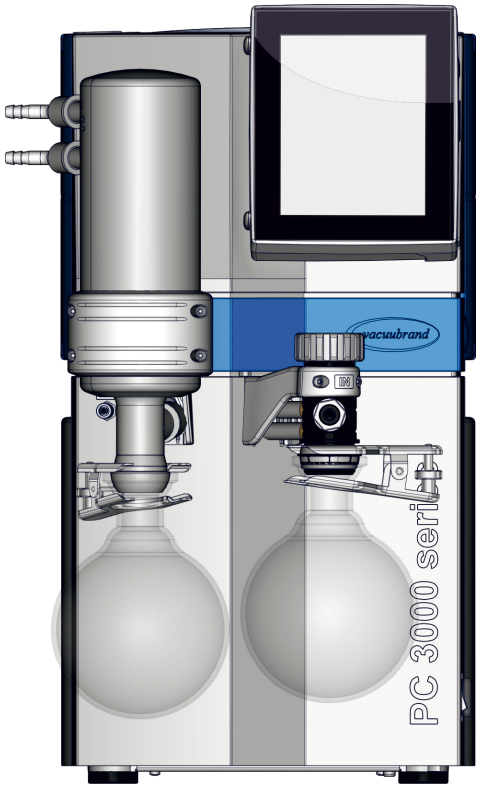
vacuubrand

Technology for Vacuum Systems

CHEMISTRY PUMPING UNITS

PC 3002 VARIO select
PC 3003 VARIO select
PC 3004 VARIO select
PC 3004 VARIO select EKP



Instructions for use

Original instructions EN

OI no.: 20901334

Original instructions
Keep for further use!

This manual is only to be used and distributed in its complete and original form. It is strictly the user's responsibility to carefully check the validity of this manual with respect to the product.

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Thank you for purchasing this product from **VACUUBRAND GMBH + CO KG** *. You have chosen a modern and technically high quality product.*

TABLE OF CONTENT

1 Introduction

This manual is part of your product. The manual 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 this manual thoroughly and completely before using the product.
- Keep this manual in an easily accessible location.
- Correct use of the product is essential for safe operation. Comply with all safety information provided!
- In addition to this manual, adhere to the accident prevention regulations and industrial safety regulations applicable in the country of use.

General

General information

- For easier readability, the general term *pumping unit* is used as an equivalent to and instead of the product name *Chemistry pumping unit PC 300x VARIO select*.
- If passing the product on to a third party, also give them this manual.
- The illustrations in this manual are only intended to facilitate comprehension.
- We reserve the right to make technical and design changes in the course of continuous product improvement.

Copyright

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Contact

Contact us

- If your manual is incomplete, you can request a replacement. Alternatively, you can use our download portal: www.vacuubrand.com
- 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 document

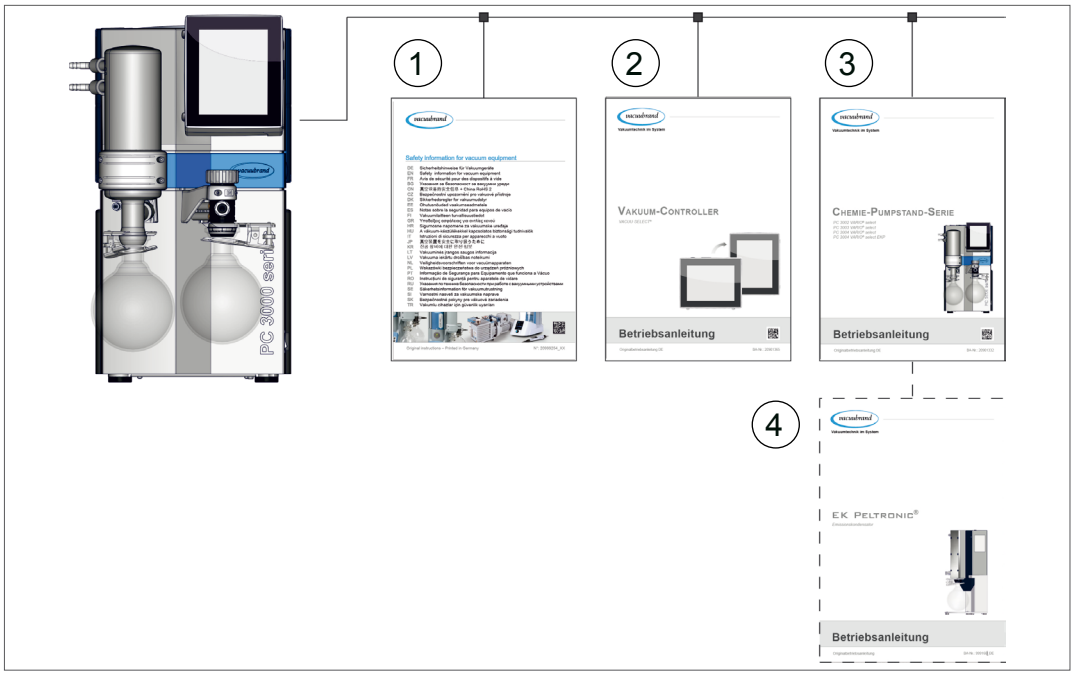
1.2.1 Manual structure

Modular instructions for use

The manuals have a modular structure with separate instruction modules for the controller, vacuum pumps, pumping units, and any accessories.

Instruction modules

Pumping unit series and instructions for use



1	Safety information for vacuum equipment
2	Description: Vacuum controller – control and operation
3	Description: Pumping unit – connection, operation, maintenance, mechanics
4	Optional description: Accessories

1.2.2 Display conventions

Warning levels

Display conventions

DANGER

Indicates an imminent hazardous situation.

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

⇨ Take appropriate action to avoid dangerous situation!

WARNING

Indicates 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 situation!

CAUTION

Indicates a potentially hazardous situation.

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

⇨ Take appropriate action to avoid dangerous situation!

NOTICE

Notice for a potentially harmful situation.

Disregarding the notice could lead to material damage.

Additional notes

IMPORTANT!

⇨ Information or specific use recommendation, which must be observed.

⇨ Important information for proper operation.

⇨ Helpful tips + tricks

⇨ Additional notes

1.2.3 Symbols and icons

This manual uses symbols and icons. Safety symbols indicate specific risks associated with handling the product. Symbols and icons are designed to help you identify risks more easily.

Safety symbols

Explanation of safety symbols

 Hazardous substance - hazards to human health.	 General prohibition sign.
 General warning sign.	 Warning Risk of explosion.
 danger: electricity	 danger: hot surface
 General mandatory sign.	 Disconnect power plug.
 Wear chemical resistant protective gloves.	 Wear protective goggles.
 Read instructions for repair.	

Additional icons

Additional symbols

 Positive example – **Do this!** Result – **OK**	 Negative example – **Do not do this!**
 Refers to content in this manual.	 Refers to content of other supplementary documents.
 Installation at temperatures < 40 °C (< 104 °F).	 Ensure sufficient air circulation.
 Flow arrow Inlet – vacuum connection	 Flow arrow Outlet – exhaust gas

1.2.4 Handling instructions (action steps)

Display of action steps

Instructions (single step)

⇨ Perform the step described.

☑ Result of action

Instructions (multiple steps)

1. First step
2. Next step

☑ Result of action

Perform the steps in the order described.

1.2.5 Abbreviations

Abbreviations

abs.	Absolute
AK	Separator flask
ATM	Atmospheric pressure (pressure graphic, program)
d_i (di)	Interior diameter
DN	Nominal diameter
EK	Vapor condenser
EKP	Emission condenser Peltronic® or EK Peltronic®
EX*	Outlet (exhaust, exit), exhaust gas connection
⟨Ex⟩	ATEX equipment labeling
FKM	Fluoroelastomer
GB	Gas ballast
Gr.	Size
IK	Inlet condenser
IN*	Inlet, vacuum connection
KF	Small flange
max.	Maximum value
min.	Minimum value
o. EK	without vapor condenser
PA	Polyamide
PBT	Polybutylene terephthalate
PC	Chemistry pumping unit with type identification number
PE	Polyethylene
RMA-N°	Return Merchandise Authorization number
SW	Wrench size (tool)
TE	Dry ice condenser

Abbreviations

resp.	responsible (supervising)
e. g.,	for example

** Labeling on vacuum pump or component*

→ ▽⇨⇨ ⇨↙▽↕ *Product-specific abbreviations on page 25*

1.2.6 Term definitions

Product-specific terms

Separator flask	Glass flask / separator mounted at the inlet or outlet.
Vapor condenser*	Cooling condenser with receiving flask mounted at the outlet (pressure side).
PC 300x VARIO select	Vacuum pumping unit with speed control for precise vacuum regulation with controller **VACUU·SELECT®** and **VACUU·SELECT® Sensor**.
Peltronic®	Electronic cooler with Peltier elements mounted at the outlet; condenses solvent vapors without external coolant.
VACUU·BUS®	Bus system from **VACUUBRAND** for communication between peripheral devices with **VACUU·BUS®** enabled gauges and controllers. The maximum permissible cable length is 30 m.
VACUU·BUS® address	Address which enables the **VACUU·BUS®** client to be unambiguously assigned within the bus system, e.g., for connecting multiple sensors with the same measurement range.
VACUU·BUS® client	Peripheral device or component with **VACUU·BUS®** port which is integrated in the bus system, e. g., sensors, valves, level indicators, etc.
VACUU·BUS® connector	4-pin round connector for the bus system from **VACUUBRAND**.
VACUU·BUS® configuration	Assigning a different **VACUU·BUS®** address to a **VACUU·BUS®** component using a gauge or controller.
VACUU·SELECT®	Vacuum controller, controller with touchscreen; consisting of operating panel and vacuum sensor.
VACUU·SELECT® Sensor	Vacuum sensor with integrated venting valve.

Product-specific terms

VARIO® drive	Speed control for vacuum pump; the motor runs only as fast as necessary to meet demand.

** only suitable for condensation of vapors*

2 Safety information

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

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

2.1 Usage

Only use the product if it is in perfect working condition.

2.1.1 Intended use

Intended use

A chemistry pumping unit of the *PC 3000 VARIO select* product series is a vacuum system consisting of a vacuum pump, controller, sensor and separator, for the creation and control of rough vacuum in designated systems, e.g. evacuating distillation instruments, in particular rotary evaporators.

Attached coolers (vapor condenser, emission condenser Peltronic®), including separators and flasks, are exclusively intended for the condensation of vapors.

The device may only be used indoors in a non-explosive atmosphere.

Intended use also includes:

- observing the information in the document **Safety information for vacuum equipment**,
- observing the manual,
- observing the manual of connected components,
- observing the inspection and maintenance intervals and having it performed by appropriately qualified personnel.
- using only approved accessories or spare parts.

Any other use is considered improper use.

2.1.2 Improper use

Improper use

Incorrect use or any application which does not correspond to the technical data may result in injury or damage to property.

Improper use includes:

- using the product contrary to its intended use,
- operation at improper environmental and operating conditions,
- operation despite obvious malfunctions or defective safety devices,
- unauthorized modifications or conversions, in particular when these impair safety,
- usage despite incomplete assembly,
- operation with sharp-edged objects,
- pulling plug-in connections on the cable out of the socket,
- to pump, to convey and to compress solids or fluids.

2.1.3 Foreseeable misuse

Foreseeable misuse

In addition to improper use, there are types of use which are prohibited when handling the device:

Prohibited types of use are, in particular:

- use on humans or animals,
- installation and operation in potentially explosive atmospheres,
- use in mines or underground,
- using the device to generate pressure,
- fully exposing vacuum devices to the vacuum,
- immersing it in liquids, exposing it to water spray or steam jets,
- pumping oxidizing and pyrophoric substances, liquids or solids,
- pumping of hot, unstable, or explosive media,
- pumping substances which may react explosively under impact and/or elevated temperature without an air supply.

IMPORTANT!

The penetration of foreign objects, hot gases and flames from the application, must be excluded.

2.2 Obligations

2.2.1 Operator obligations

Operator obligations

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

Users in the areas of competence in the *Responsibility matrix* must possess the relevant qualifications for the activities listed. Work on electrical equipment in particular may be performed only by electricians.

2.2.2 Personnel obligations

Personnel obligations

In the case of activities which require protective clothing, personal protective equipment as specified by the operator is to be worn.

If the vacuum system is not in proper order, it must be secured against being accidentally switched back on.

⇨ 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.

Personal behaviour may help to avoid work accidents.

2.3 Target group description

Target groups

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

Personnel qualification

Qualification description

Operators	Laboratory staff, such as chemists, laboratory technicians
Specialist	Person with professional qualification in mechanics, electrical equipment or laboratory devices
Responsible specialist	Similar to a specialist, with additional specialist responsibility, or responsibility for a department or division

Responsibility matrix

Responsibility Assignment Matrix

Activity	Operators	Specialist	Responsible specialist
Installation	x	x	x
Commissioning	x	x	x
Network integration			x
Operation	x	x	x
Error report	x	x	x
Remedy	(x)	x	x
Maintenance		x	x
Repair[1]		x	x
Repair order			x
Cleaning, simple	x	x	x
Empty separator flask	x	x	x
Shutdown	x	x	x
Decontamination[2]		x	x

1 see also website:
VACUUBRAND > Support > Instructions for repair

2 Alternatively, arrange for decontamination by a qualified service provider

2.4 General safety instructions

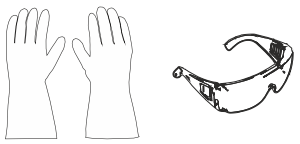
Quality standards and safety

Products from **VACUUBRAND GMBH + CO KG** are subject to stringent quality testing with regard to safety and operation. Prior to delivery each product has been tested thoroughly.

2.4.1 Protective clothing

Protective clothing

For operation no special protective clothing is required. Observe the owners' directives at work for your workplace.



During cleaning, maintenance and repair work, we recommend wearing full protective gloves, protective clothing and protective goggles.

IMPORTANT!

⇨ When handling chemicals, wear your personal protective equipment.

2.4.2 Safety precautions

Safety precautions

⇨ Use the vacuum device only if you have understood its function and this manual.

⇨ Replace defective parts immediately, e. g., a broken cable, faulty flask or faulty hose.

⇨ Use only original accessories and components which are designed for the vacuum technology, such as a vacuum hose, separator, vacuum valve, etc.

⇨ When handling contaminated parts, follow the relevant regulations and safety precautions, this also applies to equipment sent in for repair.

IMPORTANT!

Prior to any service, contamination from hazardous substances needs to be excluded.

⇨ Fill out the Health and Safety Clearance form in full and confirm with your signature.

2.4.3 Laboratory and working materials

DANGER

Hazardous substances could emit at the outlet.

During aspiration, hazardous, toxic substances at the outlet can get into ambient air.

⇨ Observe the national regulations for safe handling of hazardous substances.

⇨ 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.

Risks due to various substances

Pumping different substances

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

Working substances which get into the vacuum pump with the gas flow can damage the vacuum pump. Hazardous substances can deposit in the vacuum pump.

Possible safety precautions, depending on the application:

⇨ Flush the vacuum pump with inert gas or air before changing the medium to be pumped.

⇨ Use inert gas to dilute critical mixtures.

⇨ Prevent the release of hazardous, toxic, explosive, corrosive fluids, gases or vapors or those that are harmful to health or the environment, for example, through suitable laboratory facilities with a fume hood and ventilation control.

⇨ Protect the inside of the vacuum pump from deposits or moisture, e. g, through the provision of a gas ballast.

⇨ Be aware of interactions and possible chemical reactions of the pumped media.

⇨ Check the compatibility of the pumped substances with the wetted materials of the pumping unit.

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

2.4.4 Eliminate sources of danger

Take mechanical stability into account

Note mechanical load capacity

Due to the high compression ratio of the pump, pressure can develop at the outlet which exceeds that which the mechanical stability of the system allows.

- ⇨ Always ensure that the exhaust gas line is clear and non-pressurized. To ensure unhindered emission of gases, the outlet should not be blocked.
- ⇨ Prevent uncontrolled overpressure, for example, due to a locked or blocked piping system, condensate or clogged exhaust gas line.
- ⇨ At the gas connections, the connections for the inlet *IN* and outlet *EX* should not be mixed up.
- ⇨ Be aware of the max. pressures at the inlet and outlet of the pump as well as the max. admissible differential pressure between the inlet and outlet, according to *8.1.1 Technical data on page 71*
- ⇨ The system to be evacuated as well as all hose connections must be mechanically stable.
- ⇨ Fix coolant hoses to the hose nozzles such that they cannot inadvertently become loose.

Prevent condensate reflow

Prevent backup in the exhaust gas line

Condensate can damage the pump head. No condensate should flow back into the outlet *EX* and pump head due to the hose line. No liquid should accumulate inside the exhaust hose.

- ⇨ Avoid condensate return by using a separator. No condensate must enter the housing interior via the vacuum hoses.
- ⇨ Preferably lay the exhaust gas hose such that it descends from the outlet; that is, position it running downward so that no backup forms.

Avoid incorrect measurements

Incorrect measurement due to an obstructed vacuum line, e.g., condensate in the vacuum line can distort the measurements of the vacuum sensor.

⇨ Prevent overpressure > 1060 mbar (795 Torr) inside the suction line.

Avoid foreign bodies inside the pump

Observe vacuum pump dimensioning

Particles, liquids and dusts should not get inside the vacuum pump.

⇨ Do not pump any substances which could form deposits inside the vacuum pump.

⇨ Install suitable separators and/or filters in front of the inlet. Suitable filters are, e. g, chemically resistant, clog-proof and have a reliable flow rate.

⇨ Immediately replace porous vacuum hoses.

Risks during venting

Be aware of risks during venting

Depending on the application, venting can cause explosive mixtures to form or other hazardous situations to arise.

Risks due to residual energy

Possible residual energies

After the device has been switched off and disconnected from the power supply, there may still be dangers at the plug-in power supply due to residual energy:

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

⇨ Allow the vacuum pump to cool off.

- Electrical energy: In capacitors on the electronics, they have a discharge time of up to 3 minutes.

⇨ Wait for at least 3 minutes until capacitors have discharged.

Risk of burns due to hot surface

Surface temperatures

The surface of the vacuum pump can reach operating temperatures higher than > **70 °C**, in particualar when pumping heated media.

- ⇨ Avoid direct contact with the surface.
- ⇨ Use protection against accidental contact if the surface temperature is regularly elevated.
- ⇨ Allow the vacuum pump to cool off before performing maintenance work.

Overheating

The vacuum pump can be damaged due to overheating. Possible causes include insufficient air supply to the fan and failure to maintain minimum distances.

