



**ROTAVAC vario tec  
ROTAVAC vario control**



**Instruction manual**





[GB] It is imperative to read this instruction manual prior to initial operation! Comply with safety instructions!  
Keep for further use!  
This documentation is not subject to revision service!

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➔ Danger! Immediate danger. Death or severe injuries as well as damage to equipment and environment can occur.



⚠ Warning! Possible danger. Severe injuries as well as damage to equipment and environment can occur.



• Caution! Possible danger. Slight injuries as well as damage to equipment and environment can occur.



Note. Disregarding of notes may cause damage to the product.



Caution! Hot surface!



Isolate equipment from mains before removing the cover.



# 1 Safety information

## 1.1 General information

### NOTICE

☞ **Read and comply with this manual before installing or operating the equipment.**

Remove all packing material, remove the product from its packing-box, remove the protective covers from the inlet and outlet ports and keep, inspect the equipment. If the equipment is damaged, notify the supplier and the carrier in writing within three days; state the item number of the product together with the order number and the supplier's invoice number. Retain all packing material for inspection.

**Do not use the equipment if it is damaged.**

If the equipment is not used immediately, replace the protective covers. Store the equipment in suitable conditions.

**Attention:** ROTAVAC vario control / ROTAVAC vario tec are only utilizable in conjunction with the rotary evaporator Hei-VAP Precision.

## 1.2 Intended use

### WARNING

- ☞ The pump and all system parts must not be used on humans or animals.
- ☞ Prevent any part of the human body from coming into contact with vacuum.
- ☞ Ensure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use.
- ☞ Comply with notes on correct vacuum and electrical connections, see section "Use and operation".

### CAUTION

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

### NOTICE

Use the equipment **for the intended use only**, i.e. for generation of vacuum in vessels designed for that purpose.

## 1.3 Setting up and installing the equipment

### DANGER

- Equipment must be connected only to a **suitable electrical supply** and a suitable earth point. Failure to connect the motor to ground may result in deadly electrical shock.

The supply cable may be fitted with a moulded European IEC plug or a plug suitable for your local electrical supply. If the plug has been removed or has to be removed, the cable will contain wires colour coded as follows: green or green and yellow: earth; blue or white: neutral; brown or black: live.

### WARNING

- ☞ Due to the high compression ratio of the pumps, pressure at the outlet port might be generated being higher than the maximum permissible pressure compatible with the mechanical stability of the system.
- ☞ Do not permit any **uncontrolled pressurizing** (e. g. 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. **Risk of bursting!**
- ☞ Always provide a free and pressureless exhaust pipeline.

**WARNING**

- ☞ Ensure that the **coolant outlet pipeline** of the condenser (accessory) is always free and that it cannot get blocked. Install an optional coolant valve always in the supply line of the exhaust waste vapor condenser only.
- ☞ Secure coolant hoses at the hose nozzles (e.g. with hose clip) to prevent their accidental slipping.
- ☞ Check the overpressure safety relief device at the exhaust waste vapor condenser in appropriate intervals.

**CAUTION**

- Comply with **maximum permissible pressures** at inlet and outlet and pressure differences between inlet and outlet, see section "Technical data". Do not operate the pump with overpressure at the inlet.
- Check that mains voltage and current conform with the equipment (see rating plate).
- Avoid overpressure of more than 0.2 bar in case inert gas is connected to the pump, the gas ballast or to a venting valve.
- Connect pipes gas tight at inlet and outlet of the pump.
- **Attention:** Flexible elements tend to shrink when evacuated.
- Adopt suitable measures to avoid the flowing of liquids on or into the pump motor when assembling or disassembling vacuum connections at the pump. **Risk of corrosion and/or short circuit!**
- **Check glass parts for damage and bracing.**

**NOTICE**

Provide a firm level platform for the equipment and check that the system to be evacuated is mechanically stable and that all fittings are secure. Ensure a stable position of the pump without any mechanical contact except of the pump feet. Comply with all applicable safety regulations.

Keep a distance of minimum 20 cm between fan and ambient parts (e.g. housing, walls, ...). Check fan regularly for dust/dirt, clean if necessary to avoid a cutback of ventilation.

If the equipment is brought from cold environment into a room for operation, allow the equipment to warm up (pay attention to water condensation on cold surfaces).

The diameter of the inlet and outlet pipeline should be at least as large as the diameter of the pump connection pipelines.

Comply with all **applicable and relevant safety requirements** (regulations and guidelines), **implement the required actions and adopt suitable safety measures.**

**1.4 Ambient conditions****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 IEC 1010 gives in detail conditions under which the equipment can be operated safely (see also IP degree of protection).

Adopt suitable measures in case of differences, e. g. using the equipment outdoors, installation in altitudes of more than 1000 m above mean sea level, conductive pollution or bedewing.

Pay attention to the **permissible maximum ambient and gas inlet temperatures** (see "Technical data").

### 1.5 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**.

#### CAUTION

- 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!
- If there is a danger of formation of **deposits** in the pump chamber (check inlet and outlet of the pump), inspect the pump chambers regularly and clean if necessary.
- The pumps are **not suitable** for pumping dust and have **no approval** for operation below ground.

#### NOTICE

If pumping **different substances**, it is recommended to purge the pump with air or inert gas prior to changing the pumped media in order to pump out residues and to avoid reactions of the pumped substances with each other and with the pump materials.

**Take into consideration interactions and chemical reactions of the pumped media.** Ensure that the materials of the wetted parts are compatible with the pumped substances, see section "Technical data".

### 1.6 Safety during operation

#### DANGER

➔ Adopt suitable measures to prevent the release of dangerous, toxic, explosive, corrosive, noxious or polluting fluids, vapors and gases. In case install an appropriate collecting and disposal system and take protective action for pump and environment.

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

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

➔ Potentially explosive mixtures at the outlet of the pump have to be drained appropriately, sucked off or diluted with inert gas to non-explosive mixtures.



☞ Pay attention to the symbol "hot surfaces" on the equipment. Adopt suitable measures to prevent any danger arising from the formation of hot surfaces or electric sparks. Provide a suitable protection against contact if necessary.

#### WARNING

☞ Pumping at **high inlet pressure** may lead to overpressure at the gas ballast valve. Pumped gases or condensate might be pushed out in case the valve is open. If an inert gas supply is connected, ensure that the inlet pipeline is not contaminated.



**CAUTION**

- Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted.  
Take adequate precautions to protect people from the effects of dangerous substances (chemicals, thermal decomposition products of fluoroelastomers), wear appropriate safety-clothing and safety glasses.
- Use only **genuine spare parts and accessories**. Otherwise safety and performance of the equipment as well as the electromagnetic compatibility of the equipment might be reduced.  
Possibly the CE mark becomes void if not using genuine spare parts.
- Failure of the pump (e.g. due to power failure) or of connected components, parts of the supply or change of parameters must not lead to a critical dangerous situation under any circumstances. In case of diaphragm cracks or leaks in the manifold pumped substances might be released into the environment or into the pump housing or motor. Comply especially with notes on operation and use and maintenance.
- Due to the residual **leak rate of the equipment**, there might be 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.

**NOTICE**

Check liquid level in the catchpot of the exhaust waste vapor condenser (accessory) regularly and drain condensate in time.

Do not start the pump if the pressure difference between inlet and outlet port exceeds 1.1 bar at maximum.

