vacuubrand

VWR®

Instructions for use



VP 2 autovac

Chemistry pumping unit with speed control

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Dear customer,

Your VACUUBRAND diaphragm pumps should support you for many years without trouble and with optimal performance. Thanks to our long practical experience we have much information and advice on how you can achieve powerful application usage and personal safety through our products. Please read these instructions for use before the initial operation of your pump. VACUUBRAND diaphragm pumps are the result of many years of experience in design and construction and practical operation of these pumps combined with the latest developments in material and manufacturing technology.

Our quality maxim is the „zero fault principle“: Every diaphragm pump leaving our company, is tested intensively including an endurance run of 14 hours. Therefore faults, even those which occur rarely, are identified and can be eliminated immediately. The achievement of the specifications after the endurance run is tested for every pump.
Every VACUUBRAND pump achieves the specifications.
We are committed to providing our customers with this high quality standard.

We know that the vacuum pump cannot replace all of your real work and hope that our products contribute to an effective and trouble-free realisation of your work.

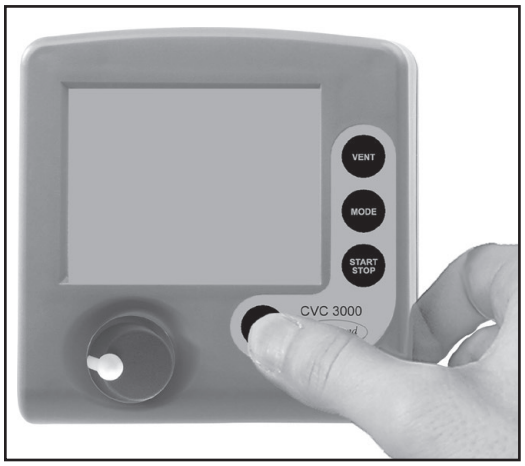
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After sales service:
Contact your local dealer or call +49 9342 808-5500.

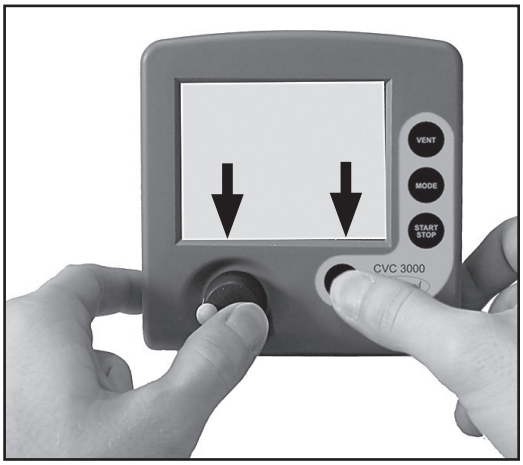
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Reset / Language selection

1 switch off



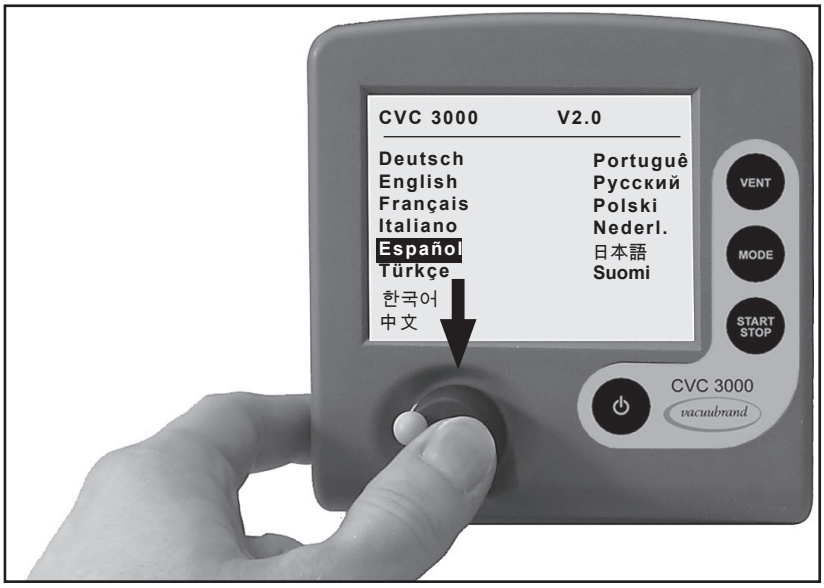
2 press both



3 turn



4 press



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⚠ DANGER

➨ DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

☞ WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

• CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.



Caution! Hot surface!



Isolate equipment from mains before removing the cover.



Electronic components must not be disposed of in the domestic waste at the end of their service life. Used electronic devices contain harmful substances that can cause damage to the environment or human health. End users are legally obliged to take used electric and electronic devices to a licensed collection point.

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Safety information!

General information

WARNING

☞ **Read this manual carefully before installing or operating the equipment. Observe the instructions contained in this manual.**
☞ **Do not use any damaged equipment.**

CAUTION

- Use the mounted handle when moving the pumping unit.

NOTICE

Remove all packing material from the packing box. Remove the product from its packing-box and retain all packaging until the equipment is inspected and tested. Remove the protective caps from the inlet and outlet ports and retain for future use. Inspect the equipment promptly and carefully.
If the equipment is damaged, notify the supplier and the carrier in writing within three days. Retain all packing material for inspection. State the item number of the product together with the order number and the supplier's invoice number. Failure to check and give notice of damage will void any and all warranty claims for those deficiencies.
Replace the protective caps if the equipment is not used immediately. Store the equipment in dry and non-corrosive conditions.

Intended use

WARNING

☞ Do not use the pump or any system parts on humans or animals.

☞ Ensure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use. Use only original manufacturer's spare parts and accessories. Otherwise the safety and performance of the equipment, as well as the electromagnetic compatibility of the equipment might be reduced.
The CE mark or the cTÜVus mark may be voided if not using original manufacturer's spare parts.
☞ Comply with all notes on correct vacuum and electrical connections; see section "Use and operation".
☞ Do not use the pump to generate pressure.

☞ The pumps are designed for **ambient temperatures** during operation between +10°C and +40°C. Periodically check maximum temperatures if installing the pump in a cabinet or a housing. Make sure ventilation is adequate to maintain recommended operating temperature. Install an external automatic ventilation system if necessary. If pumping hot process gases, make sure that the maximum permitted gas inlet temperature is not exceeded. The maximum permitted gas inlet temperature depends on several parameters like inlet pressure and ambient temperature (see "Technical data").

☞ Particles and dust must not enter the pump.
☞ Do not pump liquids.

NOTICE

Use the equipment only as intended, that is, for generation, measurement, and control of vacuum in vessels designed for that purpose. Any other use will automatically invalidate all warranty and liability claims. Remain aware of safety and risks.

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Setting up and installing the equipment

DANGER

➨ Equipment must be connected only to a **suitable electrical supply** and a suitable ground point. As such, the plug must be plugged into an outlet that is properly grounded. Failure to connect the motor to ground may result in deadly electrical shock.
The supply cable may be fitted with a molded European IEC plug or a plug suitable for your local electrical supply. The cable contains wires colour coded as follows: green or green and yellow: ground; blue or white: neutral; brown or black: hot.

WARNING

☞ Due to the high compression ratio, the pump may generate overpressure at the outlet. Check pressure compatibility with system components (e.g., exhaust pipeline or exhaust valve) at the outlet.

☞ Do not permit any **uncontrolled pressurizing**. Make sure that the exhaust pipeline cannot become blocked. If there is an exhaust isolation valve, make sure that you cannot operate the equipment with the valve closed to avoid a **risk of bursting!**

☞ Maximum permissible pressure at the pressure transducer: 1.5 bar absolute.

CAUTION

- Provide a firm, level platform for the equipment. Check that the system which you are going to evacuate is mechanically stable. Check that all fittings are secure. Ensure a stable position of the pump without any mechanical contact other than the pump feet.

- Comply with **maximum permissible pressures** at inlet and outlet and with **maximum permissible pressure differences** between inlet and outlet. See section ”Technical data”. Do not operate the pump with overpressure at the inlet.

- Avoid overpressure of more than 1.2 bar absolute in the event that gas or inert gas is connected to the pump, to the gas ballast or to a venting valve.

- Note: Flexible elements will shrink when evacuated.
- Connect hoses gas tight at inlet and outlet of the pump.

- Check the power source and the pump’s rating plate to be sure that the power source and the equipment match in voltage, phase, and frequency.

NOTICE

Make sure ventilation is adequate to maintain recommended operating temperature. Keep a minimum distance of 5 cm between the cooling fan and surrounding items (e.g., housing, walls, etc.), or else install an external automatic ventilation system. Clean ventilation slots if necessary to avoid a reduction of ventilation.
Do not place the pumping unit on soft surfaces (e.g., rubber foam) during operation. This may reduce or block the electronics’ air supply. Do not cover the pumping unit.

The mains plug is a disconnecting device to separate the pump from the supply voltage. Ensure that the mains plug is easily accessible at all times to allow the separation of the device from the power supply.

Use only hoses at the inlet and outlet of the pump with an inner diameter at least as large as the diameter of the pump’s tubing (to avoid overpressure at the outlet, and reduction of pumping speed at the inlet).

Allow the equipment to equilibrate to ambient temperature if you bring it from cold environment into a room prior to operation. Notice if there is water condensation on cold surfaces.
Comply with all applicable and relevant safety requirements (regulations and guidelines). Implement the required actions and adopt suitable safety measures.

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Ambient conditions

CAUTION

- This product may only be used indoors in a non-explosive atmosphere, and in a dry environment.
  Adopt suitable measures in case of differences from recommended conditions, e.g., installation in higher altitudes (risk of insufficient cooling), conductive pollution or external condensation on the pump.

NOTICE

To the best of our knowledge the equipment is in compliance with the requirements of the applicable EC-directives and harmonized standards (see ”Declaration of Conformity”) with regard to design, type and model. Directive EN 61010-1 gives in detail the conditions under which the equipment can be operated safely (see also IP degree of protection, „Technical data“).

Operating conditions

DANGER

➨ **The pumps have no approval for operation in or for pumping of potentially explosive atmospheres.**

➨ The pumps are **not suitable** to pump
- **unstable substances** and substances which react explosively under **impact** (mechanical stress) and/or when being exposed to **elevated temperatures** without air,
- **self inflammable** substances,
- substances which are **inflammable without air** and
- **explosive substances**.

➨ The pumps are **not approved** for operation below ground. **Do not operate** the pump **below ground**.

CAUTION

- Do not pump substances which may form deposits inside the pump. The pumps are not suitable for pumping substances which may form deposits inside the pump. Deposits and condensate in the pump may lead to increased temperatures even to the point of exceeding the maximum permitted temperatures.

- Check the inlet and outlet of the pump, if there is a danger of forming deposits inside the pump, e.g., in the pump chambers. Inspect the pump chambers regularly and clean if necessary.

- Consider interactions and chemical reactions of the pumped media. Ensure that the materials of the pump’s wetted parts are compatible with the pumped substances, see section „Technical data.
  When changing the substances pumped, we recommend purging the pump with air or inert gas prior to changing the pumped media. Purging the pump will pump out residues and it will reduce the possibility of reactions of the pumped substances with each other and with the pump’s materials.

Safety during operation

DANGER

➨ Adopt suitable measures to prevent the release of dangerous, toxic, explosive, corrosive, noxious or polluting fluids, vapours and gases. To prevent any emission of such substances from the pump outlet, install an appropriate collecting and disposal system and take protective action for pump and environment.

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➨ You must take suitable precautions to prevent any formation of explosive mixtures in the pump chamber or at the outlet of the pump. In case, e.g., of a diaphragm failure, mechanically generated sparks, hot surfaces or static electricity may ignite these mixtures. Use inert gas for gas ballast or venting, if necessary.

➨ Drain appropriately or otherwise remove any potentially explosive mixtures at the outlet of the pump, or dilute them to non-explosive concentrations.

⚠WARNING

☞ Prevent any part of the human body from coming into contact with vacuum.

☞ Make sure that the exhaust pipeline cannot become blocked.

☞ **Attention**: At pressures above approximately 1060 mbar the pressure reading becomes incorrect due to saturation of the pressure transducer. The display flashes. Release pressure immediately! Risk of bursting!

☞ Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be contaminated. Take adequate precautions to protect people from the effects of dangerous substances (chemicals, thermal decomposition products of fluoroelastomers). Use appropriate protective clothing and safety goggles.

☞ Interruption of the pump (e.g., due to power failure), failure of connected components or of parts of the supply, or change in parameters must not be allowed to lead to dangerous conditions. In case of a diaphragm failure or in case of a leak in the manifold, pumped substances might be released into the environment or into the pump housing or motor.
Comply with all notes regarding proper use of the pumps, as well as operation and maintenance guidance.

☞ The residual **leak rate of the equipment** might render possible an exchange of gas, albeit extremely slight, between the environment and the vacuum system.
Adopt suitable measures to prevent contamination of the pumped substances or the environment.

⚠CAUTION

- Pumping at high inlet pressure may lead to overpressure at the gas ballast valve. Pumped gases or condensate might be expelled if the valve is open. If an inert gas supply is connected to the gas ballast, ensure that its inlet pipeline is not contaminated.

- You must take suitable precautions to prevent any dangerous situation from arising if the controller starts the pump, switches a coolant valve or opens a venting valve.

- **Attention**: If the controller is set to **Autostart**, the process will start immediately after a power failure without pressing any further key. It is your responsibility to ensure that automatic start-up of the system will not lead to any dangerous condition. Provide appropriate safety measures. Check **prior to starting the process** whether the option ”*Autostart*” (menu: configuration) is enabled.



- Pay attention to the safety symbol ”hot surfaces” on the equipment. Hot parts may cause burns if touched. Adopt suitable measures to prevent any danger arising from hot surfaces or electric sparks. Ensure that hot surfaces of the pump do not cause burns. Provide a suitable contact guard if necessary.

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NOTICE

Prevent the backpressure of gases and the backflow of condensates at the outlet.

Check the liquid level in the catchpot regularly and drain condensate in time to prevent overfilling. Install a level sensor (see „Accessories“) for monitoring, if necessary.

Provide appropriate protective measures to allow for the possibility of failure and **malfunction**. The protective measures must also allow for the requirements of the respective application.

The CVC 3000 controller is powered by a short-circuit-proof wide-range power supply with integrated overload protection.

A temperature sensor at the circuit board protects the motor. In case of excess temperature, the pump is switched off.
Note: Only manual reset is possible. Disconnect the pump from the power source. Identify and eliminate the cause of failure.

Maintenance and repair

NOTICE

In order to comply with laws (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments can only be returned when certain procedures (see section „**Repair - Maintenance - Return - Calibration**“) are followed.

In normal use, the lifetime of the diaphragms and valves is typically 15,000 operating hours. Bearings have a typical durability of 40000 h.

DANGER



- **Ensure that the pump cannot be operated accidentally. Never operate the pump if covers or other parts of the pump are disassembled.**
- **Switch off the pump. Disconnect the electrical power cord and wait two minutes** before starting maintenance to allow the capacitors to discharge.
- **Note**: The pump may be contaminated with process chemicals, which have been pumped during operation. Ensure that the pump is completely decontaminated before maintenance commences.

WARNING

- Take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred. Use appropriate protective clothing, safety goggles and protective gloves.
- **Wear parts have to be replaced regularly.**
- **Never operate a defective or damaged pump.**

- Vent the pump before starting maintenance. Isolate the pump and other components from the vacuum system. Allow sufficient cooling of the pump. Drain condensate, if applicable.

NOTICE

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

Ensure that **maintenance** is done only by suitably trained and supervised technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
Only dismantle the pump as far as necessary.

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Technical data

Type		VP 2 autovac
Maximum pumping speed (ISO 21360)	m^3/h	1.7
Ultimate vacuum (absolute) without gas ballast*	mbar	2
Ultimate vacuum (absolute) with gas ballast*	mbar	4
Maximum permissible inlet pressure (absolute)	bar	1.1
Maximum permissible outlet pressure (absolute)	bar	1.1
Maximum permissible pressure difference between inlet and outlet	bar	1.1
Maximum permissible pressure (absolute) at gas ballast valve	bar	1.2
Permissible ambient temperature storage / operation	°C	-10 to +60 / +10 to +40
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85
Maximum permissible installation altitude above mean sea level	m	2000
Rated motor power	kW	0.16
No-load speed**	min^{-1}	0 - 2400
Maximum permissible range of supply voltage (±10%) **Attention: Observe specifications of rating plate!**		100-230 V~ 50/60 Hz
Maximum rated current at: 100-230 V~ 50/60 Hz	A	1.6-0.7
Device fuse Fuse of VACUU•BUS 24V DC supply		7AF fuse on the circuit board 1.1AT slow blow fuse (with automatic reset) on the circuit board
Motor protection		temperature sensor on the pcb (current limitation)
Overvoltage category		II
Degree of protection IEC 60529		IP 20
Degree of protection UL 50E		type 1
Pollution degree		2
Inlet		hose nozzle DN 6/10 mm
Outlet		hose nozzle DN 10 mm
A-weighted emission sound pressure level*** (uncertainty K_{pA}: 3 dB(A))	dB(A)	42

* Ultimate vacuum with function ”Pump down” and at speed ”HI”
** Note: In the motor speed range between **0 and 200 rpm** the pump is running automatically in a cycled interval operation.
*** Measurement according to EN ISO 2151:2004 and EN ISO 3744:1995 at 1500rpm and ultimate vacuum with exhaust tube at outlet.