- ⇨ When installing the device, ensure that there is a minimum distance of 5 cm between the cooling fan and adjacent parts (such as the housing, walls, etc.).
- ⇨ Always ensure sufficient air supply; if applicable, provide external forced ventilation.
- ⇨ Place the device on a stable surface; a soft surface such as foam rubber as a sound absorber can impair and block the air supply.
- ⇨ Clean polluted ventilation slots.
- ⇨ Remove covers from the device before operating it.
- ⇨ Avoid excessive heat input due to hot process gases.
- ⇨ Observe the maximum admissible media temperature → *see chapter: 8.1.1 Technical data on page 71*.

Keep signs legible

Warning signs and labels

Keep labels and information symbols and warning labels always in a well readable condition:

⇨ Connection labeling

⇨ Warning signs and notice labels

⇨ Motor data and rating plates

2.5 Motor protection

Overheating protection, deadlock protection

The pump motor has a temperature sensor on the circuit board as overload protection. In the event of excessive temperature or if the motor is blocked, the vacuum pump switches off.

Procedure for switching vacuum pump back on

If the vacuum pump is switched off due to these safety precautions, the fault must be manually reset: Unplug pumping unit from power supply -> eliminate cause of error -> switch pumping unit back on.

2.6 ATEX equipment category

Installation and potentially explosive atmospheres

The installation and operation in areas where potentially explosive atmospheres can develop to a hazardous degree is not permitted.

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

ATEX equipment labeling

ATEX equipment category

Vacuum equipment labeled with ⟨Ex⟩ has ATEX approval in line with the ATEX marking on the rating plate.

- ⇨ Only use the product if it is in perfect working condition.
- ⇨ 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.

ATEX equipment category and peripherals

The ATEX category of the product is dependent on the connected peripheral devices. Components and connected peripherals need to have the same or higher ATEX approval.

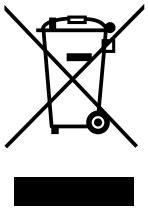
Prevent ignition source

The use of gas ballast and/or venting valves is only permitted if this would not normally, or only rarely, cause explosive mixtures within the device, or do so only for a short time.

- ⇨ If necessary vent with inert gas.

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

2.7 Proper disposal



NOTICE

Risk of environmental damage due to incorrect disposal of the product.

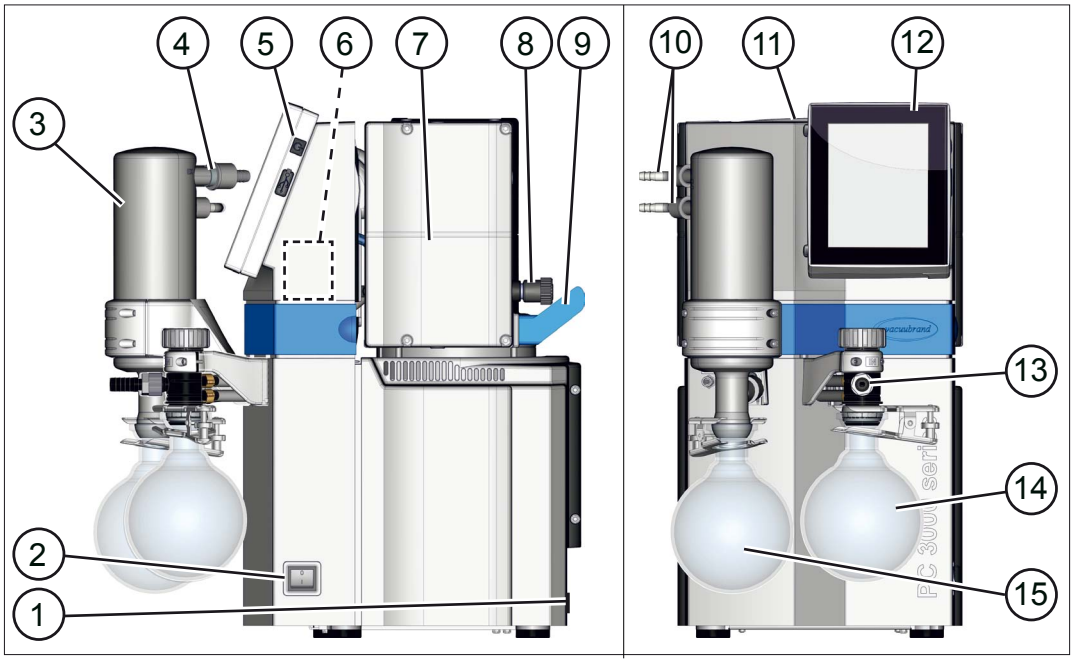
- ⇨ Do not dispose your product in household waste! Electronic components are subject to hazardous waste treatment and must only be disposed of by certified specialists.
- ⇨ Observe the national regulations for safe disposal and environmental protection.
- ⇨ Detailed information on the respective regulations can be obtained from your local administrative authority.

3 Product description

Pumping units of the PC 3000 VARIO select series generally consist in each case of a diaphragm pump with VARIO® drive, a VACUU·SELECT® vacuum controller as well as a cooler with separator. Chiller are available in various designs. The differences concern the functioning of the cooler.

3.1 PC 3004 VARIO select (basic design)

→ Example
Side- and front view PC 3004 VARIO select



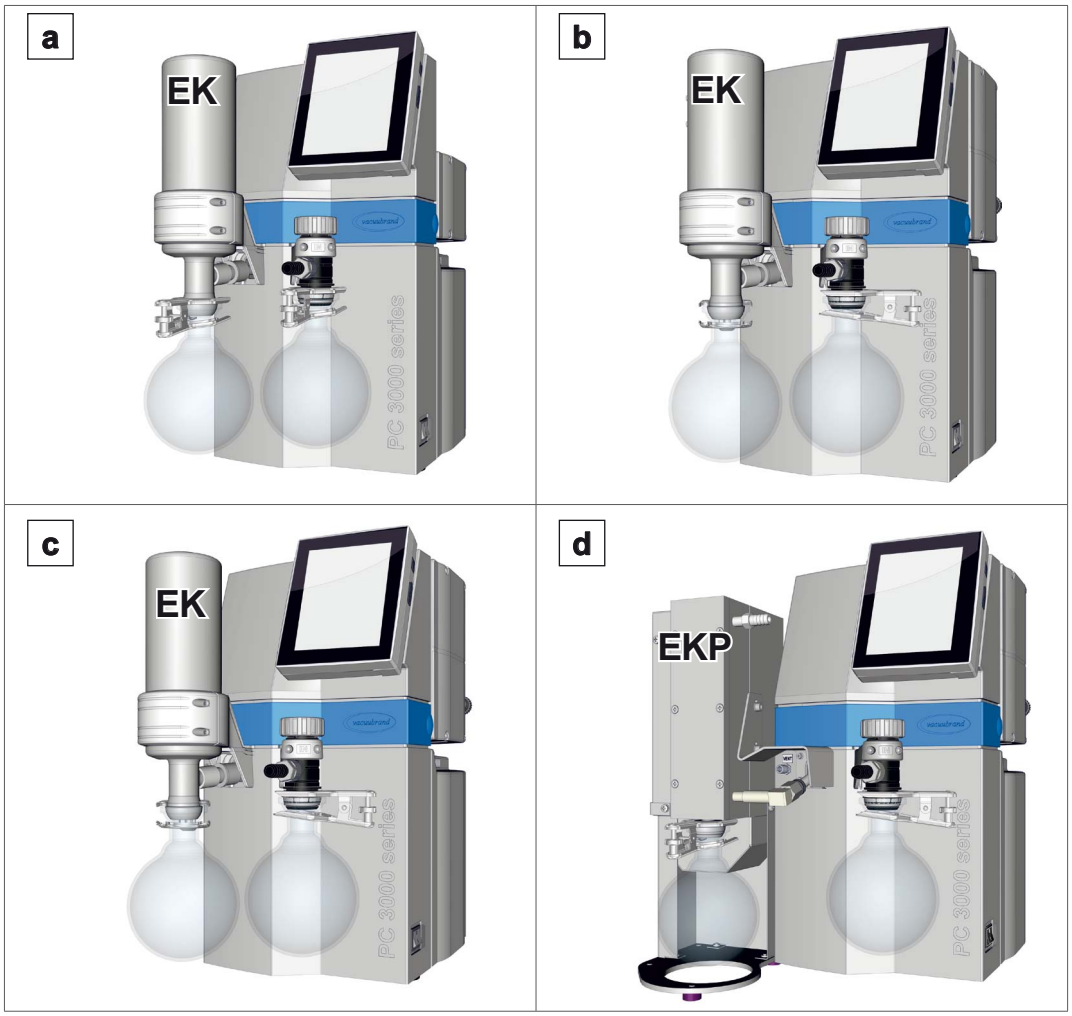
Meaning

1	Power supply, device fuse, interface connections: VACUU·BUS, Ethernet, RS232
2	Power connection with on/off switch (rocker switch)
3	Vapor condenser EK
4	Outlet, exhaust gas connection
5	ON/OFF button vacuum controller
6	VACUU·SELECT® Sensor, mounted inside the pumping unit
7	Chemistry diaphragm pump
8	Gas ballast valve
9	Handle
10	Coolant connections
11	Rating plate
12	VACUU·SELECT® operating panel, removable
13	Inlet, vacuum connection, distribution head
14	Separator flask, round bottom flask at the inlet
15	Round bottom flask at the outlet

3.2 Chemistry pumping units

Overview of the PC 3000 VARIO select chemistry pumping units

Overview Chemistry pumping units



Meaning

Chemistry pumping unit	Pump head	AK	EK	EKP
a PC 3002 VARIO select	**2**	●	●	
b PC 3003 VARIO select	**4**	●	●	
c PC 3004 VARIO select	**4**	●	●	
d PC 3004 VARIO select EKP	**4**	●		●

Product-specific abbreviations

Product-specific abbreviations

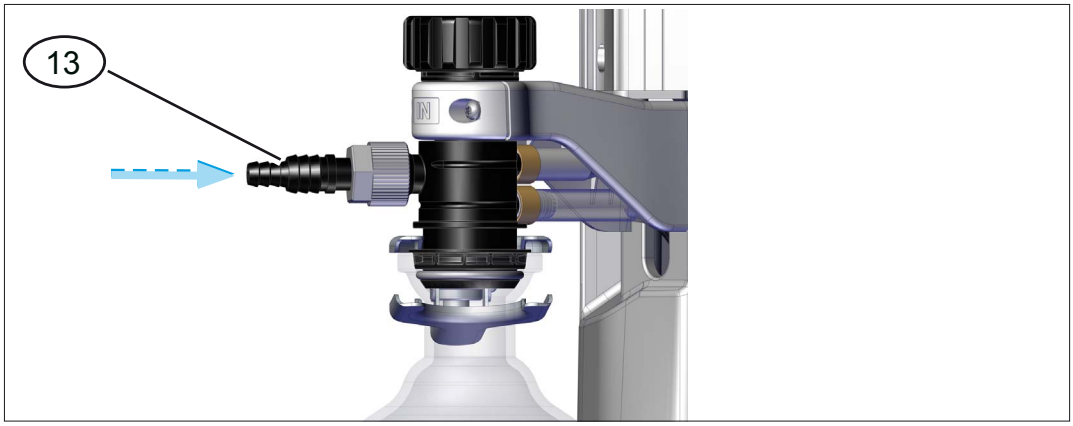
AK	Separator flask, installed at inlet or outlet
EK	Vapor condenser, mounted at the outlet
EKP	Peltronic® emission condenser, mounted at the outlet
PC	Chemistry pumping unit with type identification number

3.3 Condensers and coolers

3.3.1 Separator / Condenser at the inlet

Connection to separator flask

Connections at the AK



Meaning

13	Inlet connection vacuum IN

3.3.2 Condenser at the outlet

Connection and coolant at vapor condenser

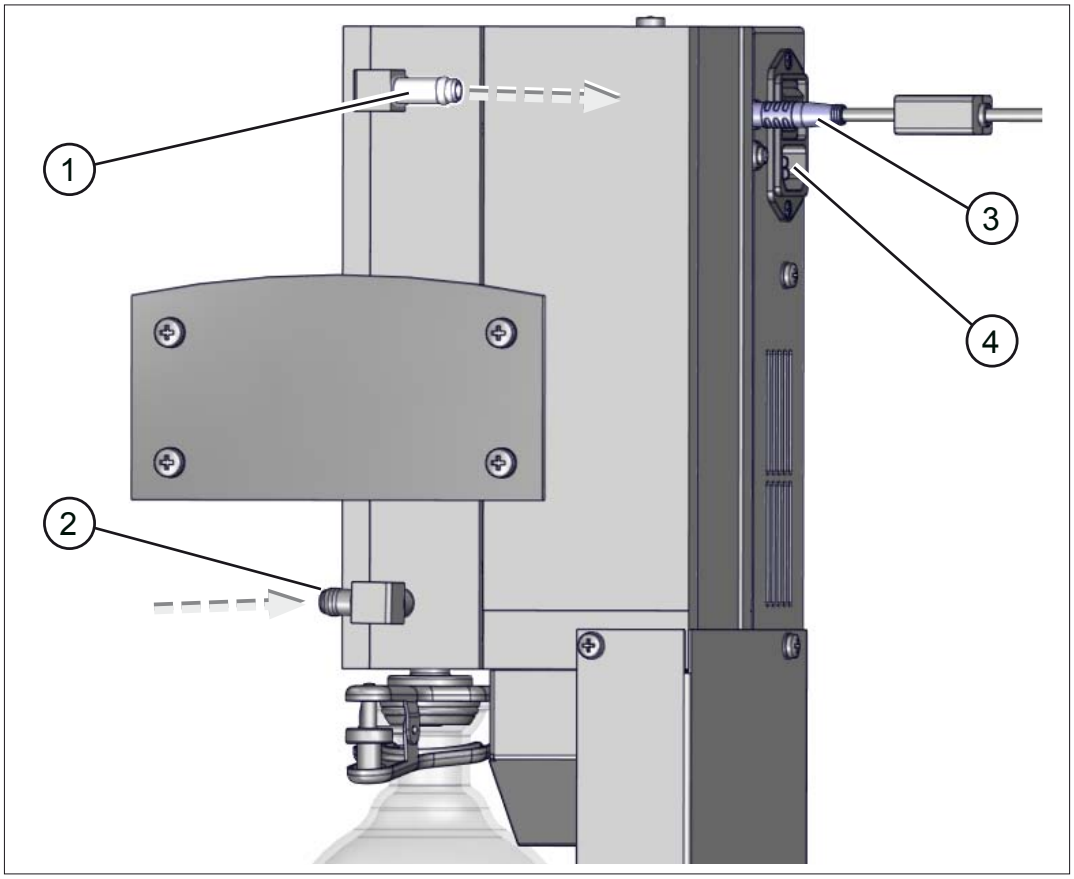
Connections at the EK

Meaning

4	Outlet connection EX
10.1	Outlet connection coolant EX
10.2	Inlet connection coolant IN, e. g, water

Connections on the Peltronic® emission condenser

Connections at the EKP



Meaning

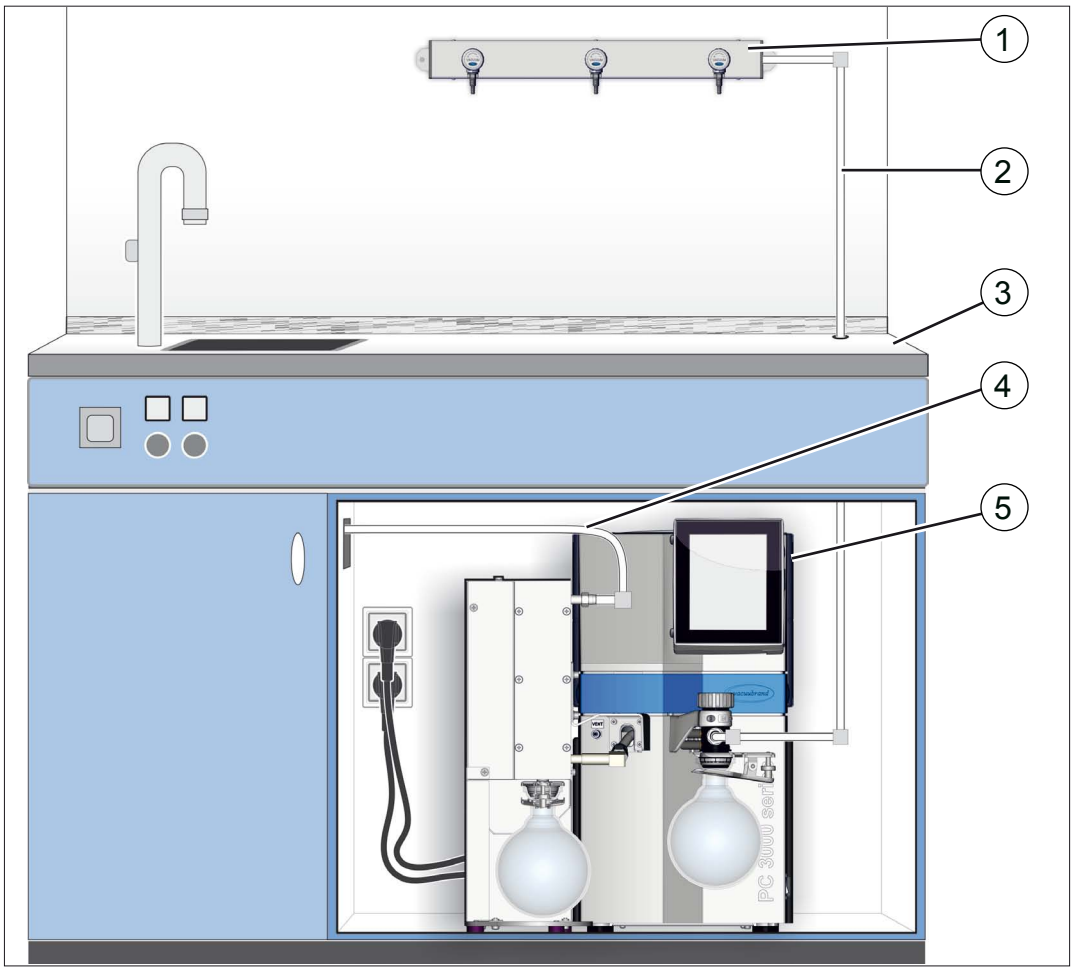
1	Outlet connection EX
2	Vacuum pump connection
3	VACUU·BUS® connection
4	To switch the gauge on/off with tools,

For detailed information on and descriptions of the Peltronic® → emission condenser, *see manual #20901074.*

3.4 Examples of use

Local vacuum network

→ Example Local vacuum network



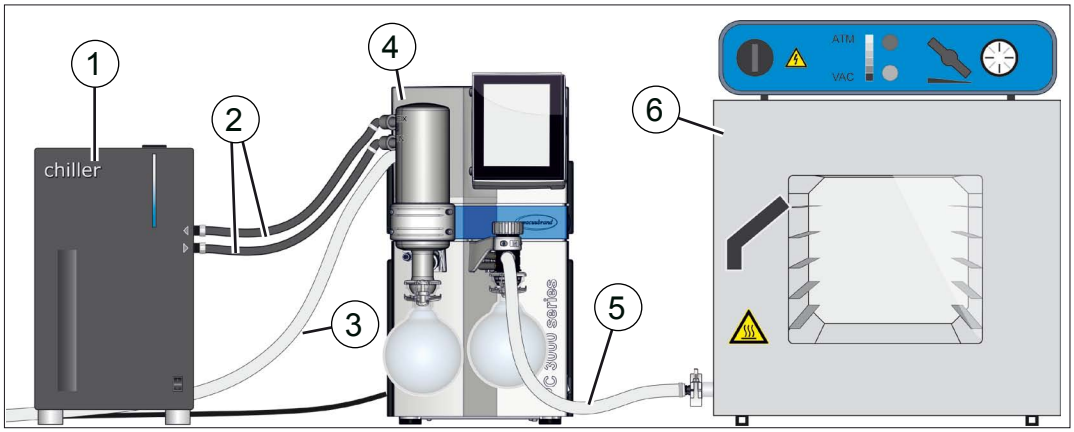
Meaning

1	Example of use: VACUU·LAN®, network arrangement
2	Vacuum hose*
3	Laboratory furniture
4	Exhaust gas hose (layed into a fume hood)
5	Vacuum pumping unit **PC 3004 VARIO select**

** pemanent installed PTFE-tubings*

Vacuum drying

→ Example Vacuum drying



Meaning

1	Chiller
2	Coolant hoses
3	Exhaust gas hose (layed into a fume hood)
4	Vacuum pumping unit **PC 3002 VARIO select**
5	Vacuum hose
6	Example of use: Dryer cabinet

4 Installation and connection

4.1 Transport

Products from **VACUUBRAND** are packed in sturdy, recyclable packaging.

