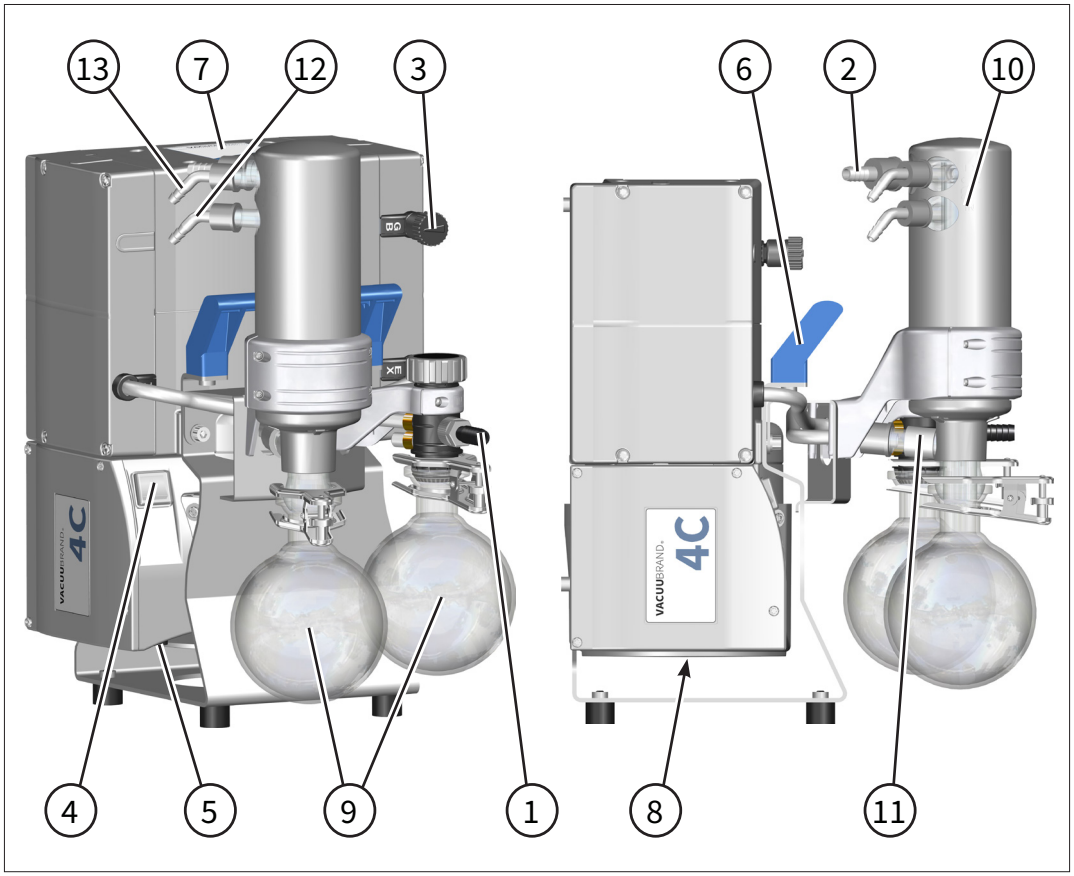
MD 4C NT +2AK

Views
MD 4C NT +2AK



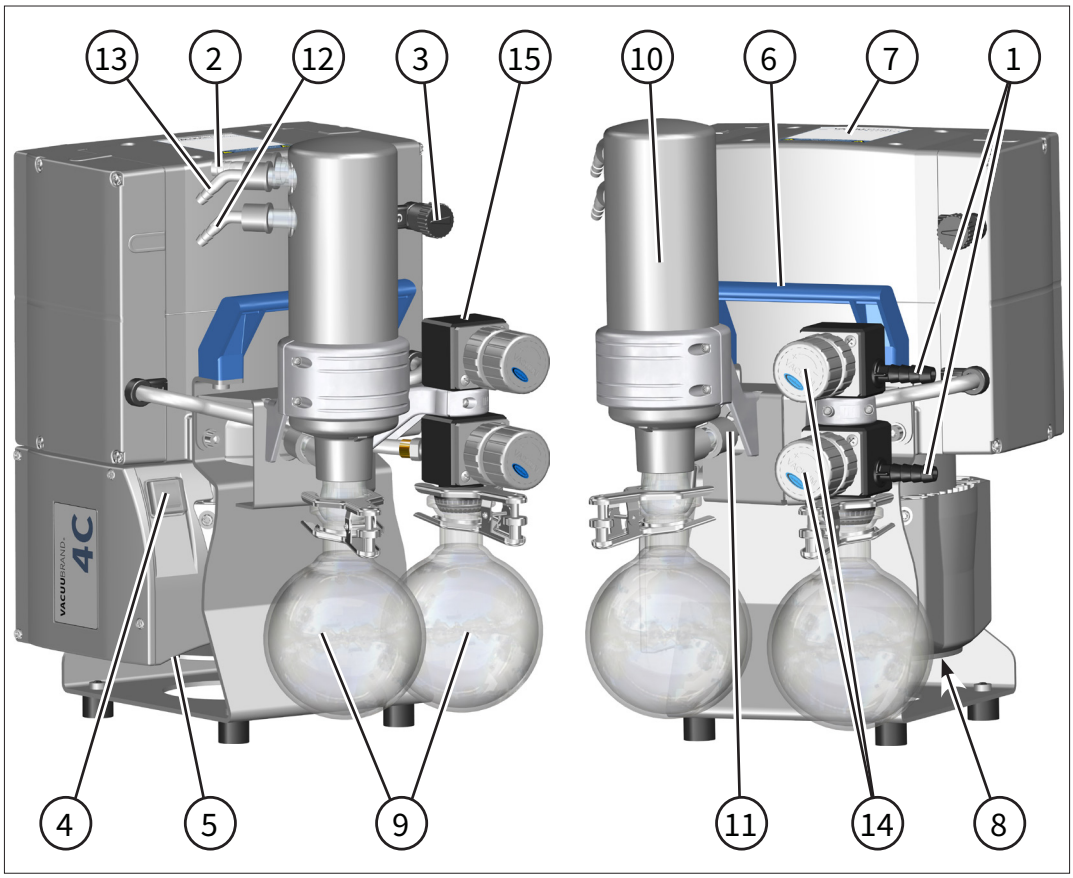
MD 4C NT +AK+EK

Views
MD 4C NT +AK+EK



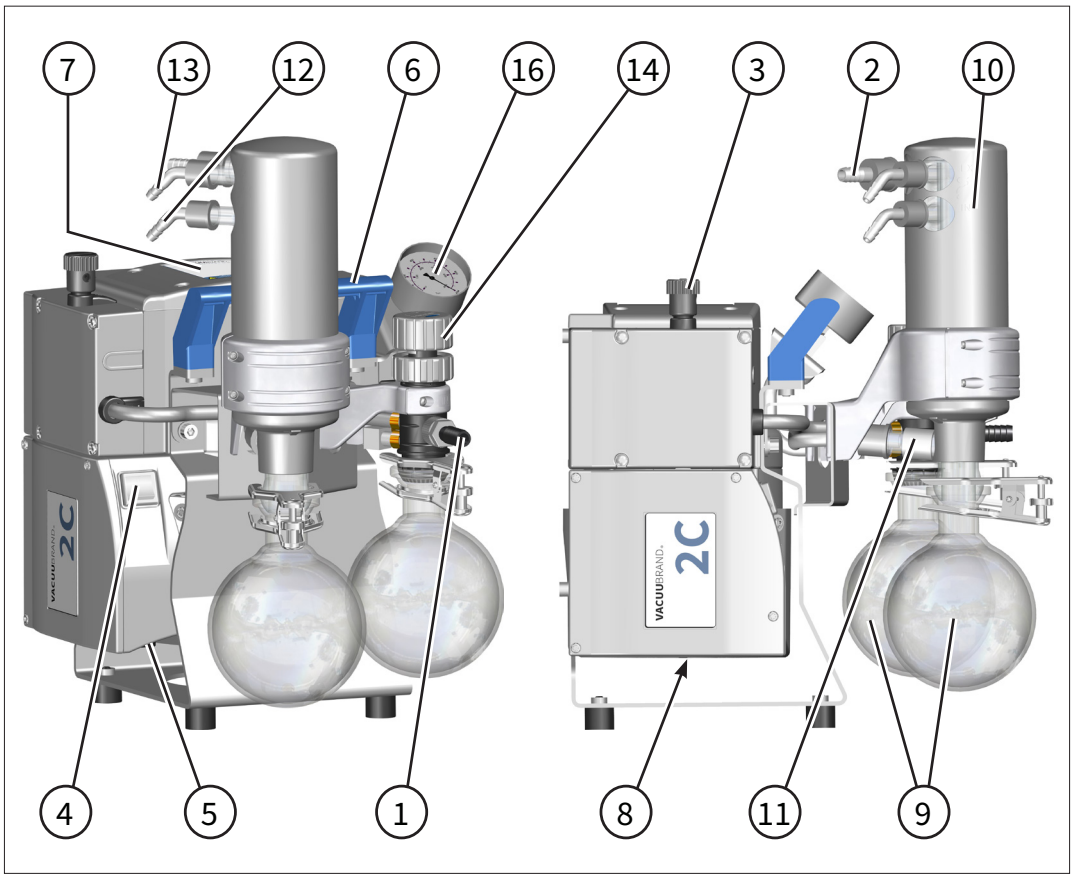
MD 4C NT +AK SYNCHRO+EK

Views
MD 4C NT
+AK SYNCHRO+EK



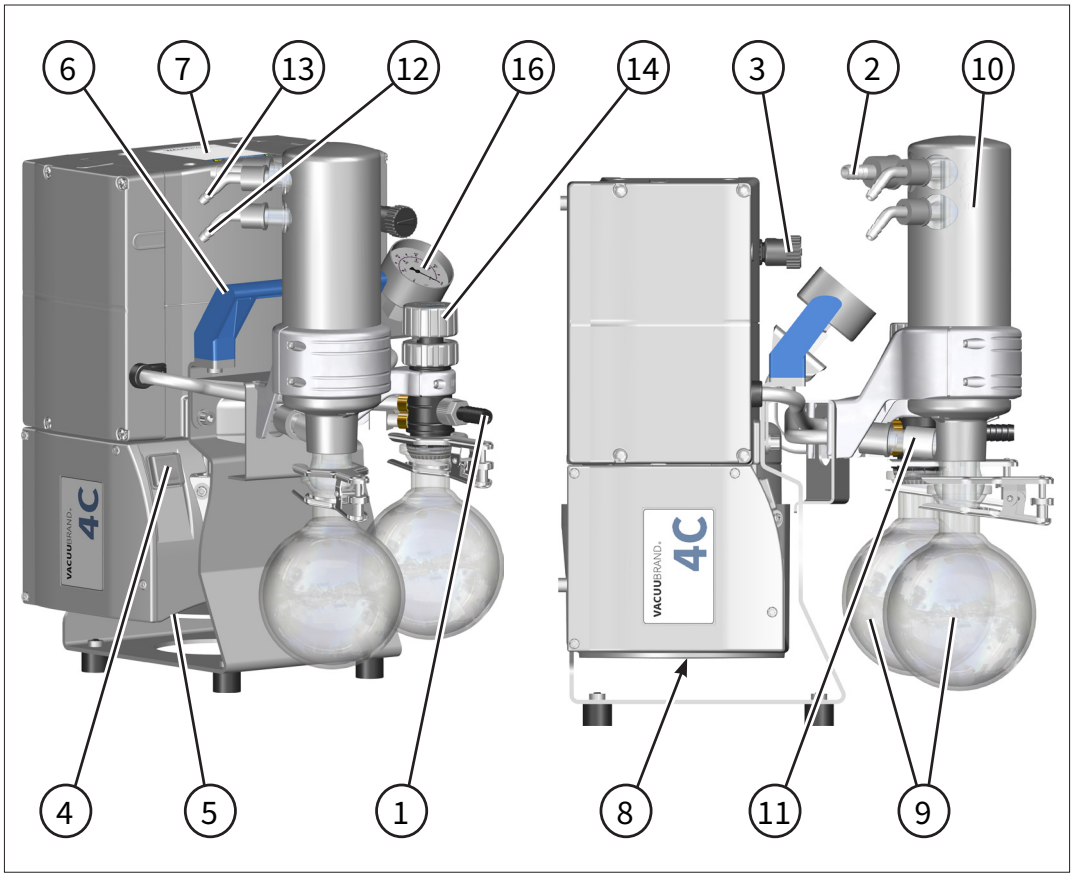
PC 101 NT

Views
PC 101 NT



PC 201 NT

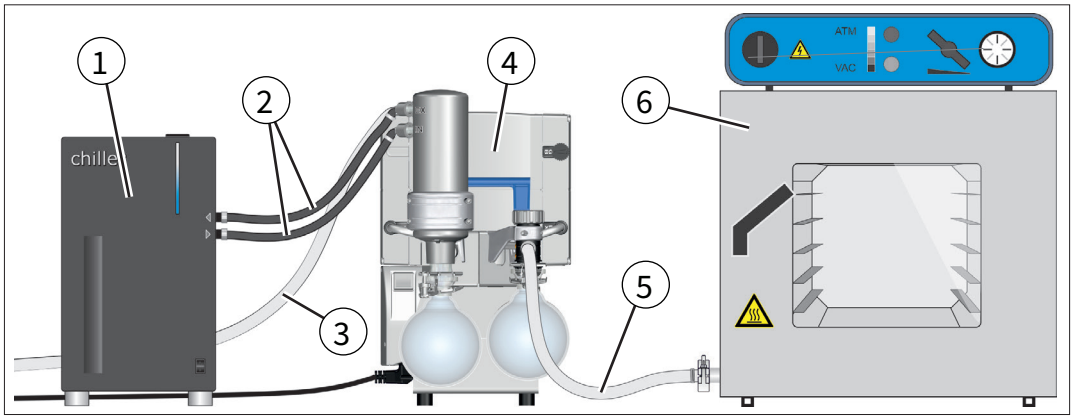
Views
PC 201 NT



3.3 Application example

Vacuum drying

→ Example Vacuum drying



Meaning

1	Chiller
2	Coolant hoses
3	Outlet hose (diverted into a fume hood)
4	Vacuum system MD 4C NT +AK+EK
5	Vacuum hose
6	Application example: drying cabinet

4 Installation and connection

4.1 Transport

The original packaging is accurately matched to your product for safe transport.

⇨ If possible, please keep the original packaging (e.g., for returning the product for repair).

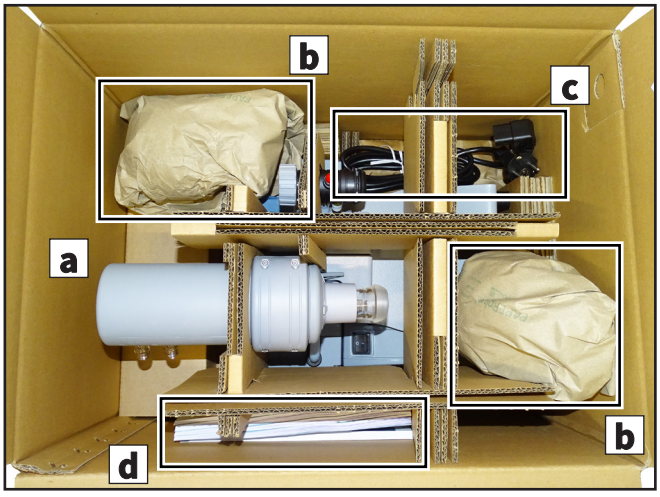
Goods receipt

Check the shipment for transport damage and completeness.

⇨ Immediately report any transport damage in writing to the supplier.

Unpacking

→ Example
Diaphragm pump in original packaging



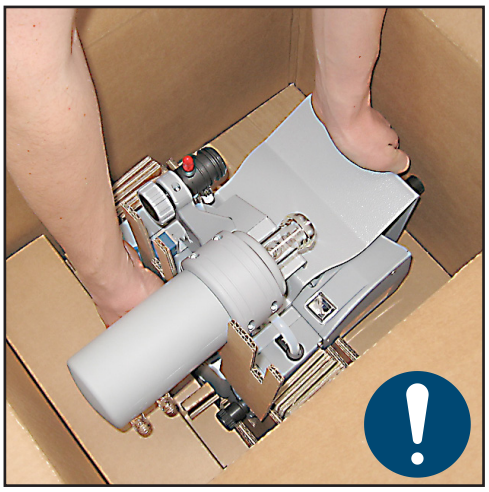
(a) = Diaphragm pump
(b) = Accessories (e.g., round bottom flasks, ground glass joint clips)
(c) = Power cord
(d) = Instructions for use

⇨ Remove the vacuum pump, power cord, instructions for use, and any attachments (e.g., round bottom flask, ground glass joint clips) from the original packaging.

⇨ Lift the vacuum pump out of the packaging by the carrying handle and, if necessary, also by the pump bracket. Never use attachments such as emission condensers or brackets as lifting aids.

⇨ Remove the connections from the glass flask, such as hose nozzles and screw fasteners.
⇨ Compare the scope of delivery with the delivery slip.
⇨ Use only the carrying handle to transport the pump.

→ Example
Lift out diaphragm pump



⇨ Note that the **weight of the vacuum pump may be up to approx. 17 kg** depending on the type.
⇨ Lift the device out of the packaging by the carrying handle and, if necessary, also by the pump bracket.

4.2 Installation

NOTE

Condensate can damage the vacuum pump.

A large temperature difference between the storage location and the installation location can cause condensation.

⇨ After delivery or storage, allow the vacuum pump to reach ambient temperature before putting it into operation. Acclimatization can take several hours.

Check installation conditions

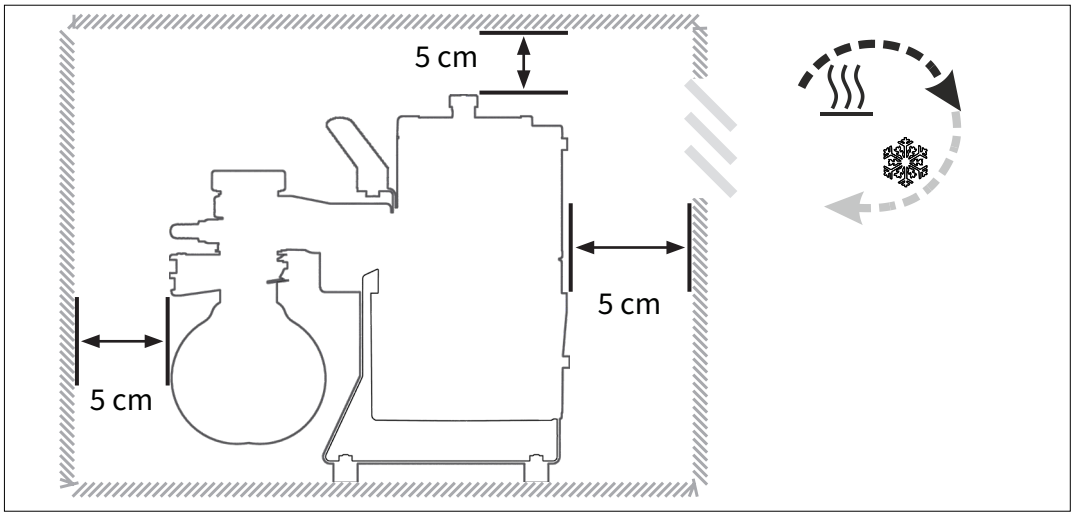
Check installation conditions

- The device is acclimatized.
- Ambient conditions have been observed and are within the limitation of use.
- The pump must have a stable and secure base without additional mechanical contact apart from the pump feet.

Installing the vacuum pump

⇨ Place the vacuum pump on a stable, vibration-free, horizontal, and level surface.

→ Example
Sketch of minimum distances in lab furniture



IMPORTANT!

⇨ When installing into laboratory furniture, maintain the minimum distance of 5 cm (2″) to adjacent objects or surfaces.

⇨ Prevent heat build-up and ensure sufficient air circulation, especially in closed enclosures or at elevated ambient temperatures. Install external forced ventilation if necessary.

⇨ The power plug serves as a disconnecting device from the electrical supply voltage. The vacuum pump must be set up in such a way that the on/off switch and the power plug are accessible at all times so that the pump can be disconnected from the power supply. To do this, a minimum distance of 12 cm (5″) must be maintained on the corresponding side of the pump from adjacent objects or surfaces. The on/off switch is located on the terminal box of the pump.

Observe limitation of use

Observing the limitations of use

Limits of use		(US)
Ambient temperature	10–40 °C	50–104 °F
Altitude, max.	2000 m above sea level	6562 ft above sea level
Minimum distance to adjacent parts	5 cm	2″
Relative humidity	30 – 85 %, non-condensing	
Protection class	IP 40	

IMPORTANT!

- ⇨ Avoid condensation or contamination from dust, liquids, or corrosive gases.
- ⇨ Note the indicated IP protection rating. The IP protection is guaranteed only if the device is properly installed and connected.
- ⇨ If operating conditions differ (e.g., when operating at higher altitudes risk of insufficient cooling), take the appropriate measures and precautions (e.g., supplying external cooling air.)
- ⇨ When connecting, observe the information on the rating plate and Section *8.1.1 Technical data on page 105*.

4.3 Connection

The diaphragm pumps have a vacuum connection and an outlet connection. ***SYNCHRO*** diaphragm pumps have an additional vacuum connection. Depending on the pump type, different connection options and attachments are available. Connect your diaphragm pump as described in the examples below. Please note the descriptions that apply to your pump type.

4.3.1 Vacuum connection (IN)

Vacuum connection (IN)

CAUTION

Flexible vacuum hoses can contract during evacuation.

Unsecured connected components can cause injury or damage when the flexible vacuum hose moves abruptly as it contracts. The vacuum hose can come loose.

⇨ Fix the vacuum hose to the connections.

⇨ Secure connected components.

⇨ Take the maximum shrinkage into account when sizing the flexible vacuum hose.

NOTE

Foreign bodies in the suction line can damage the vacuum pump.

⇨ Prevent particles, dust, liquids, or contaminants from entering the system or flowing back.

⇨ If necessary, install filters upstream of the vacuum pump to prevent particles and dust from being sucked in. Ensure that the filters are suitable for the application with respect to flow rate, chemical resistance, and resistance to clogging.