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Type		VP 2 autovac
Dimensions L x W x H approx.	mm	300 x 306 x 400
Weight approx.	kg	6.9

Controller	CVC 3000
Pressure transducer	ceramic diaphragm (alumina), capacitive, absolute pressure, gas type independent
Display	LCD graphic display, illuminated
Pressure units / scale (selectable)	mbar, Torr or hPa
Measuring range (absolute)	1080 mbar - 0.1 mbar (810 Torr - 0.1 Torr)
Maximum control range with internal pressure transducer (absolute)*	1060 mbar – 0.1 mbar (795 Torr – 0.1 Torr)
Resolution	0.1 mbar
Maximum permissible pressure at pressure transducer (absolute)	1.5 bar (1125 Torr)
Maximum permissible temperature of gaseous media	continuous operation: 40°C, for short periods (< 5 minutes) up to 80°C
Measurement uncertainty (absolute) after careful adjustment and at constant temperature	<±1 mbar (0.75 Torr)
Temperature coefficient	<±0.07 mbar/K (0.05 Torr/K)
Ambient temperature range (operation)	10°C to +40°C
Ambient temperature range (storage)	-10°C to +70°C
Permitted relative atmospheric moisture during operation (no condensation)	30% to 85%
Maximum permitted current of connected valves (connected components)	4A
Venting connection	hose nozzle for hose 4-5 mm
Maximum admissible pressure at venting connection	1.2 bar absolute
Interface	RS 232 C

* The actual vacuum control range in your special application might be reduced due to ultimate vacuum of the pump, quantity of gas occurring etc.

Gas inlet temperatures

Operating condition	Inlet pressure	Permitted range of gas temperatures at inlet
Continuous operation	> 100 mbar (high gas load)	+10°C to +40°C
Continuous operation	< 100 mbar (low gas load)	0°C to +60°C
Short-time (< 5 minutes)	< 100 mbar (low gas load)	-10°C to +80°C

We reserve the right for technical modification without prior notice!

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Wetted parts

Components	Wetted materials
Pump	
Housing cover	PTFE
Head cover	ETFE carbon fibre reinforced
Diaphragm clamping disc	ETFE carbon fibre reinforced
Diaphragm	PTFE
Valves	FFKM
Pumping unit	
Inlet	PPS
Outlet	PTFE (hose nozzle) / PVC/PP (silencer)
Tubing	PTFE
Screw-in fittings	ETFE/ECTFE
O-ring at catchpot	Fluoroelastomer
Distribution head (inlet)	PPS glass fibre reinforced
Catchpot	Borsilicate glass
CVC 3000	
Sensor	Aluminium oxide ceramic
Sensor housing	PPS / glass fibre
Sensor seal	Chemically resistant fluoroelastomer
Venting valve seal	FPM

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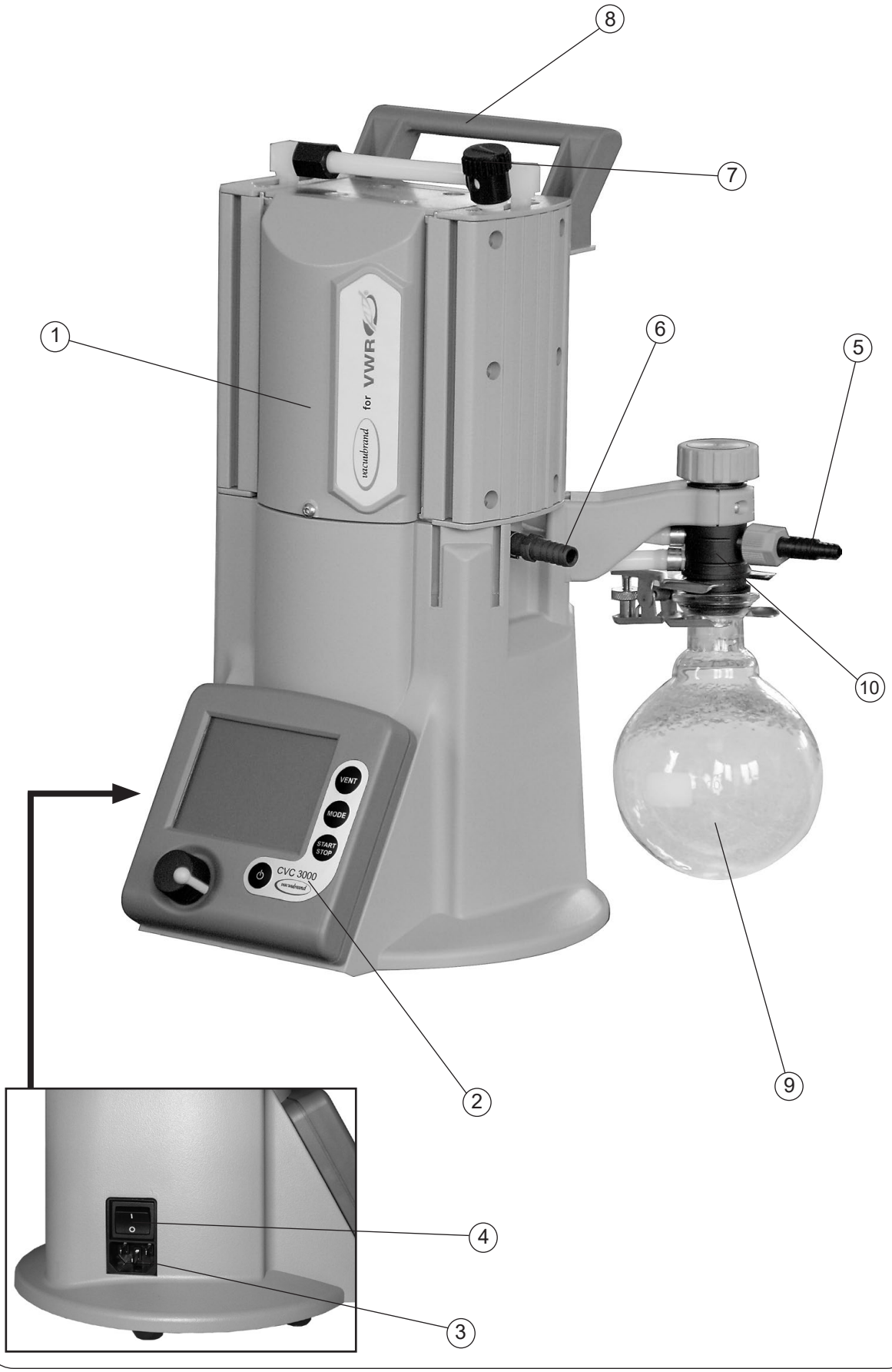
Pump parts

Position	Component
1	Chemistry diaphragm pump MD 1C VARIO
2	Controller CVC 3000
3	Mains connection
4	ON/OFF switch
5	Inlet

Position	Component
6	Outlet
7	Gas ballast valve
8	Catchpot
9	Catchpot
10	Distribution head

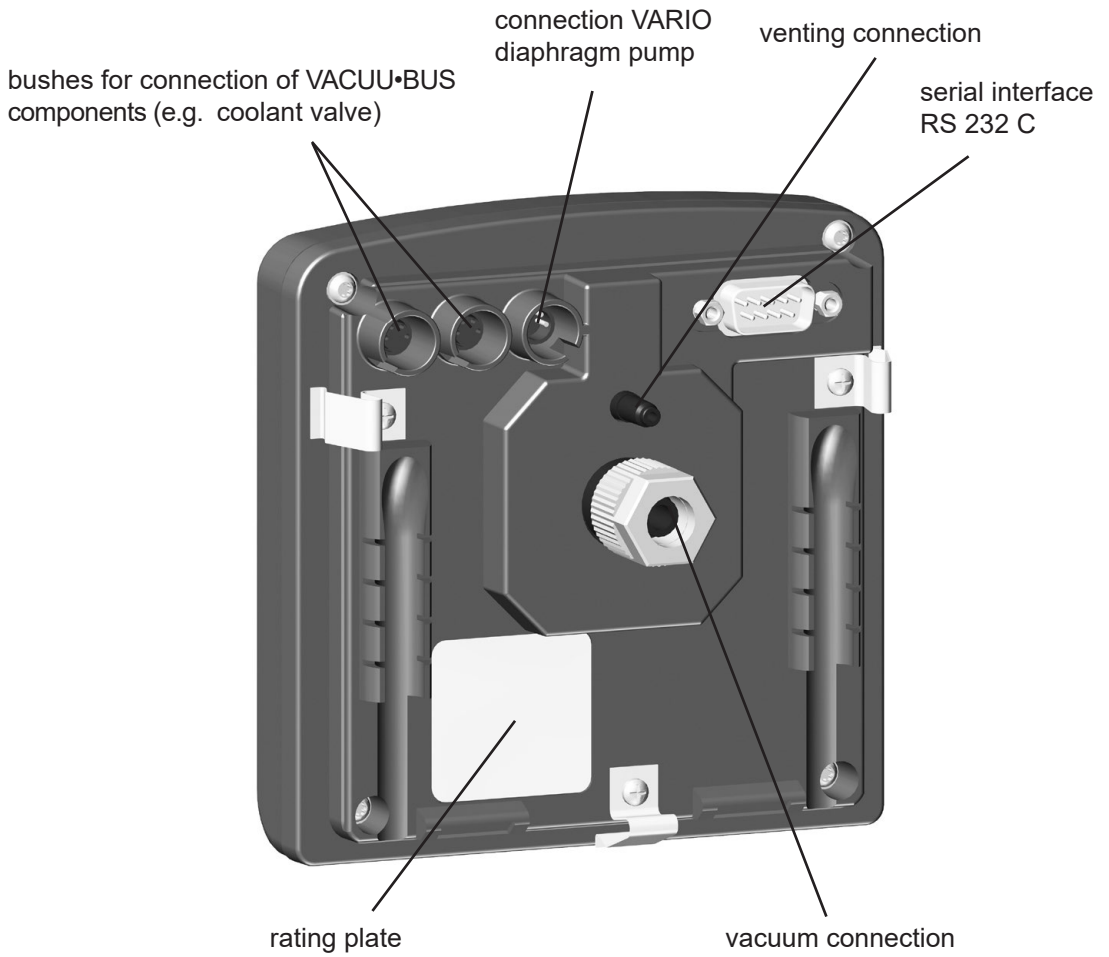
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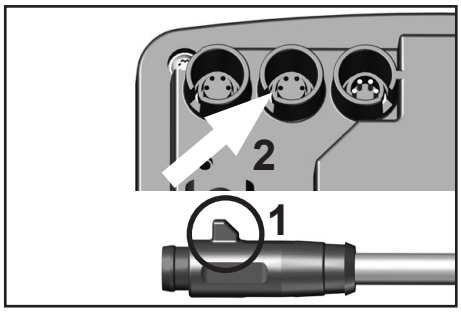
VP 2 autovac



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Rear side CVC 3000





Depending on technical version the connections of the VACUU•BUS cables are equipped with a nib.

When connecting the VACUU•BUS connections to the rear side of the controller position the nib (1) of the VACUU•BUS connection in the notch (2) of the controller connections.

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Use and operation

When switching on the controller CVC 3000 for the very first time, a menu to select the language of the controller menu is displayed. Select the desired language (e.g. "*English*") by turning the selection knob and press to confirm. Then select the pressure unit ("*mbar*", "*Torr*" or "*hPa*") in the same way.
It is possible to access the language selection menu at any time by switching on the controller while keeping the selection knob pressed.

Installing in a vacuum system

DANGER

➨ If dangerous or polluting fluids could be released at the outlet, install an appropriate system to catch and dispose of those fluids.

WARNING

☞ Connect a gas-tight exhaust line at the pump outlet if necessary. Always vent exhaust gases appropriately (e.g., into a fume hood).
☞ Never block the gas outlet. The exhaust line must always be free of obstructions (no back pressure) to ensure an unimpeded discharge of gas. The cross-section of the outlet tubing must be at least the size of the pump's exhaust connection.

☞ Maximum permissible pressure: 1.5 bar absolute.
☞ **Attention**: At pressures above approximately 1060 mbar the pressure reading becomes incorrect due to saturation of the pressure transducer. The display will flash. Release pressure immediately! Risk of bursting!

☞ Particles and dust must not be aspirated. If necessary, you must install appropriate filters. You must ensure their suitability concerning gas flow, chemical resistance and resistance to clogging prior to use.
☞ Make sure ventilation is adequate, especially if the pump is installed in an enclosure, or if the ambient temperature is elevated. Provide external ventilation, if necessary.

CAUTION

- Reduce the transmission of vibration. Prevent mechanical load due to rigid pipelines. Insert elastic hoses or flexible elements as couplings between the pump and rigid pipes.
  Note: Flexible elements will compress or flatten when evacuated if not designed for use under vacuum.
- Hose connections at the pump inlet must always be gas tight.

- A power failure may cause accidental ventilation of the pump, especially if the gas ballast valve is open. If this constitutes a potential source of danger, take appropriate safety measures.

- Check the power source and the pump's rating plate to be sure that the power source and the equipment match in voltage, phase, and frequency.

NOTICE

The ON/OFF switch and the mains connection are at the left side of the pumping unit. The mains plug is a disconnecting device to separate the pump from the supply voltage. Ensure that the mains plug is easily accessible at all times to allow the separation of the device from the power supply.
After switching off the pump, wait minimum 60 sec. before switching on again.

Make sure ventilation is adequate to maintain recommended operating temperature. Keep a minimum distance of 5 cm between the cooling fan and surrounding items (e.g., housing, walls, etc.), or else install an external automatic ventilation system.

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Use connecting hoses with large diameter and keep them as short as possible to avoid flow losses. Locate the pump as closely as possible to the application.
Always install outlet tubing descending from the pump or provide other measures to avoid backflow of condensate towards the pump.
When assembling, ensure **vacuum-tightness**. After assembly, check the whole system for leaks.
Secure hose connections at the pump appropriately, e.g., with hose clamps, to protect against accidental detachment.
To reduce pump noise emanating from the pump exhaust port, connect an exhaust hose or use a silencer (see „Accessories“).

The VACUUBRAND controller CVC 3000 can only be operated with components compatible with the VACUUBRAND VACUU•BUS system, (see „Accessories“).
The vacuum controller CVC 3000 controls VACUUBRAND diaphragm pumps NT VARIO, pumping units PC 30xx VARIO, and optional coolant and venting valves. Connected components (e.g., venting valve, level sensor, external pressure transducer 3000 series) are automatically identified and configurated. Identical components must be configurated beforehand; information upon request.

Do not use more than one controller within the same VACUU•BUS system. Several controllers in the same VACUU•BUS system will interfere with each other and result in error messages of the connected components (pumps, valves).

CVC 3000
The CVC 3000 is equipped with an internal capacitive pressure transducer with ceramic diaphragm. It measures the actual pressure independently of the gas type, and with reference to the vacuum, i.e., absolute.

- Condensate and deposits will affect the measurement results.
- Clean the pressure transducer, if necessary.

Connection of components at the controller

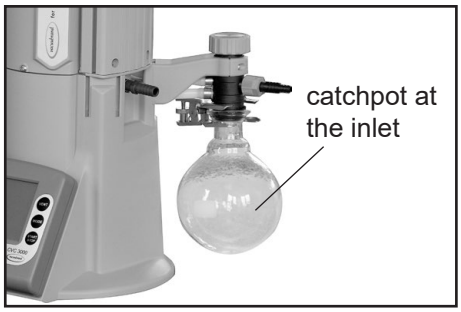


At the rear side of the controller are connections for e.g., an optional coolant valve and/or an external pressure transducer and/or an external venting valve, as well as a venting connection and the serial interface RS 232C.
- Pull the controller out of the housing. Be careful not to disconnect the measuring connection (PTFE tube)!
- Insert the cable of the component to be connected underneath the housing and plug into the controller. Do not apply off-axis forces when assembling or removing plug connections! Observe correct orientation of the plug.
- Insert controller into the housing.

Separator at the inlet:

Assembling the hose nozzle with union nut at the inlet:
➨ Take the hose nozzle with attached compression ferrule and union nut out of the catchpot and put onto inlet connection.
➨ Tighten the union nut by hand until you can feel the stop. Then tighten an additional 1/4 rotation with an open-ended wrench (size 17 mm) for final installation.

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Catchpot:
The catchpot at the inlet protects against droplets and particles from entering the pump.
☞ Enhances lifetimes of diaphragms and valves.
☞ Improves vacuum performance in applications with condensable vapours.
The catchpot is coated with a protective layer to protect against shattering in case of breakage or implosion.

➨ Assemble the catchpot at the inlet using a joint clip.