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 arrival

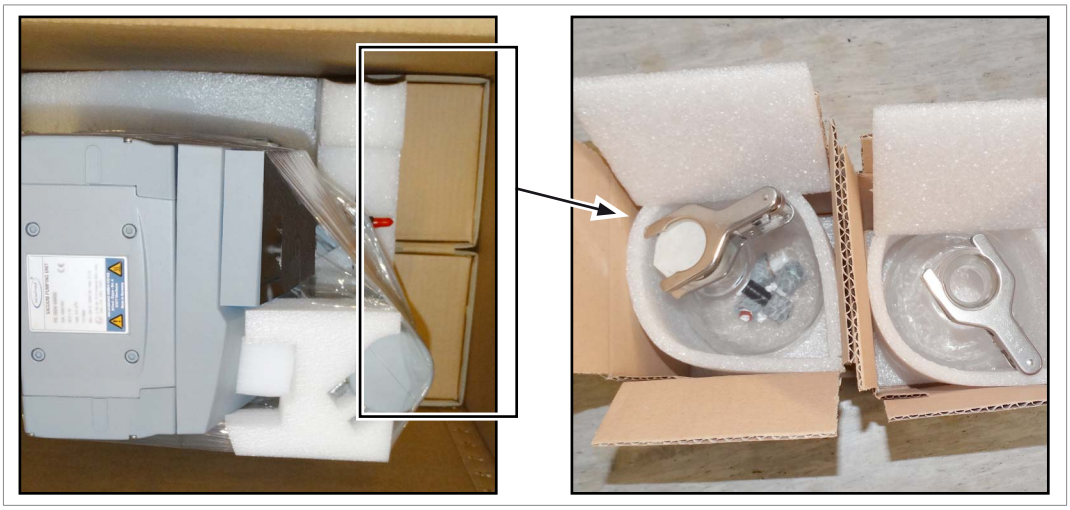
Check the shipment for transport damage and completeness.

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

Unpacking

→ Example
Pumping unit in original packaging

Glass flask in enclosed box



⇨ Remove the connections, such as hose nozzles and screw connections, out from the glass flask.

⇨ Compare the scope of delivery with the delivery note.

⇨ Lift the device only using the recessed grips out of the packaging.

4.2 Installation

NOTICE

Condensate can damage the electronics.

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

⇨ After goods receipt or storage, allow your vacuum device to acclimatize for at least 3-4 hours before initial use.

Check installation conditions

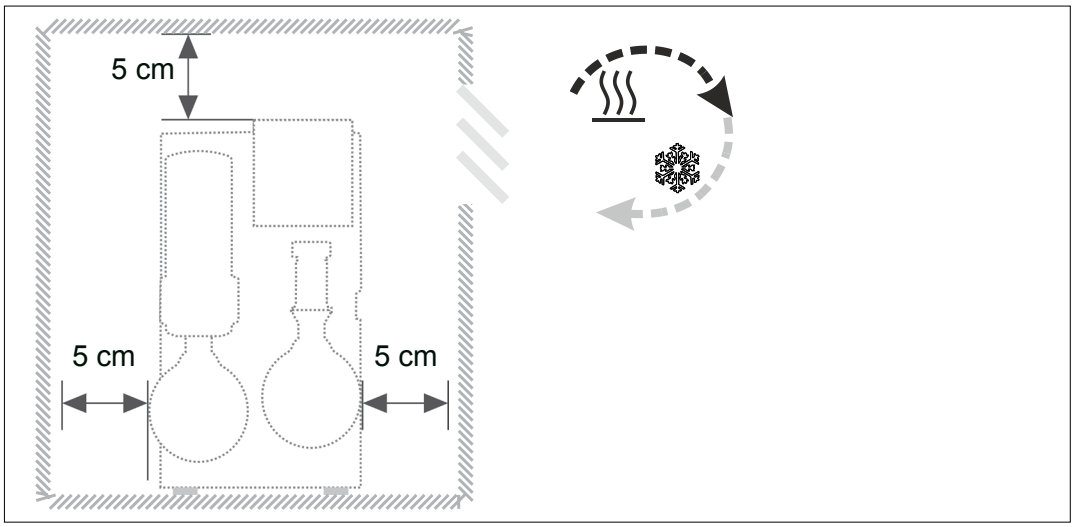
Compare installation conditions

- 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, nonvibrating, level, horizontal surface.

→ Example Sketch Minimum distances in laboratory furniture



IMPORTANT!

⇨ When installing in laboratory furnishings, maintain a minimum distance of 5 cm (2 in.) from adjacent objects or surfaces.

⇨ Prevent heat accumulation and ensure sufficient air circulation, especially in closed housings.

Observe limitations of use

Observe limitation of use

Limitation of use		(US)
Ambient temperature	10–40 °C	50–104°F
Altitude, max.	2000 m über NHN	6562 ft above sea level
Minimum distance to adjacent parts	5 cm	2 in
Coolant circuit, max. pressure	3 bar	44 psi
Relative humidity	30–85 %, non condensing	
Protection type	IP 20/IK 08	
Prevent condensation or contamination from dust, liquids, or corrosive gases.		

IMPORTANT!

⇨ Note the IP protection class of the controller. IP protection is only guaranteed if the device is appropriately installed and correctly connected.

⇨ For connection also note rating plate data and chapter *8.1.1 Technical data on page 71.*

4.3 Connection

All condensers of the pumping unit series have a vacuum connection and an exhaust gas connection. Perform the connection for your pumping unit as described in the examples below.

4.3.1 Vacuum connection (IN)

CAUTION

Flexible vacuum hoses can contract during evacuation.

Unsecured connected components can cause injuries or damage due to jerky movement (shrinkage) of the flexible vacuum hose. The vacuum hose can come loose.

- ⇨ Fix the vacuum hose to the connections.
- ⇨ Fix connected components.
- ⇨ Measure the flexible vacuum hose such that you take the maximum shrinkage into account.

NOTICE

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

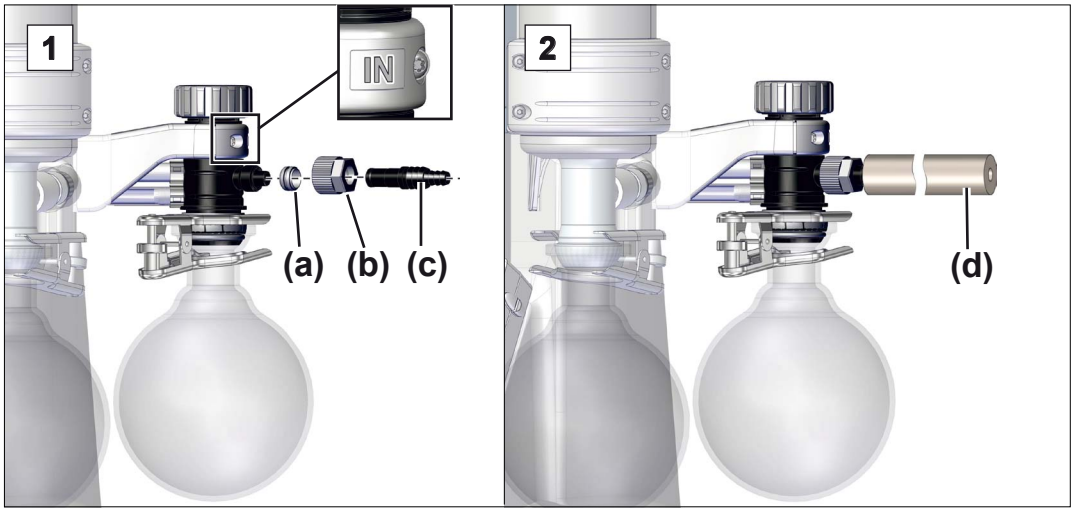
⇨ Prevent particles, liquids or contaminants from being aspirated or being able to flow back.

IMPORTANT!

- ⇨ Use the vacuum hose which is designed for the vacuum range used and which has sufficient stability.
- ⇨ Connect hose lines as short as possible.
- ⇨ Connect hose lines in a gas-tight manner to the vacuum pump.

Connect vacuum hose

→ Example
Vacuum connection at the inlet IN



1. Connect the sealing ring **(a)**, knurled nut **(b)** and hose nozzle **(c)** as shown.
2. Push the vacuum hose **(d)** from the apparatus onto the hose nozzle and fix it, e. g., with a hose clamp.

Please observe the following points to get an optimal result:

⇨ Connect a vacuum line as short as possible with a cross-section as wide as possible.

4.3.2 Exhaust gas connection (EX)

WARNING

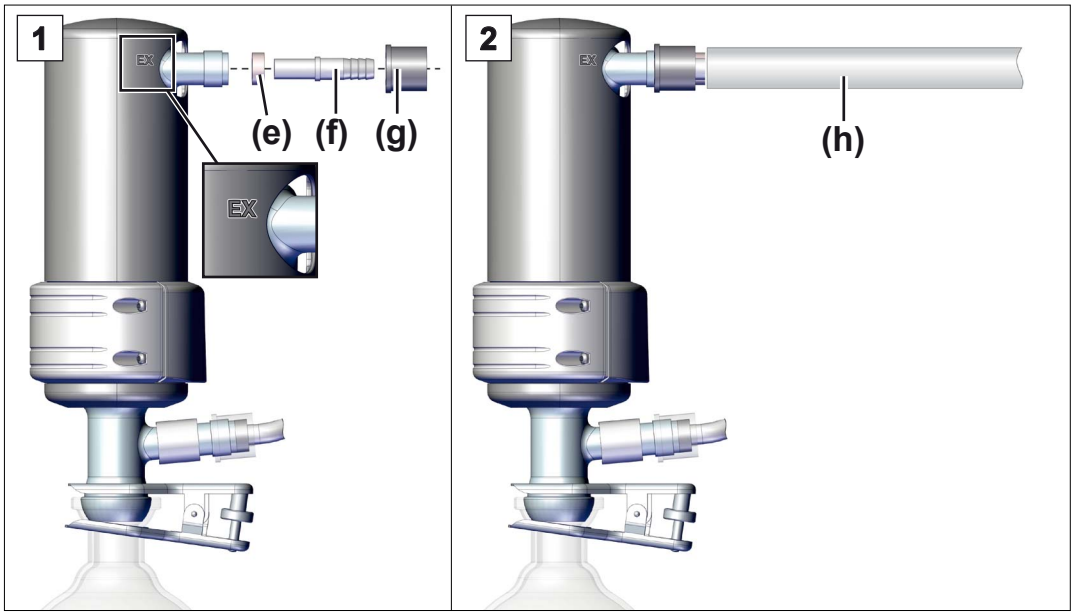
Risk of bursting due to overpressure inside the exhaust tube.

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

- ⇨ The exhaust gas line (outlet, gas outlet) must always be clear and non-pressurized.
- ⇨ Always position the exhaust gas hose downwards or take measures to prevent condensate from flowing back into the vacuum pump.
- ⇨ Observe the maximum admissible pressures and pressure differences.

Conntect exhaust gas hose

→ Example
Exhaust gas connection at the outlet EX



1. Connect the sealing ring **(e)**, the hose nozzle **(f)** and the knurled nut **(g)** as shown and screw this onto the connection.
2. Push the exhaust gas hose **(h)** onto the hose nozzle and lay the hose, if necessary, in a fume hood. If necessary fix the vacuum hose, e. g., with a hose clamp.

4.3.3 Kühlmittelanschluss am Kondensator

Coolant connection
IN = Feed line
EX = outlet

An emission condenser EK has a connection for coolant liquids. Water or the liquid from, e. g., a chiller are suitable for cooling.

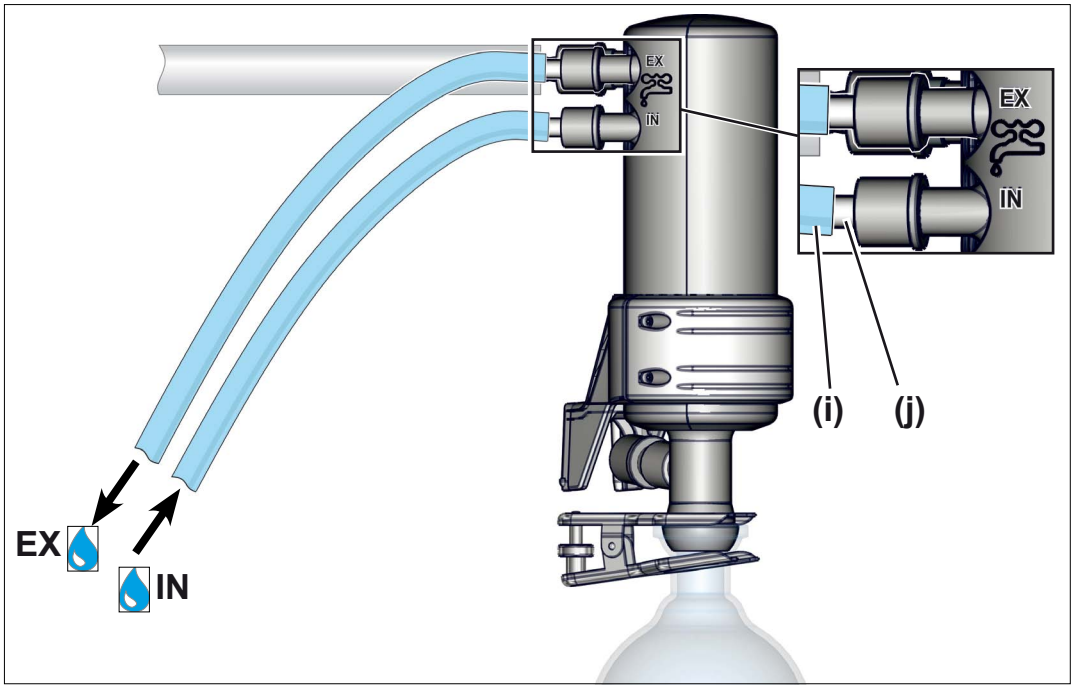
IMPORTANT!

In a closed, in-house cooling water circuit, the pressure should be limited to 3 bar (44 psi).

A cooling water valve may only be installed in the intake; the coolant drainage must be clear and non-pressurized.

Connect coolant

→ Example
Coolant connection at the EK



1. Fix both hose nozzles **(i)** to the condenser as shown using the knurled nut **(j)**.
2. Fix the hoses for the coolant on the condenser as shown. IN = feed line, EX = outlet.
3. Fix the vacuum hoses, e. g., with hose clamps.

4.3.4 Venting connection

DANGER

Risk of explosion due to venting with air.

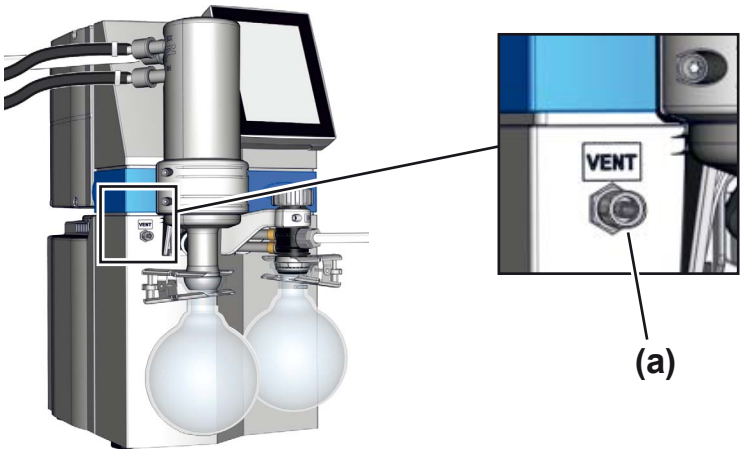
Depending on the application, venting can cause explosive mixtures to form or other hazardous situations to arise.

⇨ Never vent processes with air which could form an explosive mixture.

⇨ In the case of flammable substances, use only inert gas for venting, e. g., nitrogen (max. 1.2 bar/900 Torr abs.).

Venting with ambient air[1]

Position VENT port



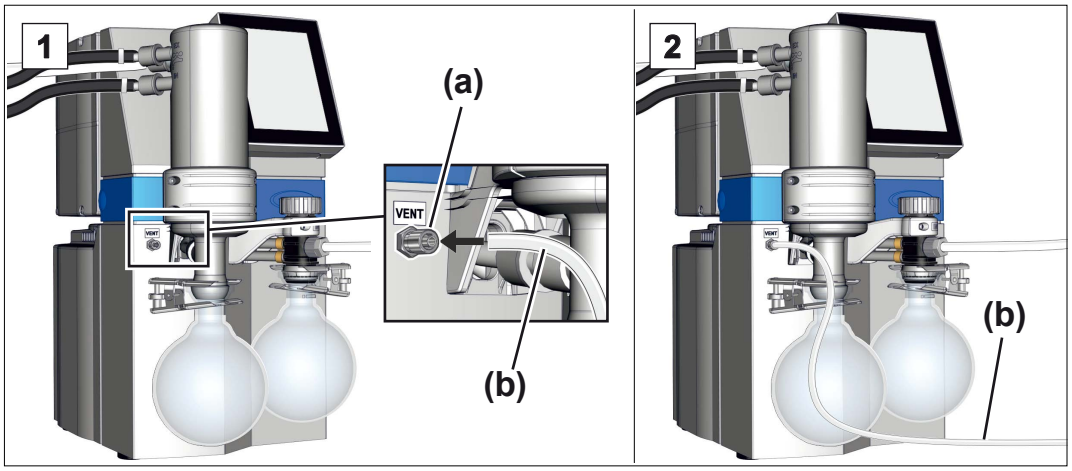
For venting with ambient air, nothing must be connected to the VENT port **(a)**.