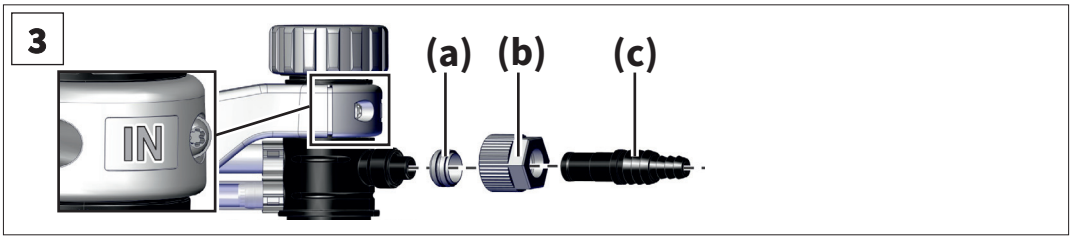
IMPORTANT!

- ⇨ Use vacuum tubing designed for the vacuum range used.
- ⇨ Use vacuum hose that is sufficiently resistant to the substances being pumped out.
- ⇨ Keep hose lines as short as possible.
- ⇨ Connect a vacuum hose with as large a cross-section as possible.
- ⇨ Connect hose lines in a gas-tight manner to the vacuum pump.
- ⇨ Avoid kinks in the vacuum hose.
- ⇨ Do not use inflexible connection lines. Rigid connecting lines can transmit mechanical forces between the vacuum pump and the application.
- ⇨ Use elastic hose pieces or suspension bodies. This prevents the transmission of mechanical forces through rigid connecting lines.
- ⇨ Secure hose lines against unintentional disconnection.
- ⇨ Prevent leaks during installation. Check the system for leaks after installation.

Install hose nozzle at inlet

Install hose nozzle at inlet

1. Remove the red protective cap at the pump inlet.
2. Remove the hose nozzle with the clamping ring and union nut attached from the round bottom flask.
3. Attach the hose nozzle to the pump inlet: Connect the clamping ring **(a)**, the union nut **(b)**, and the hose nozzle **(c)** as shown.



4. Turn the union nut by hand until it stops on the connection. Then tighten the union nut a quarter turn using a size 17 open-end wrench.

   ☑ Hose nozzle mounted at the inlet.

Install separator/round bottom flask

Install separator (AK)

The suction-side separator at the pump inlet prevents liquid droplets and particles from entering.

- Longer service life for diaphragms and valves
- Improved ultimate vacuum performance when liquids are present.
- The round bottom flask is coated on the outside (splinter protection in the case of implosion/leak protection in the case of mechanical damage).

⇨ Attach the suction-side round bottom flask with a ground glass joint clip.

☑ Round-bottom flask installed on the suction side.

Connect vacuum hose

Connect the vacuum hose to the inlet

1. If necessary, remove the red protective cap at the inlet of the vacuum pump.
2. Depending on the pump type, use a vacuum hose with an inside diameter of DN 10 mm or a vacuum hose with a small flange connection KF DN 16.
3. Connect the vacuum hose to the hose nozzle at the inlet, or connect the vacuum hose to the pump inlet using the centering ring and clamping ring.

   ☑ Vacuum hose connected

⇨ Alternatively, you can use adapters in order to create a connection via a 1/2" hose nozzle, small flange KF DN 16, or PTFE pipe DN 10/8 mm. → *See accessories in Section 8.2 Ordering information on page 116.*

⇨ If necessary, install a suction line valve or a shut-off valve in the inlet line in order to separate the vacuum pump from the application for warm-up or run-down.

Observe the following points for optimum results:

⇨ Keep the vacuum line as short as you can with as large a cross-section as possible.

4.3.2 Outlet connection (EX)

WARNING

Risk of bursting from overpressure in the exhaust line.

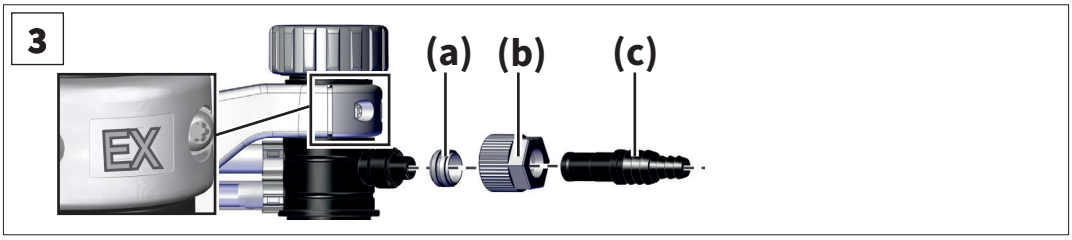
Impermissibly high pressure in the exhaust gas line can cause the vacuum pump to burst or damage seals.

- ⇨ The outlet line (exhaust gas, gas outlet) must always be clear and non-pressurized.
- ⇨ Do not block the outlet. Do not kink the outlet line.
- ⇨ Always lay the exhaust hose at a downward angle, or take measures to prevent condensate from flowing back into the vacuum pump.
- ⇨ Use an outlet line with a sufficient cross-section. The cross-section of the outlet line must be at least as large as the outlet connection of the pump.
- ⇨ Observe the maximum permissible pressures and pressure differences.

Install hose nozzle at outlet

Install hose nozzle at outlet

1. Remove the red protective cap from the pump outlet.
2. Remove the hose nozzle with the clamping ring and union nut attached from the round bottom flask.
3. Attach the hose nozzle to the pump outlet: Connect the clamping ring **(a)**, the union nut **(b)**, and the hose nozzle **(c)** as shown.



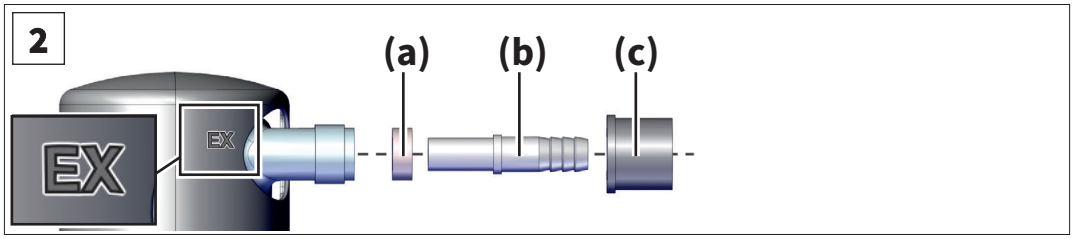
4. Turn the union nut by hand until it stops on the connection. Then tighten the union nut a quarter turn using a size 17 open-end wrench.

   ☑ Hose nozzle mounted at the outlet.

Install hose nozzle at the outlet of the EK

Install the outlet hose nozzle on the EK.

1. Remove the hose nozzle with the seal and union nut attached from the round bottom flask.
2. Attach the hose nozzle to the outlet of the emission condenser: Connect the sealing ring **(a)**, the hose nozzle **(b)** and the union nut **(c)** as shown.



3. Turn the union nut by hand until it stops on the connection.

   ☑ Hose nozzle mounted at the outlet of the EK.

Install separator/round bottom flask

Install separator (AK)

The separator at the pump outlet collects condensed vapors and solvents.

- The round bottom flask is coated on the outside (splinter protection in the case of implosion/leak protection in the case of mechanical damage).

⇨ Attach the round bottom flask to the outlet of the pump or to the emission condenser using a ground glass joint clip.

☑ Round-bottom flask mounted at the outlet.

Connect the outlet hose

Connect the outlet hose to the outlet

1. If necessary, remove the red protective cap from the outlet of the vacuum pump.
2. Use an outlet hose with an inside diameter of DN 10 mm. Ensure that the hose is sufficiently resistant to the pumped substances.
3. Slide the outlet hose onto the hose nozzle at the outlet of the pump or emission condenser. If necessary, route the hose into a fume hood. If necessary, fix the outlet hose (e.g., with a hose clip).

   ☑ Outlet hose connected.

4.3.3 Coolant connection on the emission condenser

Glass coolers and coolants

An emission condenser (EK) has a connection for coolants. Water or liquid in the circuit of a recirculating chiller is suitable for cooling.

The discharge-side emission condenser enables efficient outlet-side condensation of the vapors being pumped.

- Against condensate return
- Controlled condensate collection
- Nearly 100 % solvent recovery

The insulating jacket protects against glass splinters in the event of breakage, provides thermal insulation against condensation, and forms an external impact protection.

The glass cooler is designed for a coolant pressure of 6 bar (87 psi) absolute. However, the strength of glass equipment depends on many factors:

- Surface defects (e.g., microcracks) increase during use.
- Tensile stress can be caused by temperature control, exothermic reactions, autoclaving, connecting elements and fasteners (e.g., ground glass joint clips) as well as by overpressure and underpressure.

VACUUBRAND does not guarantee the strength of the glass coolers.

VACUUBRAND accepts no liability for damage caused by coolants resulting from the use of the cooler.

DANGER

Leakage of hazardous substances from a defective cooler.

If the cooler is defective, hazardous or toxic substances that have been extracted may be released into the ambient air. The coolant may react with the condensed liquid in the collecting flask.

- ⇨ Please observe the safety regulations for handling hazardous materials and media.
- ⇨ Ensure that damage to the cooler cannot lead to a dangerous situation (e.g., by operating the pump in a fume hood).
- ⇨ Regularly check glass components for cracks and damage. Do not use damaged coolers, and replace defective components immediately.

NOTE

Leaking coolant can damage the vacuum pump or the surrounding area.

- ⇨ Use a pressure limiter for the coolant.
- ⇨ Use only a limited amount of coolant (e.g., by using a recirculating cooler).
- ⇨ Use a coolant monitor such as a water detector or water monitor (Aquastop).

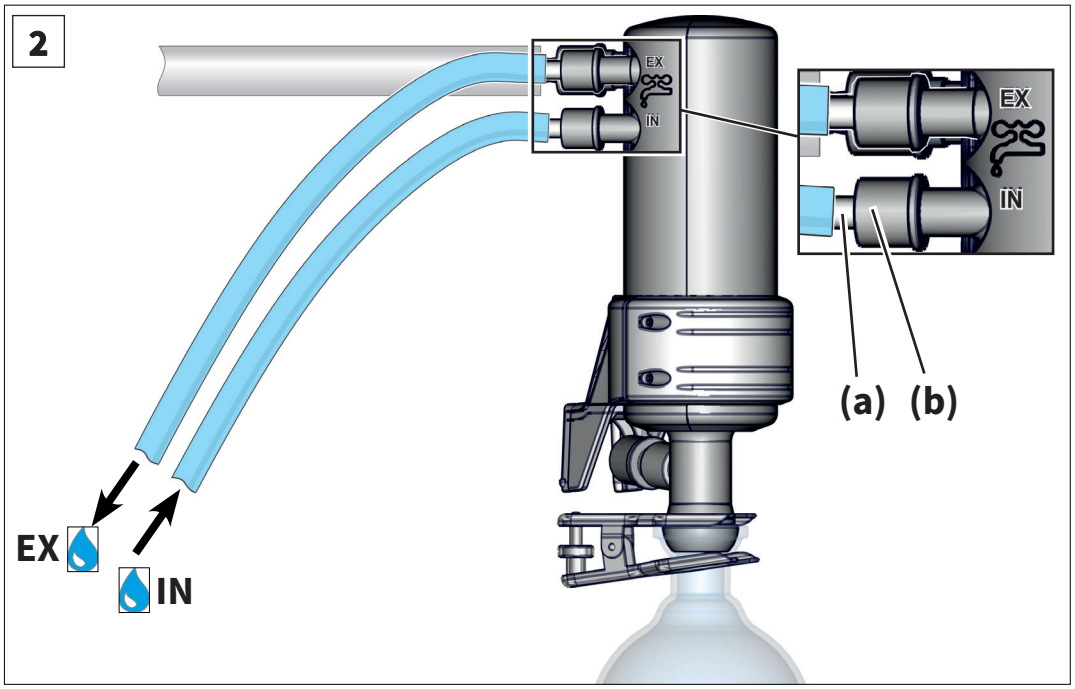
As an alternative to liquid-cooled glass coolers, VACUUBRAND offers a water-free, electrically operated Peltier cooler.

⇨ Please contact our customer service if necessary.

Connecting coolant

→ Example Coolant connection on the EK

1. Remove the two curved hose nozzles from the round bottom flask.
2. Fasten both hose nozzles **(a)** with the union nuts **(b)** to the capacitor as illustrated.



3. Attach the DN 6 to 8 mm hoses for the coolant to the capacitor as shown in the figure:
   - **IN** = Intake
   - **EX** = Exhaust
4. Secure the hoses (e.g., using hose clips) to prevent them from coming loose unintentionally.

   ☑ Coolant hoses connected.

⇨ Check the hose connections before each use and regularly during operation.

IMPORTANT!

⇨ Permissible range of coolant temperature at the emission condenser: −15–20 °C.

Condensation water

CAUTION

Condensation can damage electrical components.

The humidity in the ambient air can condense on cold coolant pipes and drip off.

⇨ Always lay coolant lines so that no condensation can drip onto the pump or electrical components such as cables, electronics, or sockets.

Ensure free coolant drainage

CAUTION

Impermissible overpressure in the coolant circuit can damage the emission condenser.

The emission condenser can be damaged by excess pressure. Coolant hoses may come loose. Coolant may leak out.

⇨ Observe the maximum permitted coolant pressure of 6 bar (87 psi) absolute at the emission condenser.

⇨ Always ensure that the coolant can drain freely from the emission condenser (unpressurized).

⇨ Prevent impermissible overpressure (for example, caused by blocked, kinked, or crushed coolant hoses) in the coolant circuit.

⇨ Install any optional coolant valve exclusively on the inlet side of the emission condenser and never on the outlet side.

⇨ Observe the maximum permissible pressure of other components connected to the coolant circuit (e.g., coolant valve).

4.3.4 Gas ballast (GB)

Use of ambient air as gas ballast

DANGER

Explosion hazard when using air as gas ballast.

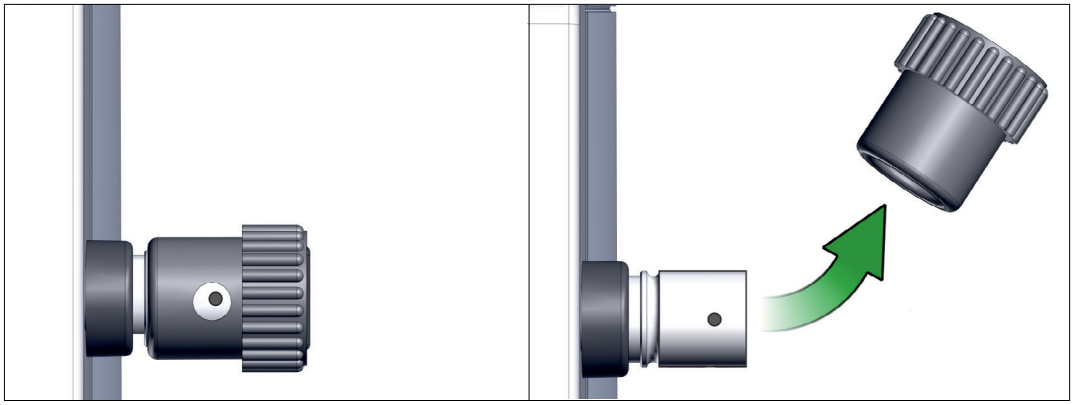
By using air as a gas ballast, a small amount of oxygen enters the inside of the vacuum pump. Depending on the process, the oxygen in the air may form an explosive mixture or create other hazardous conditions. Air and pumped substances can react in the pump.

⇨ Ensure that the air intake through the gas ballast valve never leads to reactive, explosive, or otherwise hazardous mixtures.

⇨ For flammable substances and processes in which explosive mixtures may form, use only inert gas (e.g., nitrogen) as gas ballast (maximum permissible pressure 1.2 bar/900 Torr abs.).

Use of inert gas as gas ballast – OPTION

Prepare inert gas connection (GB)



⇨ Remove the black gas ballast cap and connect a gas ballast adapter in its place, → *see accessories in Section 8.2 Ordering information on page 116*.

⇨ Observe the maximum permissible pressure (1.2 bar/900 Torr abs) when connecting inert gas to the gas ballast connection.

4.3.5 Electrical connection

⇨ Check the information on the supply voltage and type of current (see rating plate).

Vacuum pump with switchable wide-range motor

Wide-range motor, switchable

CAUTION

Possible damage to the pump motor.

If the vacuum pump is switched on with the voltage selector switch set incorrectly, the motor may be damaged.

⇨ Check the setting of the voltage selector switch on the motor terminal box before switching on the pump.

⇨ The set voltage range must match the available supply voltage.

⇨ Disconnect the vacuum pump from the power supply before switching the voltage selector switch.

Switch voltage selector switch

Switch voltage selector switch

1. Ensure that the vacuum pump is disconnected from the power supply. Turn off the pump, and unplug it.

Voltage selector switch

⇨ “230/240” applies to 180–253 V

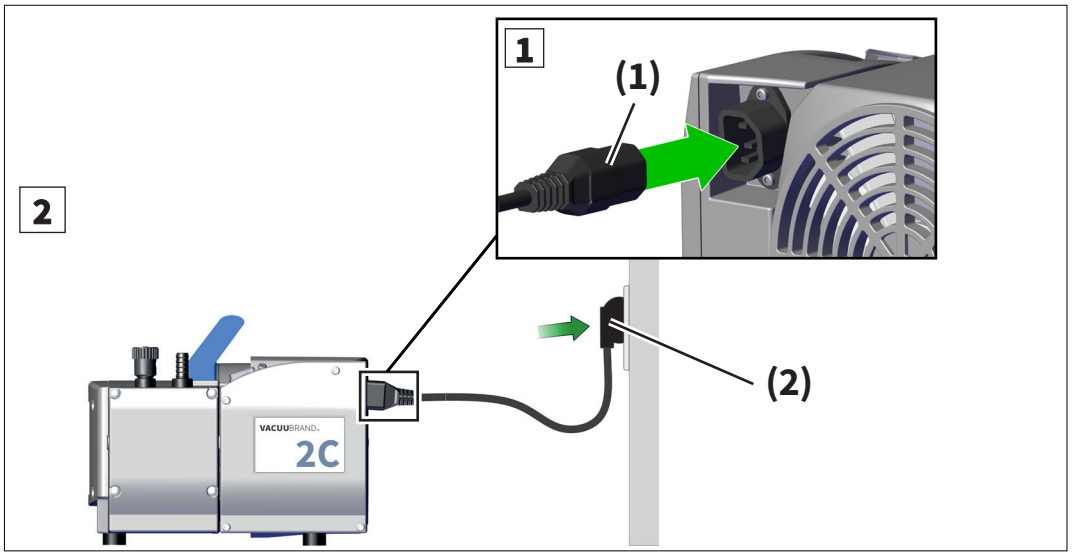
⇨ “115/120” applies to 90–132 V

2. Set the voltage selector switch to the operating voltage of the power supply network using a flat-head screwdriver.

☑ Voltage selector switch changed.

→ Example Electrical connection diaphragm pump

Pump electrical connection



1. Plug connector **(1)** of the power cord into the power connection of the vacuum pump.
2. Plug power plug **(2)** into the power outlet.
   ☑ Vacuum pump electrically connected.

IMPORTANT!

⇨ Use only a power cord that is in perfect condition and complies with regulations.

⇨ Plug the power cord only into a grounded outlet. Faulty or inadequate grounding is a deadly hazard.

⇨ Lay the power cord so that it cannot be damaged by sharp edges, chemicals, or hot surfaces.

⇨ Keep the power cord away from hot surfaces.

⇨ Keep the power cord away from heated surfaces.

⇨ The power plug serves as a disconnecting device from the electrical supply voltage. The product must be installed in such a way that the power plug is easily reached and accessible at all times to disconnect the product from the power supply.

⇨ Do not use multi-outlet power strips connected in series as the power connection.

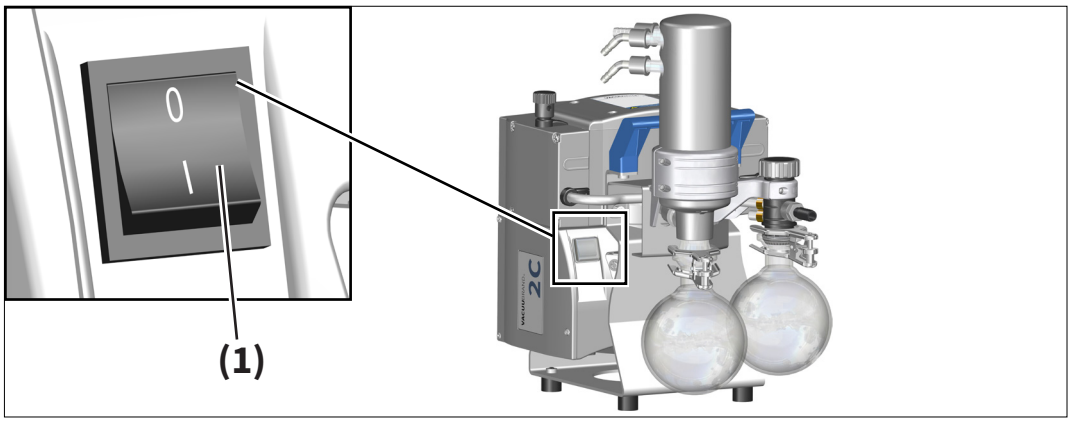
5 Commissioning (operation)

Before putting into operation, make sure that the activities described in the “Installation and connection” chapter have been carried out properly.

5.1 Switching on

Switch pump on

Switch pump on



⇨ Switch rocker switch **(1)** on – Switch position **I**.

☑ Vacuum pump switched on.

5.2 Operation

The vacuum pump reaches its specified performance only once it has reached operating temperature (after approx. 15 min).

During operation, contamination and deposits may form on the outside of the vacuum pump.

⇨ Regularly check and clean the pump in order to prevent an increase in operating temperature because of contamination.

Disturbing operating noise at the pump outlet?

⇨ Connect an outlet line or use a silencer; → *see accessories in Section 8.2 Ordering information on page 116*.

Unintentional venting

CAUTION

Risk of damage from unintentional venting of the equipment.

In the event of a power failure, the equipment may be inadvertently vented, especially if the gas ballast valve of the pump is open.

⇨ Take appropriate safety precautions if unintentional venting could lead to hazards.

⇨ Use an electromagnetic suction line valve between the apparatus and the pump.