Prevent any backpressure of gases and the backflow of condensates.

Never suck liquids or dust into the pump.

Provide appropriate protective measures (i.e precautions which allow for the requirements of the respective application) even for the case of failure and **malfunction**.

Failure of the pump (e.g. due to power failure) or of connected components, of parts of the supply or change of parameters must not lead to a critical dangerous situation under any circumstances.

The motor is protected by a **temperature sensor at the circuit board**: Current limitation if the temperature at the circuit board is higher than 70°C, switching off the pump if the temperature is higher than 85°C. In case of blockade of the motor (after 10 attempts to start-up) the pump is switched off.

If the pump is switched off due to safety measures, manual reset is necessary. Isolate the pump from mains. Eliminate the cause of failure before restarting the pump.

The A-weighted emission sound pressure level of the pump does not exceed 70 dB(A). Measurement according to EN ISO 2151:2004 and EN ISO 3744:1995 with standard silencer or exhaust tube at outlet.

### 1.7 Maintenance and repair

#### NOTICE



**Wear parts have to be replaced regularly.** In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours. Bearings have a typical durability of 40000 h (see section 7 "Replacing diaphragms and valves").

➤ **Isolate equipment from mains and wait two minutes** before starting maintenance to allow the capacitors to discharge.

#### WARNING

⚠ Ensure that the pump cannot be operated accidentally. Never operate the pump if covers or other parts of the pump are disassembled. Never operate a defective or damaged pump.

⚠ **Attention:** The pump might be contaminated with process chemicals which have been pumped during operation. Ensure that the pump is decontaminated before maintenance and take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred.

#### CAUTION

• Before starting maintenance vent the pump, isolate the pump and other components from the vacuum system. Allow sufficient cooling of the pump. Drain condensate, if applicable.

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.

In order to comply with law (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments returned to the manufacturer can be repaired only when certain procedures (see section 6 "**Questions / Repair**") are followed.

## 2 Standard items and options

	Item	qty	P/N 230/240 V 50/60 Hz	P/N 115 V 50/60 Hz
	ROTAVAC vario control (pump)	1	591-00141-00	591-00141-01
or	ROTAVAC vario tec (pump)	1	591-00171-00	591-00171-01
<b>Standard items ROTAVAC vario control / ROTAVAC vario tec</b>				
	ROTAVAC vario control (pump)	1		
	ROTAVAC vario tec (pump)	1		
	Power cord	1	14-007-003-81	14-007-003-89
	Instruction manual	1	01-005-004-90	
	Warranty card / Confirmation of condition of unit	1	01-006-002-58	

### Accessories (optional)

	Item	P/N
	ROTAVAC vario control / ROTAVAC vario tec condensate cooler	591-00084-00

### 3 Technical data

Type		ROTAVAC vario tec	ROTAVAC vario control
Maximum pumping speed	m <sup>3</sup> /h	1.0	1.7
Ultimate vacuum (absolute) without gas ballast (1500 min <sup>-1</sup> )	mbar	12	2
Ultimate vacuum (absolute) with gas ballast	mbar	20	4
Maximum permissible outlet pressure (absolute)	bar	1.1	
Maximum permissible pressure between inlet and outlet	bar	1.1	
Maximum permissible pressure (absolute) at gas ballast valve	bar	1.1	
Permissible ambient temperature storage	°C	-10 to +60	
Permissible ambient temperature operation	°C	+10 to +40	
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85	
Nominal power electrical	kW	0.16	
Maximum no-load speed	min <sup>-1</sup>	2400	
Maximum permissible range of supply voltage ( ±10% )		100-120 V~ 50/60 Hz 200-240 V~ 50/60 Hz	
Maximum rated current at: 100-120 V~ 50/60 Hz	A	1.6	
200-240 V~ 50/60 Hz	A	0.7	
Motor protection		temperature sensor on the pcb (current limitation)	
Degree of protection IEC 529		IP 20	IP 20
Inlet		hose nozzle DN 8 mm	
Outlet		hose nozzle DN 8 mm	
Coolant connection (vapor condenser (accessory))		hose nozzle DN 6-8 mm	
Maximum permissible pressure of coolant at waste vapor condenser	bar	6 (absolute)	
Permissible range of coolant temperature (vapor condenser)	°C	-15 to +20	
Dimensions L x W x H approx.	mm	236 x 156 x 196	236 x 167 x 196
Weight approx.	kg	4.3	5.4

**We reserve the right for technical modification without prior notice!**

### 3.1 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

### 3.2 Wetted parts

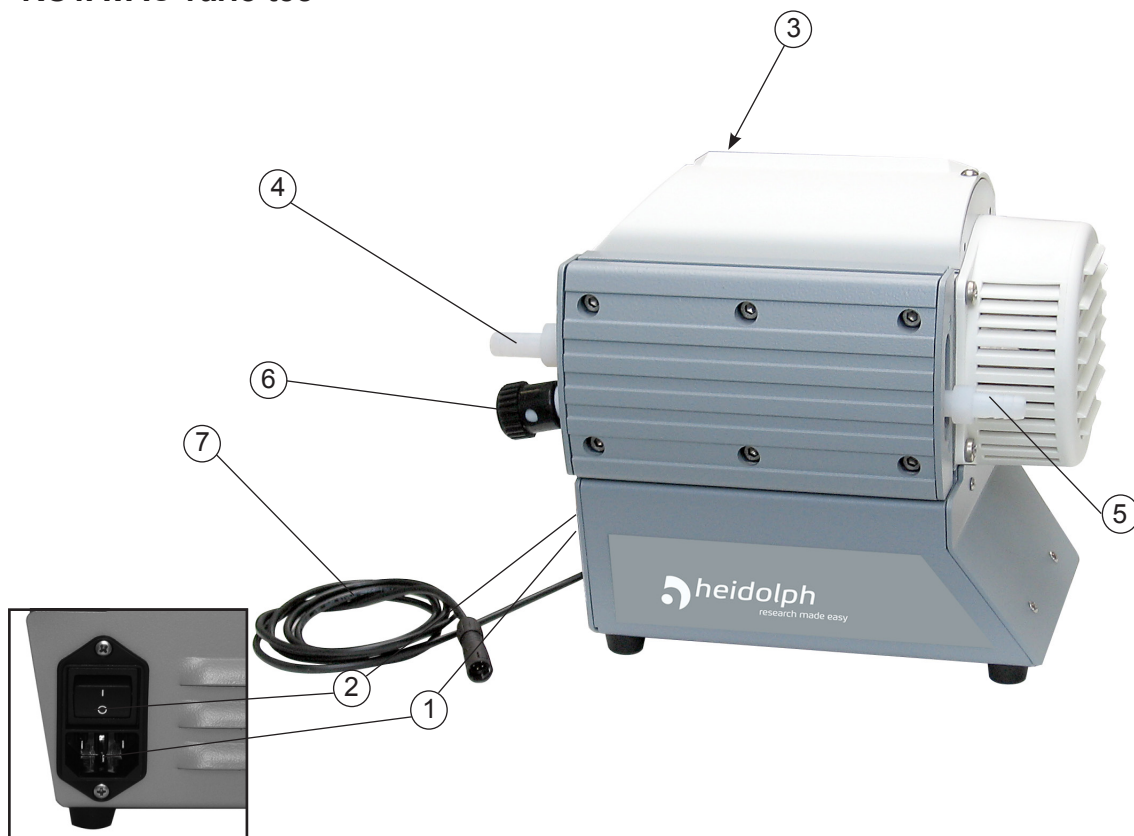
Components	Wetted parts
Housing cover inner part	PTFE carbon reinforced
Head cover	ETFE
Diaphragm clamping disc	ETFE carbon fibre reinforced
Diaphragm	PTFE
Valves	FFKM
Inlet / outlet	ETFE
Hose fittings	ETFE
Hose	PTFE
Exhaust waste vapor condenser / catchpot	Borsilicate glass