Accessories: Upgrade kit exhaust vapour condenser EK 500

Upgrade kit EK 500 .....**VACUUBRAND order-no.: 20699922**



The **exhaust waste vapour condenser** enables an efficient condensation of the pumped vapours at the outlet.
☞ No backflow of condensates.
☞ Controlled recovery of condensates.
☞ Close to 100% solvent recovery.
☞ The isolation cover protects against glass splinters in case of breakage, acts as thermal insulation to avoid the condensation of humidity and is intended to absorb shocks.

➨ Attach the tubing of the coolant circuit to the respective hose nozzles (hose nozzles for tubing 6-8 mm,) at the waste vapour condenser.

NOTICE

Check all hose connections prior to starting operation of the cooling system.
Secure coolant hoses at the hose nozzles (e.g., with hose clamps) to prevent their accidentally slipping off.

⚠ DANGER

➨ Prevent the discharge of dangerous gases and vapours to the surrounding atmosphere. If appropriate, connect the exhaust line to a suitable treatment system.

⚠ WARNING

☞ Never block the gas outlet (hose nozzle for tubing 10 mm). The exhaust hose has always to be unobstructed and without back pressure to enable an unhindered discharge of gases and protect the pump valves from damage.

⚠ CAUTION

- **Note**: Install the hoses of the cooling system in a way to avoid the flow / dripping of condensed water onto the pumping unit (especially cables and electronic parts, see also IP degree of protection, „Technical data“.
- Ensure that the **coolant outlet tubing** is always unobstructed and that it cannot get blocked.
- Maximum permissible coolant pressure at the exhaust waste vapour condenser: 6 bar absolute. Outlet flow must always be unhindered.
- Comply with the maximum permissible coolant pressures of additional components in the coolant circuit (e.g., coolant valve).
- Avoid overpressure in the coolant circuit (e.g., caused by blocked or squeezed coolant hoses).
- Only install the optional coolant valve in the supply line of the exhaust waste vapour condenser.

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During operation

DANGER

➨ Vent and dispose of **potentially dangerous gases or vapours** at the outlet of the pump appropriately.

WARNING

☞ Due to the high compression ratio, the pump might generate overpressure at the outlet. Check pressure compatibility with system components (e.g., exhaust tubing or exhaust valve) at the outlet. Ensure that the pump outlet is neither blocked nor restricted.

☞ **Maximum ambient temperature**: 40 °C
Check the maximum temperatures, if installing the pump in a cabinet or a housing. Make sure ventilation is adequate, especially if the ambient temperature is elevated.

CAUTION

- If the pump is installed at an altitude of more than 2000 m above mean sea level, check compatibility with applicable safety requirements, and adopt suitable measures. There is a risk of the motor overheating due to insufficient cooling.
- Check compatibility with the **maximally permitted pressure** at outlet and the **maximum pressure difference** between inlet and outlet ports

NOTICE

Do not start the pump if the **pressure difference between inlet and outlet ports exceeds max. 1.1 bar**. Attempts to start the pump at higher pressure difference may cause stalling and damage of the motor.

If pumping condensable vapours (water vapour, solvents, etc.), let the pump run with **gas ballast** to help purge any condensation in the pump.

Prevent internal condensation, transfer of liquids or dust. The diaphragms and valves will be damaged, if liquids are pumped in significant amounts.
Check the pump regularly for external soiling and deposits. Clean the pump if necessary to avoid an increase of the pump's operating temperature.

A temperature sensor at the circuit board protects the motor. In case of excess temperature, the pump is switched off.
Note: Only manual reset is possible. Disconnect the pump from the power source. Identify and eliminate the cause of failure.

Check ventilation slots regularly for dust/dirt. Clean if necessary. Avoid overheating (e.g., due to hot process gases).

A warm up period (approximately 15 min.) is required to ensure that the rated ultimate vacuum and pumping speed are attained.

Attention: Important notes regarding the use of gas ballast

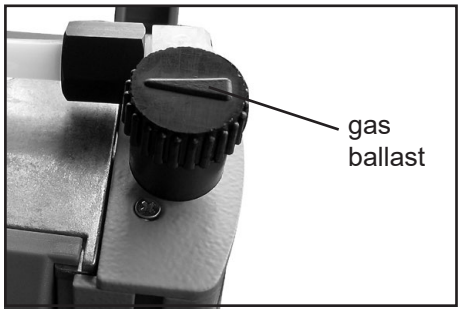
DANGER

➨ Air and pumped media might react inside the pump or at the outlet of the pump and form hazardous or explosive mixtures, when you use air rather than inert gas for the gas ballast. This constitutes a risk of significant damage to equipment and/or facilities, a risk of personal injury or even loss of life.

WARNING

☞ Make sure that air/gas intake through the gas ballast valve can never lead to hazardous, explosive or otherwise dangerous mixtures. If in doubt, use inert gas.

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For condensable vapours (water vapour, solvents, ...):
- Do not pump vapour before the pump has reached its operating temperature.
- Open the gas ballast valve when pumping condensable vapours. Turn gas ballast cap to open valve. The gas ballast valve is open if the arrow on the gas ballast cap is pointing towards the pump.
- With gas ballast valve open ultimate vacuum will be reduced, pumping speed is decreased.
- Use inert gas at the air inlet to avoid the formation of explosive mixtures. Attention: maximum supply pressure of inert gas:1.2 bar absolute.
- Close gas ballast valve by turning the cap 180°.

In case of low boiling solvents (when the formation of condensate is unlikely), the use of gas ballast might be unnecessary.

In case of condensation: Check the liquid level in the catchpot during operation. Check the liquid level regularly. Do not allow the catchpot to overfill. Drain catchpot in time to avoid overflow. Install a level sensor (order-no. 20699908) for monitoring, if necessary.

The maximum liquid level is at approximately 80% of the total filling level to avoid problems when removing the catchpot.

Removing the catchpot:
Stop process.

Catchpot at inlet:
Admit air or inert gas (via inlet of pumping unit) to restore atmospheric pressure in the catchpot before attempting removal. Remove joint clip, remove catchpot and drain condensate.

NOTICE

Reassemble drained catchpot.

WARNING

☞ **Important:** Comply with regulations when disposing solvents/condensates. Recycle if possible; purify if contaminated.

Shutdown

NOTICE

Short-term:
Has the pump been exposed to condensate?
- Allow the pump to continue to run at atmospheric pressure for a few minutes

Has the pump been exposed to media which may damage the pump materials or forms **deposits**?
- Check and clean pump heads if necessary.

Has the pressure transducer been exposed to media which may form deposits?
- Clean pressure transducer at the CVC 3000 controller if necessary.

Long-term:
- Take measures as described above regarding short-term shutdown.
- Separate pump from the application.
- Drain catchpot.
- Close inlet and outlet ports (e. g. with transport caps).
- Close the gas ballast valve.
- Store the pump under dry conditions.

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Vacuum Controller CVC 3000

When switching on the controller CVC 3000 for the very first time, a menu to select the language of the controller menu is displayed. Select the desired language e.g., "*English*" by turning the selection knob and press to confirm. Then select the pressure unit ("*mbar*", "*Torr*" or" *hPa*") in the same way.
It is possible to access the language selection menu at any time by switching on the controller while keeping the selection knob pressed.

After switching on the device the **version number of the software** is displayed, then the preselected function with the pressure reading.

Attention: Do not cant when assembling or removing plug connections! Comply with correct orientation of the plug. To connect further components use Y-adapters and extension cables VACUU•BUS. When connecting an external pressure transducer, it is used automatically. Further information on how to use several sensors simultaneously is available on request.

Keys CVC 3000

MODE:

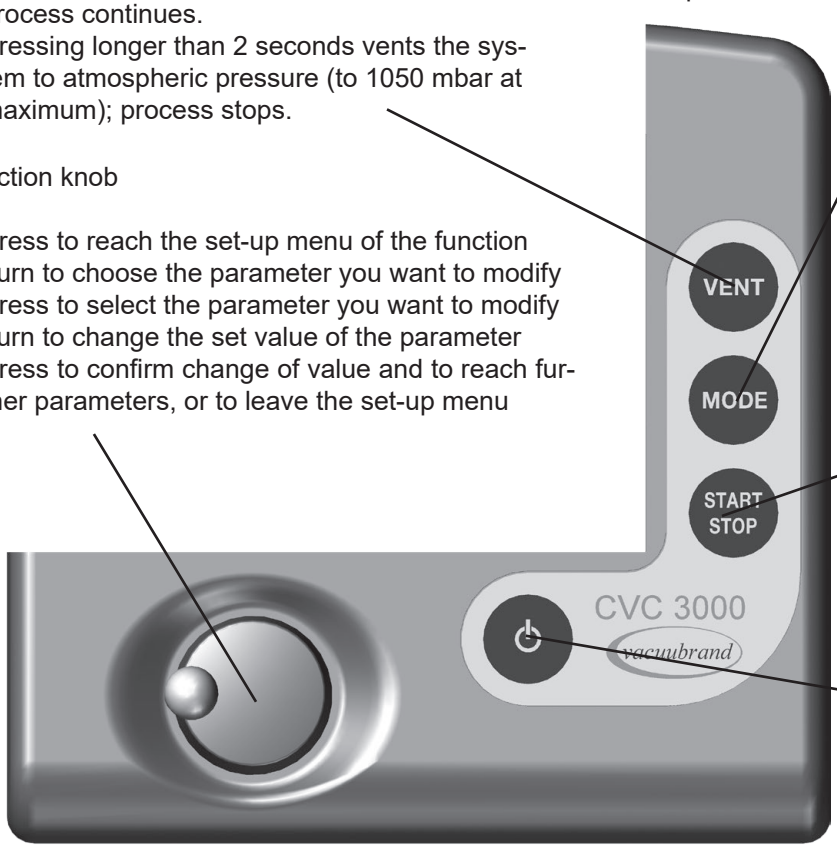
- Selects menu "function"
- Use for temporary switching during operation to other functions

VENT (venting):

- A short tap vents momentarily; process continues.
- Pressing longer than 2 seconds vents the system to atmospheric pressure (to 1050 mbar at maximum); process stops.

Selection knob

- Press to reach the set-up menu of the function
- Turn to choose the parameter you want to modify
- Press to select the parameter you want to modify
- Turn to change the set value of the parameter
- Press to confirm change of value and to reach further parameters, or to leave the set-up menu

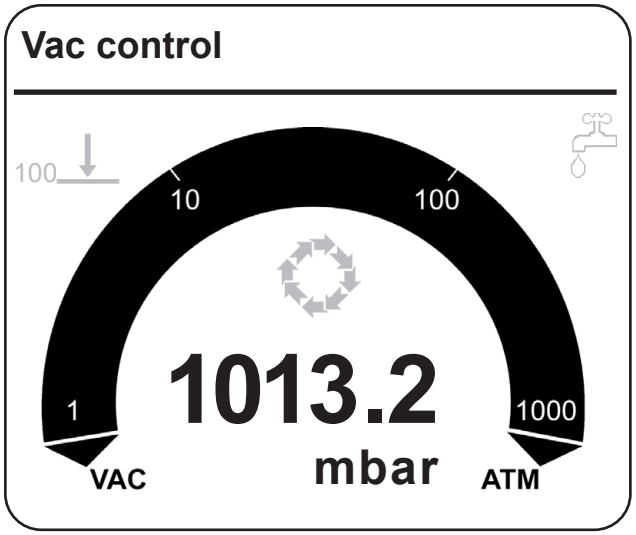


Start or Stop the process

ON/OFF switch

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Display and symbols



Function of the device:
(displayed in the upper left corner)

Pump down
Vac control
Auto mode
Program
VACUULAN
Configuration

1013.2	Actual absolute pressure at the pressure transducer
mbar Torr hPa	Preselected pressure unit

100 100 Vacuum control to a preset vacuum value (here 100 mbar/Torr/hPa) (without / with VACUU•BUS-compatible VARIO pump)

Actual pressure in interval “Set vacuum + hysteresis“ / Actual pressure = set vacuum (without / with VACUU•BUS-compatible VARIO pump)

flashing: actual pressure > preset maximum value (“*Maximum*“)

Minimum value (“*Minimum*“) reached

00:00:00 Process runtime (only if process control is running)

Pump down (continuous pumping)

50% Pump symbol is displayed when pump is running.
The pump’s motor speed in % is displayed additionally (only with NT VARIO pump).

5 Time meter is running (in function ”VACUULAN”), remaining time in minutes is displayed

In-line valve switched on

Venting valve switched on

Coolant valve switched on

PC symbol: controller is in remote operation

Control is running

Warning notice (if necessary in combination with other symbols), flashing

Level sensor activated

Emission condenser Peltronic connected

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Notes on selecting the function

The controller CVC 3000 can be adapted to specific applications by choosing the appropriate function depending on the connected components.
Automatic detection of the components:
When switching on the controller the actual configuration of the connected components is checked automatically.
Connected components (valves, sensors, pumps) are **detected automatically** and used and controlled until the controller is switched off.
The last mode of operation and the preselected values (e. g. for pressure, speed or time for switching off) are stored.
In case of similar operation conditions it is usually possible to start immediately if the preselections are chosen appropriately.

The controller has five functions and one menu for configuration, see section ”Menu guide”. The functions include specific preselection possibilities and are adapted automatically with regard to the connected components.
Depending on the connected components (valves, pump,...) some menu might not be active!

Changing the function:
➨ Switch controller on.
➨ Press START/STOP if control is running to stop control.
➨ Press key MODE.
➨ Select function with knob and press to confirm.
☞ Depending on the selected function the controller controls different components:

”Pump down”
- Manages the continuous speed control of the VACUU•BUS-compatible VARIO pump depending on preselected pressure and time settings.
- Coolant valve

”Vac control”
- With pressure preselection, controls a VACUU•BUS-compatible VARIO pump to maintain pinpoint control of that pressure.
- Coolant valve

”Auto mode”
- Provides fully automatic boiling point determination and adaptation with pinpoint precision, and optimization of pumping speed with VACUU•BUS-compatible VARIO pumps.
- Coolant valve

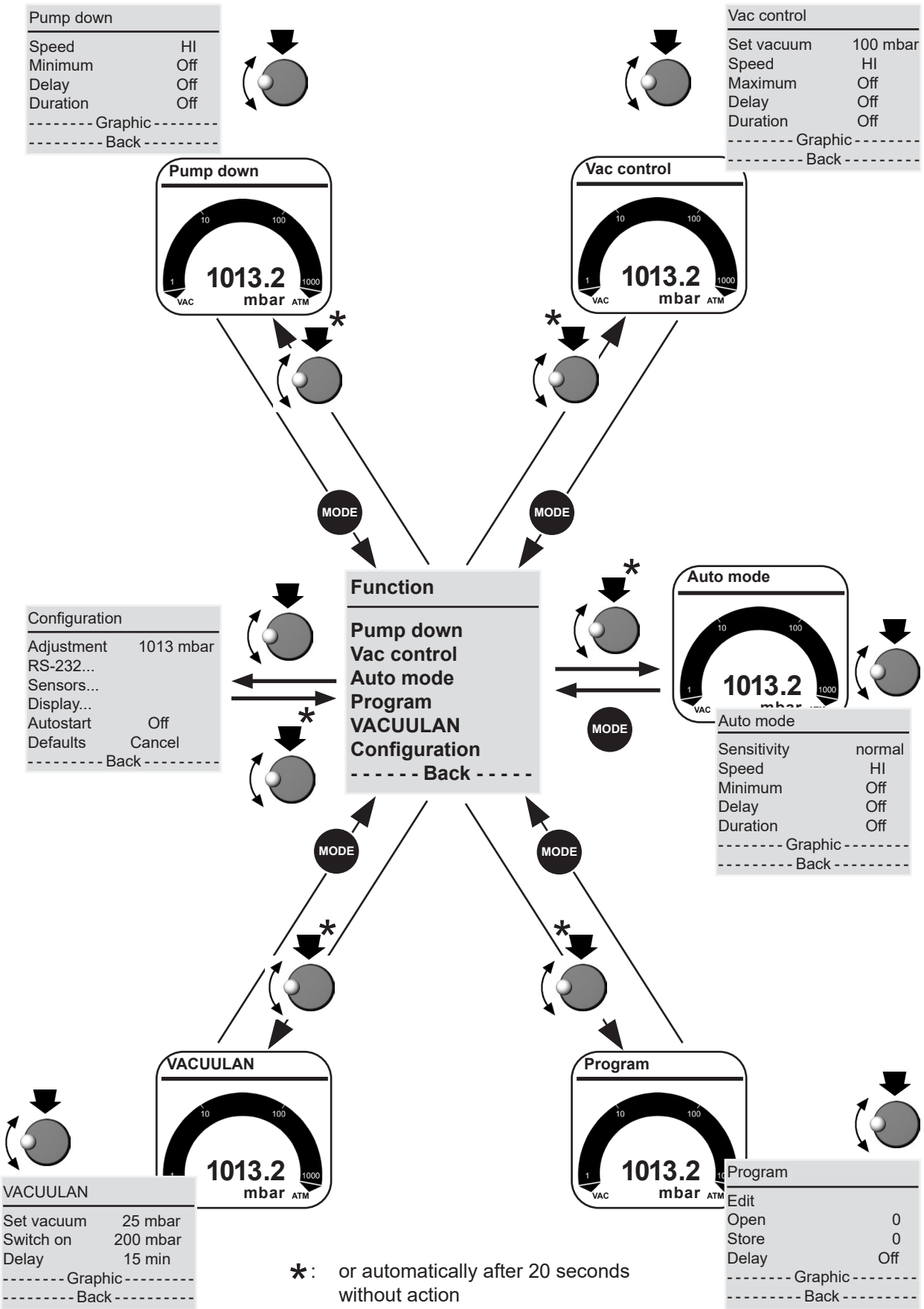
”Program”
- Control pump based on time and pressure preselections, or ”Auto mode”.
- Coolant valve
- Venting valve

”VACUULAN”
- Use continuous speed control to manage VACUU•BUS-compatible VARIO pumps, based on pressure and time preselections.
- Coolant valve

”Configuration”
Preselections for
- Adjustment of the pressure transducer
- Interface RS-232
- Sensors (configuration and switching between several sensors)
- Display (brightness and contrast of the display, language, sound)
- Autostart (automatic restart after power failure)
- Defaults (reset the controller to factory set values)

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Menu guide



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Function Pump down

➨ **Continuous pumping with pressure and time settings**

• **Operation on demand of a speed controlled VACUU•BUS-compatible VARIO pump**

Preselections

☞ Use the selection knob to select the parameters. All parameters can be altered even while operation control is running.