⇨ Use an electromagnetic gas ballast valve on the gas ballast connection.

5.2.1 Pumps with flow control diaphragm

Operation with flow control diaphragm

The suction capacity of the pump can be regulated via the flow control diaphragm at the inlet of the vacuum pump.

⇨ Open the flow control diaphragm for pumping.

- Turn the diaphragm open **only until the first point of resistance** turning becomes stiff).

⇨ Close the flow control diaphragm to stop pumping.

- Tighten the diaphragm **only lightly by hand** .

NOTE

Over-tightening the flow control diaphragm when opening or closing can damage the diaphragm. The flow control diaphragm no longer closes properly.

⇨ Open the diaphragm to the maximum extent possible until you encounter initial resistance.

⇨ Tighten the diaphragm only lightly by hand

⇨ Replace the diaphragm if it leaks.

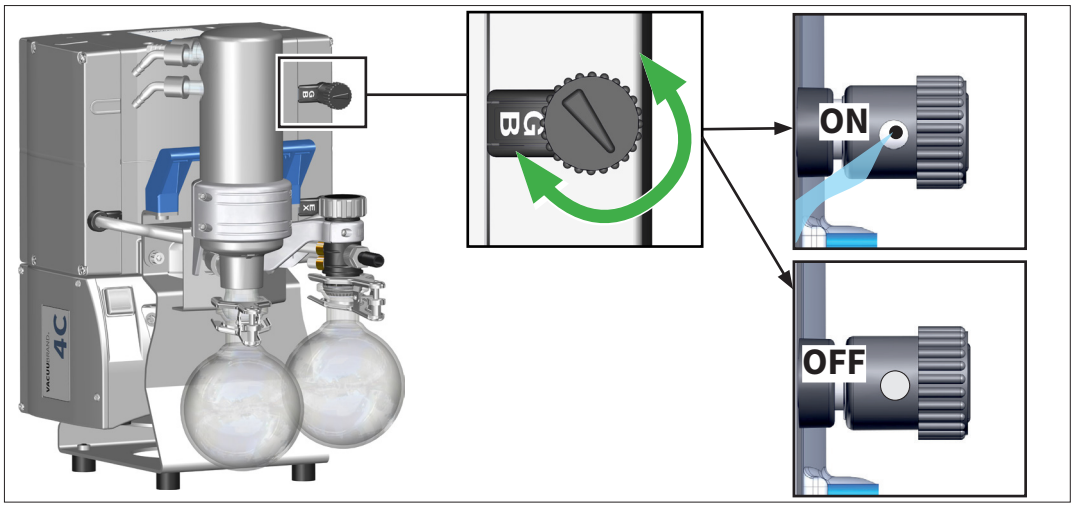
5.2.2 Operation with gas ballast

Meaning

The supply from the gas ballast (= gas addition) ensures that vapors are not condensed in the vacuum pump; instead, they are emitted out of the pump. This allows larger quantities of condensable vapors to be conveyed and extends the service life of the pump. The ultimate vacuum with gas ballast is slightly higher, → *see pump-specific data in Section 8.1.1 Technical data on page 105*)

Opening/closing the gas ballast valve

→Example
Operate gas ballast valve



⇨ Turn the black gas ballast cap in any direction to open or close the gas ballast valve. The gas ballast valve is open when the arrow on the gas ballast cap points to the letters “GB”.

⇨ If possible, evacuate the condensable vapors (e.g., water vapor, solvents) only when the vacuum pump is at operating temperature and the gas ballast valve is open. This reduces condensation of the pumped substances in the vacuum pump.

IMPORTANT!

⇨ If necessary, connect inert gas as a gas ballast to prevent the formation of explosive mixtures. Use a gas ballast adapter on small flange KF DN 16, → *see accessories in Section 8.2 Ordering information on page 116*

⇨ Observe the permissible pressure at the gas ballast connection (max. 1.2 bar/900 Torr abs).

⇨ Prevent contamination of the inert gas supply line by the pumped media by using a check valve in the inert gas supply line.

If the gas load in the vacuum pump is low when working with low-boiling media, it may be possible to omit the gas ballast. This allows the solvent recovery rate in the emission condenser to be increased in these cases.

5.2.3 Operation with emission condenser

Pressure relief valve at EK

The emission condenser has an opening in the supply line as a pressure relief valve; this is closed by a silicone rubber ring.

- The pressure relief valve prevents impermissibly high pressure in the emission condenser.

DANGER

Release of hazardous substances at the pressure relief valve of the emission condenser in the event of excess pressure in the outlet line or a defective pressure relief valve.

If the pressure relief valve opens or if the pressure relief valve on the emission condenser is defective, hazardous or toxic substances that have been extracted may be released into the ambient air.

⇨ Please observe the safety regulations for handling hazardous materials and media.

⇨ Ensure that, in the event of a damaged pressure relief valve on the emission condenser or overpressure in the outlet line, no dangerous situation can arise as a result of gas escaping from the pressure relief valve (e.g., by operating the pump in a fume hood).

⇨ Regularly check the pressure relief valve for cracks and brittleness. Replace a defective pressure relief valve.

WARNING

Risk of bursting from overpressure in the exhaust line.

Impermissibly high pressure in the emission condenser can damage the emission condenser.

⇨ The outlet line must always be clear and depressurized.

⇨ Regularly check the pressure relief valve for sticking. Replace a defective pressure relief valve.

5.2.4 Operation with condensate formation

⇨ Regularly check the liquid level in the round bottom flasks during operation.

⇨ Avoid overflowing the collecting flasks.

⇨ Empty the round bottom flasks in good time. The maximum filling height is approx. 80 % to avoid problems when removing the flasks.

⇨ If necessary, use an electronic fill level sensor (only in conjunction with VACUUBRAND controllers CVC 3000 or VACUU·SELECT, → *see accessories in Section 8.2 Ordering information on page 116*).

Empty round bottom flask

Empty round bottom flask

DANGER

Release of hazardous substances or chemicals.

The condensate in the round bottom flask may consist of the substances or chemicals that were pumped out or be contaminated by them.

⇨ Please observe the safety regulations for handling hazardous materials and media.

⇨ Dispose of condensate and chemicals according to the relevant regulations.

⇨ Wear personal protective equipment when handling chemicals.

Empty round bottom flask at outlet

1. Hold the round bottom flask, and loosen the ground glass joint clip.
2. Remove the round bottom flask.
3. Empty the round bottom flask.
4. Reattach the emptied round bottom flask to the vacuum pump.

   ☑ Round-bottom flask at outlet emptied.

Empty round bottom flask at inlet

1. Turn off the vacuum pump.
2. Vent the round bottom flask to atmospheric pressure via the inlet of the vacuum pump.
3. Hold the round bottom flask, and loosen the ground glass joint clip.
4. Remove the round bottom flask
5. Empty the round bottom flask.
6. Reattach the emptied round bottom flask to the vacuum pump.

   ☑ Round-bottom flask emptied at inlet.

5.3 Shutdown (switch off)

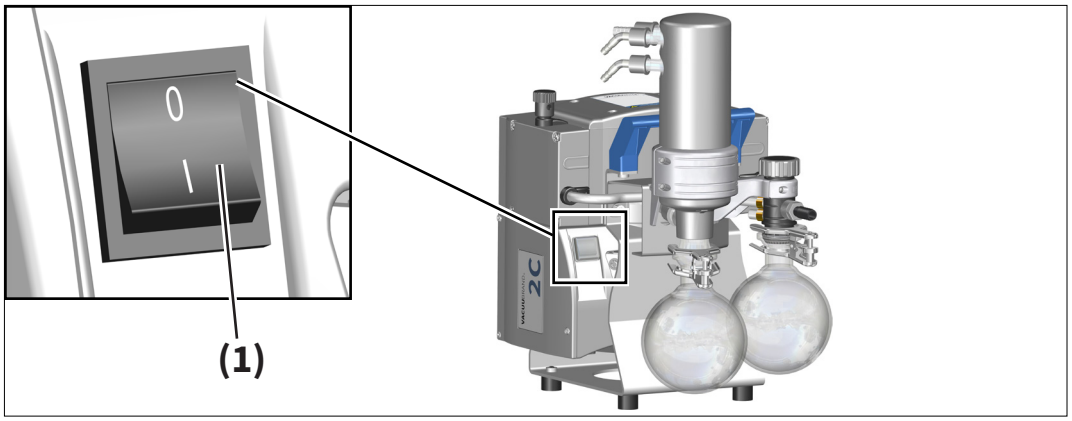
Take the pump out of operation

Switch pump off

1. Stop the process.
2. Disconnect the pump from the equipment, or close any suction line valve that may be present.
3. Allow the diaphragm pump to run for approx. 30 min with the gas ballast valve or inlet open.

   ☑ Condensate and residual media are rinsed out of the vacuum pump.

IMPORTANT! ⇨ Prevent deposits and flush condensate out of the pump.



4. Switch off rocker switch **(1)** – switch position **0**.
   ☑ Pump switched off.
5. Check the pump for contamination and damage.

5.4 Storage

Store the vacuum pump

1. Clean the vacuum pump if contamination is present.
2. Recommendation: Perform preventive maintenance before storing the vacuum pump. Maintenance is recommended, especially if media that may attack pump materials or form deposits have entered the pump.
3. Close the inlet and outlet of the vacuum pump (e.g., with the transport locks).
4. Close the gas ballast valve.
5. Empty the collecting flasks.
6. Package the vacuum pump so that it is protected from dust; enclose desiccants if necessary.
7. Store the vacuum pump in a cool, dry location.

IMPORTANT! If damaged parts are stored for operational reasons, these should be clearly identified as **not operational**.

6 Troubleshooting

6.1 Technical assistance

Technical support

⇨ For troubleshooting and fault rectification, use table *Troubleshooting*.

For technical assistance or errors for which you require additional support, please contact your local distributor or our Service Department[1].

Repair instructions, including overview drawings, spare parts lists, and general repair information, can be found on our website: www.vacuubrand.com.

The vacuum pump may be operated only if it is in perfect working order.

⇨ Observe the recommended maintenance intervals to ensure a fully functional system.

⇨ Send defective devices to our Service Department or your local supplier for repair!

1 -> Phone: +49 9342 808-5660, fax: +49 9342 808-5555, service@vacuubrand.com

6.2 Troubleshooting

Personnel for corrective action [*]

Personnel for corrective action

[1] Operator
[2] Specialist
[3] Responsible specialist

Troubleshooting

Problem	▸ Possible cause	✓ Solution	[*]
Vacuum pump does not start or stops immediately	▸ Overpressure in the outlet line.	✓ Open the outlet line. ✓ Ensure a clear passage.	[1]
	▸ Condensation in the vacuum pump.	✓ Maintain the diaphragm pump.	[2]
	▸ Pump switched off.	✓ Turn on the pump at the rocker switch.	[1]
	▸ Power plug not correctly plugged in or pulled out.	✓ Check power connection and power cord.	[1]
	▸ Motor overloaded.	✓ Allow the motor to cool down.	[2]
	▸ Thermal protection has been triggered.	✓ Allow the motor to cool down. ✓ Manually reset the fault: → Switch off the pump or disconnect the power plug → Identify and eliminate the cause of the fault → Allow the pump to cool down and switch it back on.	[2]
	▸ Device fuses blown.	✓ Determine the cause of the defect. Replace device fuses.	[2]

Troubleshooting

Problem	▸ Possible cause	✓ Solution	[*]
No or little suction power	▸ Leak in the suction line or in the apparatus.	✓ Check the pump directly – connect the measuring device to the pump inlet. ✓ Check suction line and apparatus for possible leaks.	[1]
	▸ Centering ring incorrectly inserted on small flange connection	✓ Correctly connect small flange.	[1]
	▸ Vacuum line too long or cross-section too small.	✓ Use a shorter vacuum line with a larger cross-section.	[1]
	▸ Condensate inside the vacuum pump.	✓ Allow vacuum pump to run for a few minutes with the suction nozzle open.	[1]
	▸ Deposits inside the vacuum pump.	✓ Check and clean pump heads.	[2]
	▸ Diaphragms or valves defective.	✓ Replace diaphragms and valves.	[2]
	▸ High level of vapor generated in the process.	✓ Check process parameter.	[2]
	▸ Gas ballast open.	✓ Close gas ballast.	[1]
	▸ Gas ballast cap porous or no longer present.	✓ Check gas ballast cap. ✓ Replace defective components.	[1]
Loud operating noises	▸ Loud exhaust noise. No hose connected to the outlet	✓ Connect the outlet line or silencer to the pump outlet.	[1]
	▸ Round-bottom flask not mounted at the outlet.	✓ Mount the round bottom flask at the outlet.	[1]
	▸ Diaphragm clamping disk loose.	✓ Maintain the diaphragm pump.	[2]
	▸ Ball bearing defective. ▸ The above causes can be ruled out.	✓ Send vacuum pump in for repair.	[3]
Pump seized.		✓ Send vacuum pump in for repair.	[3]

7 Cleaning and maintenance

DANGER

Danger from moving parts.

When open, moving pump parts are accessible.

⇨ Never operate the vacuum pump when it is open.

⇨ Ensure that the vacuum pump cannot start up unintentionally 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, wait 5 s for the condensers to discharge.

⇨ Ensure that the device is disconnected from the power supply before performing any work on it.

Hazard from contaminated components.

The conveyance of 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. Have the device decontaminated by a service provider if necessary.

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

IMPORTANT!

⇨ Do not operate defective or damaged vacuum pumps.

NOTE

Damage possible if work is performed incorrectly.

⇨ Have maintenance work performed by a trained professional or at least by a trained person.

⇨ 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.

7.1 Information on service work

All bearings are encapsulated and lubricated for life. The pump runs maintenance-free under normal load conditions. The valves and diaphragms as well as the motor capacitors are wear parts.

Regular maintenance increases both the service life of the vacuum pump and the protection for personnel and the environment.

⇨ Clean the pump chamber, diaphragm, and valves as soon as the pressure values achieved decrease and when there is increased operating noise. Check diaphragms and valves for damage.

⇨ Perform maintenance more frequently if corrosive or aggressive gases and vapors are being pumped or if deposits can form in the pump. Use operator experience as a guide.

Recommended maintenance intervals

Maintenance intervals

Maintenance intervals*	
▸ Clean surfaces	If required
▸ Clean the fan grilles	If required
▸ Replace diaphragm	after 15,000 operating hours
▸ Replace valves	after 15,000 operating hours
▸ Replace O-ring	after 15,000 operating hours
▸ Clean or replace molded PTFE hose	If required
▸ Replace motor capacitors	After 10,000–40,000 operating hours or when capacity decreases

** Recommended maintenance interval based on operating hours and intended use; depending on the environment and area of application, we recommend cleaning and maintenance as needed.*

IMPORTANT!

⇨ Always wear your personal protective equipment when performing activities that may bring you into contact with hazardous substances.

Prepare maintenance work

IMPORTANT!

⇨ Switch off the vacuum pump before starting maintenance work.
⇨ Disconnect the vacuum pump from the power supply, and ensure that it is free of voltage.
⇨ Disconnect the vacuum pump from the apparatus.
⇨ If necessary, disconnect the vacuum pump from the coolant circuit.
⇨ Vent the vacuum pump at the inlet to atmospheric pressure.
⇨ Allow the pump to cool down.
⇨ Empty the round bottom flasks.

Tools and spare parts required for maintenance

→ Example Tools and spare parts

No.	Replacement parts	
1	**Seal set**	
	Seal kit ME 2C NT	1x
	Seal kit ME 4C NT	1x
	Seal kit MZ 2C NT/PC 101 NT	1x
	Seal kit MD 4C NT/PC 201 NT/ME 8C NT +2AK	1x
	Seal kit ME 8C NT	1x

No.	Tools	Size
2	**Diaphragm wrench**	SW 66
3	**Flat nose pliers**	
	Close hose clips	
4	**Flat-head screwdriver**	
	Open hose clips; open film hinges	1
5	**Torx screwdriver**	
	Head cover hood; connection bracket; clamping brackets; terminal box cover; motor capacitors	TX20
	Counterhold of emission condenser	TX10
6	**Hex key**	
	Screw fasteners for head cover	5
7	**Torque wrench, adjustable 1.5–12 Nm**	

7.2 Cleaning

IMPORTANT!

This chapter does not describe how to decontaminate the product. Simple cleaning measures are described here.

⇨ Turn off the vacuum pump before starting cleaning.

⇨ Disconnect the vacuum pump from the power supply, and ensure that it is free of voltage.

⇨ Allow the pump to cool down.

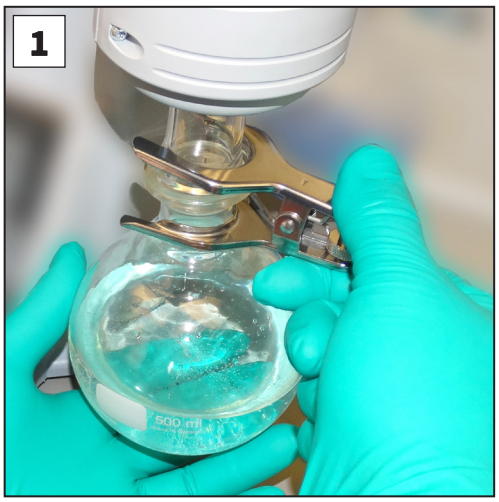
7.2.1 Clean surface

Clean soiled surfaces with a clean, slightly damp cloth. We recommend water or a mild soap solution to moisten the cloth. Allow the pump to dry completely before restarting it.

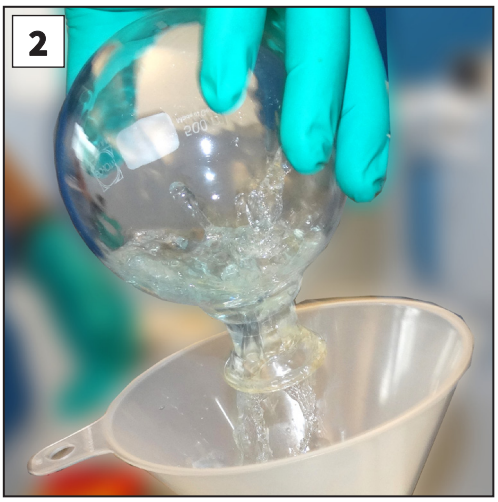
7.2.2 Empty round -bottom flask

Remove the round bottom flask and empty it.

→ *see also Section 5.2.4 Operation with condensate formation on page 62.*



1. Hold the round bottom flask, and loosen the ground glass joint clip. Remove the round bottom flask.



2. Empty the round bottom flask into a suitable container (e.g., chemical-resistant canister).

3. Then secure the round bottom flask again with the ground glass joint clip.

Depending on the application, the liquid collected can either be recovered or must be disposed of properly.

7.2.3 Clean or replace PTFE hoses

Maintenance provides the opportunity to check the components of the Diaphragm pump, including the tubing.

⇨ Clean the inside of very dirty molded hoses (e.g., using a pipe cleaner or similar).

⇨ Replace cracked or defective molded hoses.

7.3 Maintenance of the diaphragm pump

Diaphragm replacement
Valve replacement

The diaphragm replacement and valve replacement can be performed separately.

⇨ The valve heads and wiring components do not need to be dismantled to replace the diaphragm. Completely remove the head covers, including the valve heads and interconnections.

⇨ To replace the valves, completely remove the head cover, including the valve heads and connections, from one side of the pump Place the head covers flat on the work surface to change the valve.

⇨ Carry out maintenance on pump heads in succession.

Even though the diaphragm and valve can be replaced independently of each other, VACUUBRAND recommends always performing both maintenance steps when servicing the diaphragm pump.

IMPORTANT!

⇨ Some of the figures show pumps in other versions. This does not affect the diaphragm and valve replacement. The diaphragm and valve replacement is described using an MD 4C NT as an example.

Maintenance is simplified by dividing the work into separate steps.

⇨ First replace the diaphragms on one pump head/pair of pump heads.

⇨ Change the inlet/outlet valves next.

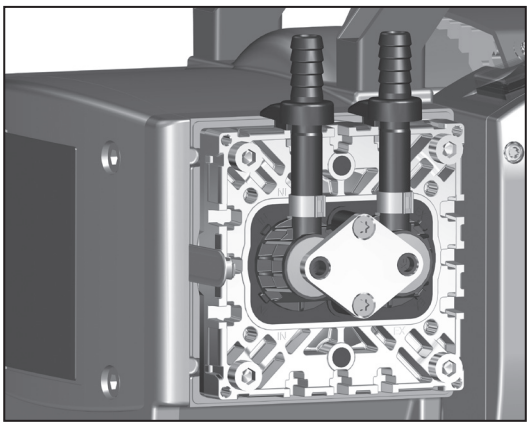
⇨ Perform these activities on the opposite pump head/pump head pair.

7.3.1 Connections and tubing

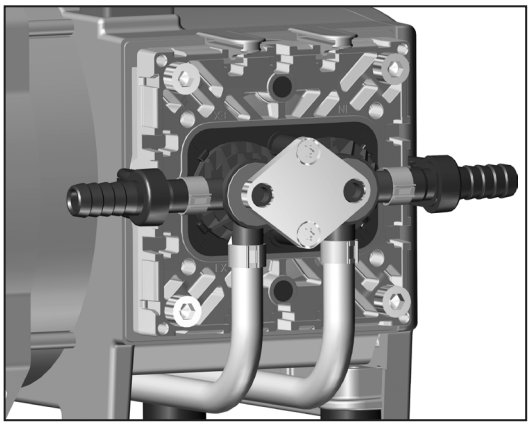
Connections and tubing for the individual pump types

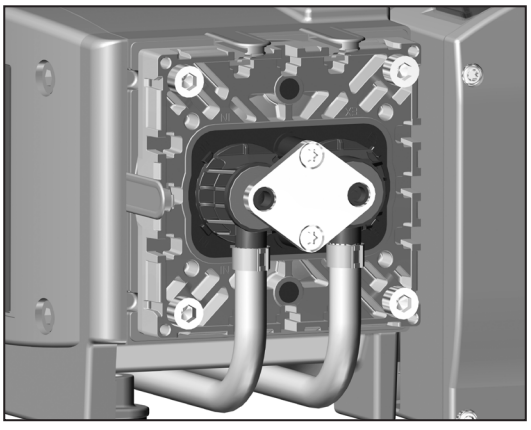
The following figures show the pump heads, including the connections and tubing, of the different diaphragm pump types. Both sides of the pump are shown (except for ME 2C NT). The head cover hoods are hidden. When performing maintenance, refer to the figures for your pump type.