**We reserve the right for technical modification without prior notice!**

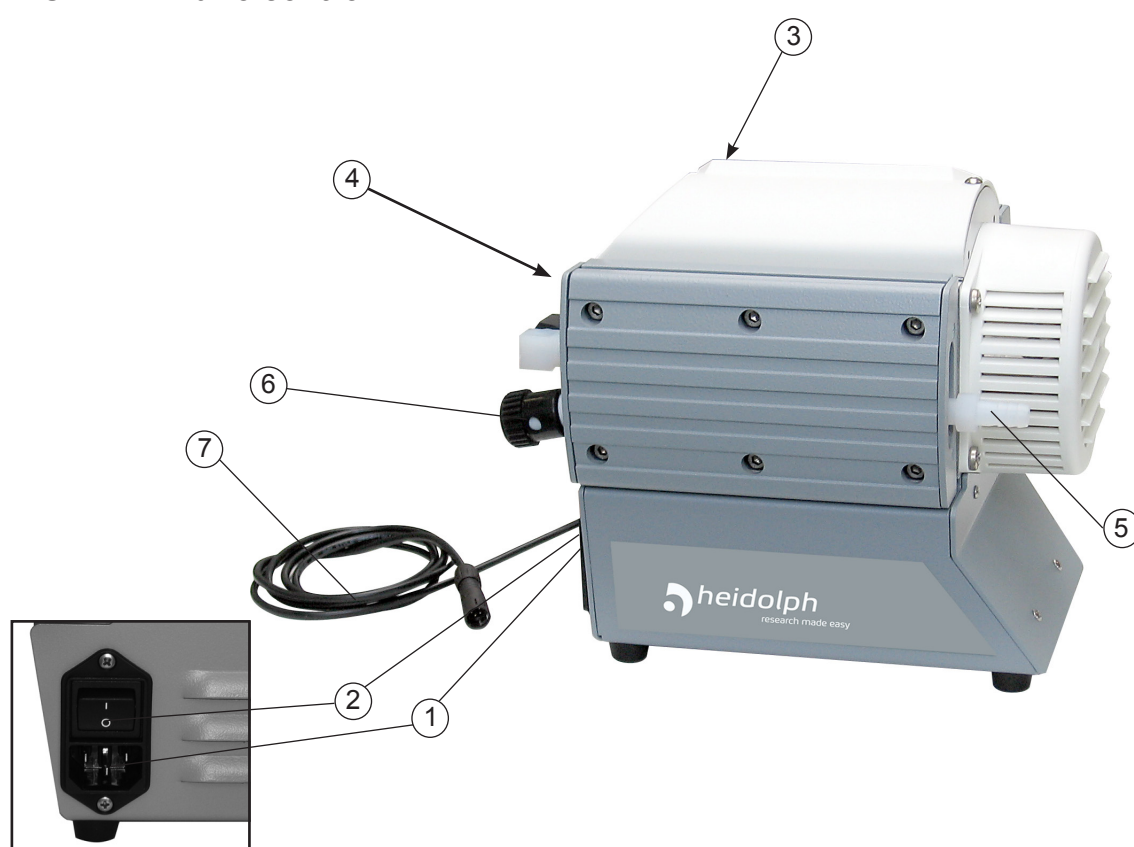
### 3.3 Pump parts

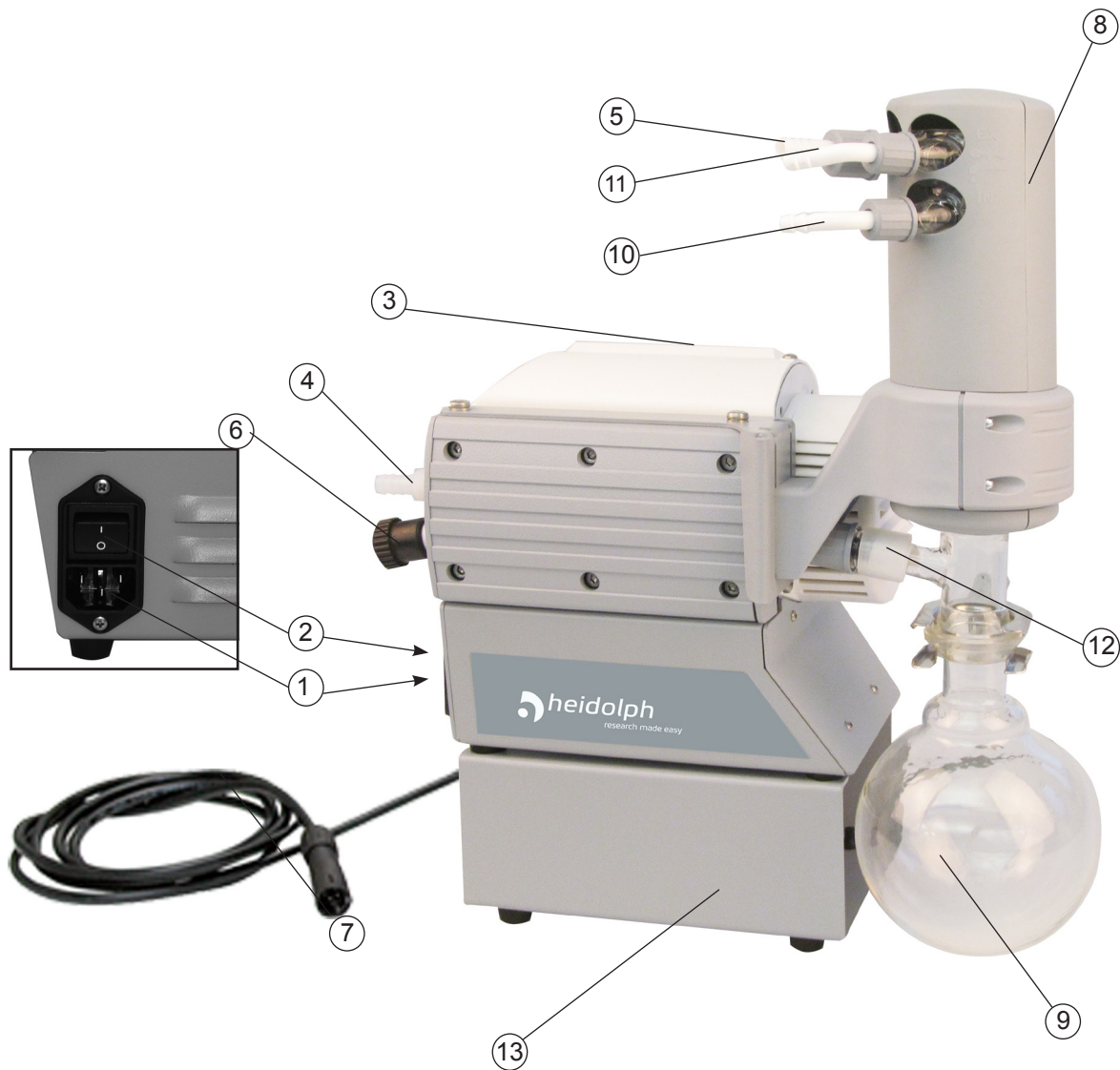
Position	Component	Position	Component
1	mains connection	7	control cable
2	on/off switch	8	exhaust waste vapor condenser
3	rating plate	9	catchpot
4	inlet	10	coolant inlet
5	outlet	11	coolant outlet
6	gas ballast valve	12	overpressure safety relief device
		13	accessory foot

### ROTAVAC vario tec



### ROTAVAC vario control



**ROTAVAC vario tec with exhaust waste vapor condenser (accessory)**



## 4 Use and operation

### 4.1 Connection of the control cable

Factory-set, the pump is designed for operation with a control signal; i.e. without a control signal, the pump does not start!