☞ ***Speed:*** Preselection of the motor speed for pump down. The selection ”HI” (recommended) causes the optimum pumping speed and ultimate vacuum of the pump (with automatic speed reduction at high vacuum).
The ”*Speed*” is adjustable in a range of 1-100% and to ”HI”.

☞ ***Minimum:*** The controller switches off the pump once the preset value for ”*Minimum*” is reached.
”*Minimum*” is adjustable in a range of 1-1060 mbar and to ”Off”.
A preset ”*Duration*” (process time) is without function, if the process is stopped due to a preset ”*Minimum*” before ”*Duration*” is reached.

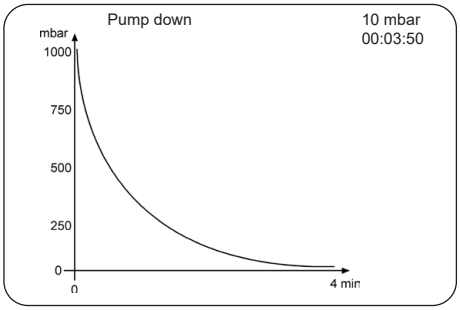
☞ ***Delay:*** ”*Delay*” determines the time the coolant valve is running on after the process has been stopped.
The ”*Delay*” is adjustable in a range of 1-300 minutes or can be set to ”Off”.

☞ ***Duration:*** ”*Duration*” determines the total process time since control start.
The process time is adjustable between 1-1440 minutes (24 h) or can be set to ”Off”. ”Off” indicates that no endpoint for pump down is determined.
If a ”*Duration*” is preset, the controller switches off the pump if the preset process time is reached, even if a preset ”*Minimum*” is still not reached.

☞ If neither ”*Minimum*” nor ”*Duration*” are preset, process control has to be stopped by pressing key ”STOP”.

The screen-shot shows the factory-set values.

Pump down	1013mbar
Speed	HI
Minimum	Off
Delay	Off
Duration	Off
---------- Graphic ----------	
---------- Back ----------	



When selecting ”*Graphic*” the display shows a pressure over time curve.

The timeline in the diagram adapts automatically to the process time.

☞ Press the selection knob twice to return to the standard display.

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Temporary switching from ”Pump down” to ”Vac control” or ”Auto mode” (only if control is running):

☞ Press key ”MODE”. The controller switches to function ”Vac control”. The actual vacuum is used as set value.
☞ Pressing key ”MODE” again switches to function ”Auto mode”. The controller adapts the boiling pressure starting with the actual vacuum.
☞ The preset function of the controller does not change due to this temporary switching. When pressing key ”STOP” the controller is in function ”Pump down” again.

Adapting the speed during pump down:

☞ Turn the selection knob while the knob is pressed.
☞ Turning the knob to the left reduces the speed.
☞ Turning the knob to the right increases the speed.

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Function Vac control

➨ **Vacuum control to a preset vacuum value**

• **Operation on demand of a speed controlled pump (VACUU•BUS-compatible VARIO pump)**

Preselections

☞ Use the selection knob to select the parameters. All parameters can be altered even while operation control is running.

☞ ***Set vacuum****:* The ”*Set vacuum*” is the set point for vacuum control with pinpoint precision for VACUU•BUS-compatible VARIO pumps. The selection ”Turbo” leads to the optimum backing pressure for a turbomolecular pump.
The ”*Set vacuum*” is adjustable in a range of 1 - 1060 mbar and to ”Turbo”.

☞ ***Speed:*** The maximum motor speed can be preselected (to control the pumping speed).
The selection ”HI” (recommended) causes the optimum pumping and ultimate vacuum.
The ”*Speed*” is adjustable in a range of 1-100% and to ”HI”.

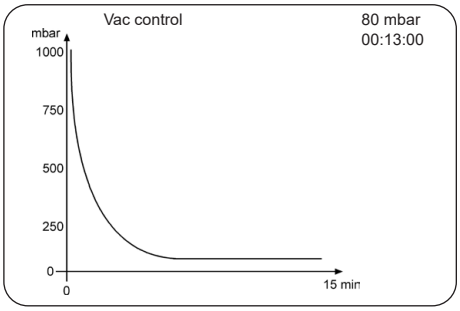
☞ ***Maximum****:* An upper pressure limit can be preselected. The pump switches off if the pressure limit is exceeded, e. g. at the end of suctions or filtrations. The pressure limit is only active once the pressure has gone below ”*Maximum*”.
The ”*Maximum*” is adjustable in a range of 1059 - 1 mbar (minimum 1 mbar higher than the ”*Set vacuum*”) and to ”Off”. ”Off” indicates that no ”*Maximum*” value is preset.

☞ ***Delay:*** ”*Delay*” determines the time the coolant valve is running on after the process has been stopped.
The ”*Delay*” is adjustable in a range of 1-300 minutes or can be set to ”Off”.

☞ ***Duration:*** ”*Duration*” determines the total process time since control start.
A preset ”*Duration*” (process time) is without effect, if the process is stopped due to a preset ”*Maximum*” before ”*Duration*” is reached.
The ”*Duration*” is adjustable between 1-1440 minutes (24 h) or can be set to ”Off”. ”Off” means that no endpoint of the process is defined.

The screen-shots show the factory-set values.

Vac control	1013mbar
Set vacuum	100 mbar
Speed	Hi
Maximum	Off
Delay	Off
Duration	Off
- - - - - - - - - Graphic - - - - - - - - -	
- - - - - - - - - - Back - - - - - - - - - -	



When selecting ”*Graphic*” the display shows a pressure over time curve.

The timeline in the diagram adapts automatically to the process time.

☞ Press the selection knob twice to return to the standard display.

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Temporary switching from ”Vac control” to ”Auto mode” while process control is running:

☞ Press key MODE. The controller switches to ”Auto mode” and adapts the boiling pressure starting with the actual set value. The preset function of the controller does not change due to this switching. When pressing key ”STOP” the controller is in function ”Vac control” again.

Adjustment of the set vacuum during vacuum control:

Dynamic, interactive adaption:
☞ Press the selection knob and keep pressed.
☞ Turning the knob for a 1/4 turn to the left causes pump down.
☞ Turning the knob for a 1/4 turn to the right causes venting.
☞ When the knob is released the actual value is used as new set value.

Alternatively:
Fine tuning:
The set vacuum can be fine tuned by turning the selection knob (without pressing) while process is running.
☞ Turn the selection knob.
☞ Turning the knob for one detent causes a change of the set vacuum of 1 mbar.
☞ A full turn causes a change of the set vacuum of 12 mbar.

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Function Auto mode

➨ **Control of a VACUU•BUS-compatible VARIO pump in ”Auto mode”:**
Automatic detection of boiling points, and automatic adjustment of determined boiling points as process parameters change.

Preselections

☞ Use the selection knob to set the parameters.

☞ **Sensitivity:** The ”*Sensitivity*” of the control influences the control speed. High sensitivity leads to a reduced pumping down speed, e. g. for small amounts of solvents or foaming processes. Use a low sensitivity for ”uncritical” processes to reduce process time. Usually setting the ”*Sensitivity*” to ”normal” is appropriate.
The ”*Sensitivity*” is adjustable to ”high”, ”normal” or ”low”.

☞ ***Speed:*** The maximum motor speed can be preselected (to control the pumping speed). The selection ”HI” (recommended) causes an automatic limitation of the adaptation depending on parameters determined during process. In case of very sensitive processes it is recommended to reduce the speed maximum.
The ”*Speed*” is adjustable in a range of 1-100% and to ”HI”.

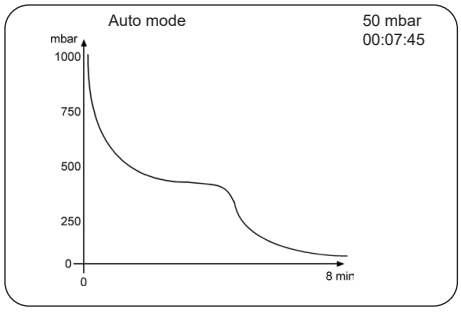
☞ **Minimum:** If the vacuum value reaches ”*Minimum*” the process is stopped. Use ”*Minimum*” for automatic process termination. When selecting ”Auto” the controller switches off automatically at the end of the process (boiling plateau). It is recommended only for large solvent amounts.
The ”*Minimum*” is adjustable in a range of 2 - 1060 mbar, to ”Auto” or to ”Off”.

☞ ***Delay:*** ”*Delay*” determines the time the cooling water valve runs on after process stop.
The ”*Delay*” is adjustable in a range of 1-300 minutes and to ”Off”.

☞ ***Duration:*** ”*Duration*” determines the total process time since control start.
The ”*Duration*” is adjustable between 1-1440 minutes (24 h) or can be set to ”Off”. A preset ”*Duration*” (process time) is without effect, if the process is stopped earlier by reaching the preset ”*Minimum*”.

The screen-shot shows the factory-set values.

Auto mode	1013mbar
Sensitivity	normal
Speed	Hi
Minimum	Off
Delay	Off
Duration	Off
- - - - - - - - - Graphic - - - - - - - - -	
- - - - - - - - - - Back - - - - - - - - - -	



When ”*Graphic*” is selected the display shows a pressure over time curve (right screen-shot).

The timeline in the diagram adapts automatically to the process time.

☞ Press the selection knob twice to return to the standard display.

Temporary switching from ”Auto mode” into function ”Vac control”

☞ Press key ”MODE”. The controller switches to ”Vac control” . The actual pressure value is used and held as new set point.

☞ The preset function of the controller does not change due to this temporary switching. When pressing key ”STOP” the controller is in function **”**Auto mode**”** again.

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Function Program

➨ **Ten programs with up to ten program steps with preset values for vacuum and time can be set and stored.**

☞ **Edit:**
Preset values for the process run can be edited:
Time: Process runtime for each program step to reach a preset vacuum level or if setting ”Step” runtime after having achieved the vacuum level. The summed up total process runtime is shown in the base line. Attention: A preset runtime of 99:59:59 hours in the final program step will cause the process to run endlessly. Termination of the process by pressing key STOP.
Vacuum: Vacuum level to be attained.
Venting valve: Operating a venting valve to reach a preset vacuum level.
”Step”: ”Step” causes pump down as fast as possible to the preset vacuum level. As soon as the vacuum level is reached the time meter starts running.
”Auto”: Auto = ⇓: automatic determination of a boiling point and adaptation to changes of the boiling point within the preselected time interval. Auto = ⇻: only automatic adaptation to changes of the boiling point. The program step is finished when the selected time or pressure value has been reached.
Selecting ”Auto” in combination with ”Step” in one program step is not possible.

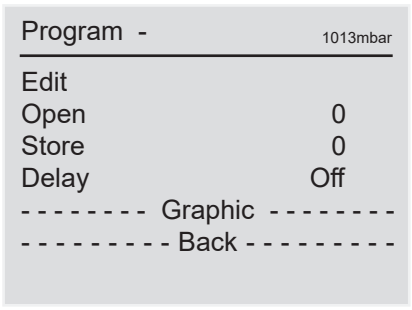
☞ **Open:** Open programs (Program 0 - 9).

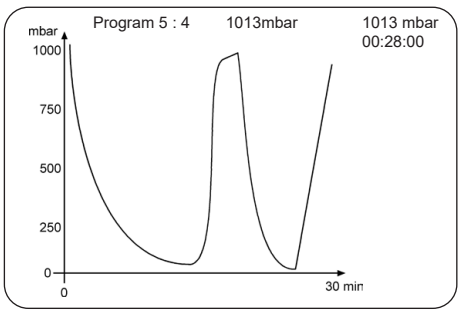
☞ **Store:** This command stores an edited program or the program of the last process to one of the storage spaces 0 - 9.

☞ **Delay:** ”*Delay*” specifies the time the coolant valve continues to run after process stop.
The ”*Delay*” is adjustable in a range of 1-300 minutes or can be set to ”Off”.

Editing:
☞ To select row: turn and press selection knob.
☞ Turning the selection knob: adjust parameter.
☞ Pressing the selection knob: confirm parameter, jump to next parameter.
☞ After 5 seconds without change the parameter is quit automatically.
➨ In case, store an edited program after having quit ”Edit” by storing it to one of the storage spaces 0 - 9 (select ”Store”).

The screen-shot shows the factory-set values.





When ”*Graphic*” is selected the display shows a pressure vs. time curve (right screen-shot).

The number of the program with program step, the set vacuum, the actual vacuum and the runtime are displayed.
The timeline in the diagram adapts automatically to the process time.
☞ Press the selection knob twice to return to the standard display.

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The last process (not in operation mode VACUULAN) is stored in the temporary data memory as long as the controller stays switched on. This program can be transferred to a storage space and edited.

Once the program is finished, the clock symbol starts to flash. Confirm the end of the program by pressing START/STOP (clock symbol will disappear).

Attention: If ***"Autostart"*** is set to ***"*****On*****"***, the program will start again (time will be reset to 00:00:00) after a power failure or after switching the controller off/on. Only if the end of the program (clock symbol flashing) has been confirmed by pressing START/STOP, the program will not start again.

Attention: If the controller is set to "*Defaults*": "On", all stored programs will be deleted.

Example for use

VACUU•BUS-compatible VARIO vacuum pump with speed control (e.g., with a rotary evaporator): Degassing and automatic distillation with timing

Program

No	hh:mm:ss	Vac	Vent.	Step	Auto
01	00:00:00	ATM	✓	✓	
02	00:10:00	300		✓	
03	01:00:00	2			⭳ *
04	00:01:00	ATM	✓	✓	
05	00:00:00	0			
06	00:00:00	0			
07	00:00:00	0			
08	00:00:00	0			
09	00:00:00	0			
10	00:00:00	0			

- - - - - - - - - - - - - Back - - - - - - - - - - - - -

01:11:00

* If the pressure difference between the vacuum for degassing and the expected vacuum for distillation is very small (distillation vacuum >75% of the degassing vacuum), select the function "Auto⇹" instead of "Auto⭳" (adapting the vacuum).

Program step 1 should be always a definite initial state, here atmospheric pressure (ATM). To reach this state definitely, set a tickmark at "Vent." and "Step" (press selection knob).
In step 2 pumping down starts as fast as possible ("Step") to 300 mbar and the vacuum is kept for 10 minutes (degassing of the solvent).
In step 3 "Auto⭳" causes an automatic search of the boiling vacuum in the pressure interval between 300 mbar and 2 mbar and automatic adaptation to a changing boiling pressure. The following step starts if time is over (after 60 minutes) even if the preset pressure (2 mbar) is still not reached or if a vacuum of 2 mbar is reached even if the preset time has not passed.
Step 4 vents to atmospheric pressure as fast as possible and switches off the control after one minute.

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Function VACUULAN

➨ **Optimised vacuum control for vacuum networks (e. g. VACUUBRAND VACUU•LAN)**

• **Operation on demand of a speed controlled pump (VARIO)**

Preselections

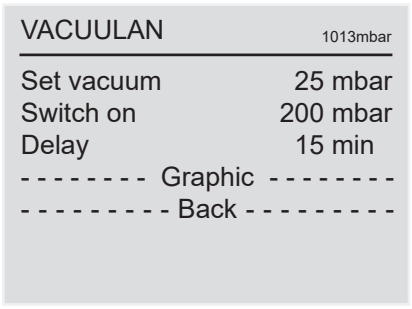
☞ Use the selection knob to select the parameters.