ME 2C NT

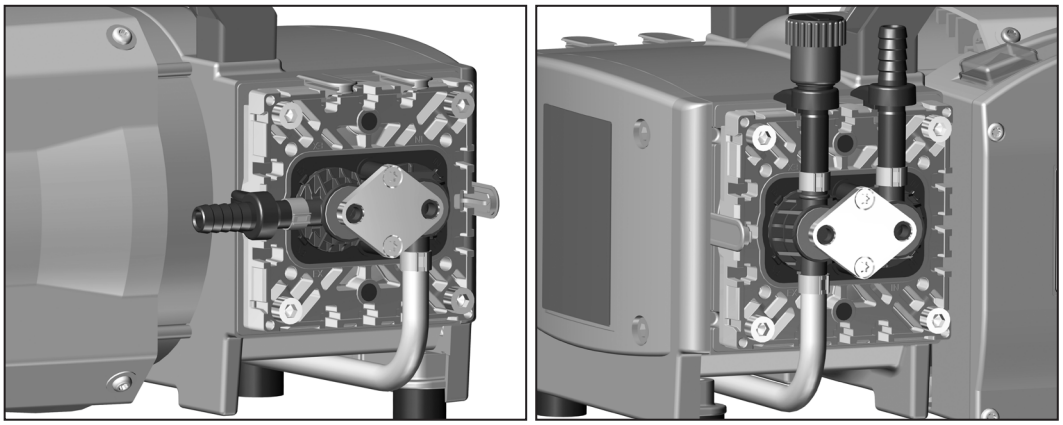


ME 4C NT

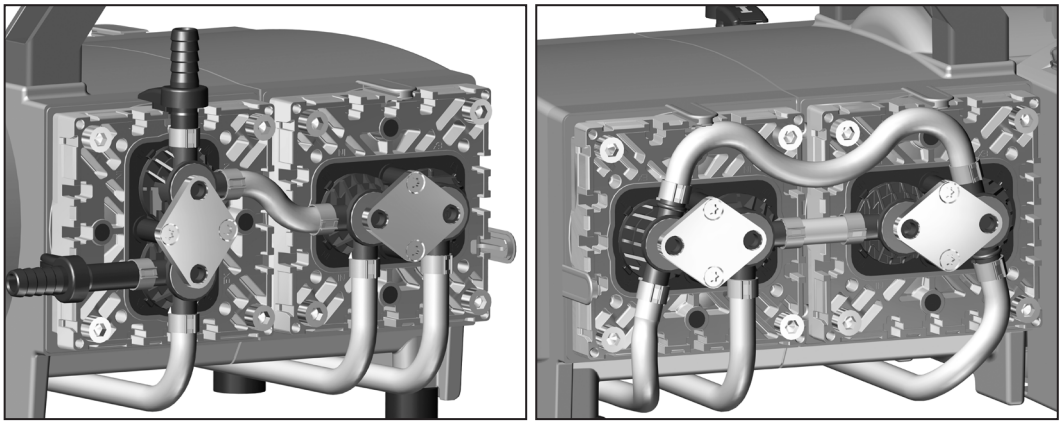




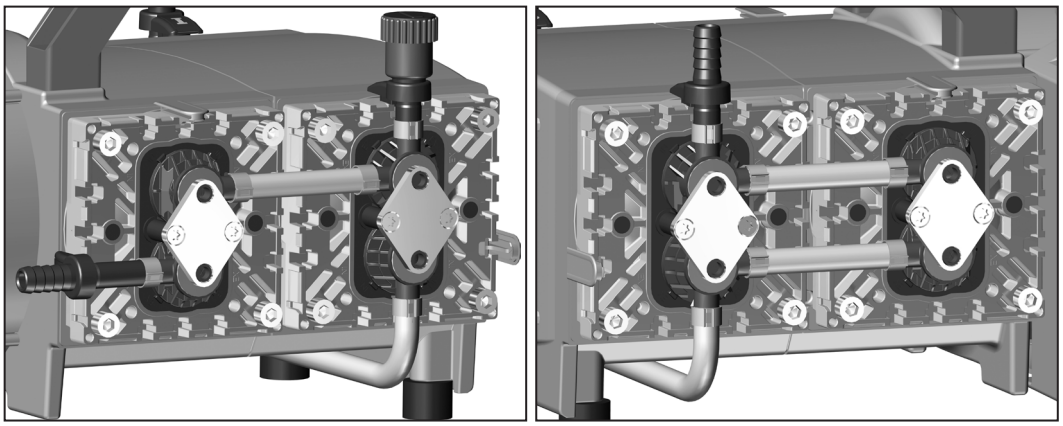
MZ 2C NT



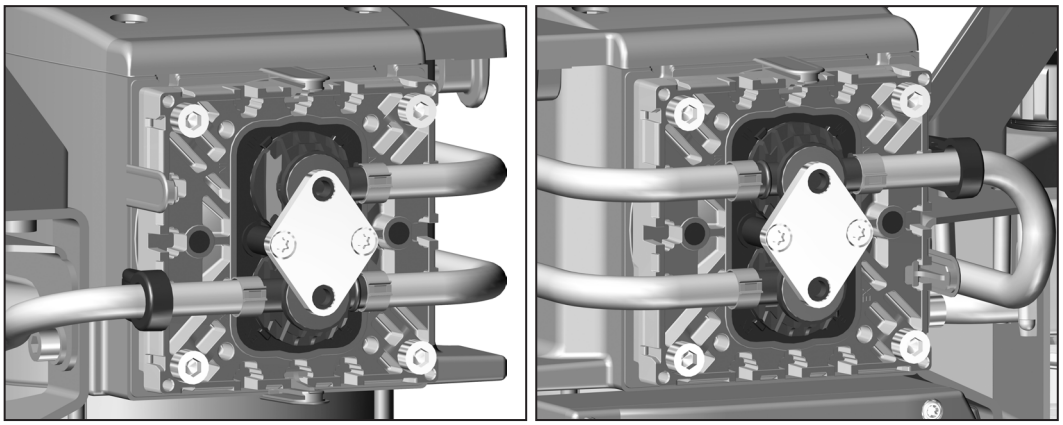
ME 8C NT



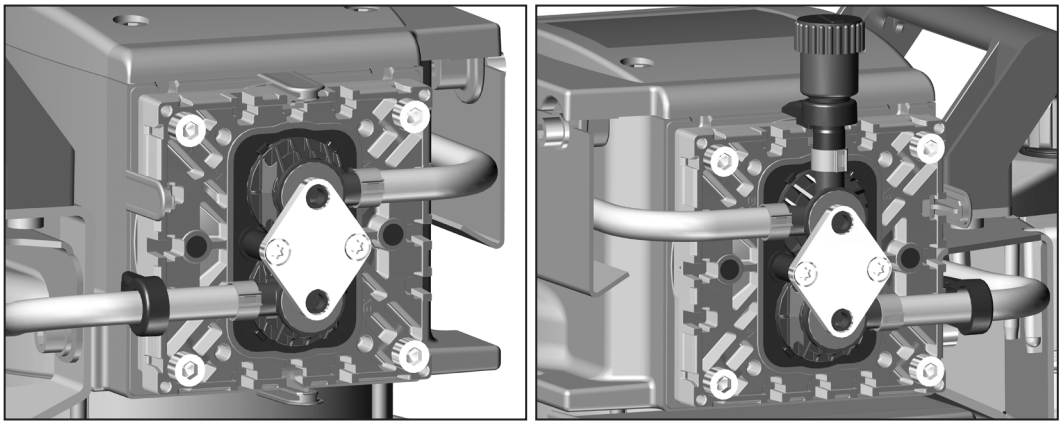
MD 4C NT



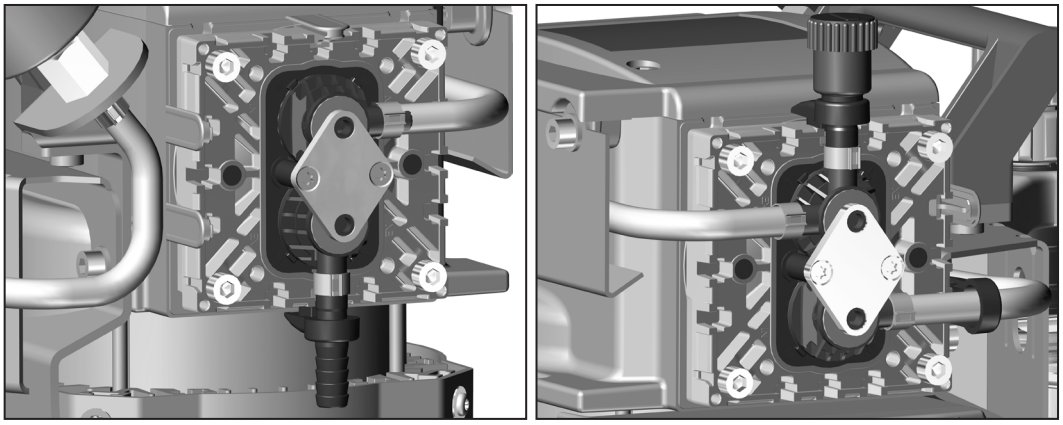
ME 4C NT +2AK



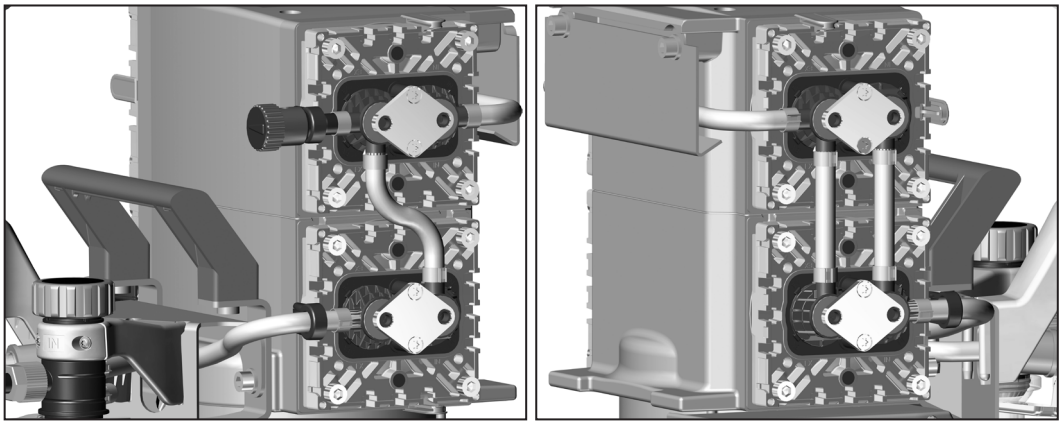
MZ 2C NT +2AK/MZ 2C NT +AK+EK/PC 101 NT
MZ 2C NT +AK SYNCHRO+EK



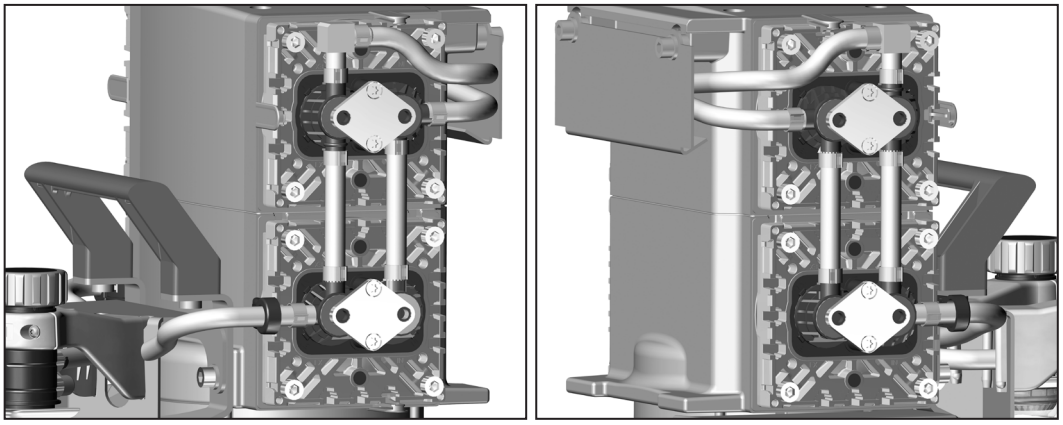
MZ 2C NT +AK+M+D



MD 4C NT +2AK/MD 4C NT +AK+EK/PC 201 NT MD 4CNT +AK SYNCHRO+EK

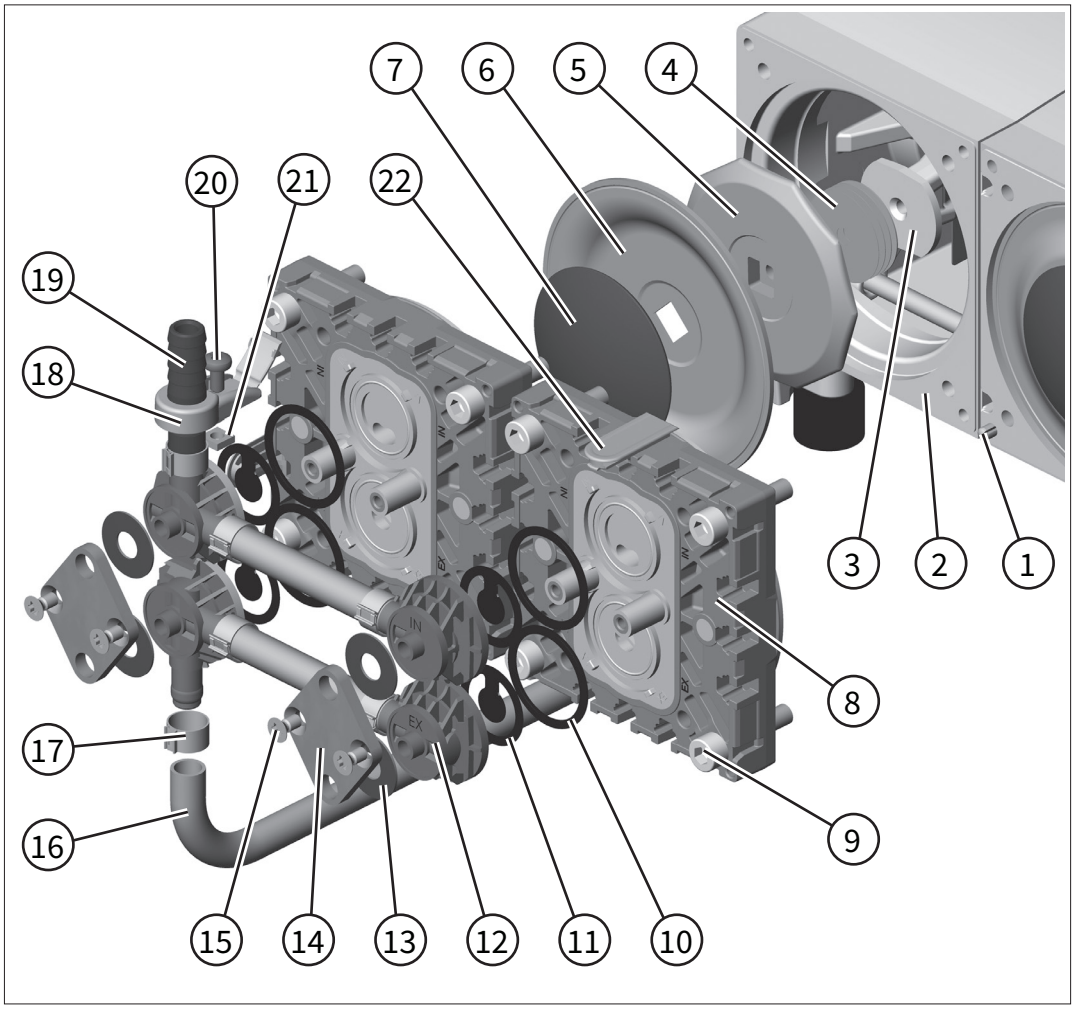


ME 8C NT +2AK



7.3.2 Exploded view of pump head (example)

Exploded view of pump head
→ Example MD 4C NT

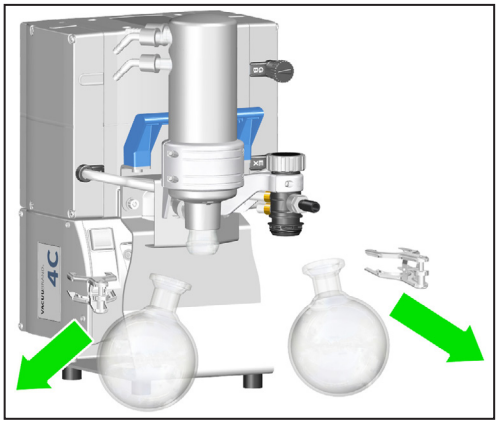


No.	Meaning
1	Cylinder pin/marking
2	enclosure
3	Connecting rod
Maintenance of diaphragm	
4	Spacers
5	Diaphragm support disk
6	Diaphragm
7	Diaphragm clamping disk with square-head screw
8	Head cover
9	Cylinder screw
Valve maintenance	
10	O-ring
11	Valve
12	Valve head

13	Disk spring
14	Clamping brackets
15	Countersunk screw
16	Connecting hose
17	Hose clip
18	Connection bracket with film hinge
19	Hose nozzle
20	Fillister head screw
21	Square nut
22	Panel

7.3.3 Preparatory activities

Remove round bottom flask



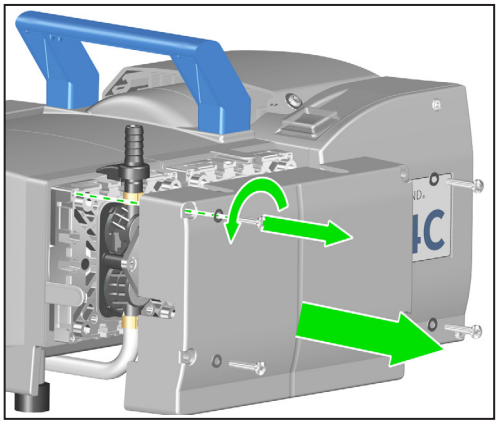
⇨ For pumps with AK or EK, remove the round bottom flasks at the inlet and outlet of the vacuum pump.

Remove head cover hood

→ Example Remove head cover hood

The side head cover hoods cover the pump heads of the vacuum pump. Depending on the pump type, the head cover hood encloses one or two adjacent pump heads.

TX 20



⇨ Remove the four screws on the head cover hood using a TX20 Torx screwdriver.

⇨ Pay attention to the washers under the screws and remove these as well.

⇨ Carefully remove the head cover hood. Avoid tilting the head cover hood.

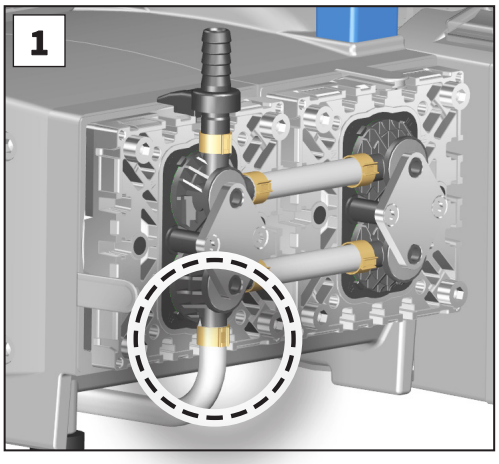
Loosen hose connections

→ Example Loosen hose connections

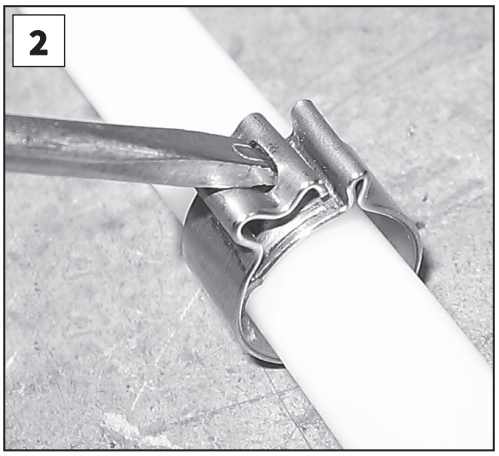
The pump heads on both sides of the pump are connected to each other via PTFE tubing. In vacuum systems, PTFE hoses run from the pump head to the inlet and outlet of the vacuum pump. For maintenance of the diaphragm pump, these hose connections must be loosened on the valve heads .

For four-cylinder pumps, the connecting hose between the two pump heads on one side of the pump does not need to be disconnected. There, both head covers can be removed together with the connecting hose.

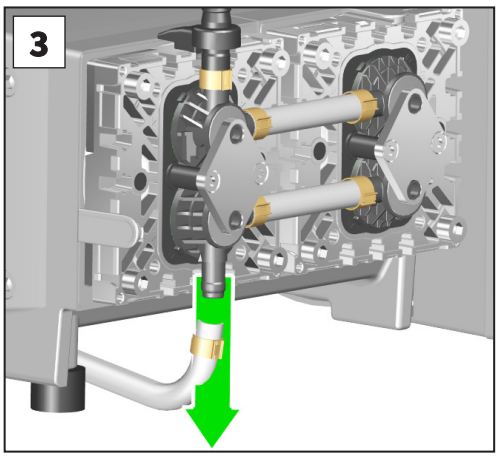
⛔ Size 1



1. Open the hose clip on the valve head; flat-head screwdriver.



2. Place the screwdriver as shown and turn it.

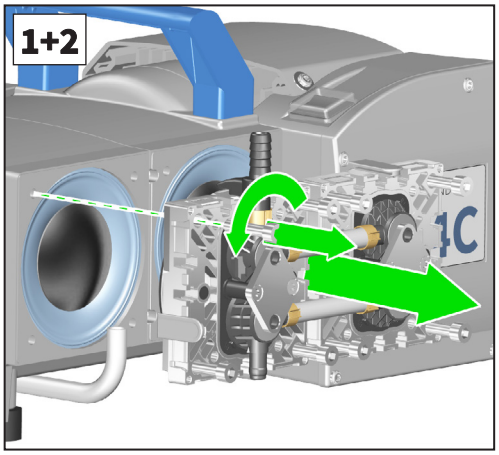


3. Remove the hose from the valve head.

7.3.4 Diaphragm replacement

Remove diaphragm

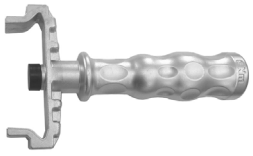
Size 5
→ Example Diaphragm replacement

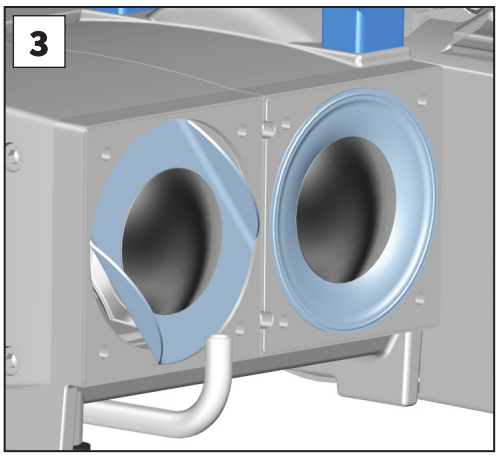


1. Remove the cylinder screws on the head cover (eight screws for two head covers on each side of the pump, four screws for one head cover on each side of the pump); Allen wrench size 5.
2. Completely remove the head covers, including the valve heads and interconnections.