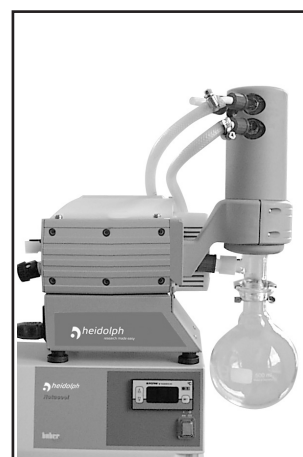
Connect the control cable of the pump to the vacuum box (see instruction manual Hei-VAP Precision).

### 4.2 Using a ROTACOOOL reflux cooler

If using the ROTAVAC vario control or Rotavac vario tec together with the ROTACOOOL reflux cooler, place the ROTAVAC vario control or ROTAVAC vario tec directly on top of the ROTACOOOL.

If using the ROTAVAC vario control or ROTAVAC vario tec without the ROTACOOOL reflux cooler, an extra foot has to be installed for operation with the condensate cooler (13; included in the scope of delivery of the condensate cooler). Position the ROTAVAC vario control or the ROTAVAC vario tec simply on the extra foot, thereby placing the pump's feet in the four hollows of the extra foot.

Install the coolant hoses in such a way that the stability of the pump is assured even with a full catchpot



### 4.3 Installing in a vacuum system

#### CAUTION

- Connection lines at the pump inlet have to be gas tight. Particles and dust must not be aspirated, the user has to provide appropriate filters if necessary. The user must ensure their suitability concerning gas flow, chemical resistance and safety against clogging prior to use.
- Connect an exhaust line gas tight at the pump outlet if necessary. Always dispose of exhaust gases appropriately (e.g. into a fume hood). If there is risk of release of dangerous or polluting fluids, install an appropriate system to catch and dispose of those fluids.
- Reduce the transmission of vibration and prevent loading due to rigid pipelines. Insert elastic hoses or flexible elements as couplings between the pump and rigid pipes. **Attention:** Flexible elements tend to shrink when evacuated.
- Assemble the glass set stress-free.
- The exhaust line has always to be free (pressureless) to ensure an unimpeded discharge of gas.
- Especially if the gas ballast valve is open, a power failure may cause unintentional ventilation of the pump and the vacuum system. In case this constitutes a potential source of danger, take appropriate safety measures.
- Make sure ventilation is adequate if the pumping unit is installed in a housing or if ambient temperature is elevated. Provide external venting if necessary. Keep a distance of minimum 20cm between fan and ambient parts.
- Before switching on check that mains voltage and current conform with the equipment (see rating plate).



**NOTICE**

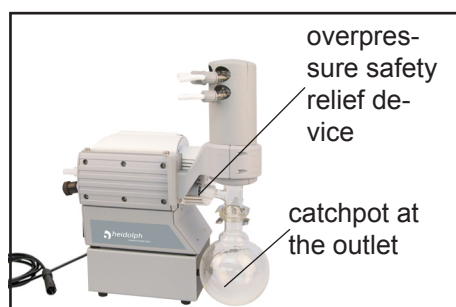
Avoid throttling losses by using connecting pipes with large diameter and keeping them as short as possible.

Install outlet pipelines always falling to avoid backflow of condensate towards the pump.

Use of a suitable valve to isolate the pump from the vacuum system is recommended to allow the pump to warm up before pumping condensable vapors or to clean the pump before it is switched off.

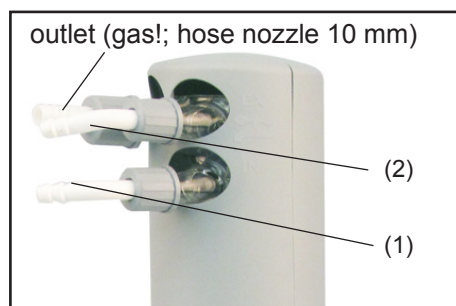
When assembling, ensure **vacuum-tightness**. After assembly, check the whole system for leaks.

Secure hose connections at the pump appropriately against accidental detaching.

**Exhaust waste vapor condenser (accessory)****Catchpot:**

The round bottom flask is coated with a protective layer to prevent disintegration in case of breakage or implosion.

- Assemble the catchpot using the joint clip.

**Exhaust waste vapor condenser:**

- Assemble hose nozzles for coolant inlet (1) and coolant outlet (2) pipelines at the exhaust waste vapor condenser.

The **exhaust waste vapor condenser** enables an efficient condensation of the pumped vapors at the outlet.

- ☞ No backflow of condensates.
- ☞ Controlled recovery of condensates.
- ☞ Next to 100% solvent recovery.
- ☞ The isolation cover protects against glass splinters in case of breaking, acts as thermal isolation to avoid condensation of humidity and is intended to absorb shocks.

**NOTICE**

Attach the pipelines of the coolant circuit to the respective hose nozzles (hose nozzles 6-8 mm, see image) at the waste vapor condenser. Check hose connections prior to starting operation of the cooling system.

Secure coolant hoses at the hose nozzles (e.g. with hose clip) to prevent their accidental slipping.

**CAUTION**

- The gas outlet (hose nozzle 10 mm) must not be blocked. The exhaust pipeline has always to be free and pressureless to enable an unhindered discharge of gases.
- If necessary connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapors to the surrounding atmosphere.
- **Attention:** Install hoses of the cooling system in a way to avoid flow / dropping of condensed water onto the pumping unit (especially cables and electronic parts).
- Ensure that the **coolant outlet pipeline** is always free and that it cannot get blocked.
- Maximum permissible coolant pressure at the exhaust waste vapor condenser: 6 bar (absolute)
- Install coolant valves always in the supply line of the waste vapor condenser only.
- Comply with the maximum permissible coolant pressures of additional components in the coolant circuit (e.g. cooling water valve).
- Avoid overpressure in the coolant circuit (e.g. caused by blocked or squeezed coolant hoses).

**4.4 During operation****CAUTION**

- **Maximum ambient temperature:** 40 °C
- Make sure ventilation is adequate if pump is installed in a housing or if ambient temperature is elevated.
- **Potentially dangerous gases or vapors** at the outlet of the pump have to be drained and disposed appropriately.
- Due to the high compression ratio of the pumps, pressure at the outlet port might be generated being higher than the maximum permissible pressure compatible with the mechanical stability of the system. Ensure that the pump outlet cannot become blocked or restricted.

**NOTICE**

If pumping condensable vapors (water vapor, solvents, ...), let the pump run with **gas ballast** to reduce condensation in the pump.