1 Only valid for sensors with integrated venting valve.

Venting with inert gas – connect venting valve[2]

Required connection material: Hose for hose nozzle (Ø 4 mm), e. g., silicone hose 4/6 mm.

Connection to VENT port



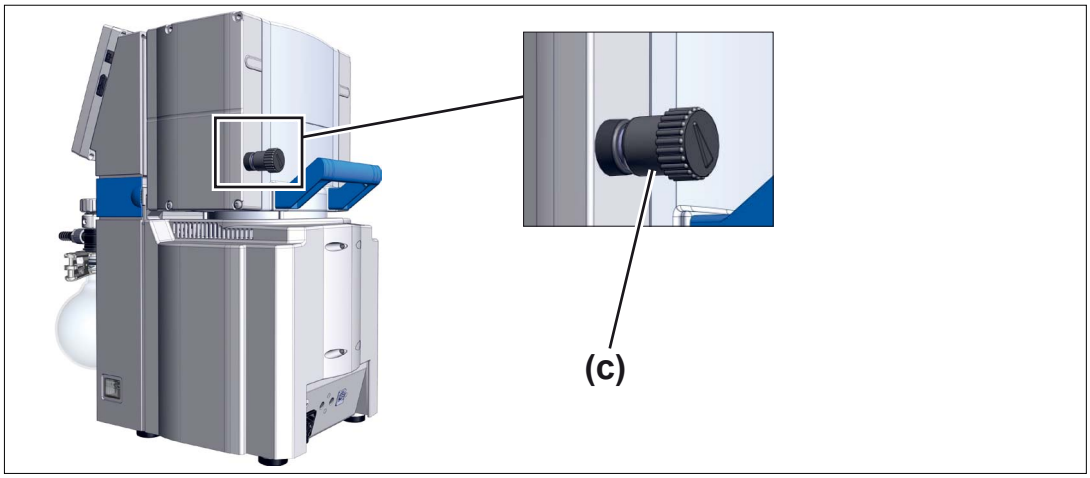
1. Push the hose **(b)** into the VENT port **(a)** and fix the tube with the knurled nut
2. Connect the hose **(b)** to inert gas (max. 1.2 bar/ 900 Torr, abs.).

2 Avoid overpressure.

4.3.5 Gas ballast (GB)

Use ambient air as gas ballast

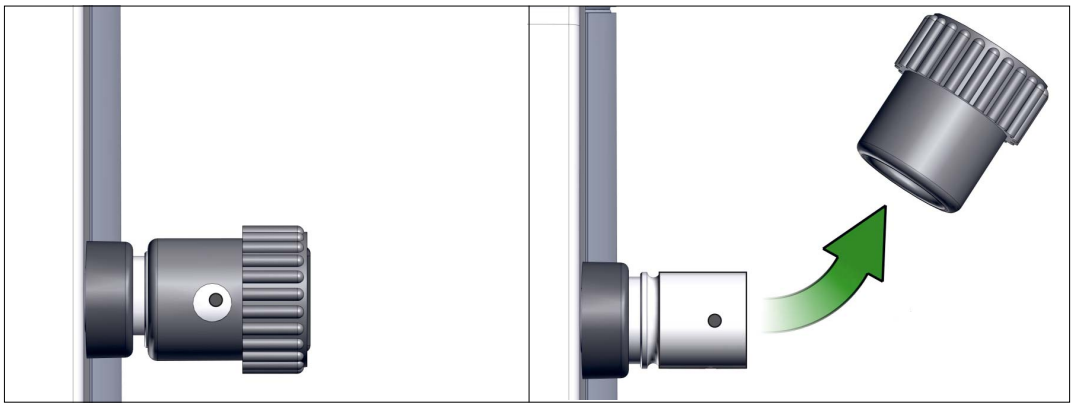
→ Example
Position of gas ballast valve



If ambient air is to be used as gas ballast, nothing must be connected at the pumping unit; gas ballast valve **(c)** → *see also chapter 5.2.2 Operation with gas ballast on page 45*

Use inert gas as gas ballast – OPTION

Prepare inert gas connection (GB)



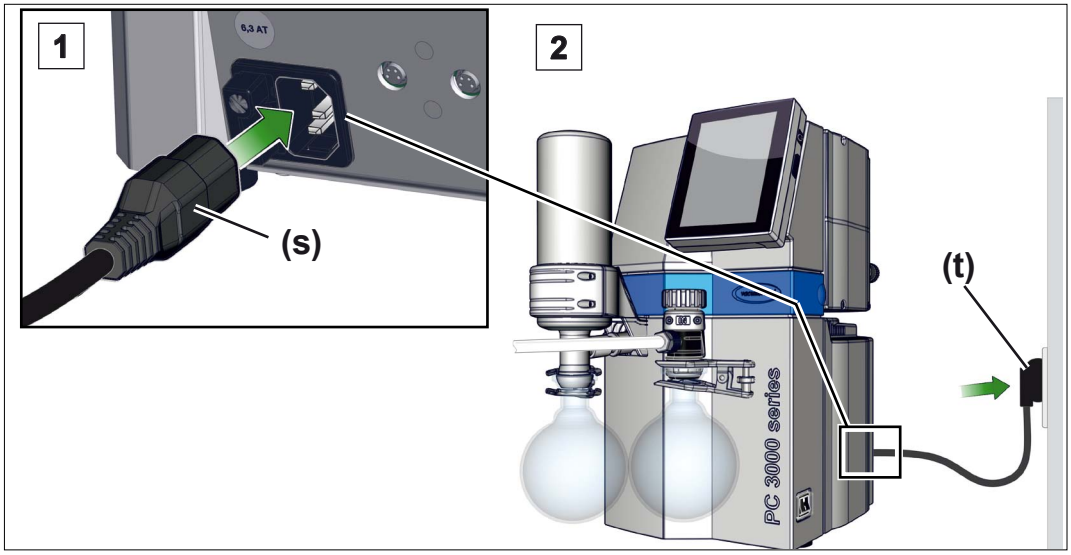
⇨ Remove the black gas ballast cap and connect a gas ballast adapter in its place.

Connection options and adapter for hose nozzle or small flange are available on your request.

4.3.6 Electrical connection

Connect pumping unit electrically

→ Example
Electrical connection pumping unit



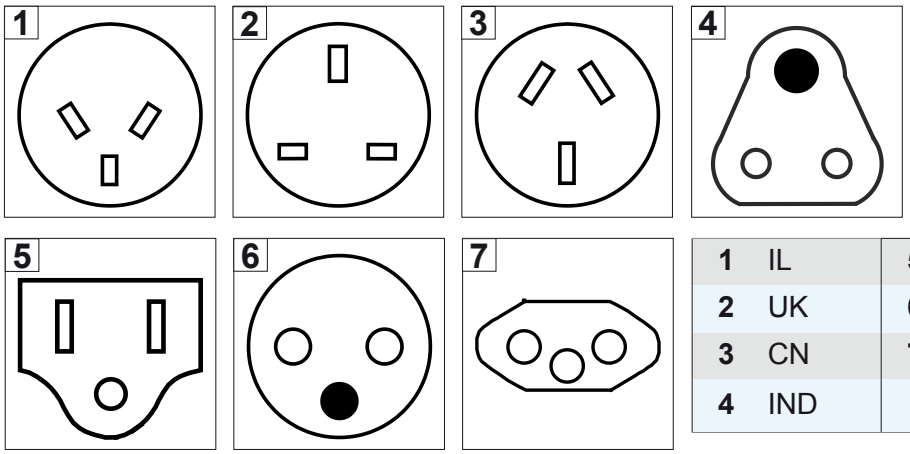
1. Insert the connector **(s)** of the power cable in the power connection of the vacuum pump.
2. Plug the wall power supply **(t)** into the mains socket.
   ☑ Pumping unit connected electrically.

IMPORTANT!

⇨ Lay the connection cable such that it cannot be damaged by sharp edges, chemicals, or hot surfaces.

Mains (power) connections with country code

Diagrams of standard power connections with grounding contact



1	IL	5	US
2	UK	6	CEE
3	CN	7	CH
4	IND		

The vacuum pump is delivered with the appropriate power plug, ready for use.

IMPORTANT!

⇨ Use the power plug which fits your power supply.

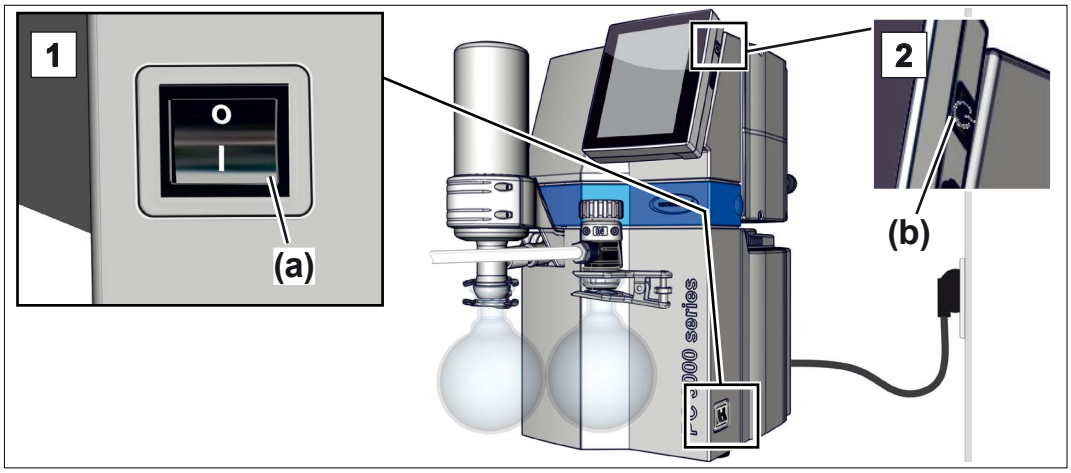
⇨ Do not use multi-outlet power strips connected in series as the power connection.

5 Commissioning (operation)

5.1 Switch on

Switch on pumping unit

Switch on pumping unit



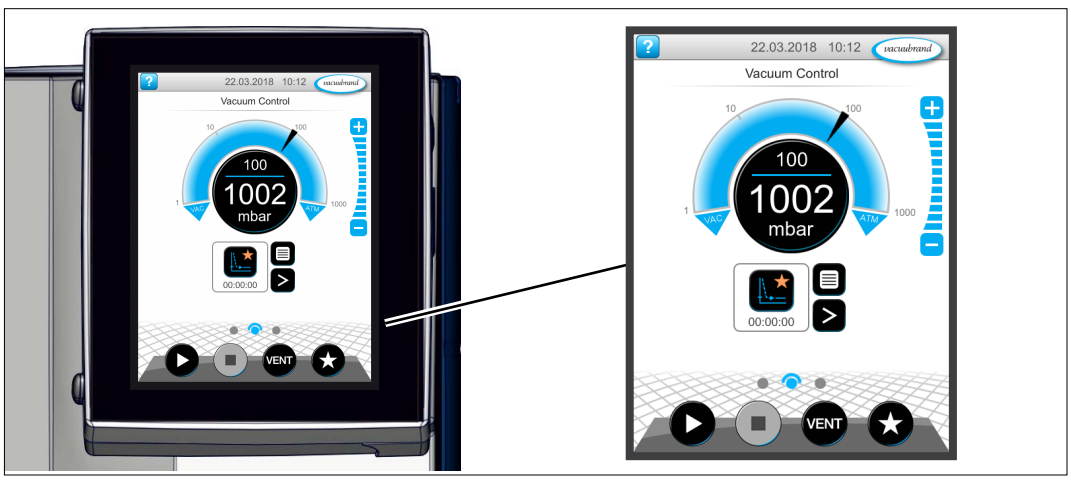
1. Switch the rocker switch **(a)** on – switch position **I**.
2. Press ON/OFF button **(b)** at the controller.
   - ☑ Display with start screen.
   - ☑ After approx. 30 seconds, the process screen appears with the operating elements in the controller display.

5.2 Operation

Operation by vacuum controller

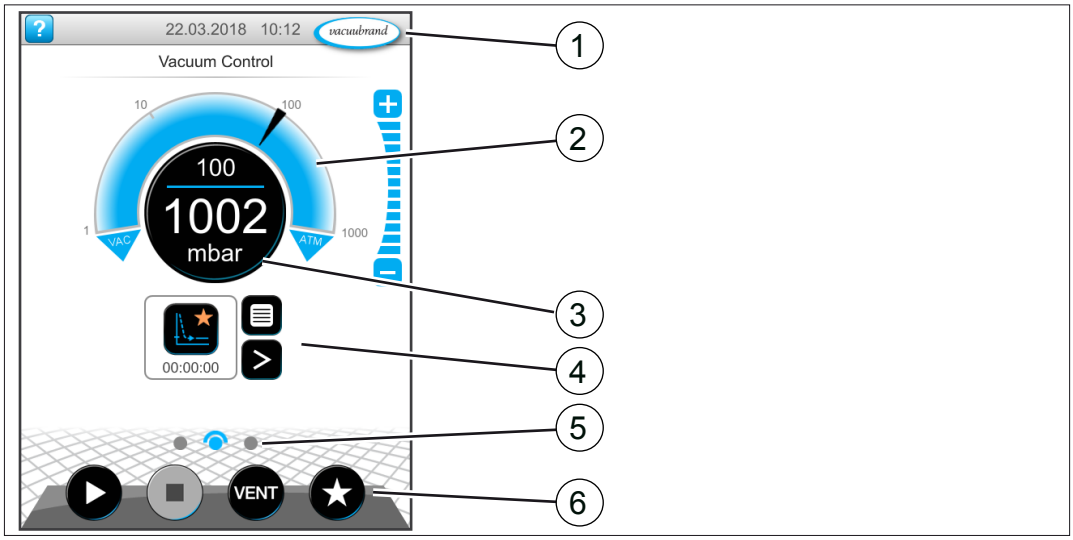
This manual contains – apart from the chapters Switching on and Switching off – the mechanical description of the pumping unit of the **PC 3000 VARIO select** series.

The operation of the installed vacuum controller and its functions are described in its own manual **VACUU·SELECT**.



Process screen

Process screen vacuum controller



1	Status bar
2	Analogue pressure reading – pressure curve
3	Digital pressure reading – pressure value (target value, actual value, pressure unit)
4	Process screen with context functions
5	Screen navigation
6	Operating elements for control

Operating elements

Operating elements vacuum controller

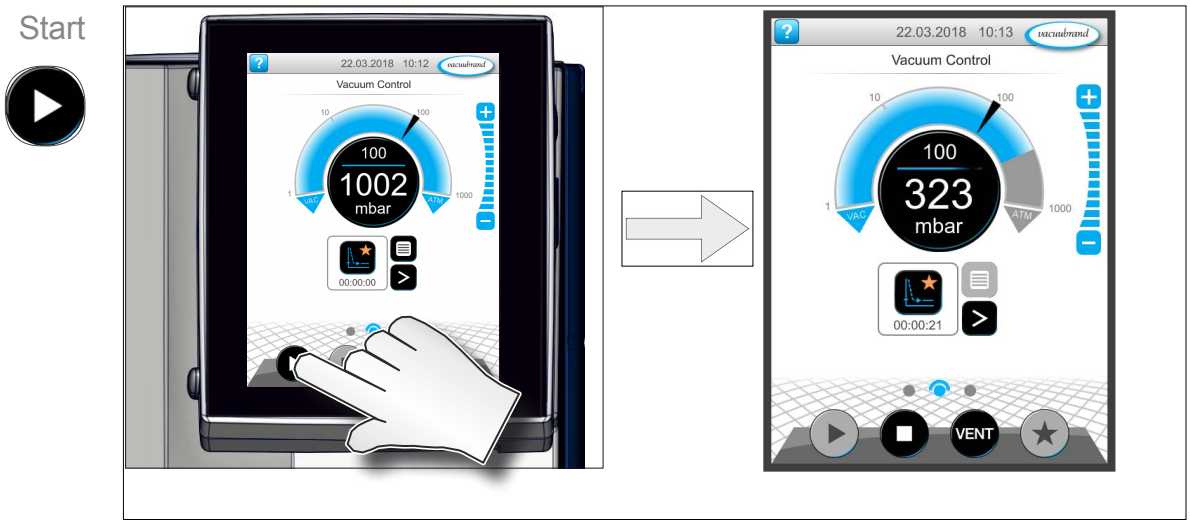
Button active	Button locked	Function
		***Start*** ▸ Start application – only available on the process screen.
		***Stop*** ▸ Stop application – always possible.
		***VENT*** – vent the system (option) ▸ Press button < 2 sec = momentarily vent; control continues.
 		▸ Press button > 2 sec = vent to atmospheric pressure; vacuum pump is stopped. ▸ Press button during venting = venting is stopped.
		***Favorites*** ▸ View Favorites menu.