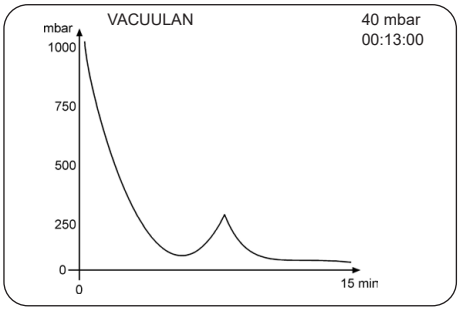
☞ ***Set vacuum*** (lower switch-off value): If the pressure drops below the ”*Set vacuum*” a time-meter starts to run; additionally the motor speed is reduced. When the pressure exceeds the ”Set vacuum” pressure again, the time meter is reset. If the ”Set vacuum” is not reached within 100 hours, the controller signals an error.
The set vacuum is adjustable in a range of 1 - 1060 mbar.

☞ ***Switch on*****:** If the pressure exceeds the pressure for switching on, pumping down starts again.
The ”*Switch on*” pressure is adjustable in a range of 1 - 1060 mbar.
In case of a sudden large pressure increase pumping starts even if the ”*Switch on*” pressure is not reached (pressure increase control).

☞ ***Delay:*** If the vacuum is below ”*Set vacuum*” for longer than the ”*Delay*” time, the pump is stopped. The pumping down is started again in case of rapid pressure increase or if the ”*Switch on*” level is exceeded.
The ”*Delay*” is adjustable in a range of 1-300 minutes or can be set to ”Off”.

The screen-shot shows the factory-set values.





When ”*Graphic*” is selected the display shows a pressure over time curve (right screen-shot).

The timeline in the diagram adapts automatically to the process time.

☞ Press the selection knob twice to return to the standard display.

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Examples for use

Assembly of a vacuum system

☞ Assemble vacuum connection lines between controller, vacuum pump and apparatus.
☞ Assemble electrical connections.
☞ Connect coolant if necessary.

Vacuum for filtration and suction

☞ Select function ”**Pump down**”.
☞ If necessary set value for *”Speed”* (high or low pumping speed). Reduce the speed in case of fast sedimentation (formation of a filter cake).
☞ Set ”*Minimum*” to a value which still does not lead to evaporation of the solvent.
☞ Start process by pressing key ”START/STOP”.

☞ **Tip for filtration:** Adjust preset pressure to a value well above the boiling pressure of the solvent (e.g. water >>20 mbar). Set the maximum pressure to e.g. 500 mbar. Once the filtration has finished, the pressure increases and the pump is switched off automatically.

Vacuum for gel dryer, drying chambers and vacuum concentrators

☞ Select function ”**Pump down**”. ”*Speed*”: ”HI” is recommended. For gel dryers set a lower speed if necessary if the gels tend to break.
☞ Set *”Minimum”* to prevent volatile components to evaporate. The process is stopped automatically as soon as ”*Minimum*” is reached.
☞ Set a process time (”*Duration*”) if necessary.
☞ Start process by pressing key ”START/STOP”.

Vacuum for distillation and evaporation (e. g. rotary evaporator)

Semi-automatic distillation and evaporation

☞ Select function ”**Pump down**”.
☞ Start process by pressing key ”START/STOP”.
☞ Observe process. As soon as evaporation starts, press key ”MODE” (switching to ”Vac control”). The vacuum level is kept constant (at the boiling pressure). Fine tuning of the vacuum value is possible by turning the selection knob.
Pressing key ”MODE” a second time switches to ”Auto mode” causing the vacuum level to be automatically adapted to changes of the boiling pressure.

alternatively:

☞ Select function ”**Vac control”**.
☞ Setting a maximum *”Speed”* leads to a faster or slower process.
☞ To set *”Maximum”* is usually not necessary because the pressure does not increase at the end of the evaporation.
☞ Set a value for *”Duration”* if the process should automatically be terminated at the end of a definite time.
☞ Set *”Set vacuum”* depending on the solvent and the temperature.
☞ Start process by pressing key ”START”.
☞ **Temporary switching to” Auto mode”**: Press key ”MODE”. The controller switches to ”Auto mode”. The setting of the controller does not change due to this switching. After pressing key ”START/STOP” the controller is in ”Vac control” again.

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alternatively:

Fully automatic determination and adaptation of the boiling point with a VACUU•BUS-compatible VARIO pump (recommended)

- ☞ Select function ”**Auto mode”**.
- ☞ Start process by pressing key ”START/STOP”.
- ☞ The function ”Auto mode” allows a fully automatic distillation even if the boiling pressure is unknown. In case of solvent mixtures the vacuum is reduced until all solvents or volatile components are evaporated (with respect to the ultimate vacuum of the pump and the bath temperature).
- ☞ If *”Minimum”* is set the controller switches off the pump when the preset vacuum value is reached. The *”Minimum”* should be clearly below the boiling vacuum of the solvent to be evaporated and above the ultimate vacuum attainable in the apparatus. If the *”Minimum”* is set to *”*Auto*”* , the controller automatically switches off the pump at the end of the evaporation (recommended for large solvent quantities only). The setting of *”Duration”* (process runtime) is without effect if the pump is switched off due to *”Minimum”* before *”Duration”* is over.
- ☞ When setting a value for *”Duration”* the controller switches off the pump when *”Duration”* has passed even if a preset *”Minimum”* is still not reached.
- ☞ If neither *”Minimum”* nor *”Duration”* is preset, the process has to be finished by pressing key STOP.

Vacuum for VACUU•LAN networks

- ☞ Select function **VACUULAN**.
- ☞ Set *”Set vacuum”* to a pressure value which can be reached in the vacuum network reliably under consideration of the ultimate vacuum of the pump and the leak rate of the system in case of no vacuum demand.
- ☞ Choose the vacuum for switching on the pump again (*”Switch on”*) in order to ensure sufficient vacuum for all processes.
- ☞ Preset *”Delay”* if necessary.
- ☞ Start process by pressing key ”START/STOP”.

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Function Configuration

In the ”Configuration” menu the device parameters are preselected.
After 20 seconds without action the function ”Configuration” and its submenus (except submenu ”Sensors”) are quit automatically without storing any possibly changed parameter.

Preselections

☞ Use the selection knob to select the parameters.

☞ ***Adjustment*:** Adjustment of the pressure transducer under vacuum and/or at atmospheric pressure, see also section ”Readjustment of CVC 3000”.
Adjustment at atmospheric pressure is carried out at an absolute pressure value between 1060 - 700 mbar and under vacuum at an absolute vacuum value between 0 - 20 mbar. In the range between 20 and 700 mbar no adjustment is possible; ---- mbar is displayed.

☞ ***RS-232*:** Configuration of the interface, setting of parameters and commands, see section ”Interface”.
Baud rate can be set to 19200, 9600, 4800 or 2400, parity on ”8-N-1”, ”7-O-1” or ”7-E-1”, Handshake on ”no”, ”Xon-Xoff” or ”RTS-CTS” and remote on ”On” or ”Off”.

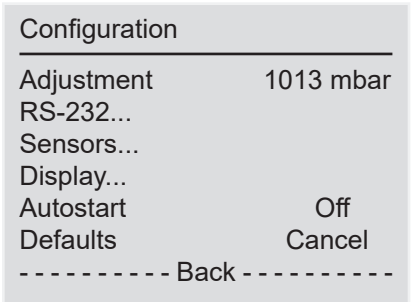
☞ ***Sensors*:** Selection of the pressure transducer to be controlled (maximum 4 external sensors).

☞ ***Display*:** Selection of the device parameters ”*Brightness*” between 0 - 100%, ”*Contrast*” between 0 - 100%, ”*Sound*” ”On” or ”Off”, ”*Units*” ”mbar”, ”hPa” or ”Torr”, ”*Language*” ”German”, ”English”, ”French”, ”Italian”, ”Spanish”, ”Turkish”, ”Korean”, ”Chinese”, ”Portuguese”, ”Russian”, ”Polish”, ”Dutch”, ”Japanese”, ”Finnish”.

☞ ***Autostart*:** If ”*Autostart*” is set to ”On” the controller restarts a running process automatically after a mains failure. If this is unwanted, set Autostart to ”Off”.
Attention: If ”*Autostart*” is preselected, the process starts immediately after power failure without pressing any further key. It is the user’s responsibility to ensure that no dangerous status of the system due to the automatic start-up can occur and to provide appropriate safety measures. If necessary, the user has to check **prior to starting the process** if the option ”*Autostart*” is enabled.

☞ **Defaults**: If ”*Defaults*” is set to ”Load”, the controller is reset to factory set values. All stored programs and parameters are deleted.

The screen-shot shows the factory-set values.



☞ The menu ”Configuration” is also accessible by pressing the selection knob while the start display is shown.

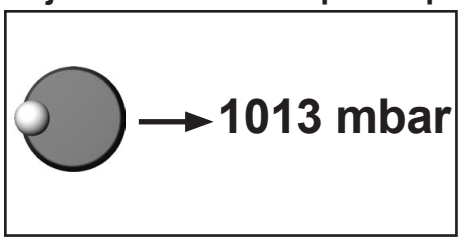
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Readjustment

NOTICE

The vacuum gauge was adjusted using factory standards, which are traceable through regular calibration in an accredited laboratory (DAkkS calibration laboratory) to the German national pressure standard. Depending on the process and/or accuracy requirements, check the adjustment and readjust if necessary. For readjustment, the device has to be adjusted both at atmospheric pressure as well as under vacuum but only if the reference pressures are certainly known. The adjustment mode can be activated only if the process control is inactive. Press key ”START/STOP” if necessary. In the range between 20 and 700 mbar no adjustment is possible; ---- mbar is displayed.

Adjustment at atmospheric pressure

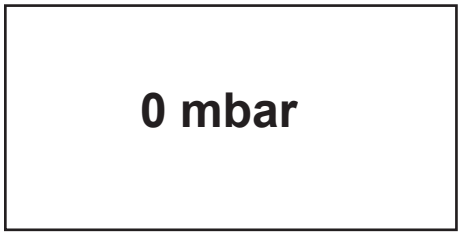


An adjustment at atmospheric pressure is only possible if the pressure is higher than 700 mbar.
Ventilate the controller and/or the vacuum system. Make sure that the vacuum connection at the controller is at atmospheric pressure.

- ➨ In function ”Configuration” select program ”Adjustment” at the controller.
- ➨ Use the selection knob to adjust the reading to actual atmospheric pressure.
- ➨ Press the selection knob to confirm.

Note: *To determine the actual atmospheric pressure, use an accurate barometer or get accurate reading from the weather service, the next airport.....(take into account the difference in altitude between e. g. airport and laboratory).*

Adjustment under vacuum

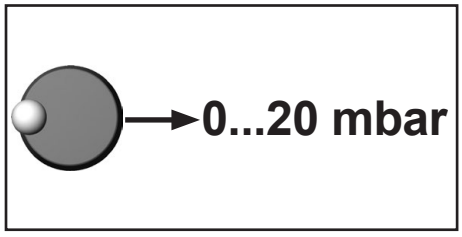


An adjustment under vacuum is only possible if the pressure is lower than 20 mbar absolute.
Evacuate the controller to a pressure < 0.1 mbar (e. g. by applying a good two-stage rotary vane pump).

- ➨ In function ”Configuration” select program ”*Adjustment*” at the controller.
- ☞ The reading is automatically adjusted to ”zero”.
- ➨ Press the selection knob to confirm.

Note: *Adjustment under vacuum with an actual pressure higher than 0.1 mbar reduces the accuracy of the measurement. If the pressure is significantly higher than 0.1 mbar, adjustment to a reference pressure is recommended.*

Adjustment at a reference pressure



Instead of adjustment under vacuum to a pressure < 0.1 mbar, adjustment to a precisely known reference pressure within the range of 0 ..... 20 mbar is possible. Evacuate the controller to a pressure within 0 ..... 20 mbar

- ➨ In function ”Configuration” select program ”*Adjustment*” at the controller.
- ☞ The reading is automatically adjusted to ”zero”.
- ➨ Use the selection knob to adjust the display to the reference pressure at the vacuum line within the range of 0 ..... 20 mbar.
- ➨ Press the selection knob to confirm.

Note: *The accuracy of the value of the reference pressure will directly affect the accuracy of the adjustment. If the nominal ultimate vacuum of a diaphragm pump is used as reference vacuum, the accuracy of the controller might be doubtful. The diaphragm pump may not achieve the specified value (due to condensate, poor condition, failure of valves or diaphragm, leaks).*

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Calibration in the factory

Control of measuring equipment

The VACUUBRAND DAkkS calibration laboratory is accredited by the Deutsche Akkreditierungsstelle GmbH (national accreditation body of the Federal Republic of Germany) for the measurable variable pressure in the pressure range from 7.5*10-3 Torr to 975 Torr (10-3 mbar to 1300 mbar) in accordance with the general criteria for the operation of testing laboratories defined in the DIN EN ISO/IEC 17025:2000 series of standards (accreditation number D-K-15154-01). The DAkkS is signatory to the multilateral agreements of the European cooperation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
Rely on calibration in the VACUUBRAND calibration laboratory:

- To meet the requirements of the DIN ISO 9000ff and 10012 series of standards regarding the calibration of inspection, measuring and test equipment at specified intervals.
- To document that the vacuum gauges calibrated are traceable to national standards of the PTB (Physikalisch-Technische Bundesanstalt; German national institute for science and technology and the highest technical authority of the Federal Republic of Germany for the field of metrology and certain sectors of safety engineering).

DAkkS calibration controller CVC 3000..... **20900215**

Interface parameters

The controller CVC 3000 is equipped with a serial interface (RS 232C, nine-pole Sub-D-plug).

☞ Plug-in or remove the cable (cable RS 232C) from the interface only if the equipment is switched off.
☞ The interface is **not** electrically isolated from the measuring circuit.

The controller is fully operable via the serial interface. Measuring results, preselections and the status of the controller can be read at any time.

Factory-set the read and write commands are completely compatible to the VACUUBRAND controller CVC 2000 (see section read and write commands ”CVC 2000”). An extended instruction set is available using the command ”CVC 3” (see section read and write commands ”CVC 3000”).

Setting of the interface

Set the interface parameters directly at the controller CVC 3000. The factory set values are underlined. Edit and confirm the interface parameters in the function ”Configuration” in the menu ”RS-232” using the selection knob.

- Baud: 2400, 4800, 9600 or 19200
- Parity: 8-N-1, 7-O-1 or 7-E-1
- Handshake: Off, Xon-Xoff or RTS-CTS
- Remote: On or Off
- Timeout: Sending 1s, receiving 10s.

In remote mode (Remote On, ”PC symbol” in the display) all keys at the controller are without function.

To return to the manual operation of the controller set the controller to ”Remote off” in menu configuration. Therefore switch off the controller. Switch on the controller and press the selection knob within 2s.

- Maximum ten commands per second are possible.
- Read commands and commands ”REMOTE”, ”CVC” and ”STORE” can be sent always. The sending of other write commands is only possible, if ”Remote on” is selected.
- The commands have to be written in capital letters.
- Command and parameter have to be separated by a blank.
- The string is terminated with <CR> or <LF> or <CR><LF>.
- The return of the controller is always terminated with <CR><LF>.
- Numerical values and parameters can be written without leading zeros.
- The return of the controller is always with leading zeros.