If pump is installed in altitudes of more than 1000 m above mean sea level check compatibility with applicable safety requirements, e. g. IEC 60034 (motor may overheat due to insufficient cooling).

Do not start the pump if the **pressure at outlet port** exceeds **maximum 1.1 bar (absolute)**. Attempts to start the pump at higher pressures may cause blockade and damage of the motor.

Check compatibility with **maximally permitted pressures** at inlet and outlet and with permitted **pressure differences** between inlet and outlet.

Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amounts.

Check the pump regularly for external soiling and deposits, clean if necessary to avoid an increase of the pump's operating temperature.

The motor is protected by a **temperature sensor at the circuit board**: Current limitation if the temperature at the circuit board is higher than 70°C.

Avoid high heat supply (e. g. due to hot process gases).

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

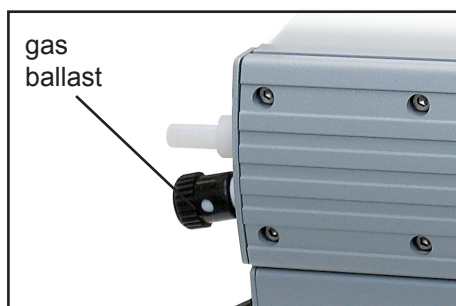
#### 4.5 Attention: Important notes regarding the use of gas ballast

### **! DANGER**

- ➔ When using air rather than inert gas, risk of significant damage to equipment and/or facilities, risk of personal injury or even loss of life exists due to the formation of hazardous and/or explosive mixtures if air and pumped media react inside or at the outlet of the pump.

### **! WARNING**

- ➔ Make sure that air/gas inlet through the gas ballast valve never leads to hazardous, explosive or otherwise dangerous mixtures. If in doubt, use inert gas.



In case of **condensable vapors** (water vapor, solvents, ...):

- ➔ Do not pump vapor until the pump has reached its operating temperature.
- ➔ Open gas ballast valve.
- ➔ The gas ballast valve is open if the arrow on the gas ballast cap points upwards.

- ➔ 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.
- ➔ Close gas ballast valve by turning it 180°.

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

Operating the pump without gas ballast increases the solvent recovery rate at the exhaust waste vapor condenser (accessory).

#### **Attention: Notes concerning the operation of the exhaust waste vapor condenser (accessory)**

### **! WARNING**

- ➔ The gas outlet (hose nozzle 10 mm) must not be blocked. The exhaust pipeline has always to be free and pressureless to enable an unhindered discharge of gases.
- ➔ Connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapors to the surrounding atmosphere.
- ➔ Ensure that the **coolant outlet pipeline** is always free and that it cannot get blocked.

### **! CAUTION**

- Check the overpressure safety relief device at the exhaust waste vapor condenser regularly, replace if necessary. Check especially for conglutination and cracks.
- Maximum permissible coolant pressure at the exhaust waste vapor condenser: 6 bar (absolute).
- Comply with the maximum permissible coolant pressures of additional components in the coolant circuit (e.g. coolant valve).
- Install optional coolant valves always in the supply line of the waste vapor condenser only.
- Avoid overpressure in the coolant circuit (e.g. caused by blocked or squeezed coolant hoses).
- In case of **condensation**: Check liquid level in the catchpot during operation. Avoid overflowing of the catchpot.

**NOTICE**

Do not allow the catchpot to get overfilled. Maximum liquid level approx. 80% to avoid problems when removing the catchpot.  
Check liquid level in the catchpot regularly and drain catchpot in time.

Permissible range of coolant temperature at the exhaust waste vapor condenser:  
-15°C to +20°C.

Check hose connections prior to starting operation of the cooling system.  
Check coolant hoses regularly during operation.

**Removing the catchpot:**

Remove joint clip, remove catchpot and drain condensate.

**NOTICE**

➔ Reassemble drained catchpot.

**Important:** Comply with regulations when disposing solvents/condensates. Reuse if possible, purify if contaminated.

**4.6 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.

**Long-term:**

- Take measures as described in section short-term shutdown.

- Separate pump from the application.

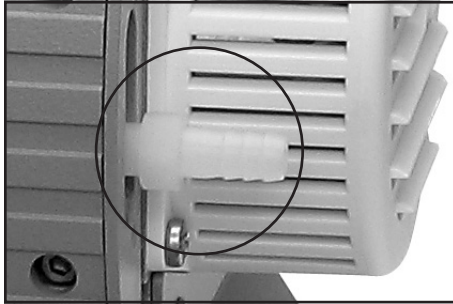
- Drain catchpot.

- Close inlet and outlet port (e. g. with transport caps).

- Close gas ballast.

- Store the pump in dry conditions.

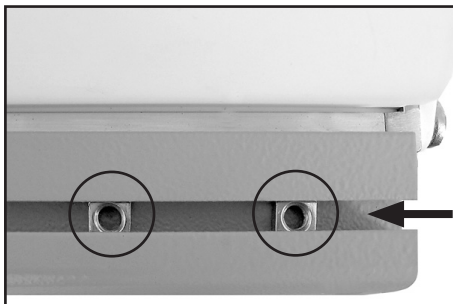
## 5 Assembling the condenser (accessory)



- ➔ Unscrew the hose nozzle at the outlet of the pump using an open-ended wrench.



- ➔ Unscrew cover.



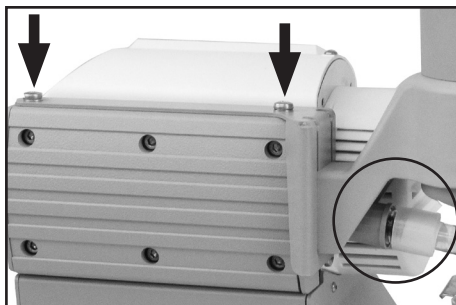
- ➔ Feed the two square nuts into the groove at the upper side of the housing cover.



- ➔ Assemble cover.



- ➔ Screw hose connection of the exhaust waste vapor condenser to the outlet of the pump using an open-ended wrench.
- ☞ Align the square of the hose connection so that the mounting angle for the condenser can be assembled (see figure).



- Loosen the union nut at the inlet of the condenser.
- Slide the mounting angle onto the housing cover of the pump as far as it will go (over the square of the hose connection). At the same time put the pump's outlet hose connection into the inlet of the condenser.
- Put the oval head screws with washers in the mounting angle and screw to the square nuts in the housing cover.
- Fasten the union nut at the inlet of the condenser.