⇨ Check the diaphragms for damage and contamination. Replace damaged or dirty diaphragms.

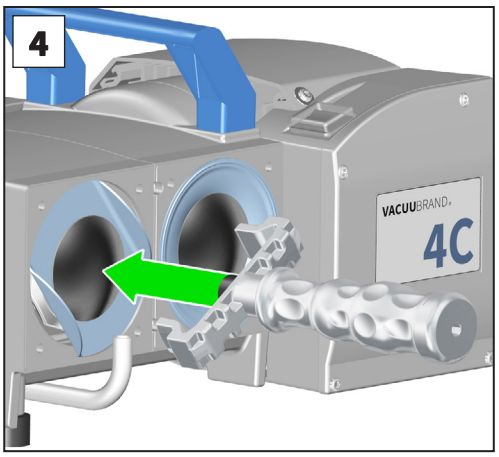
⇨ Check the head covers for contamination. Clean soiled surfaces carefully.



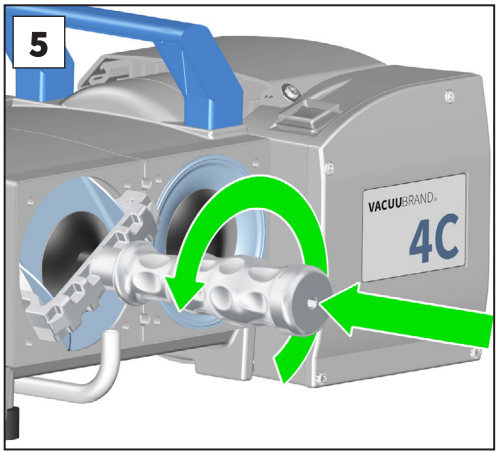


3. Carefully fold up the diaphragm at the sides.

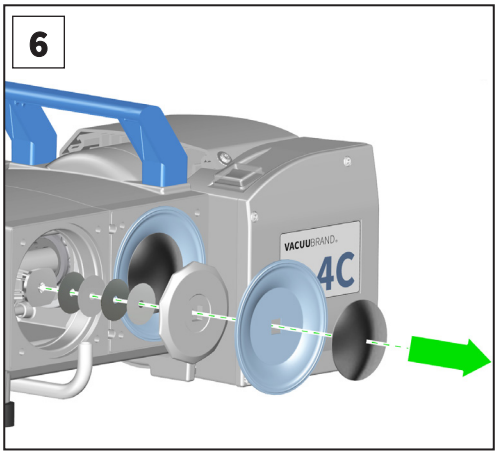
⇨ Do not use sharp or pointed tools to lift the diaphragm.



4. Use the diaphragm wrench to reach under the diaphragm to the support disk.



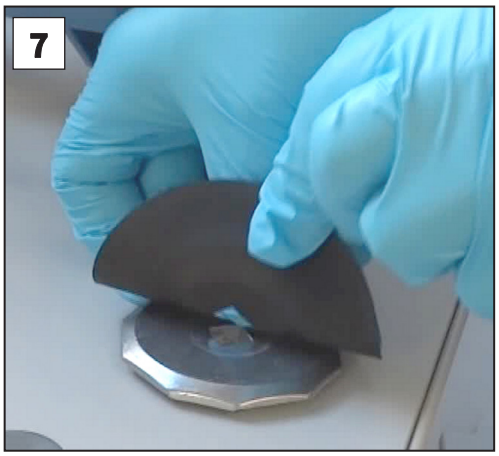
5. Loosen the diaphragm support disk using the diaphragm wrench. Unscrew the diaphragm support disk together with the diaphragm and the diaphragm clamping disk.



6. Pay attention to any spacers that may be present between the diaphragm support disk and the connecting rod.
⇨ Keep the spacers separate for each pump head.

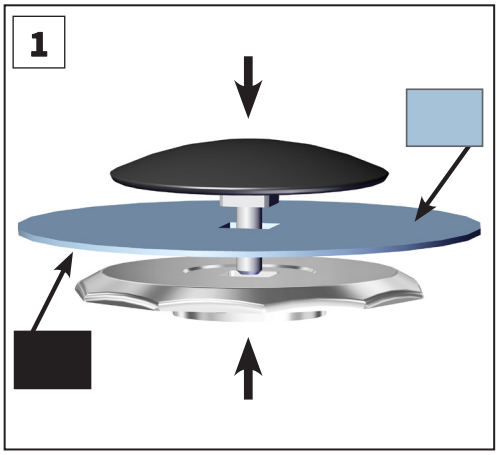
IMPORTANT!

⇨ If there are any spacers stuck to the connecting rod, carefully remove them.
⇨ Do not drop any spacers into the housing.
⇨ Keep the spacers. These must be reinstalled in the respective pump head in the same number and with the same thickness.

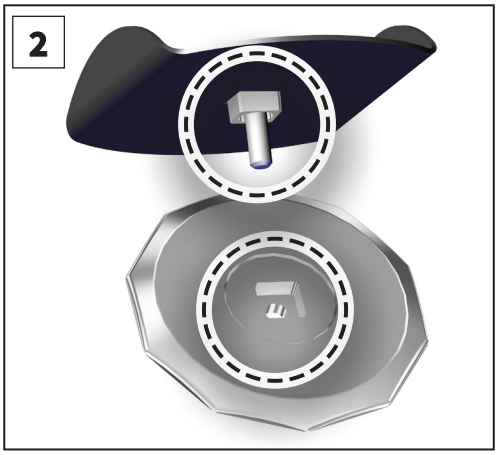


7. Remove the old diaphragm from the diaphragm support disk.
⇨ Use a soft-faced mallet or compressed air if the old diaphragm is difficult to separate from the diaphragm support disk.

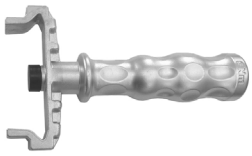
Install diaphragm

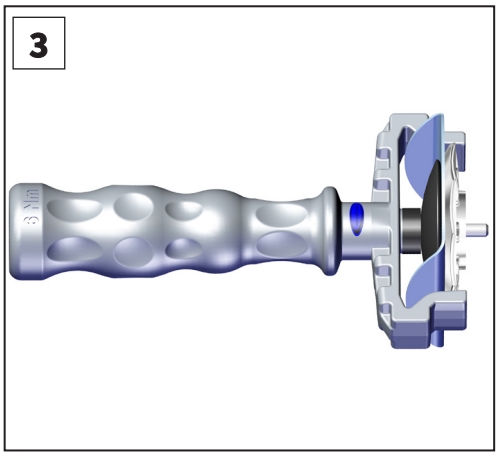


1. Place the new diaphragm between the diaphragm clamping disk and the diaphragm support disk.
⇨ Insert the diaphragm with the light-colored side facing the diaphragm clamping disk.

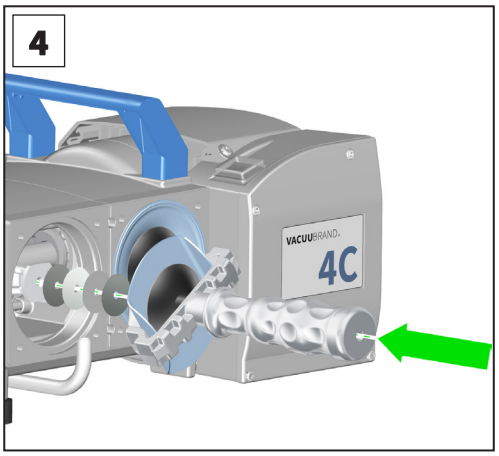


2. Ensure that the square connection screw of the diaphragm clamping disk is correctly positioned in the guide of the diaphragm support disk.





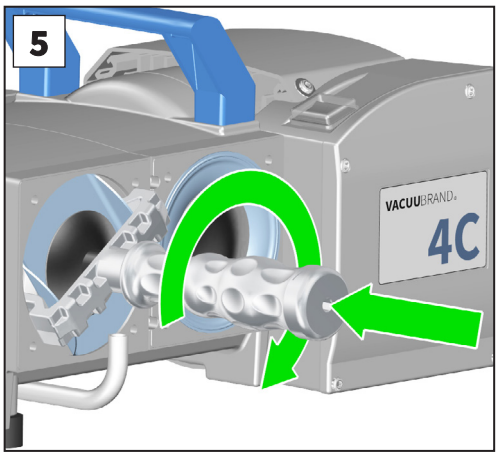
3. Carefully lift the diaphragm up at the sides. Insert the diaphragm together with the diaphragm clamping disk and the diaphragm support disk into the diaphragm wrench.
⇨ Avoid damaging the diaphragm. Do not bend the diaphragm too much.



4. Screw the diaphragm clamping disk, the diaphragm, the diaphragm support disk, and, if necessary, the spacers to the connecting rod.
⇨ Ensure that the correct number of spacers is used.

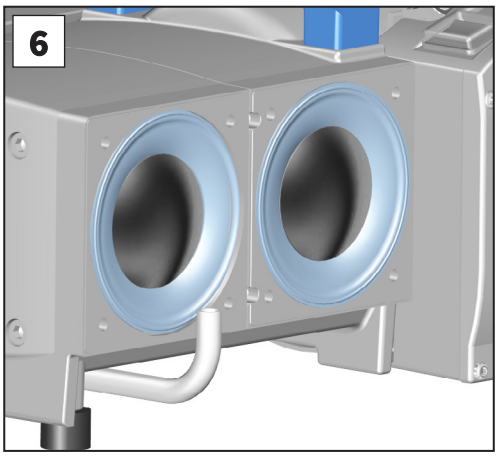
IMPORTANT!

⇨ Insufficient spacers: pump does not reach ultimate vacuum.
⇨ Too many spacers: the pump will bottom out, thereby causing noise.



5. Tighten the diaphragm to the **optimal torque** of **6 Nm**. Use a torque wrench that you can attach to the diaphragm wrench (hexagon size 6).

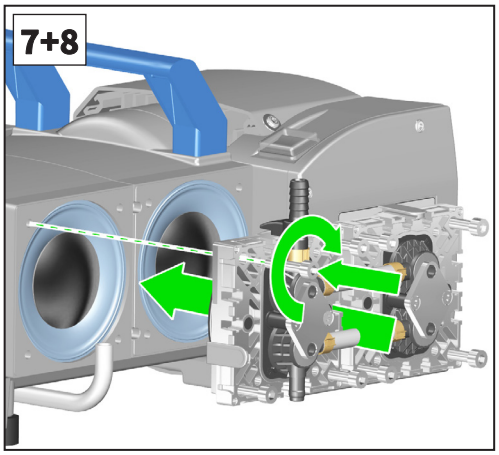
⇨ Never use additional tools (e.g., pliers or Allen wrench) without torque control.

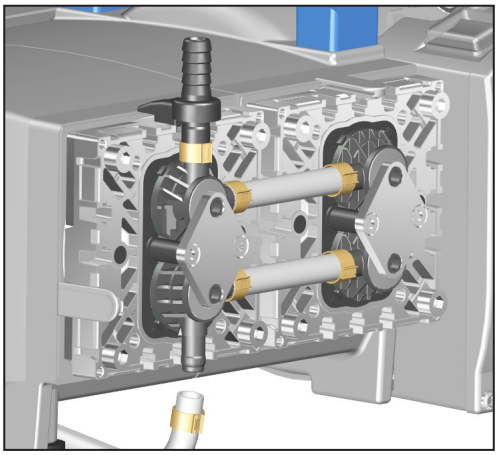


6. Position the diaphragms so that they lie centrally and flat in the contact surface of the housing opening.

⇨ If you then want to replace the valve, continue with Section *7.3.5 Valve replacement on page 87*.

Size 5





7. Put on the head covers with the valve heads and the interconnections. Note the correct position of the head covers;
→ *see Section 7.3.1 Connections and tubing on page 75.*

8. First, hand-tighten the cylinder screws in a staggered diagonal sequence. Then tighten the screws in the same diagonal sequence to the **specified torque** of **12 Nm** using a size-5 hexagon socket.

☑ Diaphragm replaced.

7.3.5 Valve replacement

Valve replacement after prior diaphragm replacement:

⇨ Place the head cover of one side of the pump, including the valve heads and interconnections, flat on the work surface.

Valve replacement without prior diaphragm replacement:

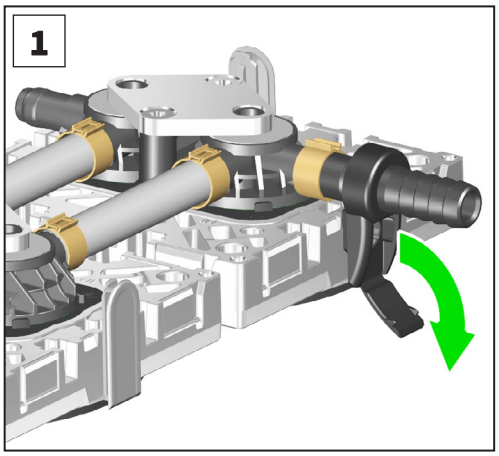
⇨ Carry out **Steps 1 and 2** in Section *Remove diaphragm on page 83* . Then place the head cover of one side of the pump, including the valve heads and interconnections, flat on the work surface.

Remove valves

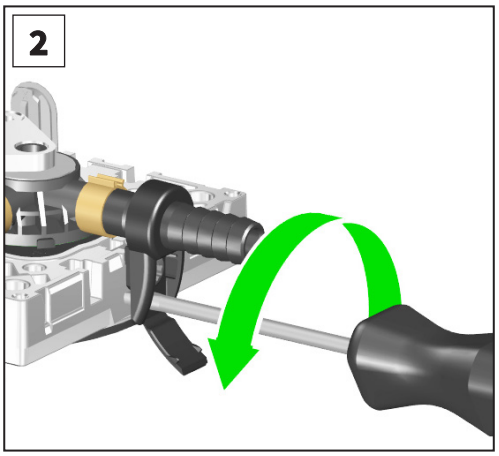
Size 1

TX 20

→ Example Valve replacement



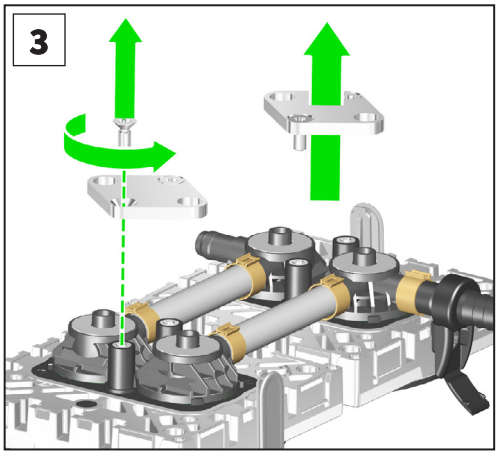
1. Open the film hinges of the connection brackets using a size 1 flat-head screwdriver.



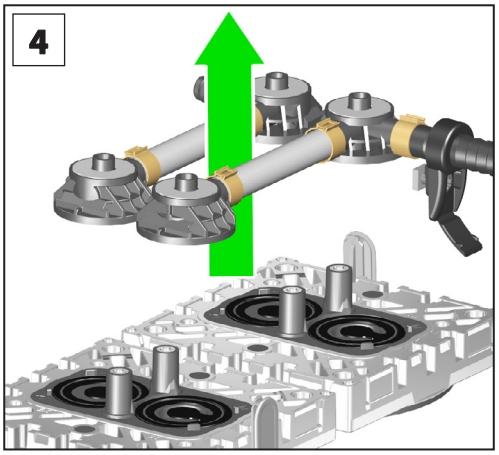
2. Slightly loosen the connection bracket by loosening the fillister head screw by a maximum of one turn using a TX20 Torx screwdriver.

⇨ Do not unscrew the fillister head screw from the square nut.

TX 20

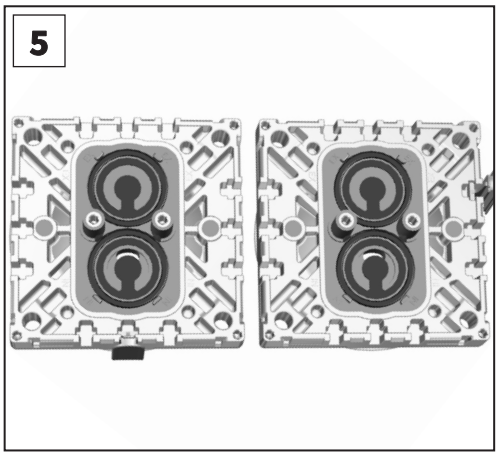


3. Loosen two countersunk screws at a time, and remove the clamping brackets using a TX20 Torx screwdriver.

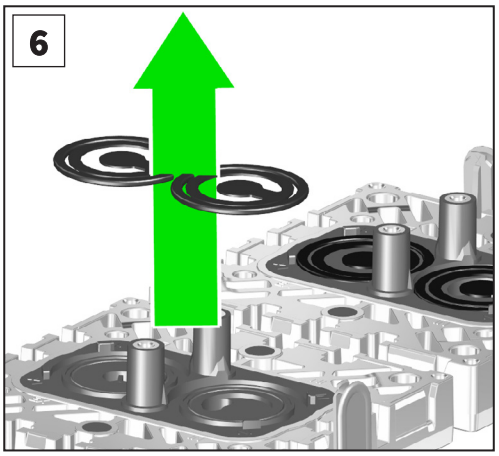


4. Completely remove the valve heads together with the disk springs and, if present, the connecting hose and connection bracket.

⇨ Note the position and orientation of the valve heads.



5. Pay attention to the position of the valves.



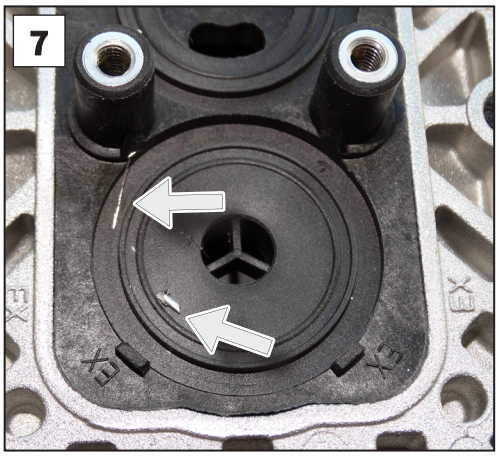
6. Carefully remove the valves and O-rings.

NOTE

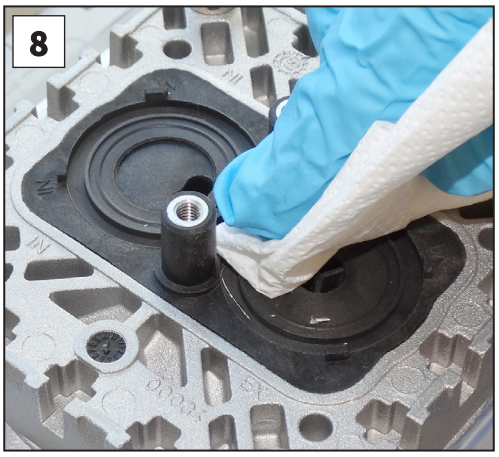
⇨ Valves can adhere to the underside of a valve head.

⇨ Depending on the pump type, the valve material is either PTFE (white) or FFKM (black).

⇨ Check valves and O-rings for damage and contamination. Replace damaged or dirty valves and O-rings.

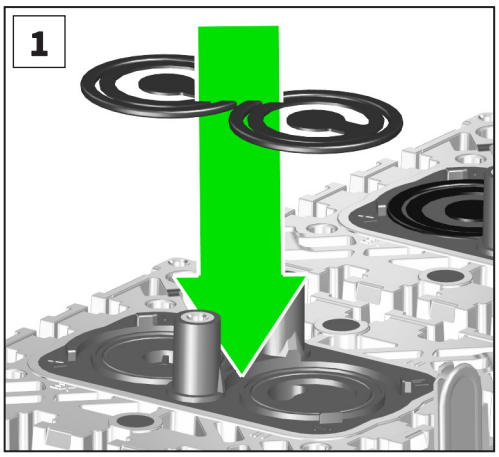


7. Check the surfaces for contamination.



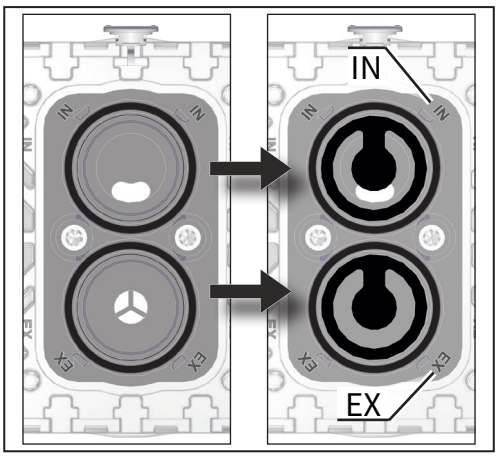
8. Clean soiled surfaces carefully.

Insert valves



1. Insert the O-rings and valves.

⇨ Ensure that the valves are in the correct position.