** Button is only displayed if venting valve is connected or activated.*

5.2.1 Operation (→ *see description of controller)*

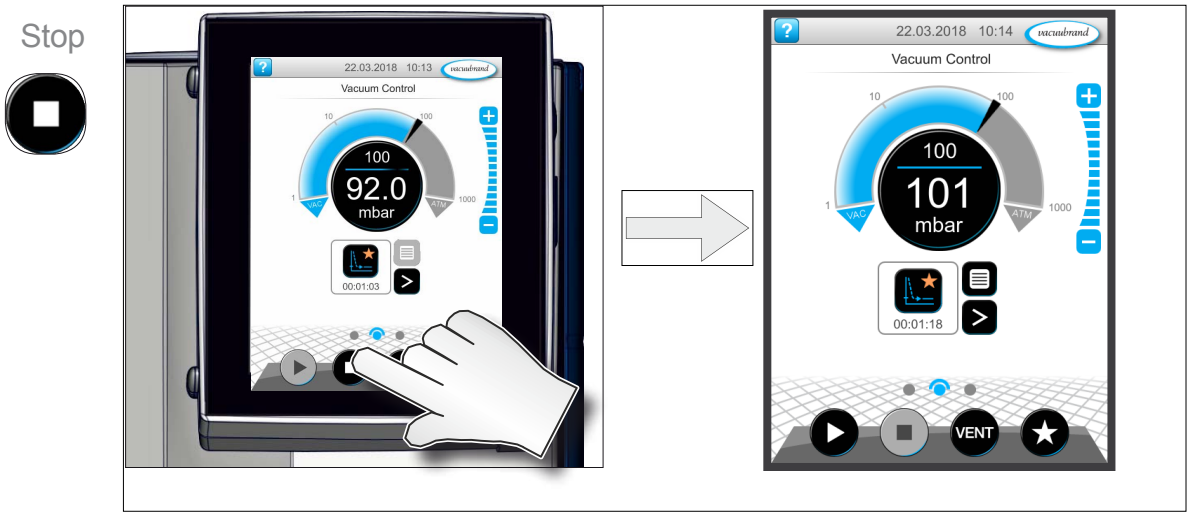
Start the vacuum controller

Start



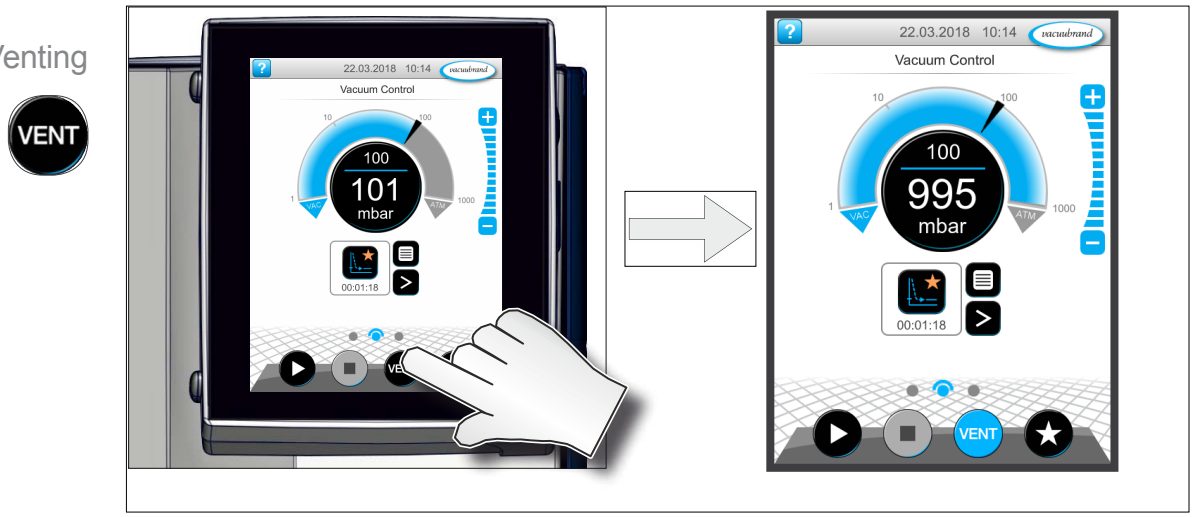
Stop the vacuum controller

Stop



Venting

Venting



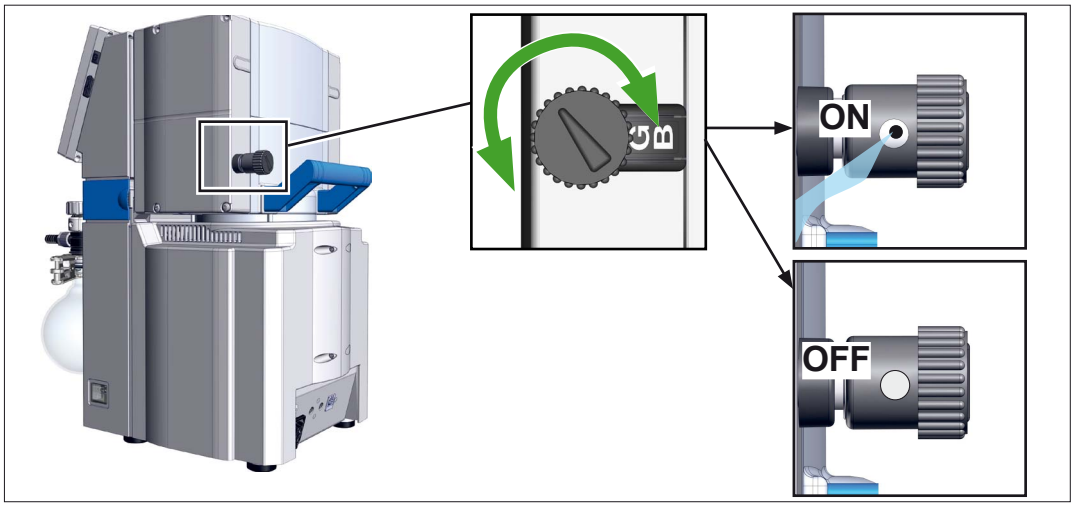
5.2.2 Operation with gas ballast

Meaning

The provision of gas ballast (= addition of gas) ensures that vapors do not condense inside the vacuum pump but are instead ejected from the pump. This makes it possible to pump larger amounts of condensable vapors and service lives are prolonged. The ultimate vacuum with gas ballast is slightly higher.

Open/close 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.

⇨ Evacuate condensable vapors, e. g., water vapor, solvents, etc. preferably only with the vacuum pump at operating temperature and with the gas ballast valve open.

IMPORTANT!

⇨ Connect inert gas as a gas ballast, if necessary, to exclude the formation of explosive mixtures.

⇨ Observe the admissible pressure at the gas ballast connection, max. 1.2 bar/900 Torr abs.

If the gas volume in the vacuum pump is low, a gas ballast can, where appropriate, be eliminated in these cases in order to increase the solvent recovery rate.

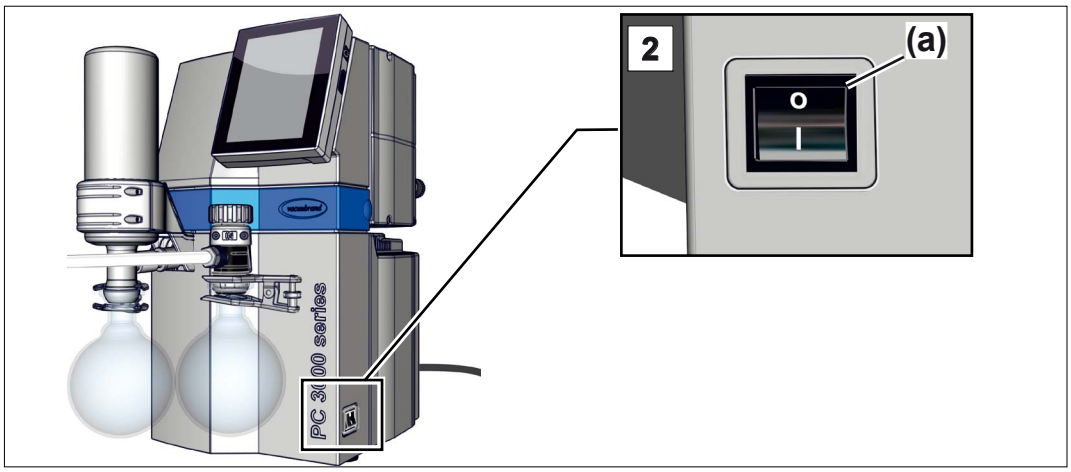
5.3 Decommissioning (switch off)

Take pumping unit out of operation

Switch-off pumping unit

1. Stop the process and allow the pumping unit to run for approx. 30 minutes, with open gas ballast or open inlet (IN).
   ☑ Condensate and residual media are rinsed from the vacuum pump.

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



2. Switch the rocker switch **(a)** off – switch position **O**.
   ☑ Pumping unit switched off.
3. Disconnect the pumping unit from the apparatus.
4. Empty the glass flasks.
5. Check the pumping unit for possible damage and pollution.

5.4 Storage

Store pumping unit

1. Clean the vacuum pumping unit when it is polluted.
2. Recommendation: Perform a preventive maintainance before storing the pumping unit. Especially if it ran more than 15000 operating hours
3. Close the suction and exhaust connections, e. g., with protection caps.
4. Package the pumping unit such that it is protected from dust; possibly enclose desiccants.
5. Store the vacuum pumping unit in a cool, dry location.

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

6 Troubleshooting

6.1 Technical support

⇨ To identify errors and potential remedies, please refer to the troubleshooting table *Error – Cause – Remedy*.

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

Operate the machine only when it is in proper working condition.

⇨ Observe the recommended maintenance intervals and thus ensure a functional system.

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

6.2 Error – Cause – Remedy

Error	▸ Possible cause	✓Remedy	Personnel
Readings deviate from the reference standard	▸ Vacuum sensor polluted. ▸ Moisture in the sensor ▸ Defective sensor. ▸ Sensor measures incorrectly.	✓ Clean sensor measuring chamber. ✓ Allow sensor measuring chamber to dry, e. g., through pumping. ✓ Calibrate sensor with reference gauge. ✓ Replace defective parts.	Specialist
Sensor does not pass on measured value	▸ No voltage applied. ▸ VACUU·BUS plug-in connection or cables defective or not connected.	✓ Check VACUU·BUS plug-in connection and cables to the controller.	Operator
	▸ Defective sensor.	✓ Replace defective parts.	Specialist

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

Error	▸ Possible cause	✓Remedy	Personnel
Venting valve does not operate	▸ No voltage applied. ▸ VACUU·BUS plug connection or cables defective or not connected. ▸ Venting valve polluted. ▸ Venting valve inside the sensor defective.	✓ Check VACUU·BUS plug connection and cables to the controller. ✓ Clean venting valve. ✓ If necessary, use another external venting valve.	Specialist
Vacuum pump does not start.	▸ Overpressure in the exhaust gas line. ▸ Condensation in the vacuum pump.	✓ Open up exhaust gas line. ✓ Ensure a clear passage. ✓ Flushing: Operate vacuum pump briefly with open suction nozzle and max. speed.	Operator
	▸ Pumping unit switched off. ▸ Power plug or plug-in power supply not correctly plugged in or pulled out. ▸ VACUU·BUS plug connection or cables defective or not connected.	✓ Switch pumping unit on using rocker switch. ✓ Check power supply and cable. ✓ Check VACUU·BUS plug connection and cables to the controller.	Operator
	▸ Motor overloaded. ▸ Thermal protection triggered.	✓ Allow the motor to cool off. ✓ Reset error manually: → Unplug pumping unit from mains → Eliminate cause of error → Switch pumping unit back on.	Specialist
No or very little suction power	▸ Leak in the suction line or in the apparatus. ▸ Separator flask not mounted properly.	✓ Check suction line and apparatus for possible leaks. ✓ Check separator flask and its correctly fixation. ✓ Check apparatus for leaks.	Operator

Error	▸ Possible cause	✓Remedy	Personnel
	▸ Vacuum line too long or diameter too small.	✓ Shorten the distance if possible and use vacuum lines with a larger cross-section.	resp. Specialist
	▸ Condensate inside the vacuum pump.	✓ Allow vacuum pump to run for a few minutes with the suction nozzle open.	Operator
	▸ Deposits inside the vacuum pump	✓ Clean and check pump heads.	Specialist
	▸ Diaphragms or valves defective.	✓ Replace defective parts.	Specialist
	▸ High level of vapor generated in the process.	✓ Check process parameter.	Specialist
	▸ Gas ballast open	✓ Close gas ballast	Operator
	▸ Gas ballast cap porous or no longer present.	✓ Check gas ballast cap. ✓ Replace defective parts.	Operator
No display	▸ Pumping unit switched off. ▸ Power plug or plug-in power supply not correctly plugged in or pulled out. ▸ VACUU·BUS plug-in connection or cables defective or not connected. ▸ Controller switched off or defective.	✓ Switch pumping unit on using rocker switch. ✓ Check power supply and cable. ✓ Check VACUU·BUS plug-in connection and cables to the controller. ✓ Replace defective parts.	Operator
Loud operating noises	▸ No hose installed.	✓ Check hose and install it right.	Operator

Error	▸ Possible cause	✓ Remedy	Personnel
Loud operating noises	▸ Ball bearing defective. ▸ Outlet pipe open. ▸ Glass flask on EK missing.	✓ Maintain vacuum pump and replace defective parts or send in the complete device. ✓ Check exhaust gas line connections. ✓ Connect the outlet pipe to an exhaustion system, e. g., fume hood. ✓ Assemble glass flask.	Specialist
Condenser (cooler) defective	▸ Mechanically damaged.	✓ Send in.	resp. Specialist

7 Cleaning and maintenance

WARNING

Danger due to electrical voltage.

⇨ Switch the device off before cleaning or performing maintenance on the device.

⇨ Pull out power plug.

Risk of injury because of toxic contaminated parts.

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

⇨ Wear your personal protective equipment, e. g., protective gloves, eye protection and, if necessary, respiratory protection.

⇨ Decontaminate the vacuum pump before opening it. If necessary, have it decontaminated by an external service provider.

⇨ Take safety precautions according to your directives for handling hazardous substances.

NOTICE

Damage possible if work is performed incorrectly.

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

⇨ Recommendation: Please read before the first maintenance the complete instructions once to get an overview of the required service activities.

7.1 Information on service work

Recommended maintenance intervals

Maintenance intervals*	if required	15000 h
Replace diaphragms		x
Replace valves		x
Replace O-ring		x
Clean or replace molded PTFE-hose	x	
Replace overpressure relief valve at EK	x	
Cleaning Pumping unit	x	

** Recommended maintenance interval after hours of operation and under normal operating conditions; depending on the environment and area of application, we advise performing cleaning and maintenance as needed.*

Recommended auxiliaries

→ Example Recommended auxiliaries for cleaning and maintenance

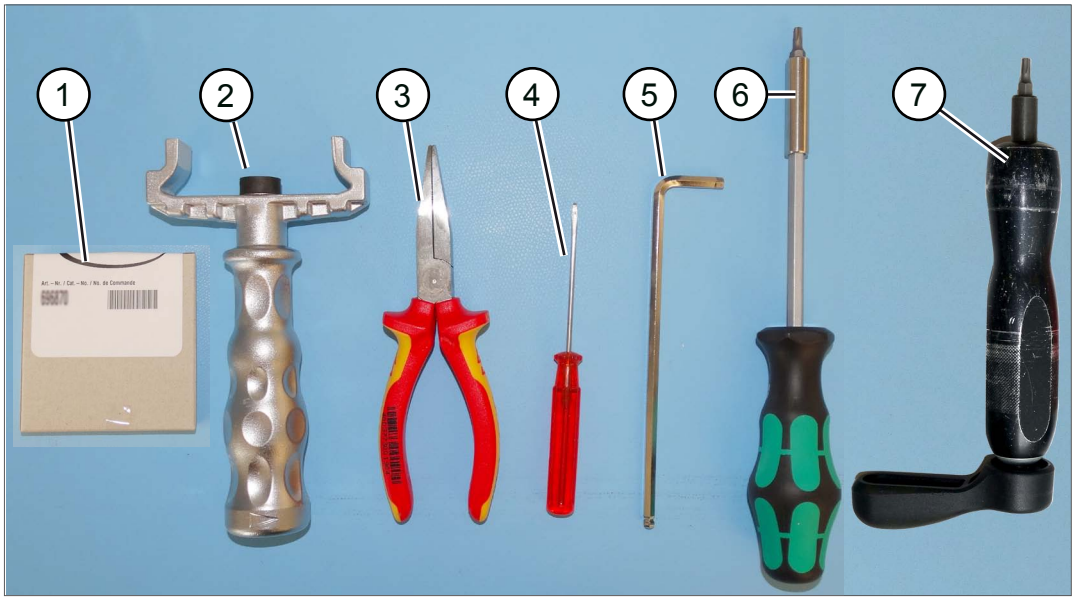
N°	Auxiliary materials
1	Round bottom flask stand
2	Protective gloves
3	Chemically resistant vessel + funnel

IMPORTANT!

⇨ Always wear your personal protective equipment when performing activities during which you can come into contact with hazardous substances.

Tools needed for maintenance

→ Example Tools



N°	Tool	Size
1	**Service kit**	
	Service kit MZ2C NT VARIO #20696869	
	or	
	Service kit MD4C NT VARIO #20696870	
2	**Diaphragm wrench #20636554**	SW66
3	**Flat nose pliers**	
	Close hose clamps	
4	**Flat-head screwdriver**	
	Open hose clamps	Gr. 1
5	**Allen key**	
	Screw connections head cover	Gr. 5
	Screw connections holder EKP	Gr. 4
6	***Torx screwdriver**	
	Screw connections counterholder EK	TX10
	Screw connections housing cover	TX20
	Fixate, loosen clamping bracket	TX20
	Screw connection gas ballast	TX20
7	**Torque wrench, adjustable 2–10 Nm**	

** In the example here with bit support*

7.2 Cleaning

IMPORTANT!

This chapter does not contain descriptions for the decontamination of the product. This chapter describes simple cleaning and care measures.

⇨ Before cleaning, switch off the Pumping unit.

7.2.1 Housing surface

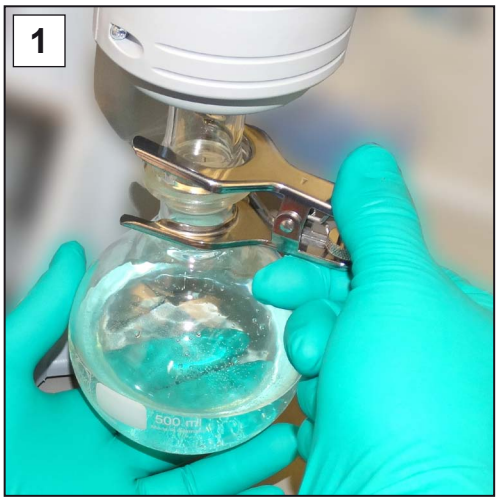
Clean surface

Clean polluted surface with a clean, slightly moistened cloth. To moisten the cloth we recommend water or mild soap.

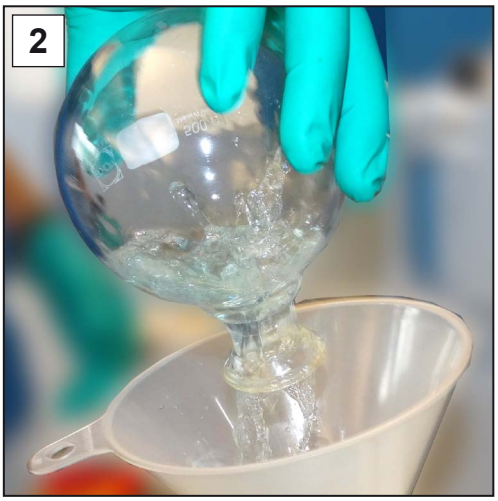
7.2.2 Empty glass flask

Remove and empty glass flask

→ Example Empty glass flask



1. Open the joint clamp and remove the glass flask.



2. Empty the glass flask into a suitable container, e. g., chemical-resistant canister.

3. Then fix the glass flask to the condenser once again using the joint clamp.

Depending on the application, the collected liquid can either be reprocessed or professionally disposed of.