- Assemble catchpot.
- ☞ In case, place the pump on the accessory foot enclosed.
- ☞ Install the coolant hoses in such a way that the stability of the pump is assured even with a full catchpot

## 6 Troubleshooting

Fault	Possible cause	Remedy
<input type="checkbox"/> Pump does not start or stops immediately.	<ul style="list-style-type: none"> <li>➔ Supply voltage too low or power supply failure?</li> <li>➔ Control signal for motor speed is missing?</li> <li>➔ Pressure in outlet pipeline too high?</li> <li>➔ Motor overloaded?</li> </ul>	<ul style="list-style-type: none"> <li>✓ Check supply voltage. Check fuse.</li> <li>✓ Check control signal.</li> <li>✓ Remove blockade in line, open valve.</li> <li>✓ Allow motor to cool down, identify and eliminate cause of failure. Manual reset is necessary. Switch off pump or unplug mains.</li> </ul>
<input type="checkbox"/> Pump does not achieve its ultimate vacuum or usual pumping speed.	<ul style="list-style-type: none"> <li>➔ Leak in the pipeline or vacuum system?</li> <li>➔ Long, narrow line?</li> <li>➔ Pump has been exposed to condensate?</li> <li>➔ Deposits have been formed inside the pump?</li> <li>➔ Diaphragms or valves damaged?</li> <li>➔ Outgassing substances or vapor generated in the process?</li> <li>➔ Pump temperature too high (motor speed reduced)?</li> </ul>	<ul style="list-style-type: none"> <li>✓ Check pump directly - connect vacuum gauge directly at pump inlet - then check connection, pipeline and vacuum system if necessary.</li> <li>✓ Use lines with larger diameter, length as short as possible.</li> <li>✓ Allow pump to run for some minutes with atmospheric pressure at the inlet.</li> <li>✓ Clean and inspect the pump heads.</li> <li>✓ Replace diaphragms and/or valves.</li> <li>✓ Check process parameters.</li> <li>✓ Ensure sufficient cooling of the pump or reduce inlet pressure.</li> </ul>
<input type="checkbox"/> Pump too noisy.	<ul style="list-style-type: none"> <li>➔ Loud exhaust noise?</li> <li>➔ Diaphragm crack or diaphragm clamping disc loose?</li> <li>➔ Other than above mentioned causes?</li> </ul>	<ul style="list-style-type: none"> <li>✓ Connect hose or silencer to pump outlet.</li> <li>✓ Perform maintenance.</li> <li>✓ Contact local distributor.</li> </ul>
<input type="checkbox"/> Pump seized.		<ul style="list-style-type: none"> <li>✓ Contact local distributor.</li> </ul>



## 7 Replacing diaphragms and valves



- ☞ **Before starting maintenance** isolate the pump from the electrical supply and wait **two minutes** after isolating the equipment from mains to allow the capacitors to discharge. Avoid the release of pollutants. Allow sufficient cooling of the pump.

### WARNING

- ☞ Ensure that the pump cannot be operated accidentally. **Never operate the pump if covers or other parts of the pump are disassembled. Never operate a defective or damaged pump.**

### CAUTION

- **Attention:** The pump might be contaminated with the process chemicals that have been pumped during operation. Ensure that the pump is decontaminated before maintenance and take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
- Wear appropriate safety-clothing when you come into contact with contaminated components. Avoid the release of pollutants.

### NOTICE

**Before starting maintenance** vent the pump and isolate it from the vacuum system and the electrical supply. Drain condensate if applicable, avoid the release of pollutants. Allow sufficient cooling of the pump. Separate pump from cooling water circuit (if applicable).

All bearings are encapsulated and are filled with long-life lubricant. Under normal operating conditions, the pump is maintenance free. The valves and diaphragms as well as the motor capacitors 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.

Depending on individual cases it may be efficient to check and clean the pump heads on a regular basis. In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours.

- Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amount.

If the pump is exposed to corrosive gases or vapor or in case of deposits, maintenance should be carried out frequently.

- Regular maintenance will improve the lifetime of the pump and also protect both man and environment.

**Ensure that maintenance is done only by suitable trained and supervised technicians.**

order no.

#### Set of seals ROTAVAC vario tec

(2 diaphragms, 4 valves, diaphragm key).....11-300-009-16

#### Set of seals ROTAVAC vario control

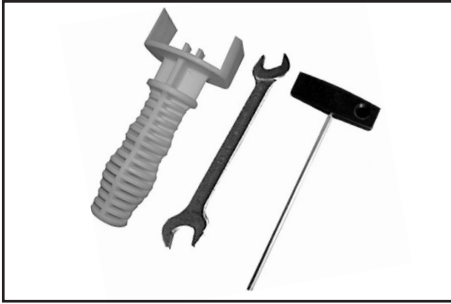
(4 diaphragms, 8 valves, diaphragm key).....11-300-005-40

Valve .....23-30-01-01-91

Diaphragm.....23-30-01-01-92

Diaphragm key.....02-07-02-01-13



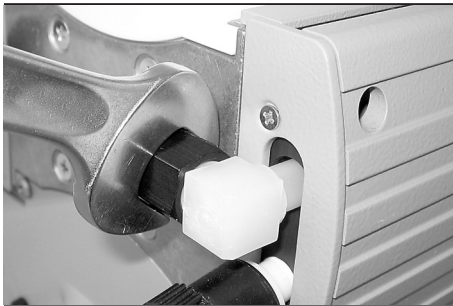
**Tools required (metric):**

- diaphragm key w/f 46 (enclosed in the set of seals)
- open ended wrench w/f 14 / 17
- hex key size 4

**⚠ Please read section "Replacing diaphragms and valves" completely before starting maintenance.**

Partially the pictures show pumps in other versions. This doesn't influence replacing diaphragms and valves of the pump.

### 7.1 Cleaning and inspecting the pump heads



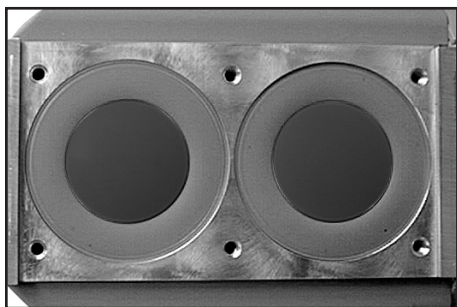
- ➔ Use open-ended wrench (w/f 17) to loosen the union nut at the hose connection next to the gas ballast.



- ➔ 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.