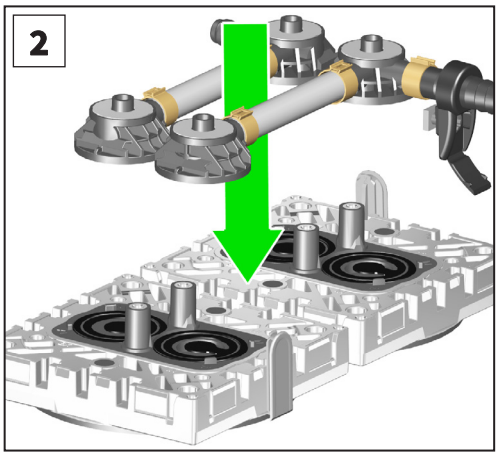
Correct positioning of the valves:
IN = Inlet (inlet)
EX = Exhaust (outlet)

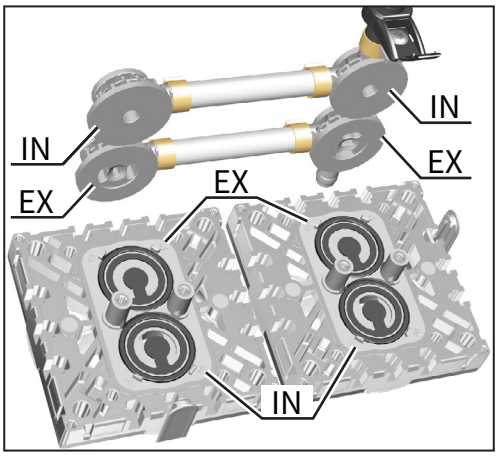
Correctly insert valves

NOTE

⇨ **Inlet side (IN)**: Identified by the designation **“IN”** next to the valve seat. The valve tongue points to the kidney-shaped opening in the valve seat.

⇨ **Exhaust side (EX)**: Identified by the designation **“EX”** next to the valve seat. The valve is in the same orientation as the inlet valve.





2. Place the valve heads together with the connecting hose and connection bracket if necessary. Center the valve heads on the valve seat.

⇨ The valve head must lie flat within the noses of the valve seat.

⇨ Ensure that the valve heads are correctly aligned:

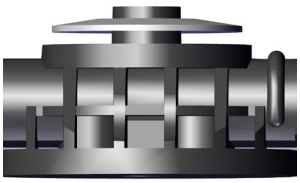
IN = Inlet (inlet)

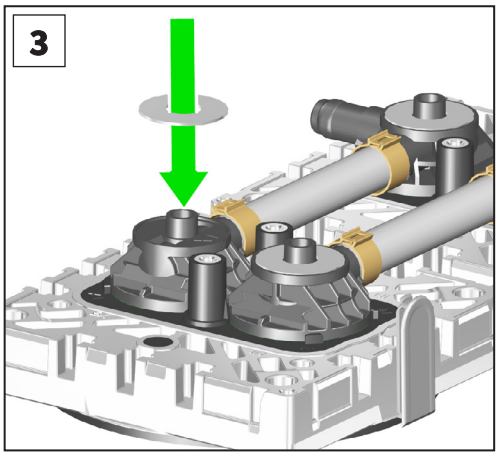
EX = Exhaust (outlet)

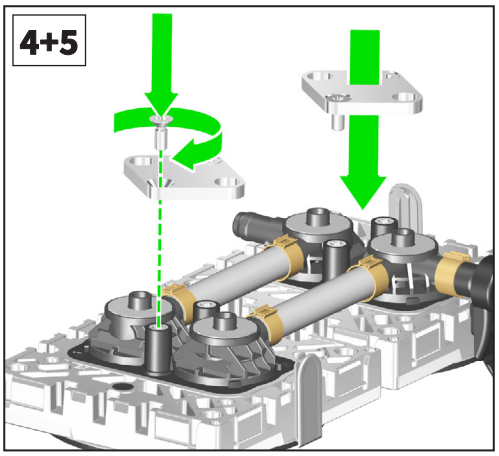
→ *See also Section:7.3.1 Connections and tubing on page 75*

NOTE

⇨ **Valve head with connection bracket**: Insert the square nut of the connection bracket into the groove in the head cover.





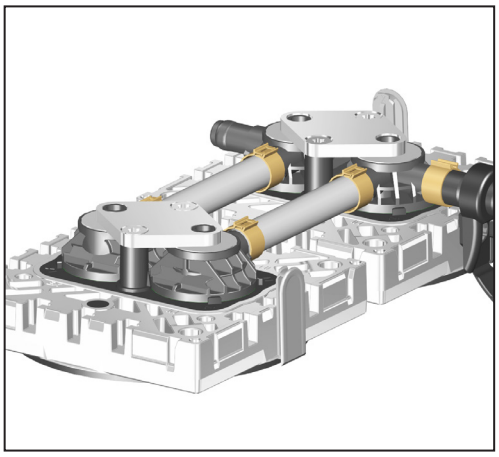


3. Place the disk springs on the valve heads with the convex side facing up.

4. Place the clamping brackets on the valve heads. Align the countersunk holes with the threaded domes.

TX 20

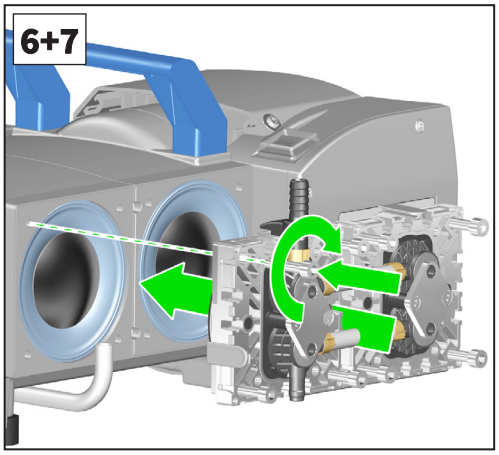
5. Lightly tighten the two countersunk screws. If necessary, correct the alignment of the valve heads. Then tighten the screws to the **optimal torqueof 3 Nm** using a TX20 Torx screwdriver.

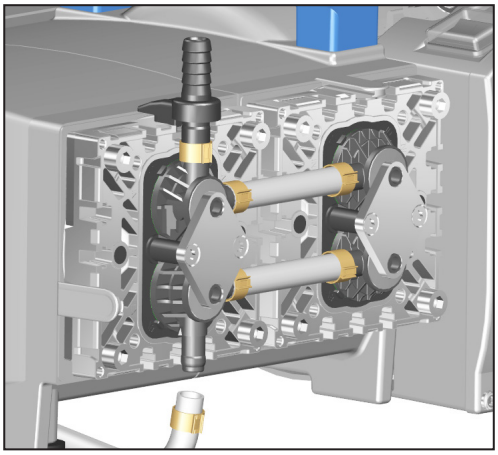


☑ Valve replaced

⇨ If you then wish to replace the diaphragm, continue with Section *7.3.4 Diaphragm replacement on page 83*.

Size 5

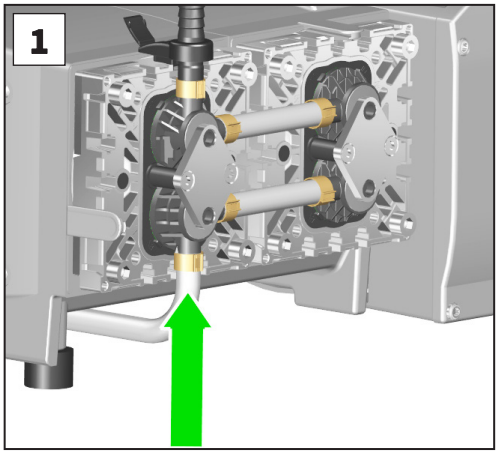




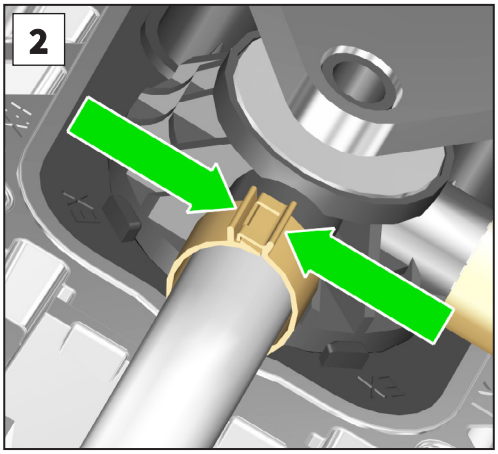
6. Put on the head covers with the valve heads and the interconnections. Note the correct position of the head covers;
   → *see Section 7.3.1 Connections and tubing on page 75.*
7. First, hand-tighten the cylinder screws in a staggered diagonal sequence. Then tighten the screws in the same diagonal sequence to the **specified torque** of **12 Nm** using a size-5 hexagon socket.

7.3.6 Final steps

Install head cover hood

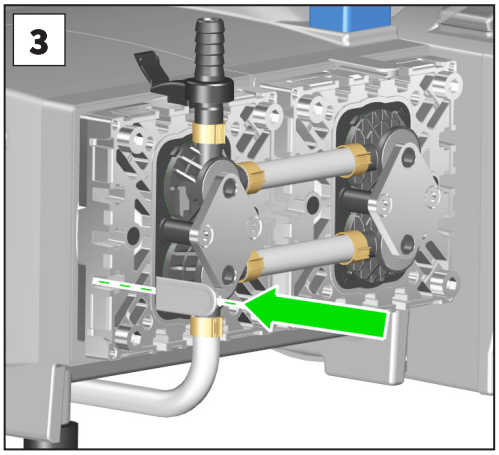


1. Push the hose and hose clip onto the hose connection of the valve head until they stop.

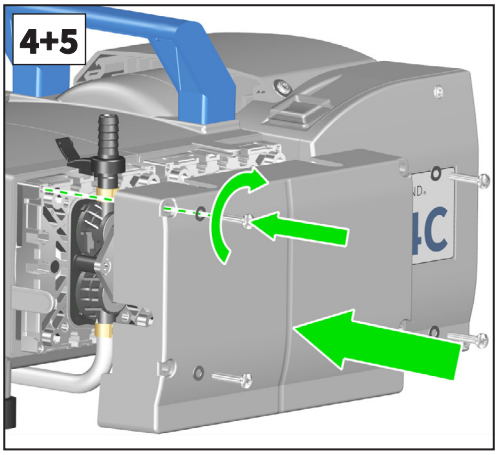


2. Close the hose clip (e.g., with flat nose pliers).

TX 20



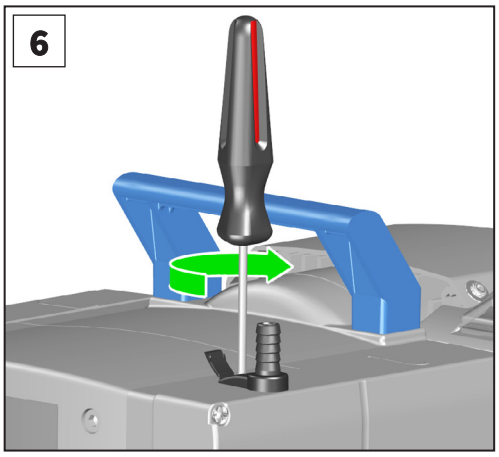
3. Insert the covers into the grooves on the head cover.



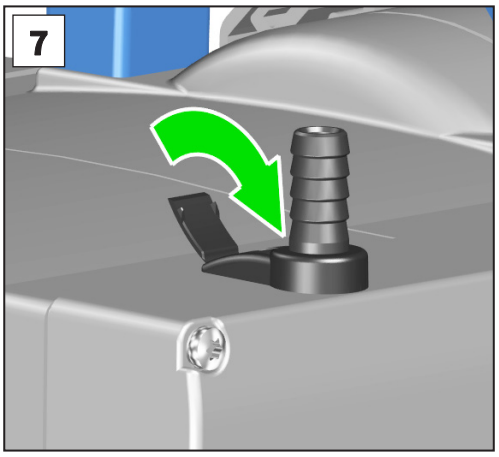
4. Place head cover hood. Push the head cover hood into the grooves of the panels and under the connection brackets.

5. Place the washers on the fastening screws of the head cover hood, and tighten the four screws using a TX20 Torx screwdriver.

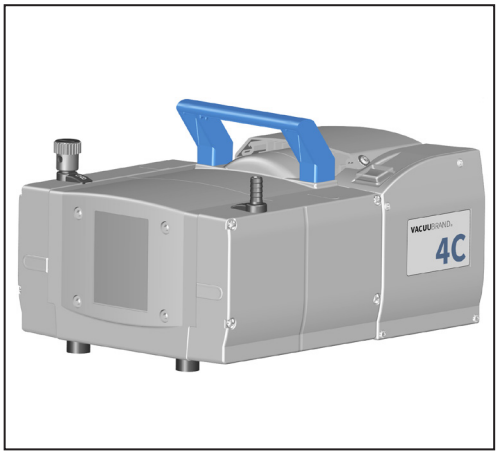
TX 20



6. Tighten the fillister head screw on the connection bracket using a TX20 Torx screwdriver.



7. Close the film hinges of the connection brackets.

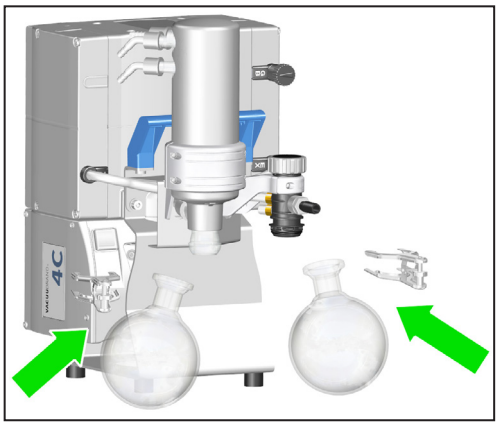


☑ diaphragm and valve replacement performed on one side of the pump

IMPORTANT!

⇨ Replace the diaphragm and valve on the opposite side of the pump in the same manner.

Install round bottom flasks



⇨ For pumps with AK or EK, attach the round bottom flask to the inlet and outlet of the vacuum pump using the ground glass joint clips.

Check ultimate vacuum

IMPORTANT!

⇨ Always check the ultimate vacuum of the pump after working on it.
This is absolutely essential because only when the specified ultimate vacuum of the pump is reached can a low leak rate of the pump be ensured, thereby preventing explosive mixtures from forming inside the pump.

Check ultimate vacuum
Observe run-in time

After a diaphragm or valve replacement, the vacuum pump reaches the specified value of the ultimate vacuum only after a running-in period of several hours.

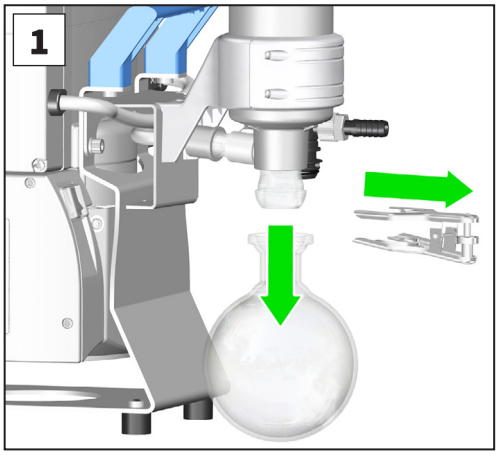
⇨ If you hear any unusual noises, immediately switch off the pump, and check the position of the clamping disks.

⇨ If the ultimate vacuum achieved remains far from the specified value even after the run-in time:

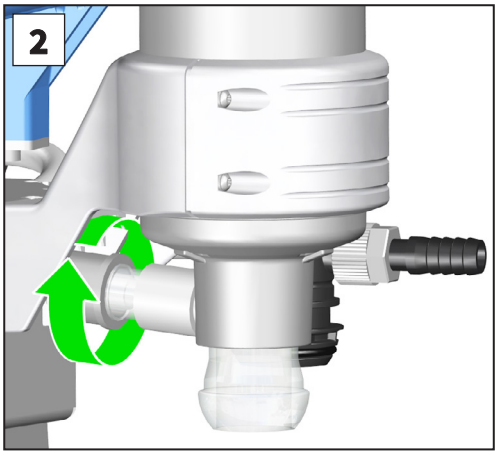
- Check the fastenings of the connecting hoses to the valve heads.
- Check the fit of the valves and O-rings under the valve heads.
- Check the pumping chambers again (diaphragms, diaphragm clamping disks, and head covers).

7.3.7 Replace pressure relief valve on EK

Replace pressure relief valve on emission condenser

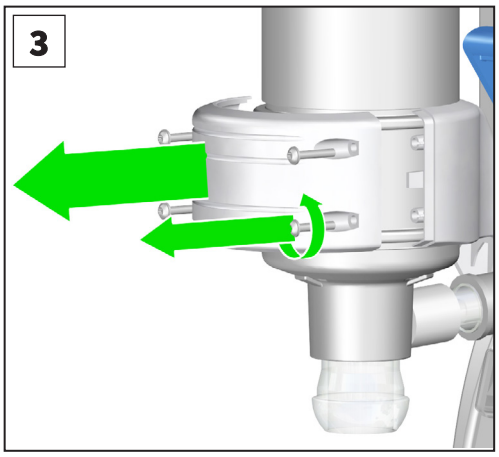


1. Hold the round bottom flask, and loosen the ground glass joint clip. Remove the round bottom flask.

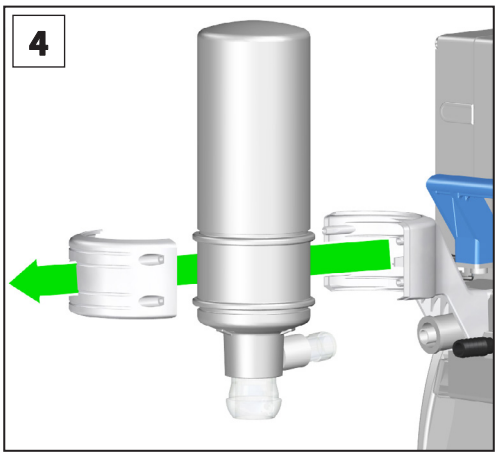


2. Loosen the union nut on the gas inlet of the EK.

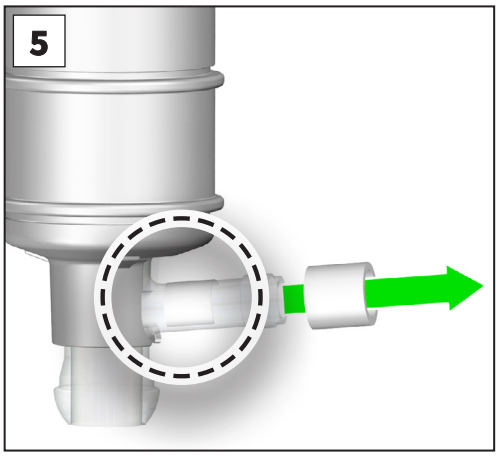
TX 10



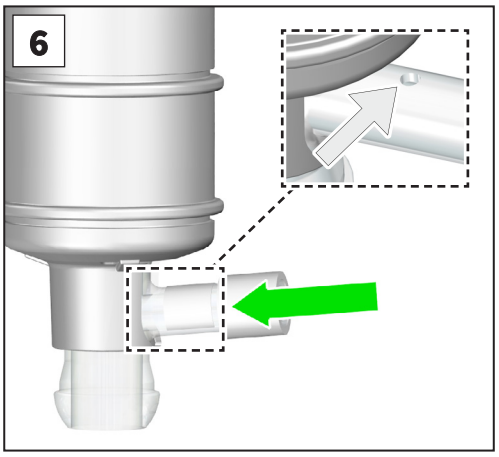
3. Loosen the four screws on the counterhold of the EK using a TX10 Torx screwdriver.



4. Remove the counterhold and the emission condenser. While doing so, pull the PTFE hose out of the inlet of the EK.

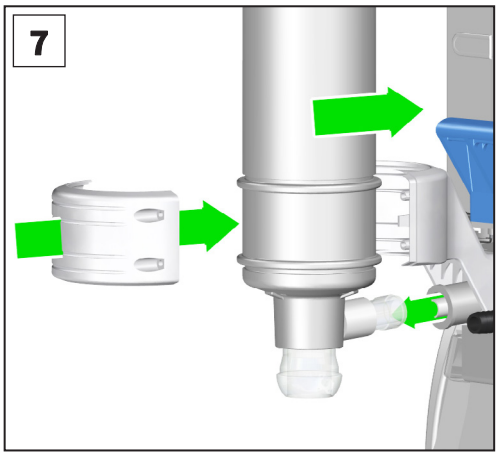


5. Remove the old pressure relief valve. Ensure that the PTFE film beneath the pressure-relief valve is correctly positioned.

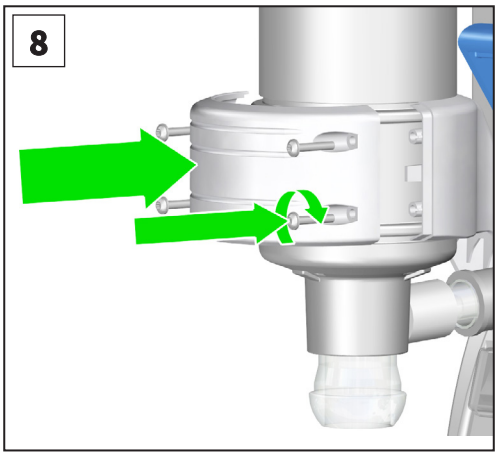


6. Install the new pressure relief valve. Ensure that the PTFE film beneath the pressure-relief valve is correctly positioned. The PTFE film must cover the small round opening in the inlet pipe of the EK.

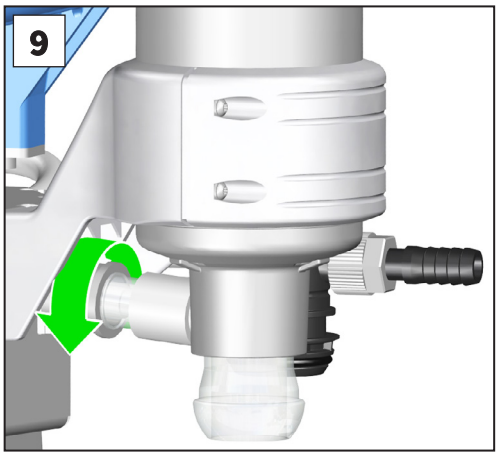
TX 10



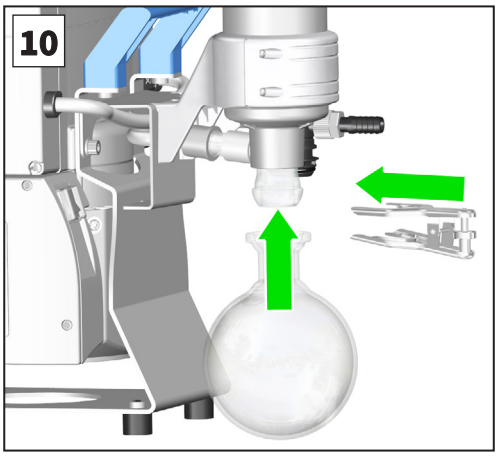
7. Mount the EK and the counterhold to the holder of the EK. Insert the PTFE hose into the inlet of the EK.