7.2.3 Clean or replace molded PTFE-hose

Maintenance provides the opportunity to check the components of the Pumping unit, including the tubing.

⇨ Clean the inside of heavily polluted molded hoses, e. g., using a pipe cleaner or the like.

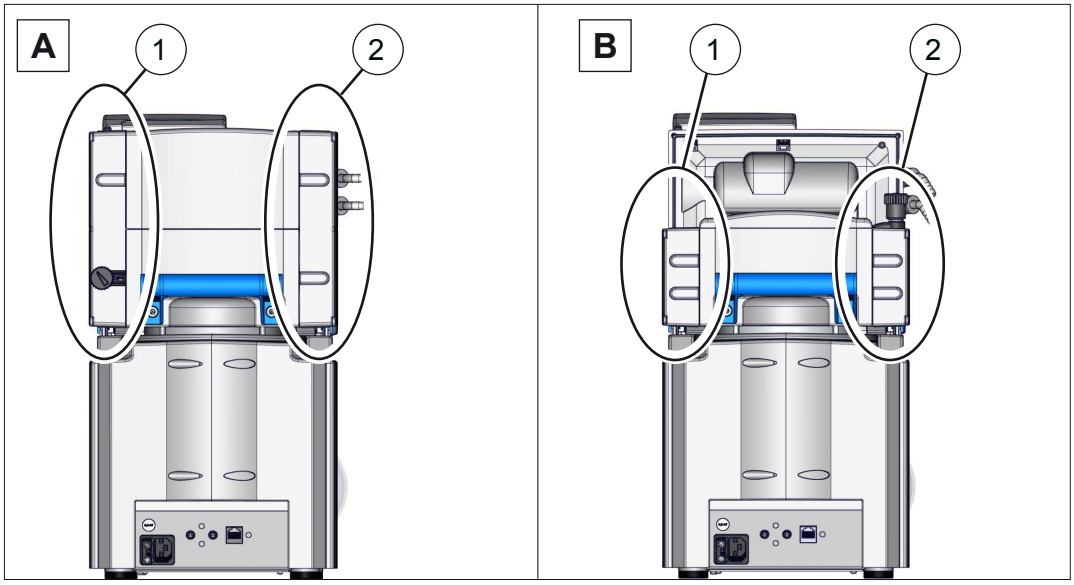
⇨ Replace brittle and defective molded hoses.

7.3 Vacuum pump maintenance

7.3.1 Maintenance items

Items to be maintained

→ Example
Maintenance of the pump heads
A = 4-headed
B = 2-headed



Maintenance items	
1	Housing cover, power connection side
2	Housing cover

IMPORTANT!

⇨ Perform maintenance of the pump heads one after the other

⇨ In the case of the pump heads, always change the diaphragms and
valves completely, as shown in the image description for pump head **(1A)**.

Easy maintenance because of splitted work steps.

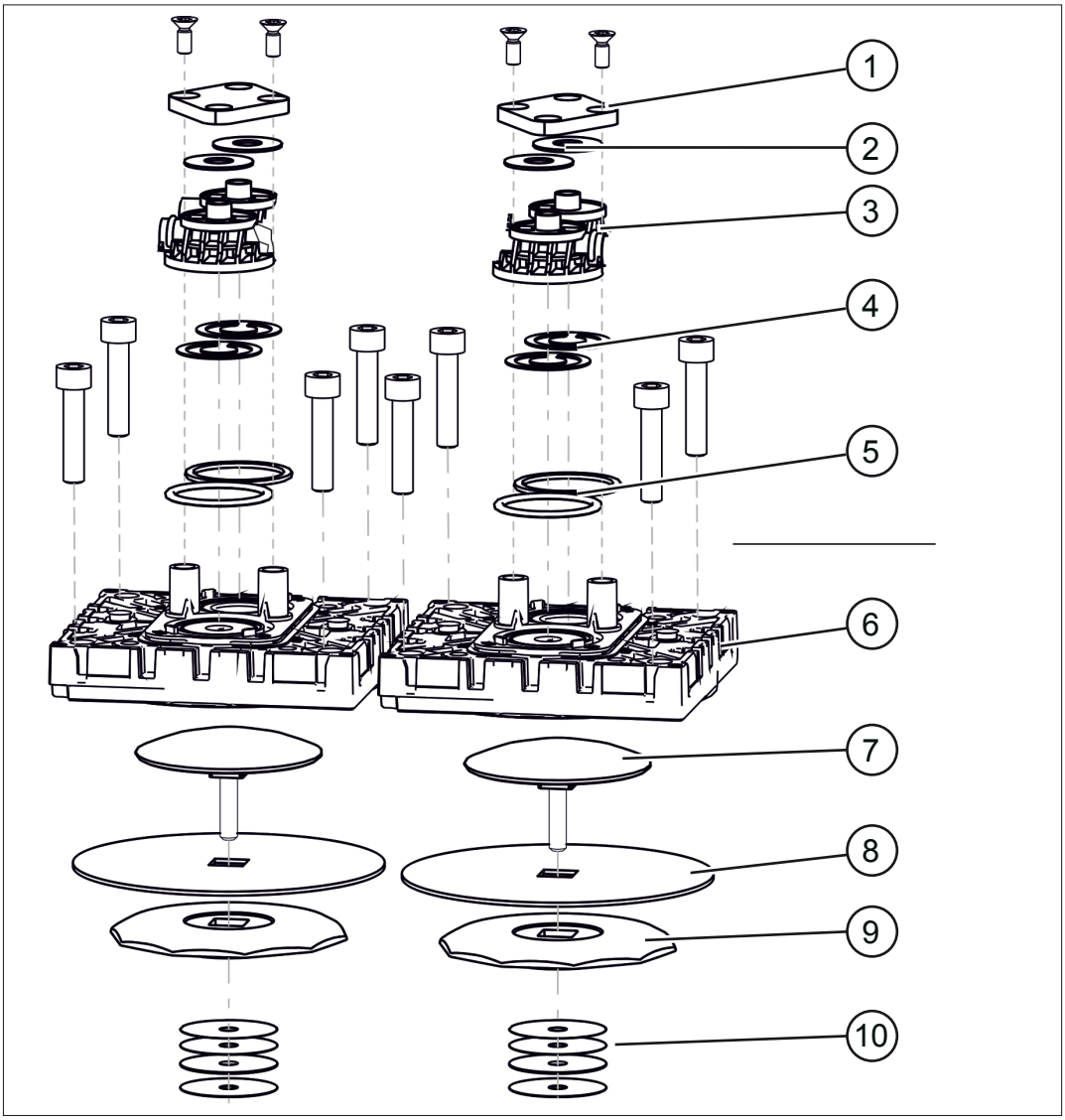
⇨ First, replace the diaphragms off one pump head.

⇨ Then change the inlet/outlet valves.

⇨ Then perform these activities at the next pump head.

Exploded-drawing pump head (example)

→ Example
Exploded-drawing pump head PC 3004



Valve maintenance	
1	Clamping bracket + screw connections
2	Disc spring
3	Valve terminals
4	Valves
5	O-rings size 26 x 2

Diaphragm maintenance	
6	Head cover + screw connections
7	Diaphragm clamping disc with square-head screw
8	Diaphragm
9	Diaphragm support disc
10	Spacer discs, max. 4 pieces per pump head

7.3.2 Change diaphragms and valves

Preparation

→ Example
Prepare maintenance

1. Switch the Pumping unit off and disconnect the power plug.

2. Remove the glass flask from the EK as well as the connected hoses.

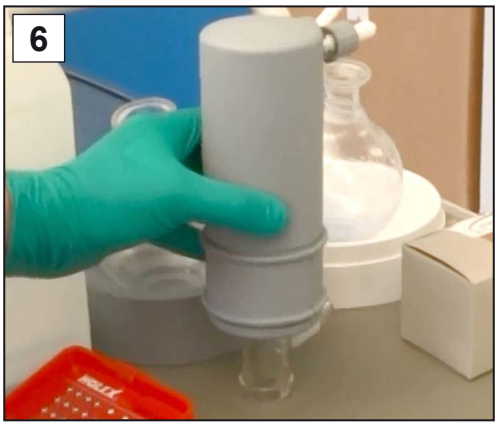
→ Example
Disassemble EK

3. Unscrew the screws from the counterholder;
Torx screwdriver TX10

4. Remove the counterholder and lay it aside together with the screws.

→ Example
Disassemble EK

5. Unscrew the knurled nuts, remove the molded hose, and remove the cooler.

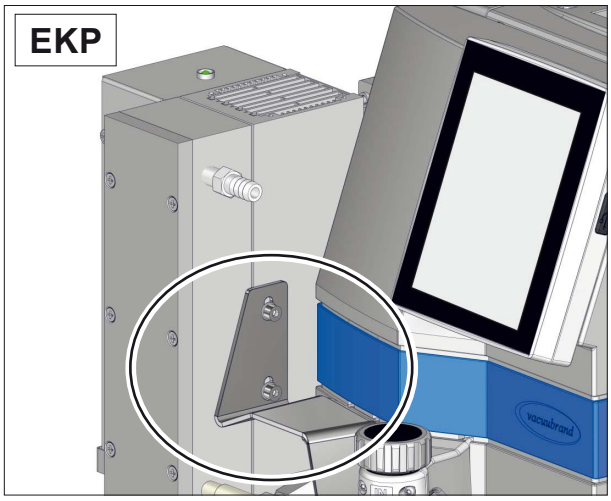


6. Set the cooler down securely so that no liquid can escape. Here you can check the over-pressure relief valve at EK and replace it if it is damaged.

The cooler EKP is secured with a retaining plate.

⇨ Detach the screws of the retaining plates on the pumping units.

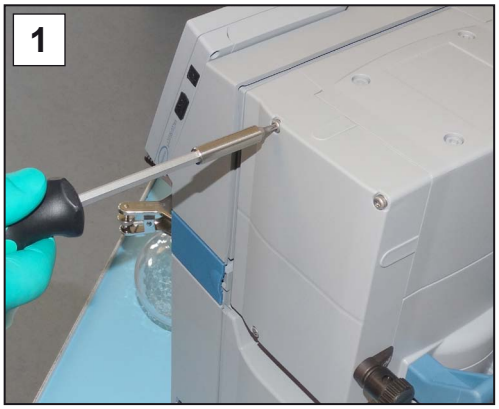
→ Example
Disassemble EKP



⇨ Unscrew the 2 fastening screws; Phillips screwdriver 4.

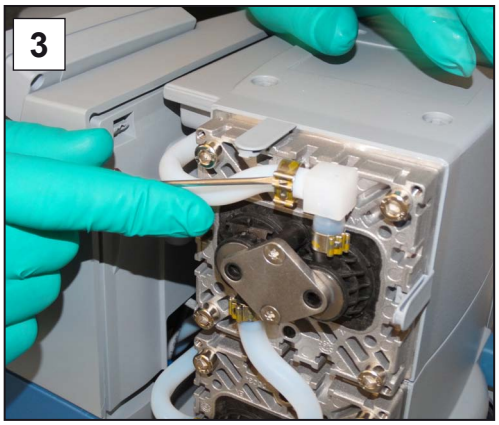
Disassemble device and housing parts

→ Example
Disassemble housing parts on left

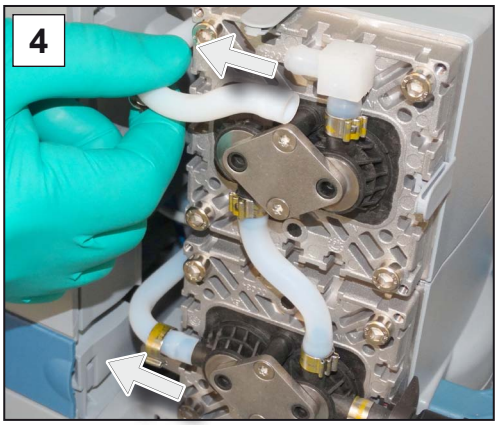


1. Unscrew the screw connections from the housing cover; Torx screwdriver TX20.

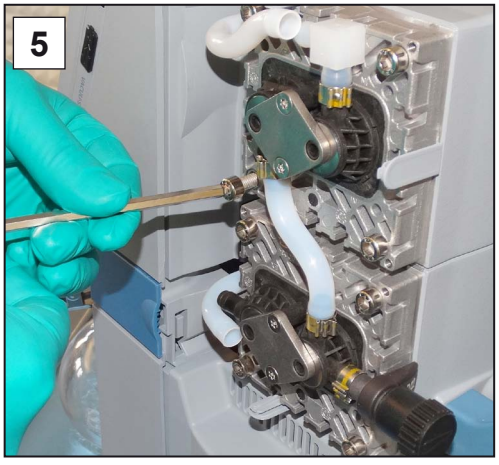
2. Remove the housing cover and lay it aside.



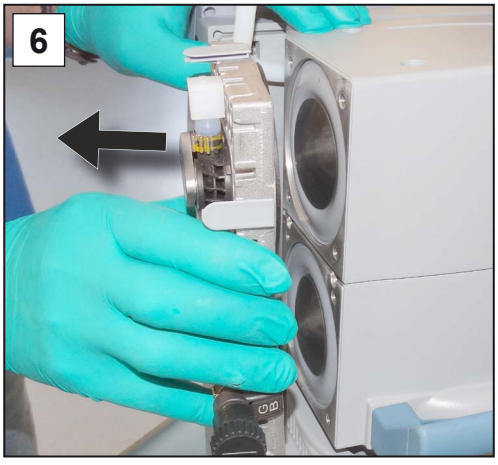
3. Open the hose clamps of the outer hoses. Flat-head screwdriver 1.



4. Pull off the molded hoses.



5. Unscrew the socket head screws from the head covers. Allen key 5.

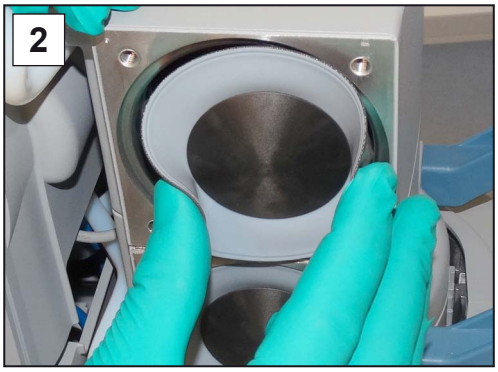


6. Lay the screw connections aside and remove the pump head pair.

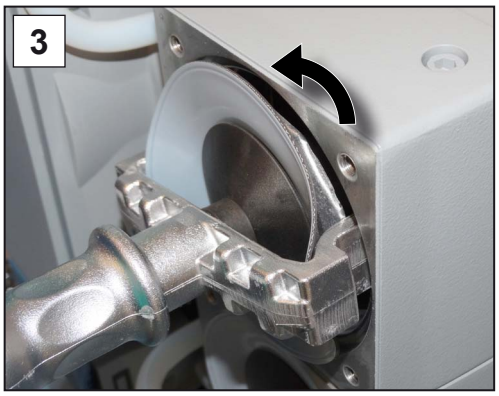
Replace diaphragms

→ Example Diaphragm replacement

1. Press lightly on one of the diaphragm clamping discs.

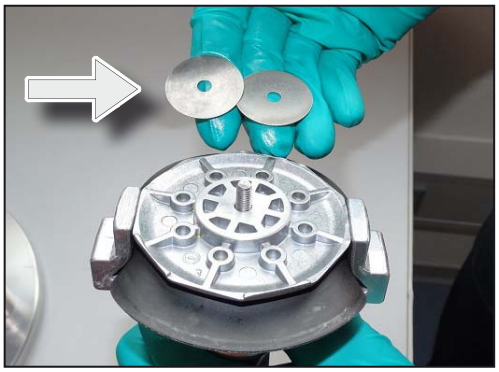


2. Fold the diaphragm on the sides upwards.



3. Carefully position the diaphragm key on the diaphragm support disc and unscrew the assembly with the attached diaphragm key.

4. Lift the diaphragm with all parts out of the vacuum pump.
If spacer discs adhere to the connecting rod, remove them carefully.

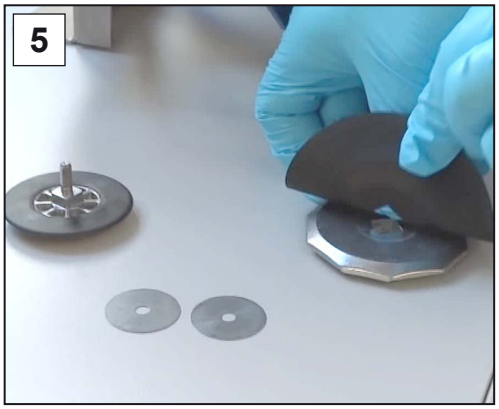


IMPORTANT!

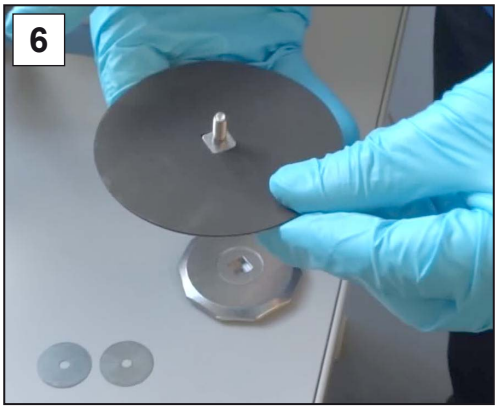
⇨ Never let drop spacer discs into the housing.

⇨ Keep the spacer discs. The same number of spacer discs must be reinserted.

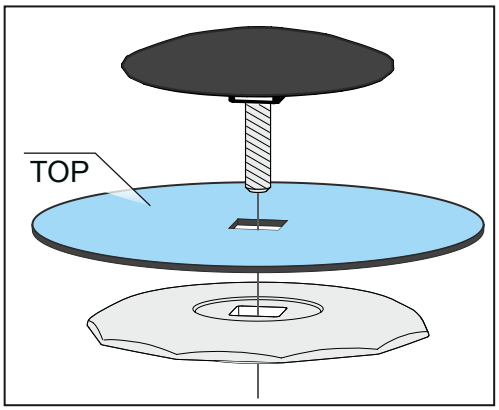
→ Example
Diaphragm replacement



5. Pull out the diaphragm clamping disc and remove the used diaphragm.



6. Position the new diaphragm on the square of the diaphragm clamping disc.

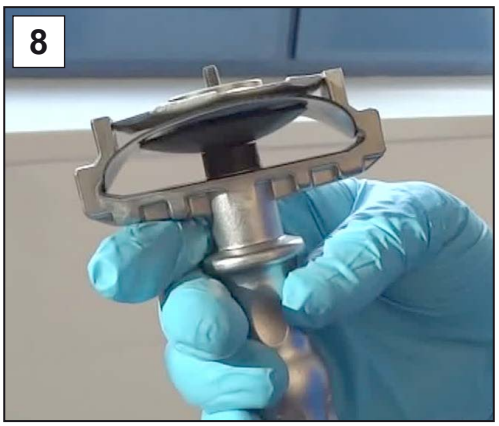


IMPORTANT!