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Read commands ”CVC 2000”

Command	Operation	Response	Description
IN_PV_1	current pressure	XXXX mbar/hPa/Torr	unit according to preselection
IN_PV_2	current frequency	XX.X Hz	pump speed
IN_CFG	device set preselections	0XXXX 1XXXX 2XXXX 3XXXX X0XXX X1XXX XX0XX XX1XX XXX0X XXX1X XXXX0 XXXX1	VACUU•LAN continuous pumping vacuum control without automatic vacuum control with automatic no coolant valve coolant valve no venting valve venting valve no automatic switch off automatic switch off remote operation off remote operation on
IN_ERR	error code	1XXX X1XX XX1X XXX1	fault at pump electronics overpressure maloperation mode pressure transducer last command to interface incorrect
IN_STAT	status of process control	0XXX 1XXX X0XX X1XX XX00 XX01 XX02 XX03 XX10 XX11 XX20 XX21 XX22 XX23 XX30 XX31 XX32 XX33	coolant valve closed coolant valve open venting valve closed venting valve open VACUU•LAN: inactive VACUU•LAN: pumping down, current pressure > selected pressure VACUU•LAN: pumping down, time for automatic switching off is running VACUU•LAN: system is switched off continuous pumping: not active continuous pumping; active vacuum control: not active vacuum control: current pressure above set vacuum vacuum control: current pressure equals set vacuum (±1 Torr/mbar) vacuum control: current pressure below set vacuum automatic: not active automatic: determining boiling point automatic: adjusting boiling point automatic: system is switched off

Write commands ”CVC 2000”

Command	Operation	Parameter	Description
OUT_MODE	function	1 2 3 *30* *31* *32*	continuous pumping vacuum control without automatic vacuum control with automatic optional: sensitivity: low optional: sensitivity: normal optional: sensitivity: high
OUT_SP_1	set vacuum	XXXX	unit (mbar/Torr/hPa) according to preselection; see respective function for parameter range
OUT_SP_V	set vacuum with venting*	XXXX	unit (mbar/Torr/hPa) according to preselection; see respective function for parameter range
OUT_SP_2	set frequency	XX.X	motor speed in Hz (99.9 for “HI”)
OUT_SP_3	vacuum for switch on (VACUU•LAN)	XXXX	unit (mbar/Torr/hPa) according to preselection; see respective function for parameter range

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Command	Operation	Parameter	Description
OUT_SP_4	delay	XX:XX	hh:mm (hours:minutes)
OUT_SP_5	vacuum for automatic switching off	XXXX	unit (mbar/Torr/hPa) according to preselection; see respective function for parameter range
OUT_SP_6	time for auto-matic switching off (VACUU•LAN)	XX:XX	hh:mm (hours:minutes)
START	starting process control		
STOP	stopping process control	1 2	termination of process control termination of process control and storage of the current pressure as new set point
REMOTE	remote operation**	0 1	set controller to local operation set controller to remote operation
OUT_VENT	driving venting valve	0 1	close venting valve (not automatically) open venting valve (process control stopped)

Read commands ”CVC 3000”

Command	Operation	Response	Description
IN_PV_1	current pressure	XXXX mbar/hPa/Torr	unit according to preselection
IN_PV_Sx	current pressure of pressure transducer x	XXXX mbar/Torr/hPa	pressure of pressure transducer x, unit (mbar/Torr/hPa) according to preselection (order of numbering according to display in ”Sensors” menu)
IN_PV_2	current speed	XXX%	1-100% or ”HI”
IN_PV_3	time	XX:XX h:m	process runtime (hours:minutes)
IN_PV_X	pressure	XXXX.X XXXX.X ...	pressure of all connected sensors, unit (mbar/Torr/hPa) according to preselection
IN_PV_T	operation time of the controller	XXXXdXXh	operation time in days and hours
IN_CFG	device set preselections + Language: 0: German 1: English 2: French 3: Italian 4: Spanish 5: Turkish 6: Korean 7: Chinese 8: Portuguese 9: Russian A: Polish B: Dutch C: Japanese D: Finnish	0XXXXXXXXXXXXXXX 1XXXXXXXXXXXXXXX 2XXXXXXXXXXXXXXX 3XXXXXXXXXXXXXXX 4XXXXXXXXXXXXXXX 5XXXXXXXXXXXXXXX XyXXXXXXXXXXXXX XX0XXXXXXXXXXXX XX1XXXXXXXXXXXX XX2XXXXXXXXXXXX XXX0XXXXXXXXXXX XXX1XXXXXXXXXXX XXXX0XXXXXXXXXX XXXX1XXXXXXXXXX XXXXX0XXXXXXXXX XXXXX1XXXXXXXXX XXXXXX0XXXXXXXX XXXXXX1XXXXXXXX XXXXXXX0XXXXXXX XXXXXXX1XXXXXXX XXXXXXXX0XXXXXX XXXXXXXX1XXXXXX XXXXXXXXX0XXXXX XXXXXXXXX1XXXXX XXXXXXXXXX0XXXX XXXXXXXXXX1XXXX	VACUU•LAN Pump down Vac control Auto mode Program measuring device y: 0.....D: language+ (hexadecimal) pressure unit mbar pressure unit Torr pressure unit hPa autostart off autostart on acoustic signal off acoustic signal on VARIO pump not connected VARIO pump connected VMS not connected VMS connected in-line valve not connected in-line valve connected coolant valve not connected coolant valve connected venting valve not connected venting valve connected fault indicator not connected fault indicator connected level sensor not connected level sensor connected

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Command	Operation	Response	Description
IN_CFG	device set preselections	XXXXXXXXXXX0XXX XXXXXXXXXXX1XXX XXXXXXXXXXXyXX XXXXXXXXXXXXyX XXXXXXXXXXXXXX0 XXXXXXXXXXXXXX1	remote module not connected remote module connected y: 1.....9: sensor number y: 1.....9: sensor quantity remote operation off remote operation on
IN_STAT	status process control	0XXXXX 1XXXXX X0XXXX X1XXXX XX0XXX XX1XXX XXX0XX XXX1XX XXXX0X XXXX1X XXXX2X XXXX3X XXXX4X XXXX5X XXXXX0 XXXXX1 XXXXX2 XXXXX3	pump off pump on in-line valve closed in-line valve open coolant valve closed coolant valve open venting valve closed venting valve open VACUU•LAN Pump down Vac control Auto mode Program measuring device control off pump down - determining boiling point set vacuum reached - boiling pressure found current pressure below set vacuum - automatic switch-off
IN_ERR	fault status	0XXXXXXXX 1XXXXXXXX X0XXXXXXX X1XXXXXXX XX0XXXXXX XX1XXXXXX XXX0XXXXX XXX1XXXXX XXXX0XXXX XXXX1XXXX XXXXX0XXX XXXXX1XXX XXXXXX0XX XXXXXX1XX XXXXXXX0X XXXXXXX1X XXXXXXXX0 XXXXXXXX1	no fault at pump fault at pump no fault at in-line valve fault at in-line valve no fault at coolant valve fault at coolant valve no fault at venting valve fault at venting valve no overpressure overpressure no fault at pressure transducer fault at pressure transducer catchpot not full catchpot full no external fault external fault last interface command correct last interface command incorrect
IN_SP_1	set vacuum	XXXX mbar/hPa/Torr	unit according to preselections
IN_SP_2	maximum speed	XXX%	speed in % (1-100% or ”HI”)
IN_SP_3	switching pressure	XXXX mbar/hPa/Torr	switching pressure for VACUU•LAN or two point control; unit according to preselection
IN_SP_4	delay	XX:XX h:m	hours:minutes (00:00 = Off)
IN_SP_5	switch off pressure	XXXX mbar/hPa/Torr	”Maximum” for ”Vac control”, ”Minimum” for ”Pump down”) unit according to preselection
IN_SP_6	runtime	XX:XX h:m	process runtime (hours:minutes)
IN_SP_P1y	time	XX:XX:XX h:m:s	time in program step y (0.....9) (hours:minutes:seconds)
IN_SP_P2y	pressure	XXXX mbar/hPa/Torr	pressure in program step y (0.....9) unit according to preselection
IN_SP_P3y	venting valve	0 1	no venting valve in program step y (0.....9) venting valve in program step y (0.....9)

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Command	Operation	Response	Description
IN_SP_P4y	Step	0 1	no ”Step” in program step y (0.....9) ”Step” in program step y (0.....9)
IN_SP_P5y	Auto	0 1	no ”Auto” in program step y (0.....9) ”Auto” in program step y (0.....9)
IN_VER	version	CVC 3000 VX.XX	software version

Write commands ”CVC 3000”

Command	Operation	Parameter	Description
OUT_MODE	function **Attention:** If control is running, it is only possible to switch either from 1 to 2, or from 2 to 3, or from 3 to 2. The set vacuum is adopted in each case.	0 1 2 3 *30* *31* *32* 4	VACUU•LAN Pump down Vac control Auto mode optional: sensitivity: low optional: sensitivity: normal optional: sensitivity: high Program
OUT_CFG	configuration	yXXX X0XX X1XX X2XX XX0X XX1X XXX0 XXX1	y: 0.....D: language+ (hexadecimal), see ”Read commands CVC 3000” pressure unit mbar pressure unit Torr pressure unit hPa Autostart off Autostart on acoustic signal off acoustic signal on
OUT_SP_1	set vacuum	XXXX	unit (mbar/hPa/Torr) according to preselection; see respective function for parameter range
OUT_SP_V	set vacuum with venting	XXXX	unit (mbar/hPa/Torr) according to preselection; see respective function for parameter range
OUT_SP_2	speed	XXX	speed in % (1-100%) or ”HI”
OUT_SP_3	start-up pressure	XXXX	unit (mbar/hPa/Torr) according to preselection; see respective function for parameter range
OUT_SP_4	delay	XX:XX	hh:mm (hours:minutes)
OUT_SP_5	switch-off pressure	XXXX	unit (mbar/hPa/Torr) according to preselection; see respective function for parameter range
OUT_SP_6	switch-off time	XX:XX	hh:mm (hours:minutes)
OUT_SP_PL	open program	X	program 0.....9
OUT_SP_PS	store program	X	program 0.....9
OUT_SP_P1y	time	XX:XX:XX *or* +XX:XX:XX	total runtime until program step y (0.....9) or time for program step y (0.....9) (additive)
OUT_SP_P2y	pressure	XXXX	pressure at program step y (0.....9) unit (mbar/Torr/hPa) according to preselection
OUT_SP_P3y	venting valve	0 1	no venting valve in program step y (0...9) venting valve in program step y (0.....9)
OUT_SP_P4y	Step	0 1	no ”Step” in program step y (0.....9) ”Step” in program step y (0.....9)
OUT_SP_P5y	Auto	0 1 2	no ”Auto” in program step y (0.....9) ”Auto ” in program step y (0.....9) ”Auto ” in program step y (0.....9)

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Command	Operation	Parameter	Description
START			process control started
STOP		0 1 2	Stop and delete fault Stop Stop and adopt the set vacuum
REMOTE**	remote operation	0 1	Remote off Remote on
ECHO***		0 1	Echo off Echo on, write command with return value
CVC		2 3	CVC 2000 commands CVC 3000 commands****
OUT_VENT		0 1 2	venting valve closed venting valve open venting until atmospheric pressure (1050 mbar at maximum)
STORE	store settings		store settings permanently, if ”ECHO = 1” after realization
OUT_SENSOR		1 2...9	internal sensor external sensors (if connected)

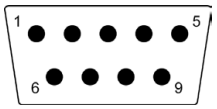
* Pressure setting with venting is only possible in ”Vac control” function if a venting valve is connected and configured, and vacuum control is started. The venting valve opens automatically if the actual pressure is at least 7.5 Torr (10 mbar) below the preset pressure. Automatic venting becomes inactive if vacuum control is stopped (by pressing ”START/STOP” or ”VENT”), a pressure value is set using the command OUT_SP_1, or if the function is changed. Activate the command OUT_SP_V again if necessary.

** If remote operation is selected or deselected, the user has to ensure that no dangerous status of the system can occur due to the change of the mode of operation, and must also take appropriate safety precautions, especially if selecting remote operation interferes with a locally operated active process.

*** With command ”ECHO 1” a return value can be activated at write commands. A return value is only given if the command is performed correctly.

****After being switched on, the controller is in ”CVC 2” mode by default. Send ”CVC 3” and ”STORE” to permanently set the controller RS 232C commands to the extended set ”CVC 3000”.

Pin assignment RS-232 C



2: RxD
3: TxD
4: DTR

5: Mass
7: RTS
8: CTS
9: +5V (Bluetooth)

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Troubleshooting

Fault	Possible cause	Remedy
❑ No display.	➡ Mains not plugged in?	✓ Plug in mains plug.
	➡ Controller CVC 3000 or pumping unit switched off?	✓ Switch device on.
	➡ VACUU•BUS cable to internal power supply not plugged in?	✓ Plug in VACUU • BUS cable at Controller CVC 3000.
	➡ Other causes (device defective)?	✓ Contact local distributor.
❑ Display disappears.	➡ Too much load (e.g. valves) connected?	✓ Check current draw of the connected devices.
	➡ Short circuit at connected valves?	✓ Replace valves.
	➡ Short circuit at the RS 232 plug?	✓ Check plug and cable.
	➡ Other causes (device defective)?	✓ Contact local distributor.
❑ Pressure reading incorrect.	➡ Pressure transducer not adjusted?	✓ Readjust the controller.
	➡ Humidity inside the pressure transducer?	✓ Let the pressure transducer dry, e.g. by pumping. Readjust if necessary. Determine and eliminate the cause for humidity.
	➡ Pressure transducer contaminated?	✓ See „Cleaning the pressure transducer“.
❑ Digital pressure reading is flashing, display shows ”0.0”.	➡ Pressure transducer not correctly adjusted under vacuum?	✓ Adjust controller CVC 3000 correctly.
❑ No digital pressure reading.	➡ Pressure transducer defective?	✓ Contact local distributor.
❑ Digital pressure reading is flashing, one blip*.	➡ Overpressure at the pressure transducer, pressure > 1060 mbar?	✓ Release pressure immediately (risk of bursting)! ⚠
❑ Warning triangle and black valve symbol are flashing, two blips*.	➡ External venting valve removed or defective?	✓ Connect valve or replace by a new one or reconfigure without valve.
❑ Warning triangle and valve symbol are flashing, three blips*.	➡ VARIO pump and in-line valve connected?	✓ Disconnect in-line valve, switch controller off/on.
❑ Warning triangle and coolant valve symbol are flashing, four blips*.	➡ Coolant valve removed or defective?	✓ Check connection cable of the valve or use new valve or reconfigure without valve.

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Fault	Possible cause	Remedy
❑ No digital pressure reading, warning triangle is flashing, five or seven blips*.	➡ Five blips: External sensor defective or removed?	✓ Plug in sensor or use new one or reconfigure without sensor.
	➡ Seven blips: Internal sensor defective?	✓ Contact local distributor.
❑ Warning triangle and pump symbol are flashing, six blips*.	➡ VARIO pump and VMS** (Vacuum Management System) connected?	✓ Remove VMS. Restart controller.
	➡ Fault at the VARIO pump or the VMS?	✓ Check pump and/or VMS, restart controller.
	➡ Connecting cable from pump or VMS removed?	✓ Check cable connections.
❑ Clock symbol is flashing. Control is stopped.	➡ Preselected process time is over?	✓ Confirm by pressing key START/STOP.
❑ Internal venting valve does not respond, valve symbol is not displayed.	➡ External pressure transducer connected and active?	✓ Select internal pressure transducer or connect external venting valve.
❑ Venting valve does not respond, valve symbol is displayed.	➡ Valve soiled?	✓ Clean valve.
❑ Function ”Vac control”: Control stops, ”arrow up” is flashing.	➡ Preset maximum pressure exceeded?	✓ Confirm by pressing key START/STOP. Adapt maximum pressure value if necessary.
❑ Function ”Pump down”: Control stops, ”arrow down” is flashing.	➡ Pressure below preset minimum pressure?	✓ Confirm by pressing key START/STOP. Adapt minimum pressure value if necessary.
❑ Function is not displayed, no menu.	➡ No controllable device connected (valve, VMS, VARIO pump)?	✓ Connect devices or use controller as measuring device.
❑ Controller does not respond when pressing keys (except ON/OFF). PC symbol is displayed.	➡ Controller in remote mode?	✓ Control CVC 3000 via interface or switch off remote mode.
❑ Controller does not respond when operating any keys. No change after switching off/on.		✓ Contact local distributor.
❑ Pump does not start or stops immediately. Warning triangle and pump symbol are flashing.	➡ Pump has been exposed to condensate?	✓ Perform maintenance.
	➡ Overpressure in the exhaust line?	✓ Open exhaust line, ensure a free (pressureless) outlet line.

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Fault	Possible cause	Remedy
❑ Pump too noisy.	➡ Loud exhaust noise?	✓ Connect hose or silencer to pump outlet.
	➡ Diaphragm crack or diaphragm clamping disc loose?	✓ Perform maintenance.
	➡ Other than above mentioned causes?	✓ Contact local distributor.
❑ Pump seized.		✓ Contact local distributor.
❑ Pump does not achieve ultimate vacuum or normal pumping speed.	➡ Wrong settings at controller?	✓ Select function ”Pump down” with speed set to ”HI” and check again.
	➡ Leak in the pipeline or vacuum system?	✓ Check connection, pipeline and vacuum system if necessary.
	➡ Long, narrow vacuum line?	✓ Use lines with larger diameter, length as short as possible.
	➡ Pump has been exposed to condensate?	✓ Allow pump to run for some minutes with atmospheric pressure at the inlet.
	➡ Deposits have been formed inside the pump?	✓ Clean and inspect the pump heads.
	➡ Diaphragms or valves defective?	✓ Replace diaphragms and/or valves.
	➡ Outgassing substances or vapour generated in the process?	✓ Check process parameters.
	➡ Pump too hot?	✓ Allow pump to cool down. Determine and eliminate the cause of overheating.
	➡ Pressure for automatic switching off reached?	✓ Adapt pressure for automatic switching off, if necessary.

* Blips only if in function ”Configuration” sound is set to ”On”.
** VMS: Vacuum Management System to switch a non-VARIO-pump

Attention: All error messages including a flashing warning triangle have to be confirmed (deleted) by pressing key START/STOP.

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Accessories

VACUUBRAND order-no.

Upgrade kit exhaust vapour condenser EK 500 ..... **20699922**

Accessories for vacuum controller CVC 3000

Vacuum gauge head VSK 3000, capacitive, ceramic diaphragm sensor 1080-0.1 mbar **20636657**
Small flange connection KF DN 16..... **20699939**
Coolant valve VKW-B, VACUU•BUS **20674220**
Air admittance valve VBM-B / KF 16 / hose nozzle 6/10 mm, VACUU•BUS **20674217**
Level sensor (for round bottom flasks) **20699908**
Y-type adapter VACUU•BUS **20636656**
Extension cable VACUU•BUS, 2m **20612552**
Wall bushing VACUU•BUS **20636153**
Cable RS 232C, 9-pole, Sub-D **20637837**
Silencer (with connection hose)..... **20636588**

Attention: Dust-laden gases, deposits and condensed solvent vapour can restrict air flow out the silencer. The resultant back pressure can lead to damage of pump bearings, diaphragms, and valves. Under those conditions, a silencer must not be used.