8. Screw the counterhold to the holder of the EK using four screws, Torx screwdriver TX10.



9. Hand-tighten the union nut on the gas inlet of the EK.



10. Attach the round bottom flask to the outlet of the vacuum pump using the ground glass joint clip.

☑ Pressure relief valve on EK replaced

7.3.8 Replace motor capacitors

Depending on the operating conditions (e.g., ambient temperature, humidity, and motor load), motor capacitors typically have a service life of 10,000–40,000 operating hours.

Check motor capacitors

WARNING

Damage caused by outdated motor capacitors

An aged capacitor can become hot and may melt. In rare cases, a flame may be emitted. This can pose a danger to personnel and the surrounding area.

⇨ Regularly check the capacitors in the vacuum pump terminal box.

⇨ Measure the capacitance of the capacitors, and estimate the operating hours.

⇨ Replace overaged capacitors.

IMPORTANT!

⇨ Work on the terminal box must be carried out by a qualified electrician.

⇨ After replacing the motor capacitors, perform an electrical safety check of the vacuum pump in accordance with IEC 61010 and national regulations.

DANGER

Hazard from electrical voltage.

Even after the vacuum pump has been switched off and disconnected from the power supply, the motor capacitors in the terminal box may still be charged. There is a risk of electric shock.

⇨ Turn off the vacuum pump.

⇨ Disconnect the power plug.

⇨ Motor capacitors have a discharge time of up to **5 s**. After unplugging the power cord, wait at least 5 s before opening the terminal box cover.

⇨ Ensure that there is no voltage.

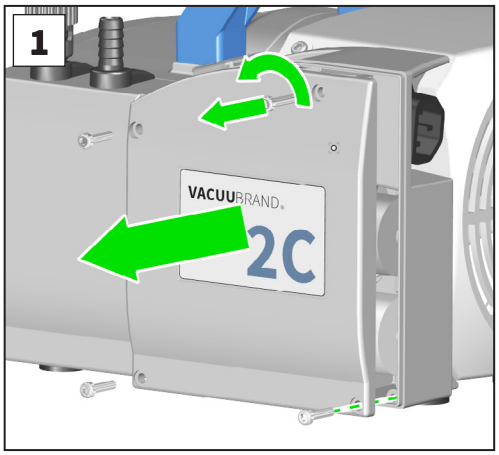
IMPORTANT!

⇨ Motor capacitors are available as spare parts upon request. Be sure to include the serial number of the vacuum pump in your inquiry.

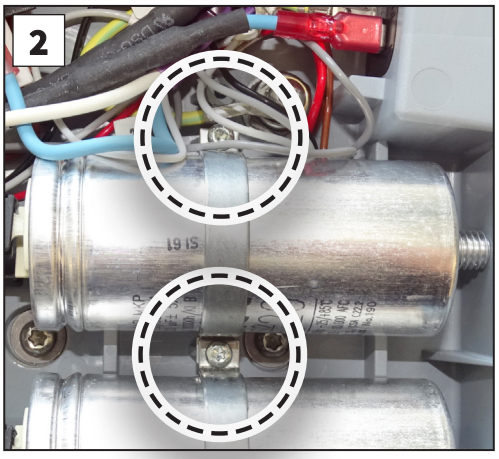
Replace motor capacitors

TX 20

→ Example MZ 2C NT

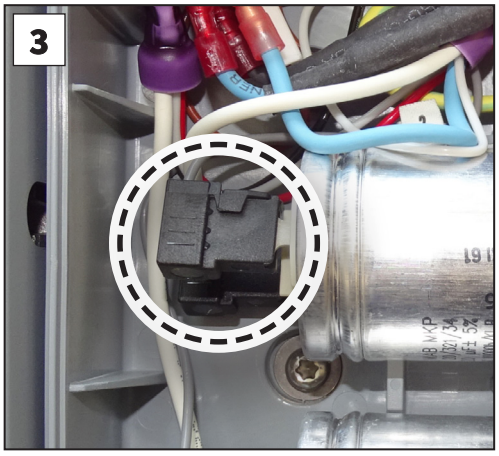


1. Loosen the four screws on the terminal box cover using a TX20 Torx screwdriver. Remove the terminal box cover.

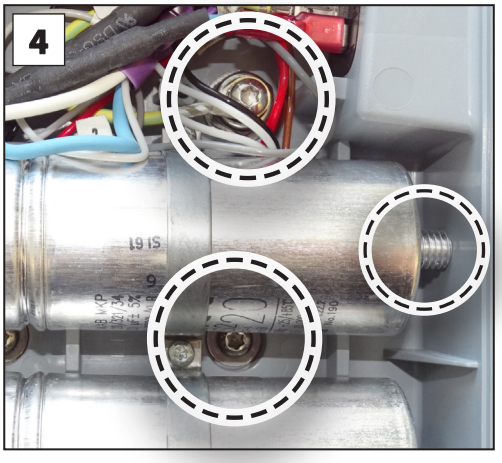


2. Unscrew the clamp that secures the motor capacitor in the terminal box.

TX 20



3. Disconnect both plugs from the old motor capacitor, and connect the plugs to the new capacitor.

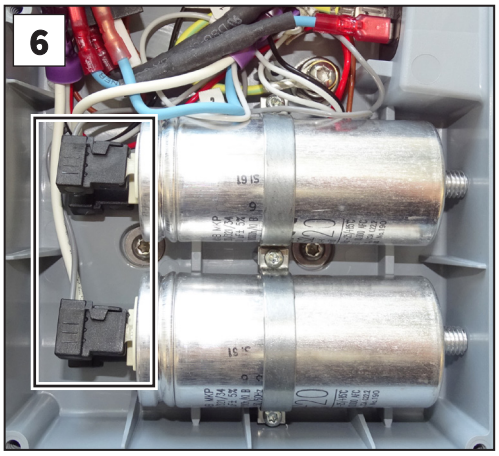


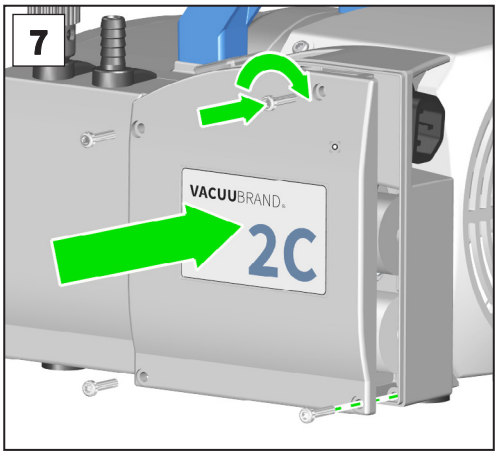
4. Screw the new motor capacitor in place with the clamp.

⇨ Ensure that the thread of the capacitor is flush with the wall of the terminal box.

5. Replace the second motor capacitor in the same way.

TX 20





6. Ensure that there are no other strands in the area of the plugs of the motor capacitors.

7. Put the terminal box cover on. Ensure that no cables are pinched. Tighten the four screws using a TX20 Torx screwdriver. **Recommended torque: 1.5 Nm**.

☑ Motor capacitors replaced

DANGER

Risk of electric shock.

Improper replacement of the motor capacitors may result in electric shock.

⇨ After replacing the motor capacitors, check the electrical safety of the device 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.

7.3.9 Replace the device fuse

There are two safety fuses installed in the terminal box of the diaphragm pump. The safety fuses are integrated into two cables (blue and black). The cables with integrated fuses are attached with blade receptacles.

⇨ To replace the fuses, replace the entire cables with the integrated fuses.

⇨ Replace both cables (blue and black) with the integrated fuses.

⇨ Identify and eliminate the cause of the fault before restarting the vacuum pump.

IMPORTANT!

⇨ The device fuse must be replaced by a qualified electrician.

⇨ After replacing the device fuse, perform an electrical safety check of the vacuum pump in accordance with IEC 61010 and national regulations.

DANGER

Hazard from electrical voltage.

Even after the vacuum pump has been switched off and disconnected from the power supply, the motor capacitors in the terminal box may still be charged. There is a risk of electric shock.

⇨ Turn off the vacuum pump.

⇨ Disconnect the power plug.

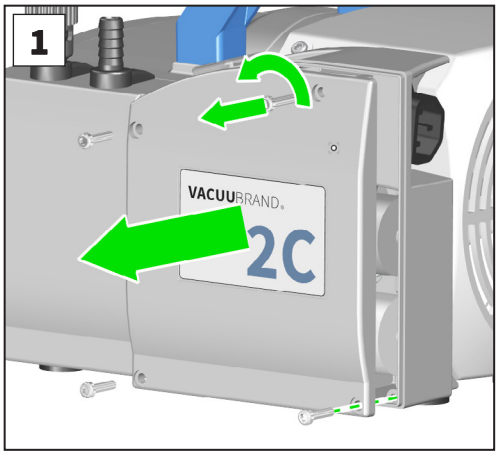
⇨ Motor capacitors have a discharge time of up to **5 s**. After unplugging the power cord, wait at least 5 s before opening the terminal box cover.

⇨ Ensure that there is no voltage.

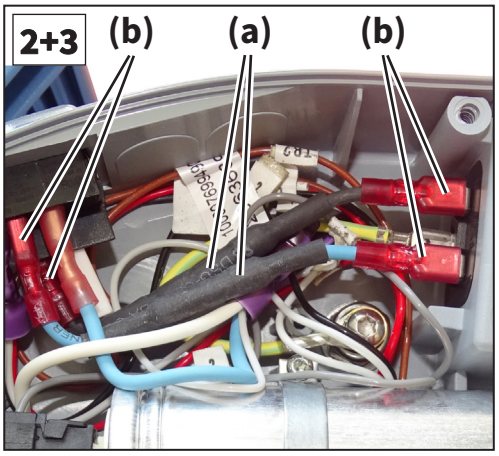
Replace the device fuse

TX 20

→ Example MZ 2C NT

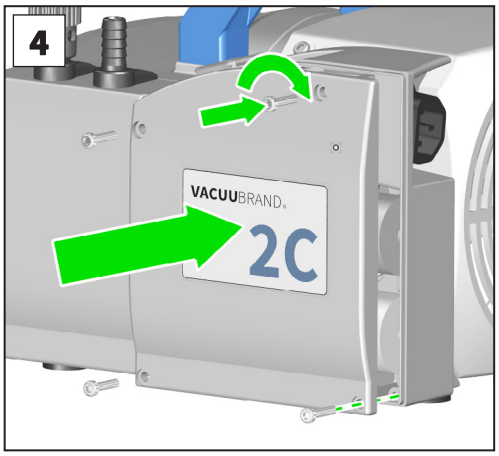


1. Loosen the four screws on the terminal box cover using a TX20 Torx screwdriver. Remove the terminal box cover.



2. Remove the cable with the defective fuse **(a)** with the blade receptacles **(b)**.
3. Connect the new cable with the integrated fuse (blade receptacles).

TX 20



4. Put the terminal box cover on. Ensure that no cables are pinched. Tighten the four screws using a TX20 Torx screwdriver. **Recommended torque: 1.5 Nm**.

☑ Device fuses replaced

DANGER

Risk of electric shock.

Improper replacement of the fuse may result in electric shock.

⇨ After replacing the fuse, check the electrical safety of the device 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.

If the maintenance work is fully completed:

⇨ Perform a functional and safety check.

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

⇨ Connect the tubing for operation.

⇨ Connect the diaphragm pump to the power supply.

☑ Pumping unit is ready for restarting.

Without reconnection:

☑ Pumping unit is ready for storage.

8 Appendix

8.1 Technical information

8.1.1 Technical data

Ambient conditions

Technical data

		(US)
Ambient temperature during operation, maximum	10 – 40 °C	50 – 104 °F
Storage/transport temperature	-10 – 60 °C	14 – 140 °F
Altitude, max.	2000 m above sea level	6562 ft above sea level
Relative humidity	30–85 %, non-condensing	
Contamination level	2	
Protection class (IEC 60529)	IP 40	
Protection type (UL 50E)		Type 1

Operating conditions

		(US)
permissible media temperature (gas) of non-explosive atmospheres:		
Continuous operation Inlet pressure > 100 mbar (75 Torr), high gas load	10 – 40 °C	50 – 104 °F
Continuous operation Inlet pressure < 100 mbar (75 Torr), low gas load	0 – 60 °C	32 – 140 °F
Short term (< 5 min) Inlet pressure < 100 mbar (75 Torr), low gas load	−10 – 80 °C	14 – 176 °F

Technical data

ATEX certification with ATEX marking on the rating plate Interior (conveyed gases)	II 3/- G Ex h IIC T3 Gc X Internal atm. only Tech. file: VAC-EX02	
Permissible media temperature (gas) atmospheres:		
Continuous operation Inlet pressure > 100 mbar (75 Torr), high gas load	10 – 40 °C	50 – 104 °F
Continuous operation Inlet pressure < 100 mbar (75 Torr), low gas load	10 – 40 °C	50 – 104 °F
Short term (< 5 min) Inlet pressure < 100 mbar (75 Torr), low gas load	10 – 40 °C	50 – 104 °F

Connections

		(US)
Vacuum connection, inlet (IN)	Hose nozzle DN 10 mm *or* Small flange KF DN 16	
Maximum permissible inlet pressure, absolute	1.1 bar	16 psi
Gas ballast (GB) (if available)	Gas ballast valve, manual	
Maximum permissible pressure at gas ballast, absolute	1.2 bar	17.5 psi
Outlet connection EX (OUT)	Hose nozzle DN 10 mm	
Maximum permissible outlet pressure, absolute	1.1 bar	16 psi
Maximum permissible pressure difference between inlet and outlet	1.1 bar	16 psi

Only types with emission condenser (EK):		
Coolant connection	Hose nozzle DN 6–8 mm	
Maximum permissible pressure of the coolant at the EK, absolute	6 bar	87 psi
Permissible range of coolant temperature	–15 – 20 °C	5 – 68 °F

Technical data

Electrical data

Overvoltage category	II
Device fuse	Two 6.3 A time-delay fuses
Motor protection	Thermal winding mechanism, self-locking*
Idle speed 50/60 Hz	1,500/1,800 min^{-1} (rpm)
Power connection	IEC power connector + power cord CEE, CH, CN, UK, IN, US
Power cord, length	2 m

** : At supply voltages below 115 V, the self-holding mechanism of the winding protection may be limited.*

Observe the information on the rating plate

Types ME 2C NT, ME 4C NT, MZ 2C NT, PC 101 NT		(US)
Rated power	0.18 kW	0.24 hp
Rated voltage	230 V ±10 % 50 / 60 Hz	100 – 115 V ±10 % 50 / 60 Hz / 120 V ±10 % 60 Hz
Rated voltage (models with switchable wide-range motor)	200 – 230 V ±10 % 50 / 60 Hz	100 – 115 V ±10 % 50 / 60 Hz / 120 V ±10 % 60 Hz
Maximum rated current	3.4 A (100 – 115 V 50 / 60 Hz / 120 V 60 Hz) 1.8 A (200 – 230 V 50 / 60 Hz) 1.8 A (230 V 50 / 60 Hz)	

Observe the information on the rating plate

Types MD 4C NT, PC 201 NT		(US)
Rated power	0.25 kW	0.34 hp
Rated voltage	230 V ±10 % 50 / 60 Hz	100 – 115 V ±10 % 50 / 60 Hz / 120 V ±10 % 60 Hz
Rated voltage (models with switchable wide-range motor)	200 – 230 V ±10 % 50 / 60 Hz	100 – 115 V ±10 % 50 / 60 Hz / 120 V ±10 % 60 Hz
Maximum rated current	5.7 A (100 – 115 V 50 / 60 Hz / 120 V 60 Hz) 3.0 A (200 – 230 V 50 / 60 Hz) 3.0 A (230 V 50 / 60 Hz)	

Observe the information on the rating plate

Types ME 8C NT		(US)
Rated power	0.25 kW	0.34 hp
Rated voltage	230 V ±10 % 50 / 60 Hz	120 V ±10 % 60 Hz
Rated voltage (models with switchable wide-range motor)	200 – 230 V ±10 % 50 / 60 Hz	100 – 115 V ±10 % 50 / 60 Hz / 120 V ±10 % 60 Hz
Maximum rated current	5.7 A (100 – 115 V 50 / 60 Hz / 120 V 60 Hz) 4.0 A (120 V 60 Hz) 3.0 A (200 – 230 V 50 / 60 Hz) 3.0 A (230 V 50 / 60 Hz)	

Pump-specific data

ME 2C NT		(US)
Maximum suction capacity 50/60 Hz according to ISO 21360	2.1 / 2.4 m^3/h	1.2 / 1.4 cfm
Ultimate vacuum, absolute	70 mbar	52.5 Torr
Dimensions (L × W × H), approx.	243 × 211 × 198 mm	9.6 × 8.3 × 7.8″
Weight[2], approx.	10.2 kg	22.5 lb

ME 4C NT		(US)
Maximum suction capacity 50/60 Hz according to ISO 21360	3.9 / 4.3 m^3/h	2.3 / 2.6 cfm
Ultimate vacuum, absolute	70 mbar	52.5 Torr
Dimensions (L × W × H), approx.	254 × 243 × 198 mm	10.0 × 9.6 × 7.8″
Weight[2], approx.	11.1 kg	24.3 lb

1 Suction capacity of the pump, without AK/EK
2 without power cord

Technical data

ME 4C NT +2AK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	3.9 / 4.3 m³/h	2.3 / 2.6 cfm
Ultimate vacuum, absolute	70 mbar	52.5 Torr
Dimensions (L × W × H), approx.	316 × 243 × 291 mm	12.4 × 9.6 × 11.5″
Weight [2], approx.	13.6 kg	30.0 lb

ME 8C NT		(US)
Maximum suction capacity 50/60 Hz according to ISO 21360	7.1 / 7.8 m³/h	4.0 / 4.6 cfm
Ultimate vacuum, absolute	70 mbar	52.5 Torr
Dimensions (L × W × H), approx.	328 × 243 × 198 mm	12.9 × 9.6 × 7.8″
Weight [2], approx.	14.3 kg	31.5 lb

ME 8C NT +2AK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	7.1 / 7.8 m³/h	4.0 / 4.6 cfm
Ultimate vacuum, absolute	70 mbar	52.5 Torr
Dimensions (L × W × H), approx.	319 × 243 × 374 mm	12.8 × 9.6 × 15.8″
Weight [2], approx.	16.7 kg	36.8 lb

MZ 2C NT		(US)
Maximum suction capacity 50/60 Hz according to ISO 21360	2.0 / 2.3 m³/h	1.2 / 1.4 cfm
Ultimate vacuum without gas ballast, absolute	7 mbar	5.3 Torr
Ultimate vacuum with gas ballast, absolute	12 mbar	9 Torr
Dimensions (L × W × H), approx. Type 22614856	243 × 243 × 198 mm 246 × 243 × 201 mm	9.6 × 9.6 × 7.8″ 9.7 × 9.6 × 7.9″
Weight [2], approx.	11.1 kg	24.3 lb

1 Suction capacity of the pump, without AK/EK
2 without power cord

Technical data

MZ 2C NT +2AK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	2.0 / 2.3 m³/h	1.2 / 1.4 cfm
Ultimate vacuum without gas ballast, absolute	7 mbar	5.3 Torr
Ultimate vacuum with gas ballast, absolute	12 mbar	9 Torr
Dimensions (L × W × H), approx.	319 × 243 × 309 mm	12.6 × 9.6 × 12.2″
Weight [2], approx.	13.6 kg	30.0 lb

MZ 2C NT +AK+M+D		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	2.0 / 2.3 m³/h	1.2 / 1.4 cfm
Ultimate vacuum without gas ballast, absolute	7 mbar	5.3 Torr
Ultimate vacuum with gas ballast, absolute	12 mbar	9 Torr
Dimensions (L × W × H), approx.	310 × 243 × 313 mm	12.2 × 9.6 × 12.3″
Weight [2], approx.	13.4 kg	29.5 lb

MZ 2C NT +AK+EK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	2.0 / 2.3 m³/h	1.2 / 1.4 cfm
Ultimate vacuum without gas ballast, absolute	7 mbar	5.3 Torr
Ultimate vacuum with gas ballast, absolute	12 mbar	9 Torr
Dimensions (L × W × H), approx.	326 × 248 × 402 mm	12.8 × 9.8 × 15.8″
Weight [2], approx.	14.2 kg	31.3 lb

1 Suction capacity of the pump, without AK/EK
2 without power cord

Technical data

MZ 2C NT +AK SYNCHRO+EK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	2.0 / 2.3 m³/h	1.2 / 1.4 cfm
Ultimate vacuum without gas ballast, absolute	7 mbar	5.3 Torr
Ultimate vacuum with gas ballast, absolute	12 mbar	9 Torr
Dimensions (L × W × H), approx.	326 × 243 × 402 mm	12.8 × 9.6 × 15.8″
Weight [2], approx.	14.5 kg	32.0 lb

MD 4C NT		(US)
Maximum suction capacity 50/60 Hz according to ISO 21360	3.4 / 3.8 m³/h	2.0 / 2.2 cfm
Ultimate vacuum without gas ballast, absolute	1.5 mbar	1.1 Torr
Ultimate vacuum with gas ballast, absolute	3 mbar	2.3 Torr
Dimensions (L × W × H), approx.	328 × 243 × 198 mm	12.9 × 9.6 × 7.8″
Weight [2], approx.	14.3 kg	31.5 lb

MD 4C NT +2AK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	3.4 / 3.8 m³/h	2.0 / 2.2 cfm
Ultimate vacuum without gas ballast, absolute	1.5 mbar	1.1 Torr
Ultimate vacuum with gas ballast, absolute	3 mbar	2.3 Torr
Dimensions (L × W × H), approx.	319 × 243 × 374 mm	12.6 × 9.6 × 14.7″
Weight [2], approx.	16.7 kg	36.8 lb