⇨ Ensure that the diaphragm is inserted correctly, with the coated, light-colored side facing up.

⇨ Pay special attention to the correct fitting onto the square of the thread.

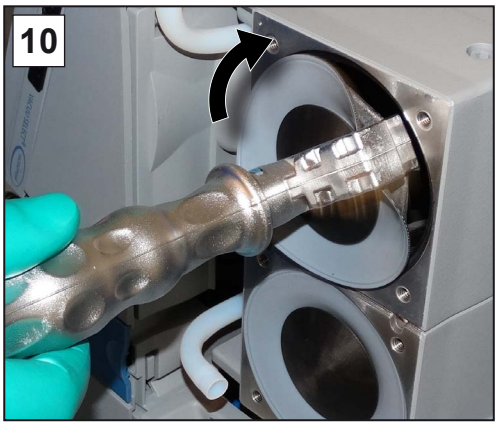
7. Place all spacer discs on the thread pin.



8. Fixate the diaphragm parts inside the diaphragm wrench.

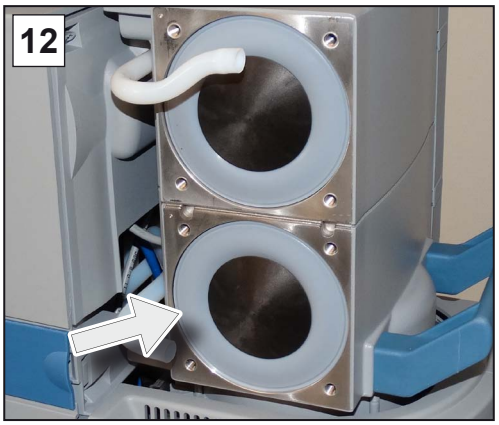
→ Example
Diaphragm replacement

9. Hold the spacer discs firmly and place the assembly on the rod thread.



10. Tighten the assembly hand-tight using the diaphragm wrench.

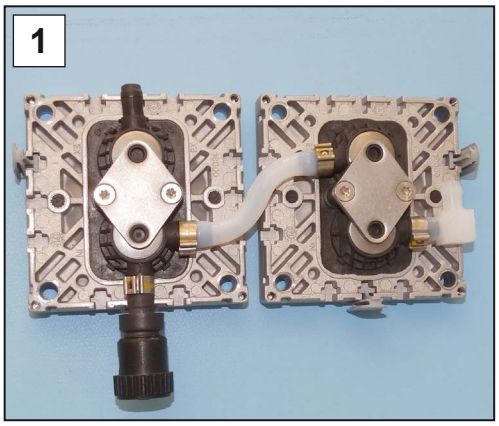
11. Then position a torque wrench with hexagon socket bit on the diaphragm key and tighten the assembly with 6 Nm.



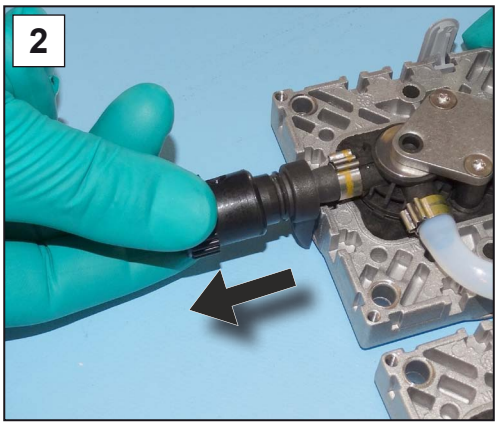
12. Repeat the process for the second diaphragm.

Replace valves

→ Example
Valve replacement

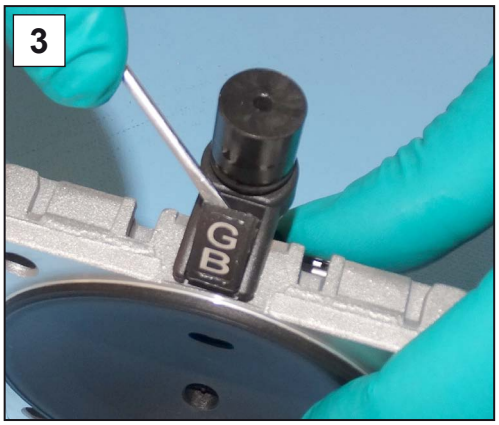


1. Take the pump head pair which had been laid aside.

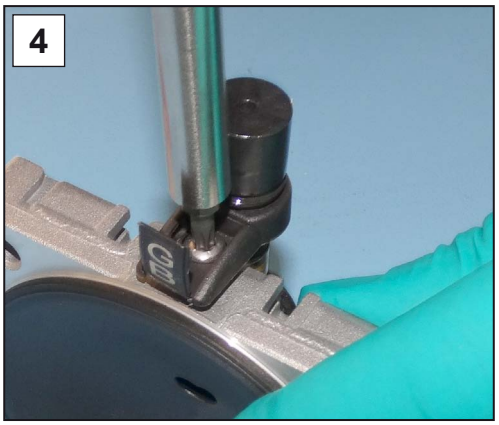


2. Remove the gas ballast cap.

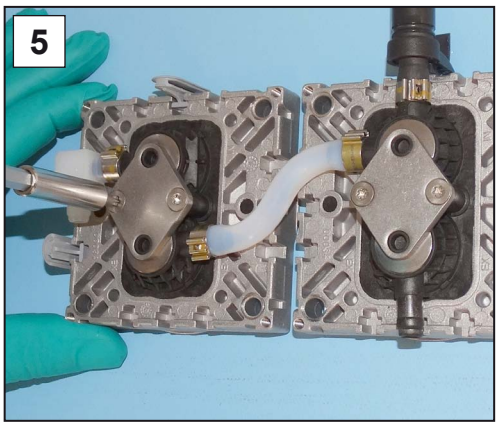
Figure 2–4 optional description, since gas ballast mounted only on one side



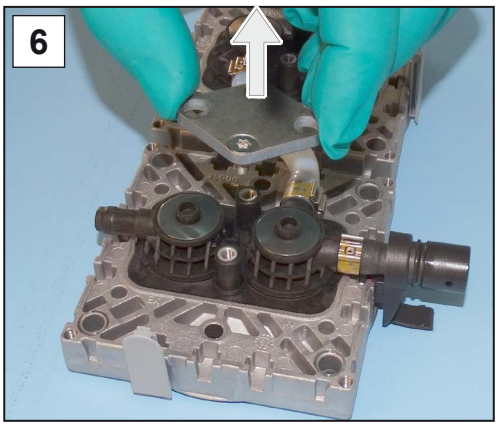
3. Carefully pry off the cover.



4. Unscrew the screw connection; Torx screwdriver TX20.

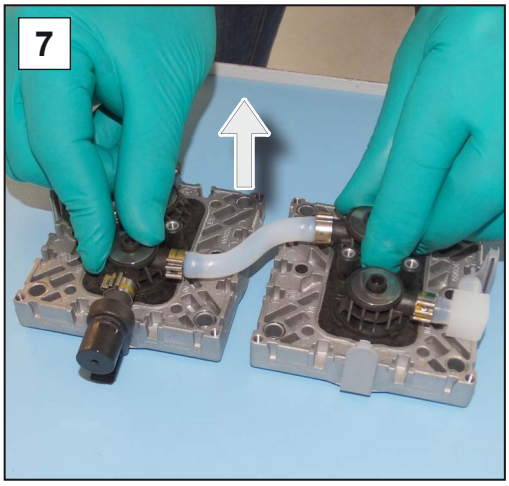


5. Unscrew the Torx screws. Torx screwdriver Tx20

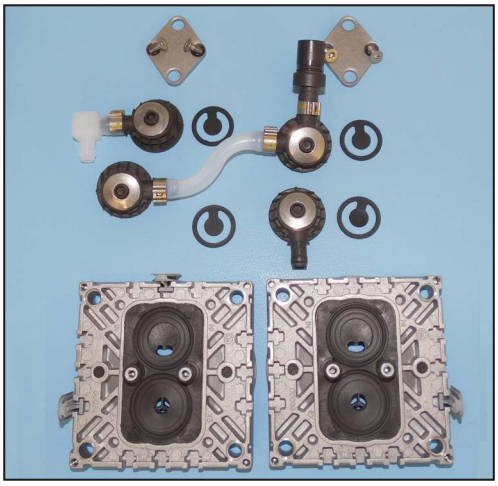


6. Remove the clamping brackets from the valve terminals.

→ Example
Valve replacement



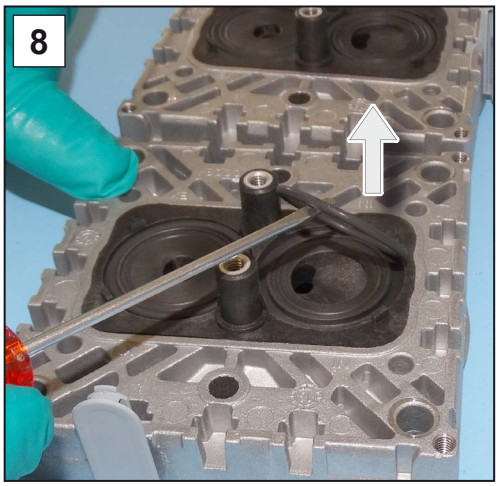
7. Remove the valve terminals with the disc springs.



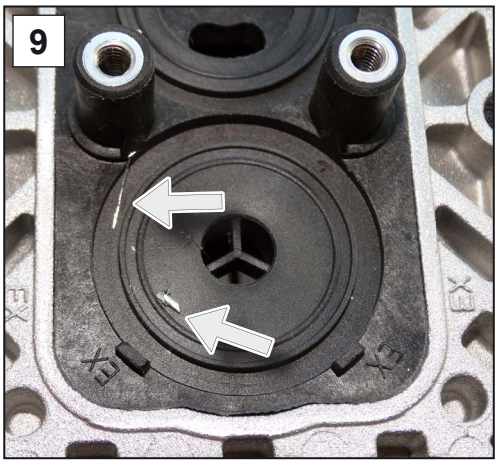
Top view: valve terminals, valves and pump head pair.

NOTICE

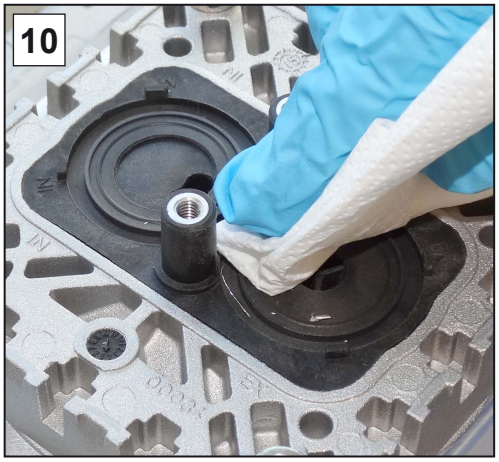
Valves can adhere to the underside of a valve terminal.



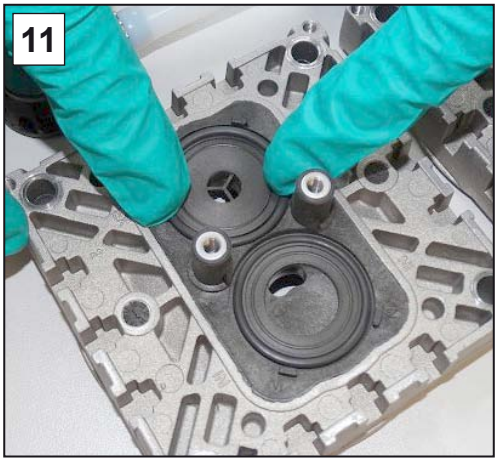
8. Carefully remove the used O-rings and valves.



9. Check the surfaces for dirt or particles.



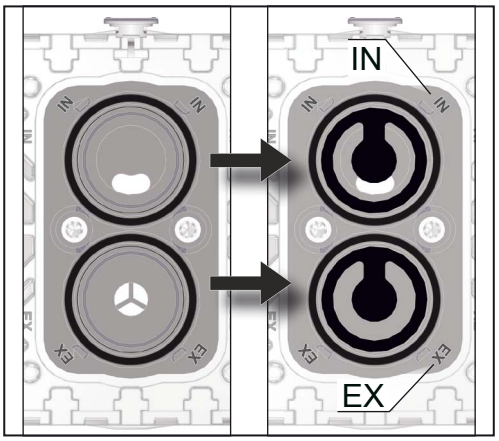
10. Carefully clean dirty surfaces.



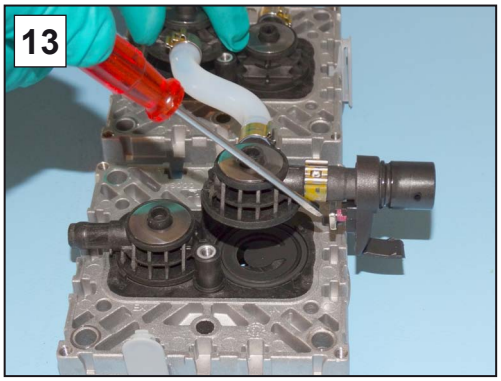
11. Place the new sealing rings in the grooves.

→ Example
Valve replacement

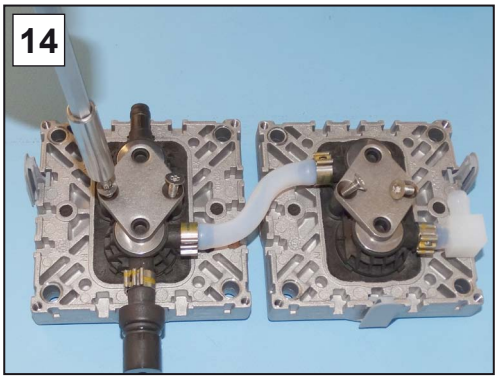
12. Position the new valves and align them.



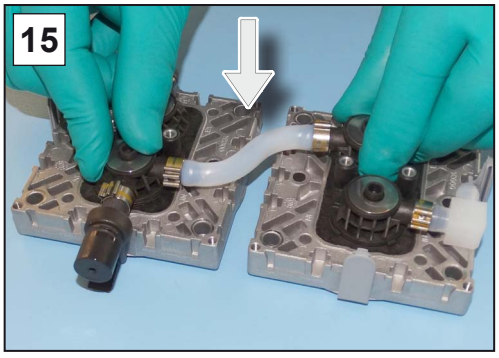
Top view cutout: proper positioning of the valves. IN = Inlet (inlet) EX = Exhaust (outlet)



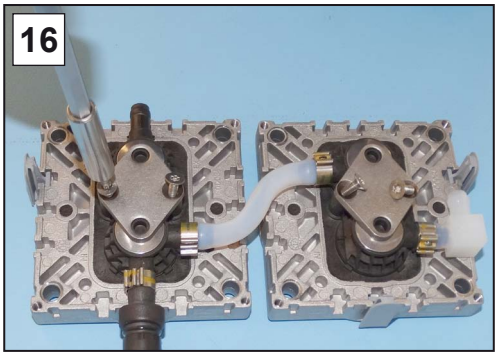
13. Place both valve terminals with the disc springs on the pump heads.



14. Place the clamping brackets on the valve terminals and tighten the screw connections hand-tight.



15. Place both valve terminals with the disc springs on the pump heads.



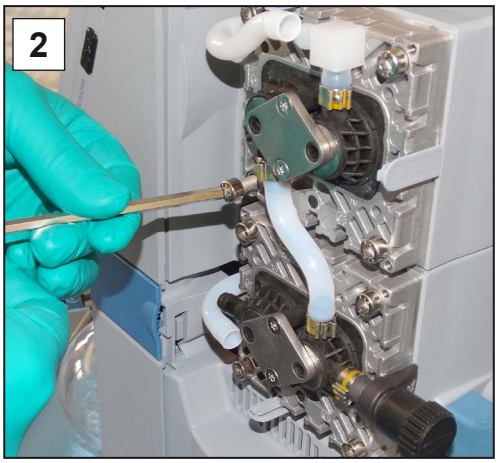
16. Place the clamping brackets on the valve terminals and tighten the screw connections hand-tight.

Assemble device and housing parts

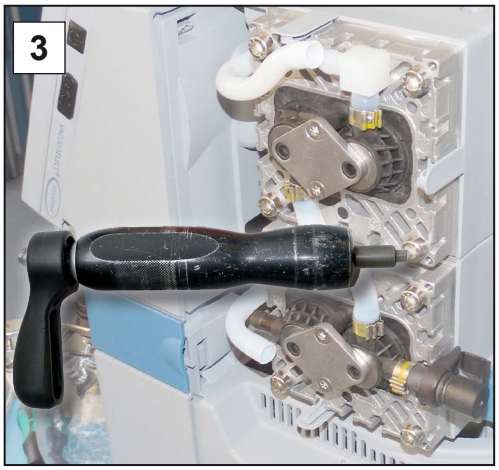
Before putting the pumping unit back into service, all device and housing parts which had been previously removed must be fixed once again.

→ Example
Assemble device and housing parts

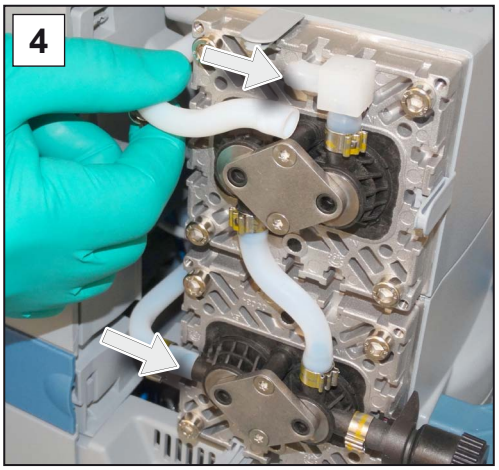
1. Carefully press the diaphragms into the opening of the housing such that they are centered and flush.