Spare parts

VACUUBRAND order-no.

Round bottom flask 500 ml, coated..... **20638497**
O-Ring 28 x 2.5 ..... 20**635628**
at the spherical ground joint of the round bottom flask at the inlet

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Cleaning the pressure transducer

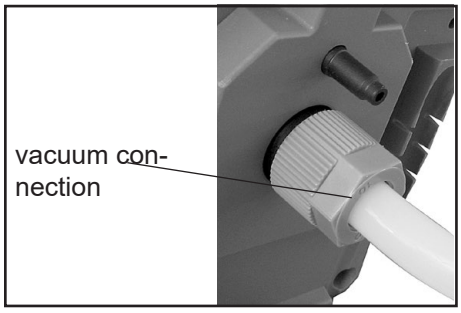
The controller itself is maintenance free.
Contamination of the pressure transducer or deposits will influence the accuracy of measurement.

NOTICE

Attention: Never use a spiky or sharp-edged tool to clean the pressure transducer.

Clean a contaminated pressure transducer as follows:

- Pull the controller out of the stand housing.
  Disconnect vacuum connection.
- Fill the measurement chamber with a solvent (e.g., benzene) and allow sufficient cleaning time. Observe all regulations concerning usage and disposal of solvents!
- Drain the solvent and dispose of in accordance with regulations, repeat cleaning if necessary.
- Rinse the gauge head chamber several times with alcohol in order to remove all solvent residues.
- Allow the pressure transducer to dry.
- Assemble vacuum connection.
- Insert controller into the stand housing.
- Readjust the pressure transducer if necessary.



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Replacing diaphragms and valves

DANGER

➨ **Never operate the pump if covers or other parts of the pump are disassembled.** Ensure that the pump cannot be operated accidentally.



➨ Before starting maintenance, **disconnect the electrical power cord**. **Wait two minutes** after isolating the equipment from AC power to allow the capacitors to discharge.

➨ **Note**: The pump might be contaminated with the process chemicals that have been pumped during operation. Ensure that the pump is decontaminated before maintenance. Avoid the release of pollutants.

WARNING

☞ **Never operate a defective or damaged pump**.

☞ Take adequate precautions to protect people from the effects of dangerous substances that may have contaminated the pump and may be released upon disassembly. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
Use appropriate protective clothing, safety goggles and protective gloves.

☞ Allow sufficient cooling of the pump before starting maintenance.

☞ Vent the pump and isolate it from the vacuum system before you start maintenance.

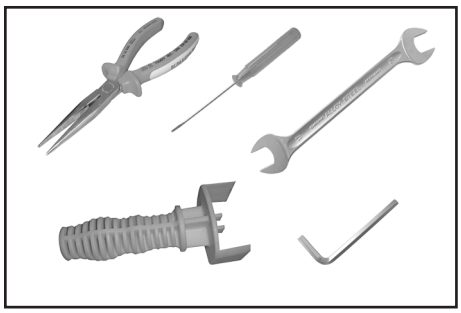
NOTICE

Ensure that maintenance is done only by suitably trained and supervised technicians.
The valves and diaphragms are wear parts. If the rated ultimate vacuum is no longer achieved or in case of increased noise level, the pump interior, the diaphragms and the valves must be cleaned and the diaphragms and valves must be checked for cracks or other damage.
All bearings are encapsulated and are filled with long-life lubricant. Under normal operating conditions, the drive system is maintenance free.

In demanding circumstances, it may be efficient to check and clean the pump heads on a regular basis. In normal use, the lifetime of the diaphragms and valves is typically 15,000 operating hours.

- Prevent internal condensation, transfer of liquids or dust. The diaphragms and valves will be damaged if liquid is pumped in significant amount.
- Carry out maintenance frequently if the pump is exposed to corrosive media or in case of deposits.
- Regular maintenance will improve the lifetime of the pump and also protect both users and the environment.

Set of seals MD 1C (4 diaphragms, 8 valves, diaphragm key) **20696828**



Tools required (metric):

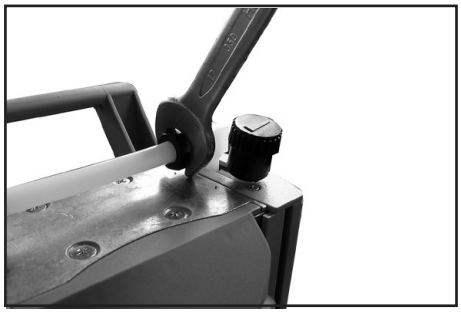
- diaphragm key w/f 46
- open ended wrench w/f 14/17
- hex key size 4/5
- flat-bladed screw driver 2.5 mm
- flat pliers

☞ **Please read section ”Replacing diaphragms and valves” completely before starting maintenance.**
The pictures may show other versions of pumps. This does not change the method of replacing diaphragms and valves.

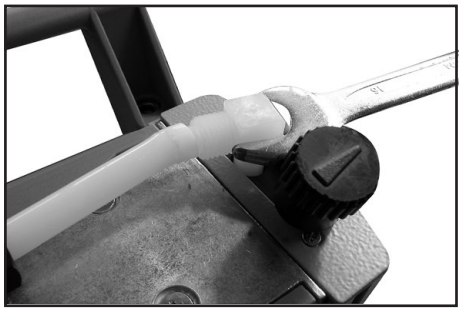
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➨ Remove the joint clip and the catchpot at the inlet.

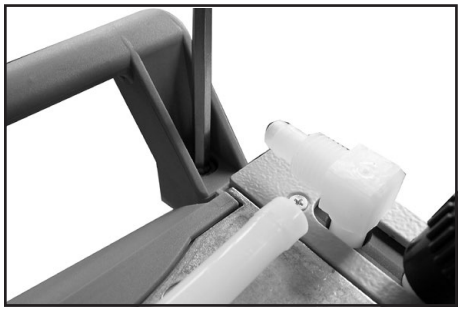


➨ Use open-ended wrench (w/f 17) to loosen the union nut at the hose connection next to the gas ballast.



➨ Use open ended wrench (w/f 14) to turn the elbow fitting 1/4 of a turn, disconnect the hose. Do not remove the elbow fitting from the pump head.

☞ Through reassembly a leak may result.



➨ Use hex key size 5 to unscrew the handle from one side of the housing cover.

Disassembling the housing cover at the side of the inlet/outlet



➨ Lay the pumping unit down with the housing cover at inlet/outlet side facing upwards (support pumping unit appropriately).

➨ Use a hex key size 4 to loosen the six socket head screws at the pump head and remove the upper housing (housing cover with housing cover insert). Do not kink hoses.

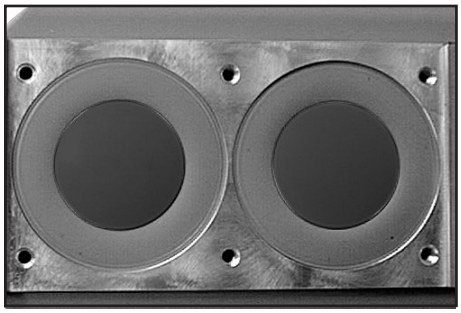
☞ Never remove parts using a spiky or sharp-edged tool (e. g. screw driver), we recommend to use a rubber mallet or compressed air (to be blown carefully into port).

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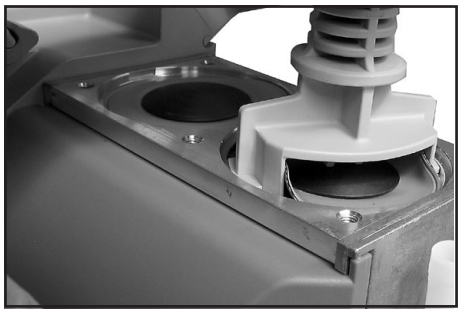


➨ Take the head covers carefully off the housing to check the valves.
Note the position of the valves and remove them.
☞ Replace valves if damaged.
Use petroleum ether or industrial solvent to remove deposits. Do not inhale.

Replacing the diaphragms



➨ Check the diaphragms for damage and replace if necessary.

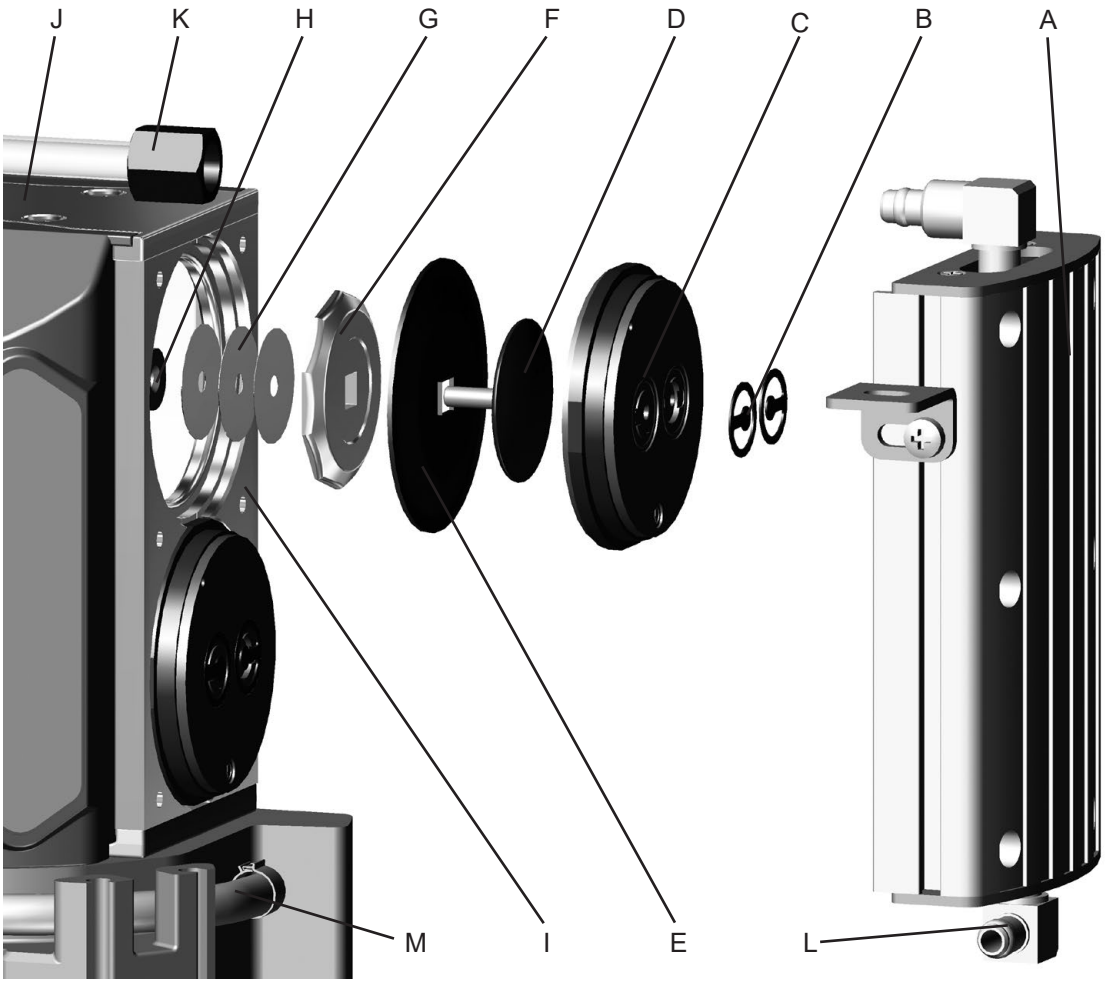


➨ Lift diaphragm carefully.
➨ Apply pressure to the adjacent clamping disc to bring connecting rod into upper turning point position if necessary.
☞ Never use a spiky or sharp-edged tool to lift the diaphragm.
➨ Use the diaphragm key to grip the diaphragm support disc below the diaphragm.
➨ Apply pressure to the diaphragm clamping disc to bring the diaphragm into the lower turning point position. Press diaphragm key against diaphragm clamping disc, unscrew and remove diaphragm support disc with diaphragm.

☞ If the old diaphragm is difficult to separate from the support disc, immerse assembly in naphtha or petroleum ether. Do not inhale!
☞ Check for washers under clamping disc. Do not mix the washers from the different heads. Make sure that the original number is reassembled at the individual pump head.

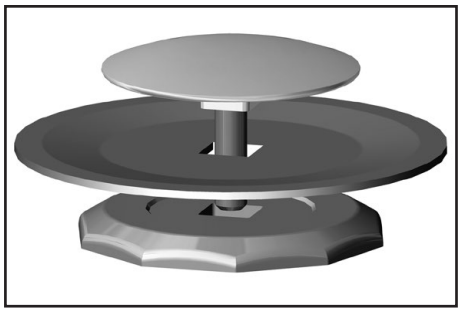
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View of the disassembled pump head parts

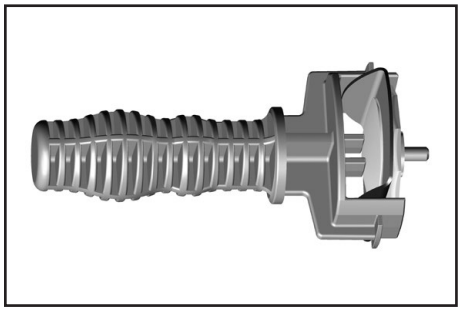


A: Housing cover with insert
B: Valves
C: Head cover
D: Diaphragm clamping disc with square head screw
E: Diaphragm
F: Diaphragm support disc
G: Washer(s)
H: Connecting rod
I: Housing
J: Housing bearing flange
K: Union nut
L: Fitting
M: Hose connection

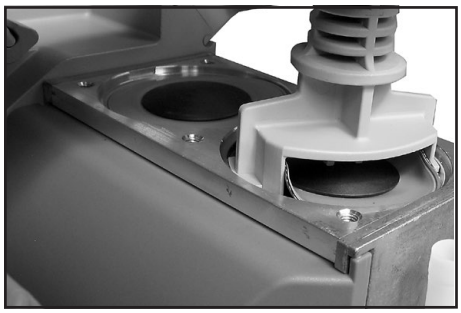
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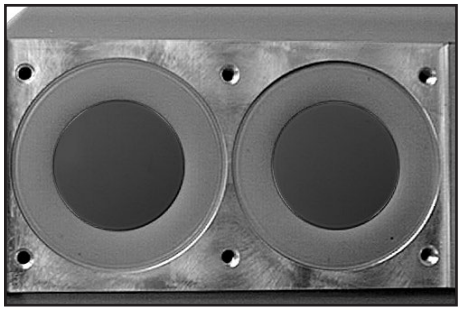
➨ Position new diaphragm between diaphragm clamping disc with square head screw and diaphragm support disc.
☞ Attention: Position diaphragm with pale side towards diaphragm clamping disc (to pump chamber).



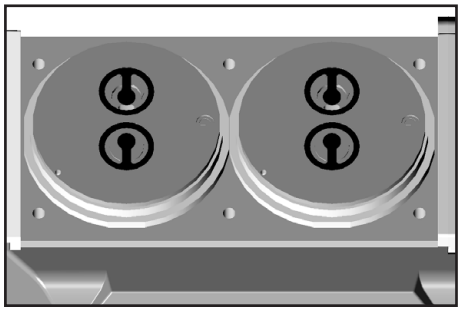
➨ Lift diaphragm at the side and position carefully together with diaphragm clamping disc and diaphragm support disc in the diaphragm key.
☞ Avoid damaging the diaphragm: Do not bend diaphragm too much.
➨ Check for washers. Do not mix the washers from the different heads. Assemble the original number of washers between support disc and connecting rod at the individual pump head.
☞ Smaller number of washers: The pump will not attain final vacuum. More washers: Clamping disc will hit head cover; noise or even blockage of the pump.



☞ Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the guide hole of the diaphragm support disc.
☞ Position washers between diaphragm support disc and rod.
➨ Assemble diaphragm clamping disc, diaphragm and diaphragm support disc to connecting rod.
☞ For that purpose, put pumping unit in upright position, if necessary. Afterwards, lay the pumping unit down again.



➨ Bring the diaphragms into a position in which they are in contact with the housing and centred with respect to the bore.