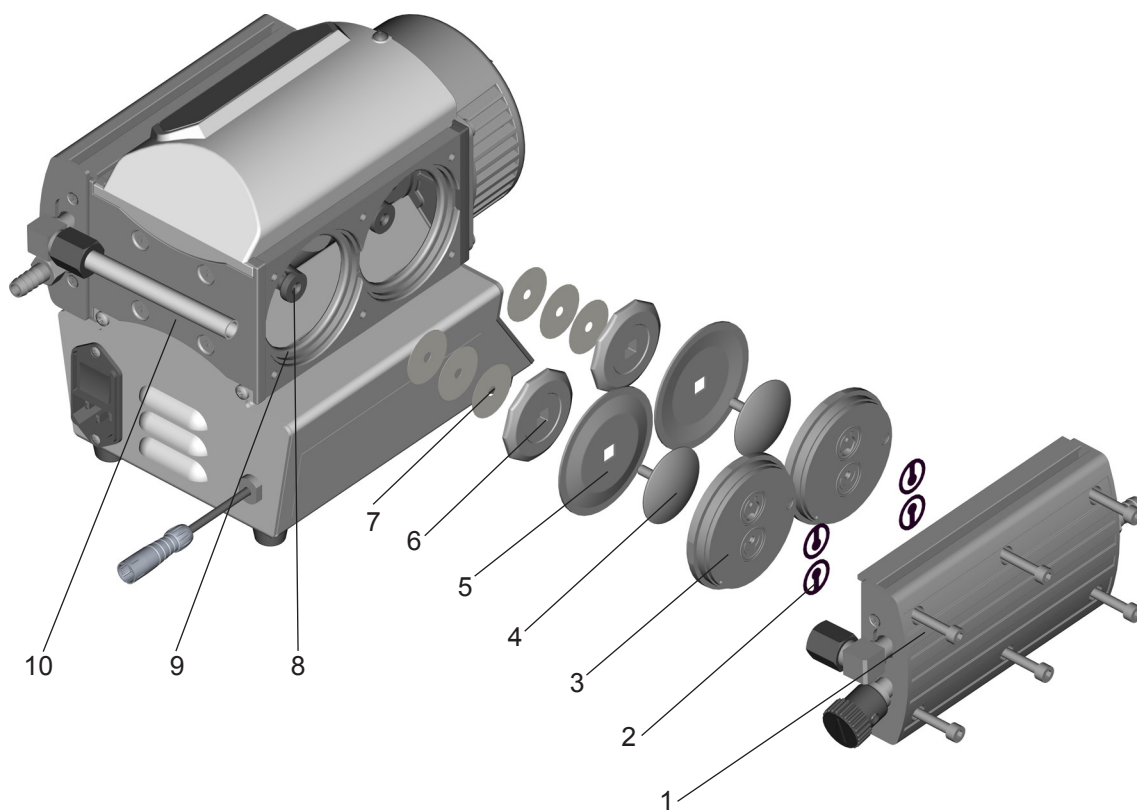


- ➔ Use a hex key size 4 to loosen the six socket head screws at the pump head and remove the upper housing (housing cover with housing cover insert).
- ⚠ Never remove parts using a spiky or sharp-edged tool (e. g. screw driver), we recommend to use a rubber mallet or compressed air (to be blown carefully into port).



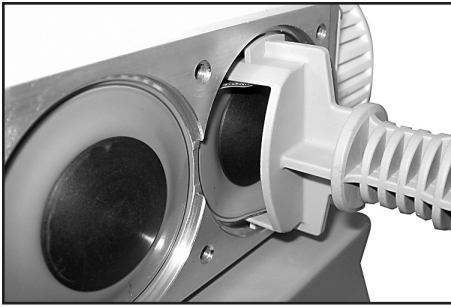
- ➔ Take the head covers carefully off the housing to check the valves.  
Note the position of the valves and remove them.
- ➔ Replace valves if damaged.  
Use petroleum ether or industrial solvent to remove deposits. Do not inhale.
- ➔ Check the diaphragms for damage and replace if necessary.

**View of the disassembled pump head parts**



- |  |                           |
|--|---------------------------|
| 1: housing cover                                 | 6: diaphragm support disc |
| 2: valve   | 7: washers                |
| 3: head cover                                    | 8: rod                    |
| 4: diaphragm clamping disc with connecting screw | 9: housing                |
| 5: diaphragm                                     | 10: bearing plate         |

## 7.2 Replacing the diaphragm



- ➔ 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.



- ➔ 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).

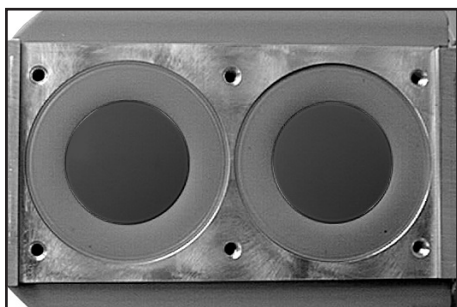


- ➔ Lift diaphragm at the side and position carefully together with diaphragm clamping disc and diaphragm support disc in the diaphragm key.
- ⚠ Avoid damaging the diaphragm: Do not bend diaphragm too much.
- ➔ Check for washers. Do not mix the washers from the different heads. Assemble the original 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.

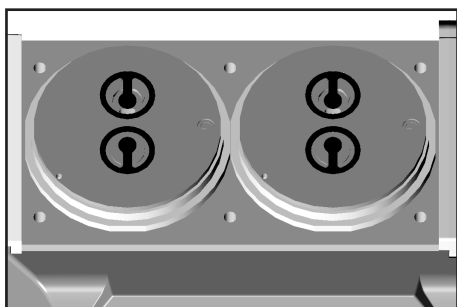
## 7.3 Replacing the valves and assembly of the pump heads



- ⚠ 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.

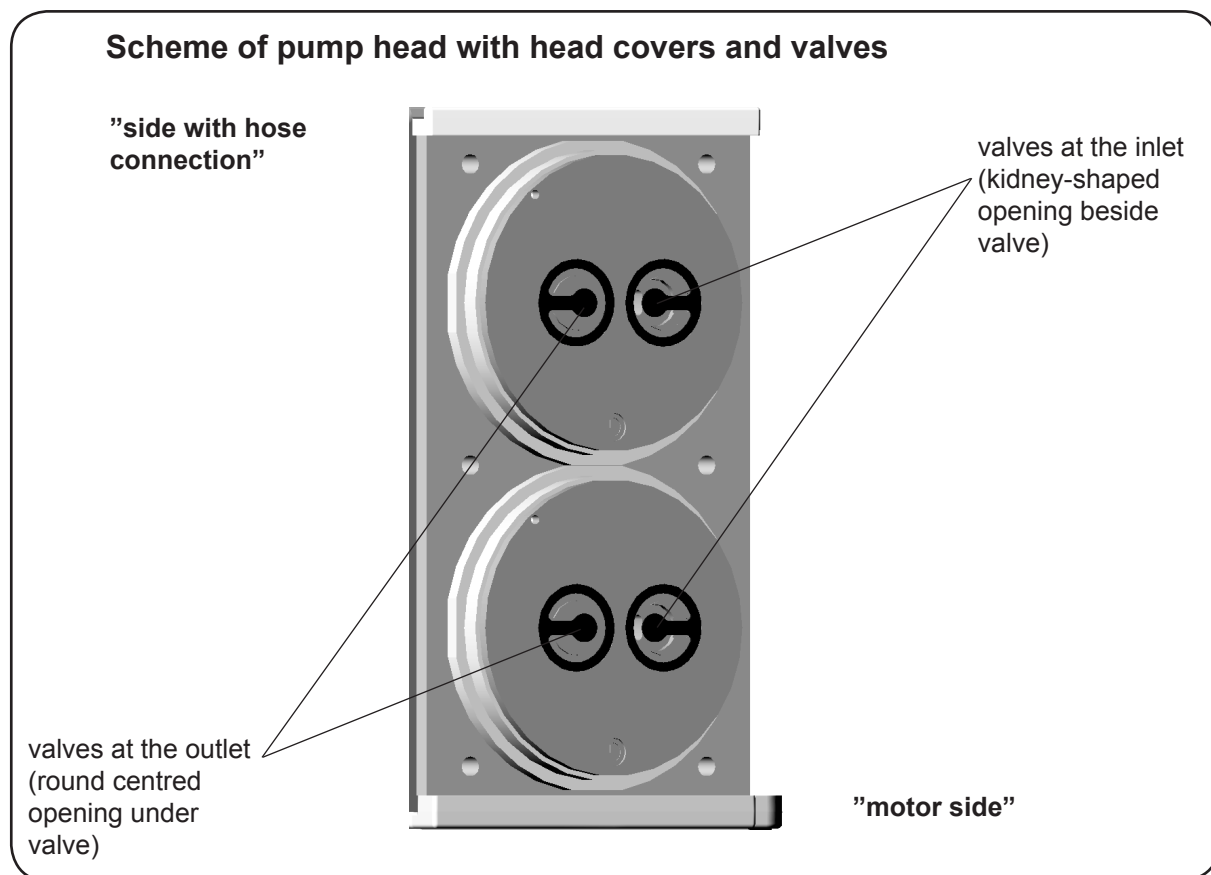


- ➔ Bring the diaphragms into a position in which they are in contact with the housing and centred with respect to the bore.
- ➔ Lay pump down and support appropriately.