1 Suction capacity of the pump, without AK/EK
2 without power cord

Technical data

MD 4C NT +AK+EK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	3.4 / 3.8 m³/h	2.0 / 2.2 cfm
Ultimate vacuum without gas ballast, absolute	1.5 mbar	1.1 Torr
Ultimate vacuum with gas ballast, absolute	3 mbar	2.3 Torr
Dimensions (L × W × H), approx.	326 × 243 × 402 mm	12.8 × 9.6 × 15.8″
Weight [2], approx.	17.3 kg	38.1 lb

MD 4C NT +AK SYNCHRO+EK		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	3.4 / 3.8 m³/h	2.0 / 2.2 cfm
Ultimate vacuum without gas ballast, absolute	1.5 mbar	1.1 Torr
Ultimate vacuum with gas ballast, absolute	3 mbar	2.3 Torr
Dimensions (L × W × H), approx.	326 × 248 × 402 mm	12.8 × 9.8 × 15.8″
Weight [2], approx.	17.6 kg	38.8 lb

PC 101 NT		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	2.0 / 2.3 m³/h	1.2 / 1.4 cfm
Ultimate vacuum without gas ballast, absolute	7 mbar	5.3 Torr
Ultimate vacuum with gas ballast, absolute	12 mbar	9 Torr
Dimensions (L × W × H), approx.	326 × 243 × 402 mm	12.8 × 9.6 × 15.8″
Weight [2], approx.	14.5 kg	32.0 lb

1 Suction capacity of the pump, without AK/EK
2 without power cord

PC 201 NT		(US)
Maximum suction capacity [1] 50/60 Hz according to ISO 21360	3.4 / 3.8 m^3/h	2.0 / 2.2 cfm
Ultimate vacuum without gas ballast, absolute	1.5 mbar	1.1 Torr
Ultimate vacuum with gas ballast, absolute	3 mbar	2.3 Torr
Dimensions (L × W × H), approx.	326 × 243 × 402 mm	12.8 × 9.6 × 15.8″
Weight [2], approx.	17.5 kg	38.6 lb

Other specifications

		(US)
Volume of round bottom flask, only types with AK/EK	500 ml	0.52 quarts
Emission sound pressure level* (uncertainty K_{pA}: 3dB(A))	45 dB(A)	

** Measurement at ultimate vacuum at 230 V/50 Hz according to DIN EN ISO 2151:2009 and EN ISO 3744:2011 with outlet line at outlet connection*

1 Suction capacity of the pump, without AK/EK
2 without power cord

Wetted materials

Wetted materials

Component	Materials affected by media
Head cover	Carbon fiber reinforced ETFE
Diaphragm clamping disk	Carbon fiber reinforced ETFE
Diaphragm	PTFE
Valves ME 2C NT/ME 4C NT/ME 8C NT	PTFE
Valves MZ 2C NT/MD 4C NT/ ME 8C NT +2AK	FFKM
O-ring	FKM
Valve head	Carbon fiber reinforced ECTFE
Gas ballast tube	PTFE carbon reinforced
Hoses	PTFE
Inlet (hose nozzle) Pump Vacuum system	 PTFE carbon reinforced PP (PBT for SYNCHRO version)
Inlet (small flange)	Stainless steel
Outlet (hose nozzle) Pump/MZ 2C NT +AK+M+D Vacuum system (EK) Vacuum system (2AK)	 PTFE carbon reinforced PET PP
Flow control diaphragm	PTFE
Valve block (SYNCHRO version)	PP
Valves (SYNCHRO valve block)	FFKM
Distributor head	PPS, glass fiber reinforced
Blind plate	PP
O-ring on the separator (AK)	FFKM
Pressure relief valve at EK	PTFE/silicone rubber
Emission condenser (EK)/round bottom flask	Borosilicate glass

8.1.2 Rating plate

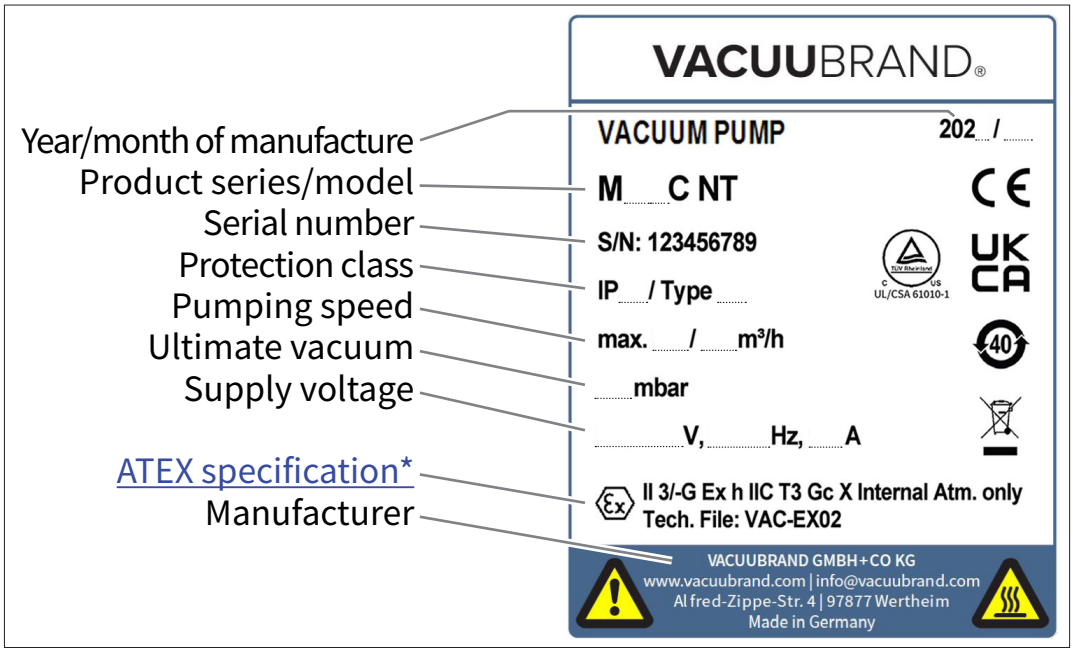
Data on rating plate

⇨ In the event of a fault, note the pump type and serial number from the rating plate.

⇨ When contacting our service department, provide the type and serial number from the rating plate. This will allow us to provide you with specific support and advice for your device.

Diaphragm pump rating plate, general

→ Example Rating plate



** Indicating documentation, group and category, marking G (gas), type of protection, explosion group, temperature class (see also: Approval for ATEX equipment category).*

8.2 Ordering information

Accessories

Ordering information for accessories

	Order No.
DVR 2pro digital absolute pressure gauge	20682906
Vacuum hose (PVC), DN 10, transparent (sold by the meter)	20686062
Silencer* for hose nozzle DN 10 mm	20636588
Check valve (mechanical) *Simultaneous operation of two systems at different pressure levels, stainless steel/FFKM, KF DN 16 and hose nozzle DN 6/10 mm, leak rate < 10^{-3} mbar·l/s at a pressure difference > 500 mbar.*	20639683

** Caution: Dust-laden gases, deposits, and condensed solvent vapours can reduce the gas throughput of the silencer. These factors or a high gas flow rate can cause excess pressure to build up, which can damage the pump bearings, diaphragms, and valves. Do not use the silencer in such circumstances.*

Expansion options for vacuum systems

Ordering information: Expansion options for vacuum systems

	Order No.
SYNCHRO expansion kit for second connection *Valve block; replaces manifold head*	20699920
Adapter G 1/4 to PTFE pipe 10/8 mm *for inlet on valve block (SYNCHRO)*	20677060
Small flange KF DN 16 *For mounting on inlet on valve block (SYNCHRO)*	20662593
Sealing ring for small flange KF DN 16 (20662593)	23120565
Hose nozzle DN 6/10 mm *for inlet on valve block (SYNCHRO)*	20642470
Extension kit for small flange KF DN 16 *at inlet on manifold head*	20699939
Hose nozzle DN 6/10 mm *for inlet on manifold head*	20636635
Elbow (90°) for PTFE pipe DN 10/8 mm *for installation at the inlet on manifold head*	20637873
Adapter for gas ballast connection *via small flange KF DN 16*	20672101
Blind flange (C1) *For mounting on valve block or manifold head*	20677136
Flow control diaphragm (C2) *For mounting on valve block or manifold head*	20677137
Solenoid valve (C3-B) * *For mounting on valve block or manifold head, VACUU·BUS*	20636668
Pressure gauge element (C5) *For mounting on valve block or manifold head*	20677100

VACUU·SELECT Compact Controller, benchtop version, *with suction line valve, 100–230 V AC/50–60 Hz*	20700070
Fill level sensor * *for monitoring the fill level in the collecting flasks, VACUU·BUS*	20699908
Coolant valve VKW-B* *For installation in the cooling water inlet of the EK, VACUU·BUS*	20674220
VACUU•LAN® mini network *with three VCL 01 modules*	22614455

** A CVC 3000 or VACUU·SELECT vacuum controller is required for use.*

Connection options for NT chemistry diaphragm pumps

Ordering information: Connection options for NT chemistry diaphragm pumps

	Order No.
Small flange KF DN 16 with hose *can be attached to hose nozzle*	20667058
Small flange KF DN 16 *For mounting directly on valve head (for inlet ME 4C NT/ ME 8C NT/MD 4C NT; outlet ME 4C NT/MZ 2C NT)*	20699918
Small flange KF DN 16 *For mounting directly on valve head (for outlet ME 8C NT/ MD 4C NT)*	20699919
Adapter hose nozzle DN 10 to hose nozzle 1/2”	20636002
Adapter to PTFE pipe DN 10/8 mm *For mounting directly on valve head (for inlet ME 4C NT/ ME 8C NT/MD 4C NT; outlet ME 4C NT/MZ 2C NT)*	20636274
Adapter to PTFE pipe DN 10/8 mm *For mounting directly on valve head (for inlet MZ 2C NT; outlet ME 8C NT/MD 4C NT)*	20636275
Elbow (90°) for PTFE pipe DN 10/8 mm	20638434
T-piece for PTFE pipe DN 10/8 mm	20638435
PTFE pipe DN 10/8 mm *sold by the meter*	20638644

Spare parts

Ordering information for spare parts

	Order No.
500 ml round bottom flask, coated	20638497
O-ring 28 × 2.5 *at the spherical joint of the round bottom flask*	20635628
Gas ballast cap	20639223
Seal kit ME 2C NT	20696878
Seal kit ME 4C NT	20696864
Seal kit MZ 2C NT/PC 101 NT	20696869
Seal kit MD 4C NT/PC 201 NT/ME 8C NT +2AK	20696870

Seal kit ME 8C NT	20696867
Pressure relief valve on the emission condenser (EK)	20638821
NT fuse set *Two cables with integrated 6.3 A time-delay safety fuse*	20636542

⇨ A complete list of available spare parts can be found at → www.vacuubrand.com/repair

Supply sources

Purchase original accessories and original spare parts from a subsidiary of **VACUUBRAND GMBH + CO KG** or your local distributor.

International sales offices and distribution

⇨ Information on the complete product range is available on our website: www vacuubrand.com.

⇨ Your local distributor or **VACUUBRAND GMBH + CO KG** Sales Office is available to assist you with orders or questions on vacuum control and optimal accessories.

8.3 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 clearance certificate: repair, maintenance, return, disposal.

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

Service handling

Meet terms of service

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

⇨ 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.

8.4 Index

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8.5 EC declaration of conformity

EG-Konformitätserklärung für Maschinen
EC Declaration of Conformity of the Machinery
Déclaration CE de conformité des machines

CE

Hersteller / Manufacturer / Fabricant:
VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hiermit erklärt der Hersteller, dass das Gerät konform ist mit den Bestimmungen der Richtlinien:
Hereby the manufacturer declares that the device is in conformity with the directives:
Par la présente, le fabricant déclare, que le dispositif est conforme aux directives:

- 2006/42/EG
- 2014/34/EU
- 2011/65/EU, 2015/863

Membranvakuumpumpe / Diaphragm vacuum pump / Pompe à membrane:
Typ / Type / Type: **ME 2C NT / ME 4C NT / ME 4C NT + 2 AK / MZ 2C NT / MZ 2C NT + 2 AK / MZ 2C NT + AK + EK / MZ 2C NT + AK + M + D / MZ 2C NT + AK SYNCHRO + EK / PC 101 NT / ME 8C NT / ME 8C NT + 2 AK / MD 4C NT / MD 4C NT + 2 AK / MD 4C NT + AK + EK / MD 4C NT + AK SYNCHRO + EK / PC 201 NT**

Artikelnummer / Order number / Numéro d'article: **20730100, 20730102, 20730105 / 20731200, 20731201, 20731202 / 22614080 / 20732300, 20732301, 20732302, 20732345, 22614856 / 20732500, 20732501, 20732502, 20732505, 20732510 / 20732600, 20732601, 20732602, 20732615 / 20732700 / 20732800, 20732801, 20732802 / 20733000, 20733002 / 20734200, 20734201, 20734202 / 20734405 / 20736400, 20736401, 20736402 / 20736600 / 20736700, 20736701, 20736702, 20736710 / 20736800, 20736801, 20736802 / 20737000**

Seriennummer / Serial number / Numéro de série: Siehe Typenschild / See rating plate / Voir plaque signalétique

Angewandte harmonisierte Normen / Harmonized standards applied / Normes harmonisées utilisées:
EN ISO 12100:2010 (ISO 12100:2010), EN 1012-2:1996 + A1:2009, EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 (IEC 61010-1:2010 + COR:2011 + A1:2016, modifiziert / modified / modifié + A1:2016/COR1:2019)
EN 1127-1:2019, EN ISO 80079-36:2016 (ISO 80079-36:2016)
EN IEC 63000:2018 (IEC 63000:2016)

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person authorised to compile the technical file / Personne autorisée à constituer le dossier technique:
Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Ort, Datum / place, date / lieu, date: Wertheim, 10.12.2025

(Dr. Constantin Schöler)
Geschäftsführer / Managing Director / Gérant

ppa.
(Jens Kaibel)
Technischer Leiter / Technical Director / Directeur technique

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E-Mail: info@vacuubrand.com
Web: www.vacuubrand.com

8.6 UKCA declaration of conformity

Declaration of Conformity

Manufacturer:
VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hereby the manufacturer declares that the device is in conformity with the directives:

- Supply of Machinery (Safety) Regulations 2008
  (S.I. 2008 No. 1597, as amended by S.I. 2019 No. 696)
- The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016 No. 1107, as amended by S.I. 2019 No. 696)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012 No. 3032)

Diaphragm vacuum pump

Type: **ME 2C NT / ME 4C NT / ME 4C NT + 2 AK / MZ 2C NT / MZ 2C NT + 2 AK / MZ 2C NT + AK + EK / MZ 2C NT + AK + M + D / MZ 2C NT + AK SYNCHRO + EK / PC 101 NT / ME 8C NT / ME 8C NT + 2 AK / MD 4C NT / MD 4C NT + 2 AK / MD 4C NT + AK + EK / MD 4C NT + AK SYNCHRO + EK / PC 201 NT**

Order number: **20730100, 20730102, 20730105 / 20731200, 20731201, 20731202 / 22614080 / 20732300, 20732301, 20732302, 20732345, 22614856 / 20732500, 20732501, 20732502, 20732505, 20732510 / 20732600, 20732601, 20732602, 20732615 / 20732700 / 20732800, 20732801, 20732802 / 20733000, 20733002 / 20734200, 20734201, 20734202 / 20734405 / 20736400, 20736401, 20736402 / 20736600 / 20736700, 20736701, 20736702, 20736710 / 20736800, 20736801, 20736802 / 20737000**

Serial number: See rating plate

Designated standards applied:
EN ISO 12100:2010, EN 1012-2:1996+A1:2009, EN 61010-1:2010+A1:2019, EN 61010-1:2010/A1:2019/AC:2019-04
EN 1127-1:2019, EN ISO 80079-36:2016
EN IEC 63000:2018

Person authorised to compile the technical file:
Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Place, date: Wertheim, 10.12.2025

(Dr. Constantin Schöler)
Managing Director

ppa.
(Jens Kaibel)
Technical Director

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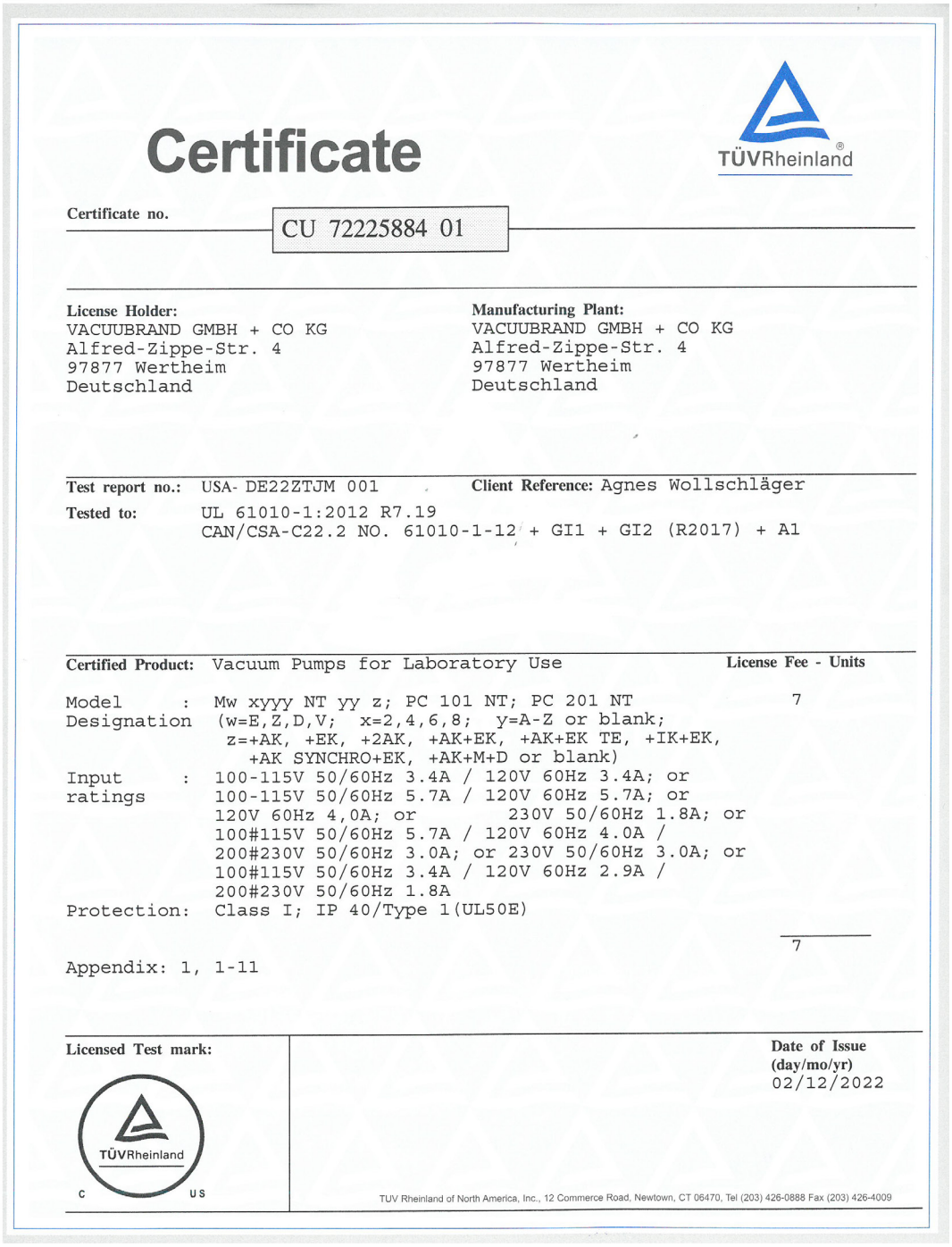
E-Mail: info@vacuubrand.com
Web: www.vacuubrand.com

VACUUBRAND®

8.7 CU certificate



Certificate

TÜVRheinland®

Certificate no. CU 72225884 01

License Holder:
VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
Deutschland

Manufacturing Plant:
VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
Deutschland

Test report no.: USA- DE22ZTJM 001 **Client Reference:** Agnes Wollschläger

Tested to: UL 61010-1:2012 R7.19
CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1

Certified Product: Vacuum Pumps for Laboratory Use **License Fee - Units**

Model Designation : Mw xyyy NT yy z; PC 101 NT; PC 201 NT — 7
(w=E,Z,D,V; x=2,4,6,8; y=A-Z or blank;
z=+AK, +EK, +2AK, +AK+EK, +AK+EK TE, +IK+EK,
+AK SYNCHRO+EK, +AK+M+D or blank)

Input ratings : 100-115V 50/60Hz 3.4A / 120V 60Hz 3.4A; or
100-115V 50/60Hz 5.7A / 120V 60Hz 5.7A; or
120V 60Hz 4,0A; or 230V 50/60Hz 1.8A; or
100#115V 50/60Hz 5.7A / 120V 60Hz 4.0A /
200#230V 50/60Hz 3.0A; or 230V 50/60Hz 3.0A; or
100#115V 50/60Hz 3.4A / 120V 60Hz 2.9A /
200#230V 50/60Hz 1.8A

Protection: Class I; IP 40/Type 1(UL50E)

7

Appendix: 1, 1-11

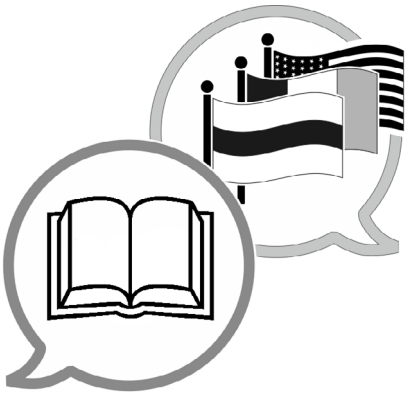
Licensed Test mark: TÜVRheinland C US

Date of Issue (day/mo/yr) 02/12/2022

TUV Rheinland of North America, Inc., 12 Commerce Road, Newtown, CT 06470, Tel (203) 426-0888 Fax (203) 426-4009

IMPORTANT! ⇨ This certificate is valid only for pumps with the corresponding marking **(Licensed Test Mark)** on the pump rating plate.

VACUUBRAND®



Manufacturer:

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