2. Hold the pump head pair on the vacuum pump and screw in the screw connections; Allen key 5.

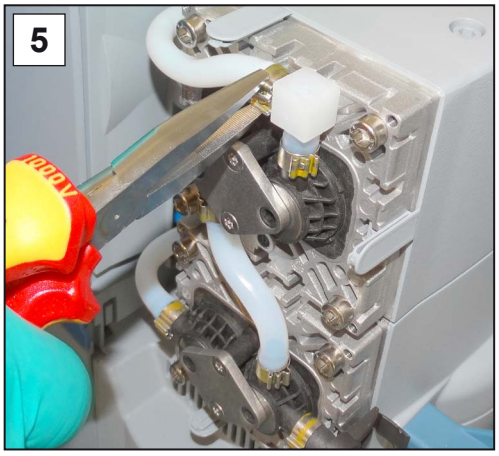


3. Tighten the screw connections crosswise using a torque wrench; hexagon socket with 6 Nm, Torx with 3 Nm.

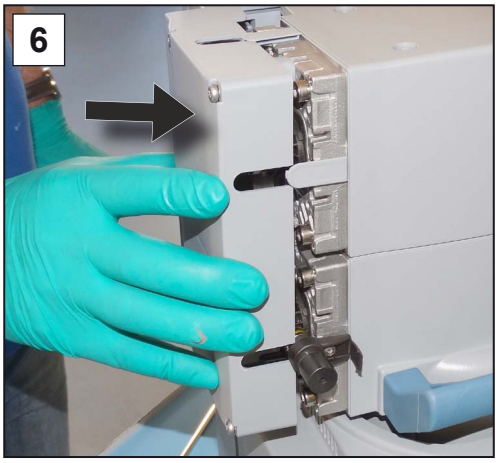


4. Push the molded hoses back onto the connections.

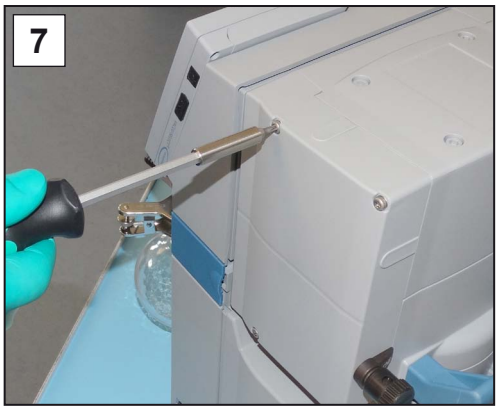
→ Example
Assemble device and housing parts



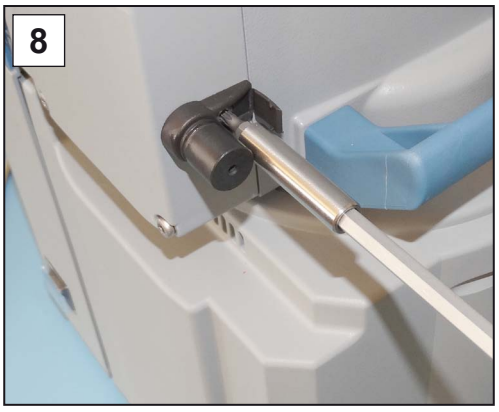
5. Close the hose clamps on the hose nozzles, e. g., with a flat nose pliers.



6. Put the housing cover on properly.



7. Screw in the screw connections of the housing cover; Torx screwdriver TX20.



8. Tighten the screw connection and close the cover; Torx screwdriver TX20.

Changing the diaphragm and valve of the next pump head

⇨ Turn the pumping unit to the other side.

⇨ Repeat the steps from the previous descriptions for changing the diaphragm and valve.

If the maintenance work is completed in full:

⇨ Connect the hose system for operation.

⇨ Connect the pumping unit to the power supply.

☑ Pumping unit ready to return to service.

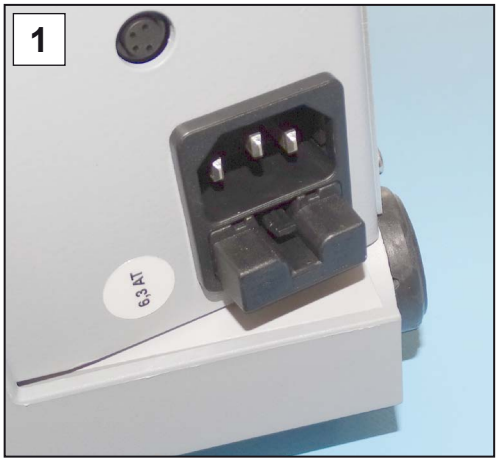
Without reconnection:

☑ Pumping unit prepared for storage.

7.3.3 Change device fuse

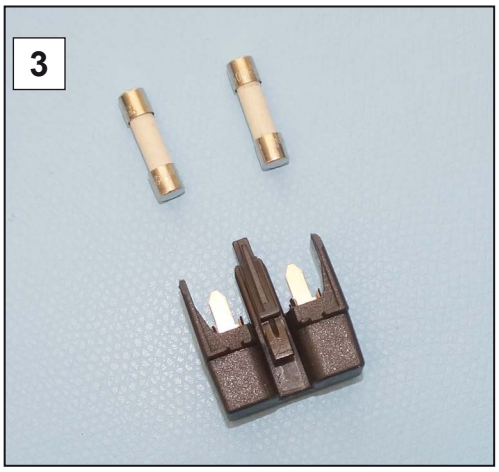
At the power connection on the rear side of the pumping unit, there are 2 device fuses, type: 6,3 A/t – 5x20.

Change device fuse

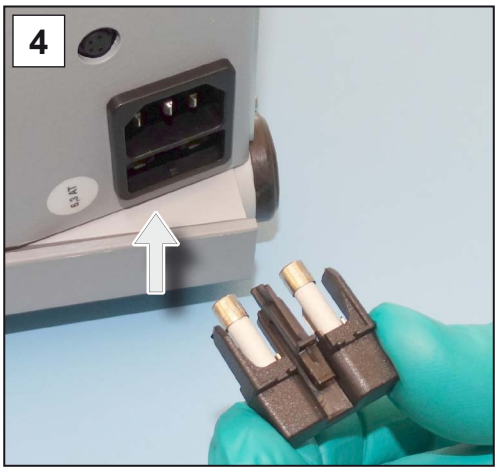


1. Pull out power plug.

2. Carefully pull out the fuse holder.



3. Replace the fuses.



4. Push the fuse holder back onto the fuse socket.

8 Appendix

8.1 Technical information

Chemistry pumping units	
PC 3002 VARIO select	**PC 3003 VARIO select**
PC 3004 VARIO select	**PC 3004 VARIO select EKP**

8.1.1 Technical data

Technical data

Ambient conditions		(US)
Ambient temperature, max.	10–40 °C	50–104°F
Operating temperature	10–40 °C	50–104°F
Storage/transport temperature	-10–60 °C	14–140°F
Altitude, max.	3000 m above sea level	9840 ft above sea level
Relative humidity	30–85 %, non condensing	
Protection type	IP 40 / IK 08	

Operating conditions		(US)
Maximum admissible media temperature (gas), non-explosive atmosphere:		
momentarily	80 °C	176°F
Continuous operation	45 °C	113°F
ATEX conformity	II 3/- G IIC T3 X Internal Atm. only	
Maximum admissible media temperature (gas) Ex atmosphere:		
momentarily	40 °C	104°F
Continuous operation	40 °C	104°F

Connections	
Vacuum inlet IN	Hose nozzle DN 6/10
Gas ballast GB	Gas ballast valve, manual
Inert gas adapter – OPTION	Small flange GB NT KF DN 16 Hose nozzle GB NT DN 6/10
Venting valve (venting with inert gas) – OPTION	Silicone rubber hose 3/6
Coolant water EK	2x (+2x) Hose nozzle DN 6/8
Exhaust gas, outlet EX	Hose nozzle DN 8/10
Cold-device plug	+ Power supply CEE, CH, CN, UK, IN, US
Plug-in connector	VACUU·BUS®

Technical data

Electrical data		(US)
Nominal voltage	200-230 VAC	100-120 VAC
Frequency	50 Hz	60 Hz
Nominal current at 50 Hz		
... PC 3002	1,4 A	
... PC 3003 / PC 3004	2,5 A	
Capacity, max.	0,53 kW	
Device fuse 2x	6,3 A/t 5x20	
Interface	VACUU·BUS®	
Power cable	2 m	

Vacuum data		(US)
PC 3002		
Max. Pumping speed	2,8 m^3/h	1.65 cfm
Ultimate vacuum, abs.	7 mbar	5 Torr
Ultimate vacuum with GB, abs.	12 mbar	9 Torr
Number of cylinders/stages	2/2	
PC 3003		
Max. Pumping speed	2,8 m^3/h	1.65 cfm
Ultimate vacuum, abs.	0,6 mbar	0.45 Torr
Ultimate vacuum with GB, abs.	1,5 mbar	1.1 Torr
Number of cylinders/stages	4/4	
PC 3004		
Max. Pumping speed	4,6 m^3/h	2.7 cfm
Ultimate vacuum, abs.	1,5 mbar	1.1 Torr
Ultimate vacuum with GB, abs.	3 mbar	2.2 Torr
Number of cylinders/stages	4/3	

Max. Inlet pressure, abs.	1,1 bar	825 Torr
Max. Outlet pressure, abs.	1,1 bar	825 Torr
Max. Differential pressure, abs.	1,1 bar	825 Torr
Max. Max. pressure at gas connections, abs.	1,2 bar	900 Torr
Sensor	integriert	integrated
Measuring principle	Ceramic diaphragm (aluminum oxide), capacitive, gas type independent, absolute pressure	
Accuracy of measurement	±1 mbar/hPa/Torr, ±1 digit (after adjustment, constant temperature)	
Upper measurement limit	1060 mbar	795 Torr
Lower measurement limit	0,1 mbar	0.1 Torr
Temperature coefficient	< 0,07 mbar/hPa	0.05 Torr/K

Weights* and dimensions (l x b x h)		(US)
PC 3002 VARIO select	419 mm x 243 mm x 444 mm	16.5 in x 9.57 in x 17.48 in
Weight*	17,9 kg	39.5 lb
PC 3003 VARIO select	419 mm x 270 mm x 457 mm	16.5 in x 10.63 in x 18 in
Weight*	21,1 kg	46.6 lb
PC 3004 VARIO select	419 mm x 268 mm x 457 mm	16.5 in x 10.55 in x 18 in
Weight*	21,1 kg	46.6 lb
PC 3004 VARIO select EKP	402 mm x 361 mm x 457 mm	15.83 in x 14.21 in x 18 in
Weight*	25,2 kg	55.5 lb

** without cable*

Other information	
Sensor type	VACUU·SELECT Sensor
Controller	VACUU·SELECT
Volume of separator (glass flask)	á 500 ml
Sound pressure level at 1500 rpm/62% (VARIO)	43 dBA

8.1.2 Wetted materials

Wetted materials

Component	Wetted materials
Pump	
Head cover	ETFE, carbon-fiber-reinforced
Diaphragm clamping disc	ETFE, carbon-fiber-reinforced
Diaphragm	PTFE
Valves	FFPM
O-ring	FKM
Valve terminal	ETFE, carbon-fiber-reinforced
Housing cover inside	PTFE carbon-fiber-reinforced
Silencer	PBT, PVF
Hose to silencer	PVC
Hose fittings	ETFE/ECTFE
Pumping unit	
Inlet	PP, stainless steel
Outlet	PET
Distribution head	PPS, glass-fiber-reinforced
Hoses	PTFE
Hose fittings	ETFE, ECTFE
O-ring on separator	Fluoroelastomer, NBR
Overpressure relief valve at vapor condenser	Silicone rubber, PTFE film
Blind plate	PP
Distributor head (inlet)	PPS, glass-fiber-reinforced, PP (blind plate)
Condenser EK	Borosilicate glass
Round bottom flask	Borosilicate glass
Emission condenser Peltronic	ETFE, ECTFE, PP, PA
Separator flask	PMP
Screw plug	Galvanized steel
VACUU·SELECT Sensor	
Vacuum sensor	Aluminium oxide ceramics, gold-coated
Measurement chamber	PPS
Small flange	PP
Sealing ring at the sensor	chemically resistant fluorelastomer
Hose nozzle	PP
Seal on the venting valve	FFPM

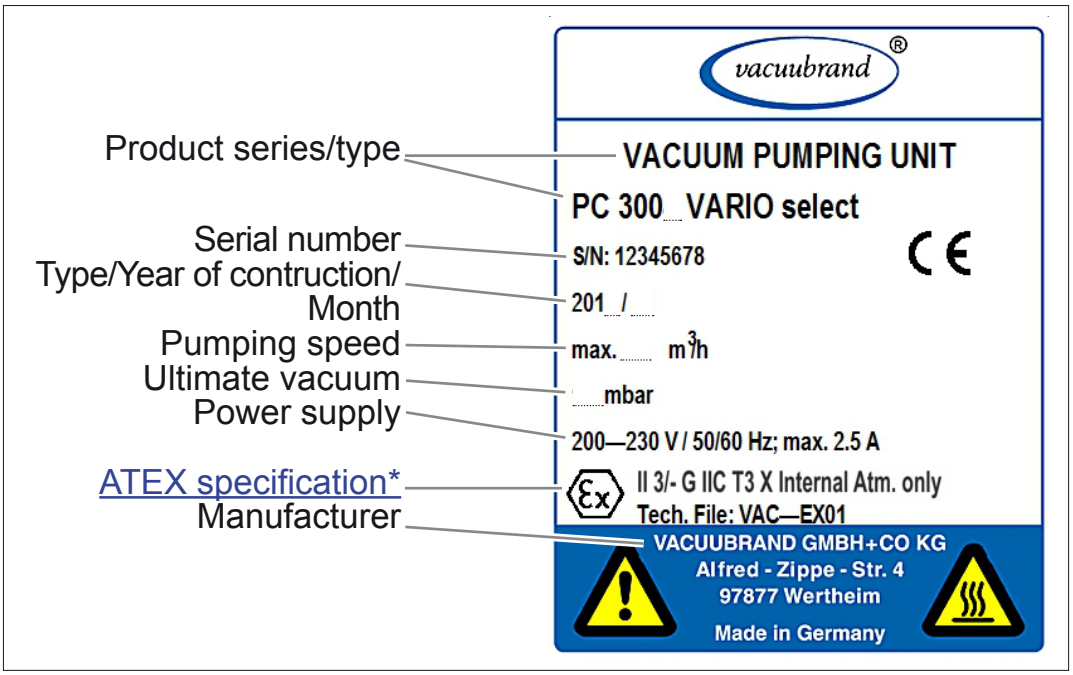
8.1.3 Rating plate

Data on rating plate

- ⇨ In the event of an error, make a note of the type and serial number on the rating plate.
- ⇨ When contacting our Service Department, please 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.

Rating plate pumping unit, in general

→ Example Rating plate



** Documentation, group and category, marking G (gas), type protection, explosion group, temperature class (additionally see: Approval for ATEX equipment).*

8.2 Ordering information

Ordering information pumping unit series

Chemistry pumping units	Order no.*
PC 3002 VARIO select	207335xx
PC 3003 VARIO select	207385xx
PC 3004 VARIO select	207375xx
PC 3004 VARIO select EKP	207375xx

** Order no. depends on power cable CEE, CH, UK, US, CN, IN*

Ordering information accessories

Accessories	Order no.
Vacuum hose DN 6 mm (l = 1000 mm)	20686000
Vacuum hose DN 8 mm (l = 1000 mm)	20686001
Coolant valve VKW-B	20674220
Venting valve (air admittance valve) VBM-B	20674217
Level sensor	20699908
VACUU·SELECT Sensor	20612881
VSK 3000	20640530
DAkkS calibration with first delivery	20900214
DAkkS recalibration	20900215

Ordering information spare parts

Spare parts		Order no.
Hose nozzle 6 rounded		20639948
Hose nozzle DN 6/10		20636635
Small flange KF DN 16		20635008
Extension cable VACUU·BUS, 0.5 m		20612875
Extension cable VACUU·BUS, 2 m		20612552
Extension cable VACUU·BUS, 10 m		22618493
Joint clip VA KS35/25		20637627
Glass flask/round bottom flask 500 ml		20638497
Knurled nut M14x1 (union nut)		20637657
PA Locking ring for knurled nut		20637658
Vapor condenser EK, complete		20699922
Immission condenser IK		20636256
Peltronic® emission condenser EKP		20636298
Anti-rotation protection D17x17.5		20635113
Gas ballast cap		20639223
Power cable	CEE	20612058
	CH	20676021
	CN	20635997
	IND	20635365
	UK	20612065

⇨ A full list of available spare parts is available under → VACUUBRAND > Support > Repair instructions > Chemistry pumping units.

Sources of supply

International sales offices and distribution

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

⇨ Information about our complete product range is available in the current product catalog.

⇨ Your local distributor or **VACUUBRAND GMBH + CO KG** sales office is available to assist you with orders, 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)
- Calibration (DAkkS-accredited)
- With Health and Safety Clearance form: return, disposal.

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

Service handling

Meet the terms of service

1. Contact your local distributor or our Service Department.
2. Request an RMA no. for your order.
3. Clean the product thoroughly or if necessary, decontaminate it professionally.
4. Fill out the Health and Safety Clearance form in full.

Return (reshipment)

5. Return your product, including:
   - RMA no. and description of the error
   - Repair or service order,
   - Health and Safety Clearance form
   - Attach everything to the outside of the package

⇨ 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 excluded.
- A brief description and/or photos help locate the source of the error.

8.4 Index

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8.5 EC Declaration of Conformity

EU-Konformitätserklärung
EC Declaration of Conformity
Déclaration CE de conformité

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 (M-RL), 2014/30/EU (EMV-RL), 2014/34/EU (ATEX-RL), 2011/65/EU (RoHS-2)

Chemie-Pumpstand-Serie / Chemistry pumping unit series / Groupe de pompage ***chimie***
Typ / Type / Type: **PC 3002 VARIO select, PC 3003 VARIO select, PC 3004 VARIO select, PC 3004 EKP VARIO select**

Artikelnummer / Order number / Numéro d'article: **20733554, 20738454, 20737554, 20737574**
Seriennummer / Serial number / Numéro de série: Siehe Typenschild / See rating plate / Voir plaque signalétique

Angewandte harmonisierte Normen / Harmonized standards applied / Normes harmonisées utilisées: DIN EN ISO 12100:2011, DIN EN 1012-2:2011, IEC 61010-1:2010 (Ed. 3), DIN EN 61010-1:2011, DIN EN 61326-1:2013, DIN EN 1127-1:2011, DIN EN ISO 80079-36:2016, DIN EN 50581:2013

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

Ort, Datum / place, date / lieu, date: Wertheim, 05.04.2018

(Dr. F. Gitmans)
Geschäftsführer / Managing Director / Gérant

ppa.
(Dr. J. Dirscherl)
Technischer Leiter / Technical Director / Directeur technique

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