- ➔ Assemble head covers and valves.
- ⚠ Check for correct position (see also fig. below).

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



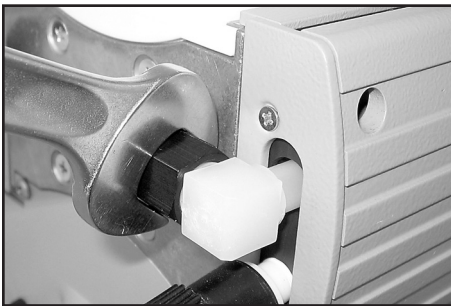


- ➔ Position housing cover.
- ⚙️ Move housing cover slightly to make sure that the head covers are correctly positioned.
- ➔ Screw in the six socket head screws fixing the housing cover crosswise first slightly, then tighten.
- ⚙️ Do not tighten until head cover is in contact with housing, **max. torque 6 Nm**.

**Replace diaphragms and valves similarly on the other side of the pump (only ROTAVAC vario control).**



- ➔ Use open ended wrench (w/f 14) to reconnect hose to elbow fitting.

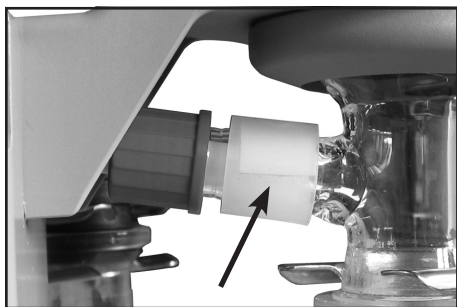


- ➔ Tighten union nut first by hand and then tighten one full turn using open ended wrench.

**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 unusual noise switch off pump immediately and check clamping disc positions.

If the specified ultimate vacuum is not achieved and if this does not change after the run-in period: Check hose connectors at pump head for leaks. If necessary recheck valve seats and pump chambers.

**7.4 Replacing the overpressure safety relief device at the condenser**

**Overpressure safety relief device**.....  
..... 23-30-01-04-98

**Round bottom flask 500 ml, coated** ..... 514-83000-02



- Remove joint clip at the catchpot.
- Unscrew the four Torx screws at the counter holder of the condenser and remove condenser. Thereby remove the adapter from the inlet of the condenser.
- Pull off old overpressure safety relief device and install new one. Check for correct position of the PTFE-foil under the overpressure safety relief device.
- Reassembly in reverse order.
- Position adapter in the inlet of the condenser and screw condenser with counter holder to the pump (Torx screws). Fix with union nut.



## 8 Warranty, liability, copyright

### Warranty

Heidolph Instruments provides a three-year warranty on the products described here (with the exception of glass and consumable parts) if registered with enclosed warranty card or via internet ([www.heidolph.com](http://www.heidolph.com)). Warranty starts with the date of registration. Without registration warranty starts according to serial number. This warranty covers defects in materials and workmanship. Transit damage is excluded from this warranty.

To file for such warranty service, contact Heidolph Instruments or your local Heidolph Instruments Dealer. If defects in material or workmanship are found, your item will be repaired or replaced at no charge. Misuse, abuse, neglect or improper installation are not covered by this warranty. Alterations to the present warranty need Heidolph Instruments' consent in writing.

### Exclusion clause

Heidolph Instruments cannot be held liable for damage from improper use or misuse. Remedy for consequential damage is excluded.

### Copyright

Copyright in pictures and wording of the present Instruction Manual is held by Heidolph Instruments.



## 9 FAQ / repair work

If any aspect of installation, operation or maintenance remains unanswered in the present manual, please contact the following address.

For repair services please call Heidolph Instruments or your local, authorized Heidolph Instruments Dealer.

Note: You will receive approval for sending your defective item to the following address:

Heidolph Instruments GmbH & Co. KG  
Lab Equipment Sales  
Walpersdorfer Str. 12  
D-91126 Schwabach / Germany  
phone: ++49-9122-9920-68  
Fax: ++49-9122-9920-65  
E-Mail: Sales@Heidolph.de

### Safety Information

When shipping items for repair that may have been contaminated by hazardous substances, please:

- advise exact substance
- take proper protective measures to ensure the safety of our receiving and service personnel
- mark the pack IAW Hazardous Materials Act



# 10 Confirmation of condition of unit

In case of repair

1. Details about the unit

Model \_\_\_\_\_

Serial number \_\_\_\_\_

Reason for repair \_\_\_\_\_

2. Has the unit been cleaned or decontaminated / sterilized?

yes no

3. Is the unit in a condition which does not represent any health threats for the staff of our service department?

yes no

If not, which substances has the appliance come into contact with?

\_\_\_\_\_  
\_\_\_\_\_

4. Shipper

Name \_\_\_\_\_

First name \_\_\_\_\_

Company \_\_\_\_\_

Department \_\_\_\_\_

Street \_\_\_\_\_

ZIP code \_\_\_\_\_

City \_\_\_\_\_

Country \_\_\_\_\_

Phone \_\_\_\_\_

E-Mail \_\_\_\_\_

5. Legally binding declaration

The customer is aware of being legally liable to Heidolph Instruments for any damages arising from incomplete and incorrect information.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company stamp \_\_\_\_\_

Please note: The shipper is responsible for the return of the goods in wellpacked condition, suitable for the mode of transport.

*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.*



## EU-Konformitätserklärung EU Declaration of conformity

**CE** Vakuumpumpe  
Vacuum pump

Wir, die Heidolph Instruments GmbH & Co. KG,  
We, Heidolph Instruments GmbH & Co. KG,

**Heidolph Instruments GmbH & Co. KG**  
**Walpersdorfer Straße 12**  
**91126 Schwabach / Deutschland**

erklären, dass nachstehend bezeichnete Geräte in Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der zutreffenden, aufgeführten EU-Richtlinien entspricht. Bei einer mit uns nicht abgestimmten Änderung an dem Gerät verliert diese Erklärung ihre Gültigkeit.

hereby declare, that the product designated below is in compliance with the basic requirements of all applicable EU-directives stated below with regard to design, type of model sold and manufactured by us. This certificate will be invalid if the product is modified without the prior written consent and agreement of the manufacturer.

Rotavac Valve Control	591-00130
Rotavac Valve Tec	591-00160
Rotavac Vario Pumping Unit	591-00142
Rotavac Vario Control	591-00141
Rotavac Vario Tec	591-00171
Rotavac 20	591-07210

Maschinenrichtlinie / Machinery Directive 2006/42/EG  
EMV-Richtlinie / Electromagnetic Compatibility Directive 2014/30/EU  
Angewandte (harmonisierte) Normen / (Harmonized) Standards applied:  
EN 61010-1:2011-07, EN 1012-2, EN 61326-1:2013,

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person  
Authorized to compile the technical file: Marcell Sarré - Heidolph Instruments GmbH & Co. KG,  
Walpersdorfer Straße 12, 91126 Schwabach / Germany

Schwabach, 21.04. 2016

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Geschäftsführer  
Managing Director

Marcell Sarré  
Qualitätsmanager  
Quality Manager

01-001-025-11-4



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