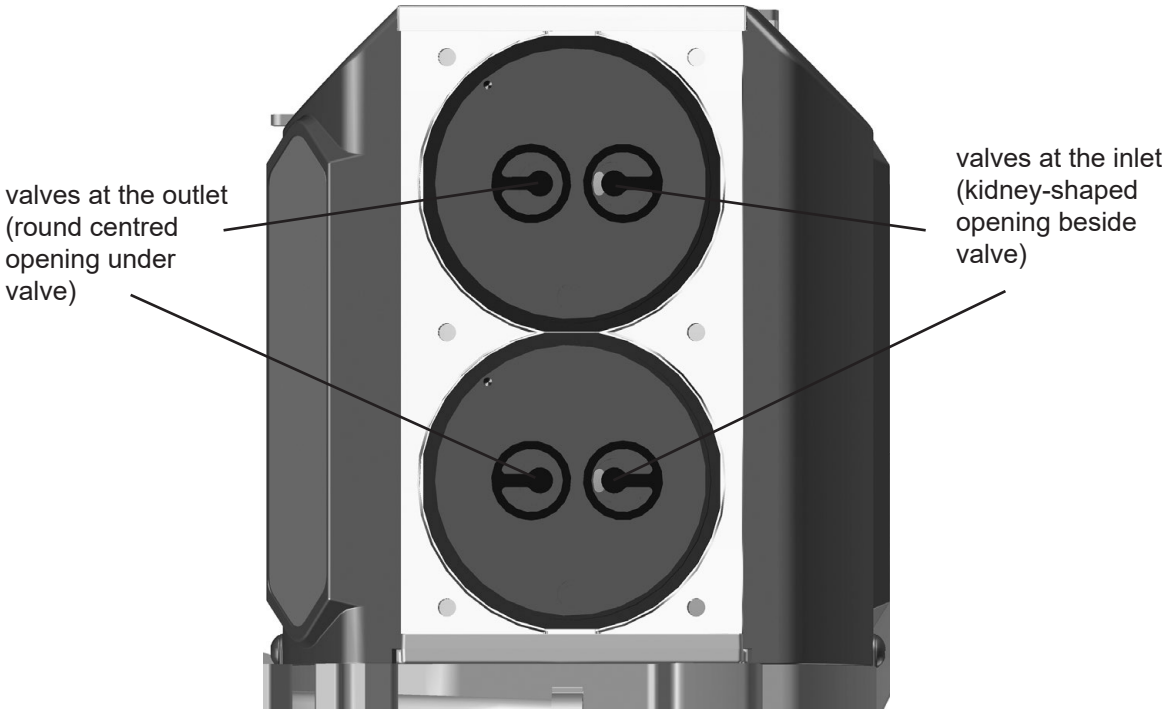


➨ Assemble head covers and valves.
☞ Check for correct position (see also fig. below).

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It is absolutely essential to comply with the positions and orientations of the head covers and valves!

Scheme of pump head with head covers and valves



Assembling the housing cover at the side of the inlet/outlet



➨ Position housing cover.

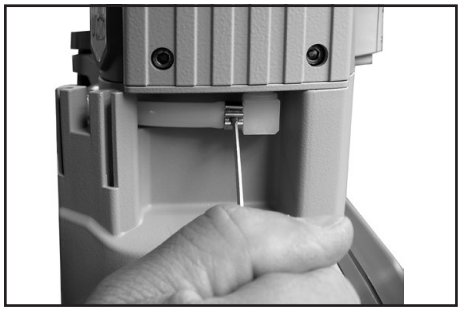
☞ Move housing cover slightly to make sure that the head covers are correctly positioned.

➨ Screw in the six socket head screws fixing the housing cover crosswise first slightly, then tighten (hex key size 4).

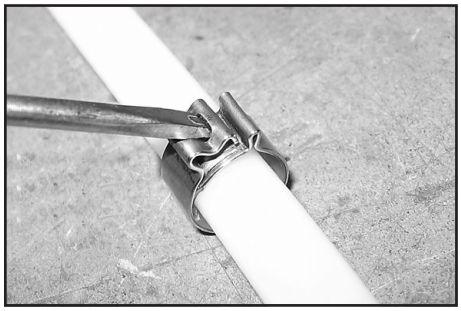
☞ Do not tighten until head cover is in contact with housing, **max. torque 6 Nm.**

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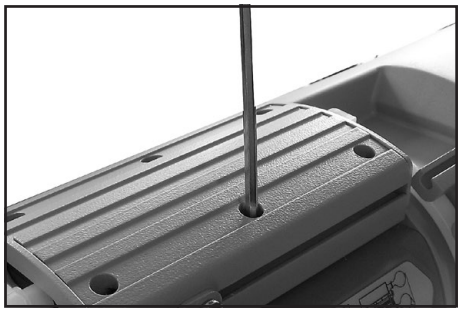
Disassembling the housing cover at the side of the on/off switch



➨ Open hose clip by using a flat-bladed screw driver and pull off hose



➨ Apply screw driver as shown and turn.



➨ Lay the pumping unit down with the on/off switch facing upwards (support pumping unit appropriately).
➨ Use a hex key size 4 to loosen the six socket head screws at the pump head.

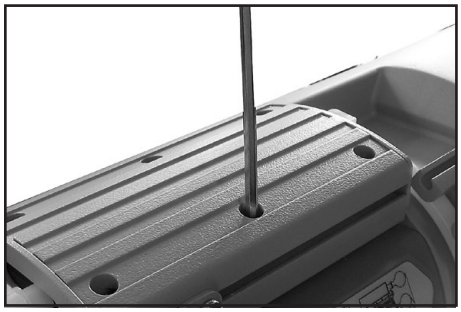


➨ Raise the housing cover.
➨ Remove the hose from the hose connection at the housing cover. Do not kink the hose.
➨ Take the head covers carefully off the housing cover to check the valves. Note the position of the valves and remove them.
☞ Never remove parts using a spiky or sharp-edged tool (e. g. screw driver), we recommend to use a rubber mallet or compressed air (to be blown carefully into port).
☞ Replace valves if damaged.
Use petroleum ether or industrial solvent to remove deposits. Do not inhale.

For replacing the diaphragms and valves refer to section ”Replacing the diaphragms” above!

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Assembling the housing cover at the side of the on/off switch

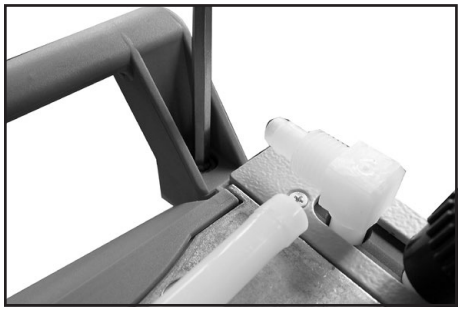


- ➨ Position housing cover. Pay attention to correct position of hose.
- ☞ Move housing cover slightly to make sure that the head covers are correctly positioned.
- ➨ Screw in the six socket head screws fixing the housing cover crosswise first slightly, then tighten (hex key size 4).
- ☞ Do not tighten until head cover is in contact with housing, **max. torque 6 Nm.**



- ➨ Slip the PTFE tube onto the hose connection at the housing cover.
- ➨ Close hose clip with flat pliers.

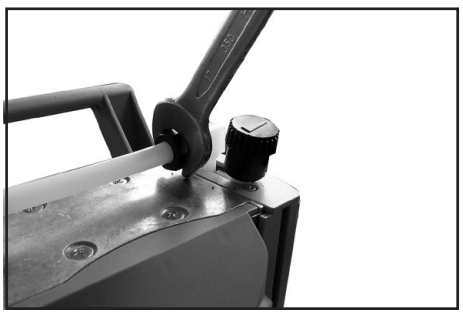
Assembling of fittings



- ➨ Assemble handle.



- ➨ Use open ended wrench to reconnect hose to elbow fitting.



- ➨ Tighten union nut first by hand and then tighten one full turn using open ended wrench.

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➨ Assemble the catchpot using the joint clip.

If the pump does not achieve the ultimate vacuum:

☞ In case the diaphragms and valves have been replaced, a run-in period of several hours is required before the pump achieves its ultimate vacuum.

☞ In case of loud noise switch off immediately and check diaphragms and valves for correct position.

If the specified ultimate vacuum is not achieved and if this does not change after the run-in period:

☞ Check hose connectors between pump heads and manifolds for leaks. If necessary recheck pump chamber.

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Repair - Maintenance - Return - Calibration

IMPORTANT

Every employer (user) is held responsible for the health and safety of his employees. This also applies to service personnel performing repair, maintenance, return or calibration.
The **health and safety clearance form** informs the contractor about any possible contamination of the device and forms the basis for the risk assessment.
In case of devices which have been in contact with biological substances of risk level 2 contact the VACUUBRAND service absolutely before dispatching the device. These devices have to be completely disassembled and decontaminated by the user prior to shipment. Do not return devices which have been in contact biological substances of risk level 3 or 4. These devices cannot be checked, maintained or repaired. Also decontaminated devices must not returned to VACUUBRAND due to a residual risk.
The same conditions apply to on-site work.

No repair, maintenance, return or calibration is possible unless the correctly completed health and safety clearance form is returned. Devices sent are rejected if applicable. Send a completed copy of the **health and safety clearance form** to us in advance. The declaration must arrive before the equipment. Enclose a second completed copy with the product.

Remove all components from the device that are no original VACUUBRAND components. VACUUBRAND will not be responsible for lost or damaged components that are no original components.
Drain the device completely of fluids and residues. Decontaminate the device.
Close all openings airtight especially if using substances hazardous to health.
To expedite repair and to reduce costs, please enclose a detailed description of the problem and the product's operating conditions with every product returned.
If you do not wish a repair on the basis of our **quotation**, the device may be returned to you disassembled and at your expense.
In many cases, the components must be cleaned in the factory prior to repair.
For cleaning we use an environmentally friendly water based process. Unfortunately the combined attack of elevated temperature, cleaning agent, ultrasonic treatment and mechanical stress (from pressurised water) may result in damage to the paint. Please mark in the health and safety clearance form if you wish a repaint at your expense just in case such a damage should occur. We will also replace parts for cosmetic reasons at your request and at your expense.

Before returning the device
Pack the device properly, if necessary, please order original packaging materials at your costs.
Mark the package completely
Enclose the completed health and safety clearance form.
Notify the carrier of any possible contamination if required.

Scrapping and waste disposal
Dispose of the equipment and any components removed from it safely in accordance with all local and national safety and environmental requirements. Particular care must be taken with components and waste oil which have been contaminated with dangerous substances from your processes. Do not incinerate fluoroelastomer seals and O-rings. You may authorize us to dispose of the equipment **at your expense.** Otherwise we return the device at your expense.

Documents are only to be used and distributed completely and unchanged. It is strictly the users´ responsibility to check carefully the validity of this document with respect to his product.

Health and safety clearance form

1. Device (Model): .....
2. Serial no.: .....
3. Reason for return / malfunction: .....

   .....
4. Has the device been used in a copper process step (e.g., semiconductor production): ☐ yes ☐ no
5. Substances (gases, liquids, solids, biological material, e. g. bacteria, viruses) in contact with the device / which have been pumped:

   .....

   .....

   .....

   .....
6. Risk level of the used biological material: ☐ none ☐ 1 ☐ 2* ☐ 3** ☐ 4**
   * Contact the VACUUBRAND service absolutely before dispatching the device.
   ** Devices which have been in contact with biological substances of risk level 3 or 4 cannot be checked, maintained or repaired. Also decontaminated devices must not returned to VACUUBRAND due to a residual risk.
7. Radioactive contamination: ☐ yes ☐ no
8. Prior to return to the factory the device has been decontaminated: ☐ yes ☐ no
   Description of the decontamination method and the test / verification procedure:

   .....

   .....
9. All parts of the device are free of hazardous, harmful substances: ☐ yes ☐ no
10. Protective measures required for service staff:

    .....
11. If the paint is damaged, we wish a repaint or a replacement of parts for reason of appearance (repaint and replacement at customer's expense): ☐ yes ☐ no

12. Legally binding declaration

We assure for the returned device that all substances, which have been in contact with the device are listed in section 5 and that the information is complete and that we have not withheld any information. We declare that all measures - where applicable - have been taken listed in section "Repair - Maintenance - Return - Calibration". By our signature below, we acknowledge that we accept liability for any damage caused by providing incomplete or incorrect information and that we shall indemnify VACUUBRAND from any claims as regards damages from third parties. We are aware that as expressed in § 823 BGB (Public Law Code of Germany) we are directly liable for injuries or damages suffered by third parties, particularly VACUUBRAND employees occupied with handling/repairing the product. Shipping of the device must take place according to regulations.

Name: ..... Signature: .....

Job title: ..... Company's seal:

Date: .....

Release for repair grant by VACUUBRAND (date / signature): .....

Protective measures: ☐ Protective gloves, safety goggles ☐ Hood ☐ External cleaning

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Straße 4
97877 Wertheim - Germany

T +49 9342 808-5660 F +49 9342 808-5666
E-Mail: service@vacuubrand.com
www.vacuubrand.com

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CE

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

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
2014/30/EU
2011/65/EU, 2015/863

Membranvakuumpumpe / Diaphragm vacuum pump / Pompe à membrane:
Typ / Type / Type: VP 2 autovac
Artikelnummer / Order number / Numéro d'article: 20696767
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 12100:2011, DIN EN 61010-1:2011, IEC 61010-1:2010 (Ed. 3), DIN EN 1012-2:2011, DIN EN 61326-1:2013, DIN EN IEC 63000:2019

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person authorised to compile the technical file / Personne autorisée à constituer le dossier technique:
Dr. F. Gitmans · VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Wertheim, 10.02.2020
. . . . . .
Ort, Datum / place, date / lieu, date

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

i. A. . . . . .
(Dr. A. Wollschläger)
Regulatory Affairs Manager /
Directrice des affaires réglementaires

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4 · 97877 Wertheim
T +49 9342 808-0 · F +49 9342 808-5555
info@vacuubrand.com
www.vacuubrand.com

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DECLARATION OF CONFORMITY – China RoHS 2

VACUUBRAND GMBH + CO KG has made reasonable efforts to ensure that hazardous materials and substances may not be used in its products.
In order to determine the concentration of hazardous substances in all homogeneous materials of the subassemblies, a “Product Conformity Assessment” (PCA) procedure was performed. As defined in GB/T 26572 the “Maximum Concentration Value” limits (MCV) apply to these restricted substances:

- Lead (Pb): 0.1%
- Mercury (Hg): 0.1%
- Cadmium (Cd): 0.01%
- Hexavalent chromium (Cr(+VI)): 0.1%
- Polybrominated biphenlys (PBB): 0.1%
- Polybrominated diphenyl ether (PBDE): 0.1%

Environmentally Friendly Use Period (EFUP)

EFUP defines the period in years during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions. During normal use by the user such electrical and electronic products will not result in serious environmental pollution, cause serious bodily injury or damage to the user’s assets.
The Environmentally Friendly Use Period for VACUUBRAND products is 40 years.



此表格是按照SJ/T 11364-2014中规定所制定的。
This table is created according to SJ/T 11364-2014.

MATERIAL CONTENT DECLARATION FOR VACUUBRAND PRODUCTS							
	有毒有害物质或元素 Hazardous substances						
部件名称 Part name	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr(+VI)	多溴联苯 PBB	多溴二苯醚 PBDE	环保期限标识 EFUP
包装 Packaging	O	O	O	O	O	O	
塑料外壳 / 组件 Plastic housing / parts	O	O	O	O	O	O	
真空油 Vacuum oil	O	O	O	O	O	O	
电池 Battery	O	O	O	O	O	O	
玻璃 Glass	X	O	O	O	O	O	
电子电气组件 Electrical and electronic parts	X	O	O	O	O	O	
控制器 / 测量设备 Controller / measuring device	X	O	O	O	O	O	
金属外壳 / 组件 Metal housing / parts	X	O	O	O	O	O	
电机 Motor	X	O	O	O	O	O	
配件 Accessories	X	O	O	O	O	O	

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注释： 此表格适用于所有产品。以上列出的元件或组件不一定都属于所附产品的组成。
Note: Table applies to all products. Some of the components or parts listed above may not be part of the enclosed product.

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
O: Indicates that the above mentioned hazardous substance contained in all homogeneous materials of the part is below the required limit as defined in GB/T 26572.

X: 表示该有毒有害物质至少在该部件某一均质材料中的含量超出GB/T 26572规定的限量要求。
X: Indicates that the above mentioned hazardous substance contained in at least one of the homogeneous materials of this part is above the required limit as defined in GB/T 26572.

除上表所示信息外，还需声明的是，这些部件并非是有意用铅（Pb）、 汞 （Hg）、铬（Cd）、六价铬（Cr(+VI)）、多溴联苯（PBB）或多溴二苯醚（PBDE）来制造的。
Apart from the disclosures in the above table, the subassemblies are not intentionally manufactured or formulated with lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr+VI), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE).

Products manufactured by VACUUBRAND may enter into further devices (e.g., rotary evaporator) or can be used together with other appliances (e.g., usage as booster pumps).
With these products and appliances in particular, please note the EFUP labeled on these products.
VACUUBRAND will not take responsibility for the EFUP of those products and appliances.

Place, date: Wertheim, 06/04/2020

(Dr. F. Gitmans)
Managing Director

i.A.
(Dr. A. Wollschläger)
Regulatory Affairs Manager

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

Tel.: +49 9342 808-0
Fax: +49 9342 808-5555
E-Mail: info@vacuubrand.com
Web: www.vacuubrand.com

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VACUUBRAND GMBH + CO KG
-Technology for Vacuum Systems-
© 2021 VACUUBRAND GMBH + CO KG Printed in Germany
Alfred-Zippe-Str. 4 · 97877 Wertheim / Germany
T +49 9342 808-0 · F +49 9342 808-5555
info@vacuubrand.com · www.vacuubrand.com

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