

Hei-VAP Precision



Operating Instructions

Translation of the original operating instructions.

The operating instructions must be read prior to the initial start-up for your safety and ease of use!
Follow safety instructions to prevent unnecessary accidents from occurring associated with misuse of product!
Store for future use in a safe location!
This documentation is not subject to any modification service!

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1 About this Document

1.1 Versions references

Version	Modification
1.0	07/2009

Versions references

1.2 About this manual

These instructions use icons and notes that will help simplify the process of locating information quickly. Read the explanations regarding these notes and icons in the following section.

Notes regarding this manual

Please read the safety guidelines and warnings in these instructions very carefully to ensure safe operation of the product. You will find the safety instructions in chapter 2. Warnings may be found in the introductions throughout of the chapters and prior to instruction sections.

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1.2.1 Reference documents



Information for the Heidolph vacuum pumps Rotavac valve control and Rotavac valve tec, along with the Vac control automatic controller are contained in a separate operating instruction # 01-005-004-80.

Information regarding the Heidolph emission condensate cooler vacuum pumps, Rotavac vario control and Rotavac vario tec are contained in a separate operating instruction, # 01-005-004-90-0.

Reference documents

1.2.2 Icons and symbols

Warnings

Warnings

The following symbols and signal words will be continuously used in this documentation.
The combination of icon and a signal word classifies the respective safety instruction.
The symbol can vary according on the type of risk.




	Icon	Designation
Death	RISK 	This signal word must be used, if death or irreversible health impairments may develop when the non-compliance of operator regarding the hazard warning.
Injury + property damages	WARNING 	This signal word points to injuries and property damages, including injury, accident and health risks.
	WARNING 	This signal word provides a reference to the risk of property damages. In addition, there is a low risk of injuries.
No damages	CAUTION	This signal word may only be used, if health risks cannot develop. It warns of malfunctions and is presented without an icon, since the degree of the risk to operator is low.
	IM-PORTANT	This signal word points to operation simplifications and cross-references. It excludes any risks of property damages or risks of injuries and is therefore without an icon.

Table 1-1: Identification of warnings

Structure of warnings

Structure of warn-ings



RISK

The type and source of the risk is located here!

The potential consequences, if actions are not taken to prevent the risk are listed here.

➔ The action to prevent the risk is listed here.



WARNING









Risk of injury based on disregarding the safety icons!

Risks exist here based on disregarding the warnings on the device and in the operating instructions.

➔ Observe warnings.

The following specific safety icons in correspondence with BGV A8 regulations will be used at the respective text locations of these operating instructions and require special attention depending on the combination of the signal word and icon:











Mandatory signs

Icon	Explanation	Icon	Explanation
	Observe information		Use eye protection
	Follow additional information		Use hand protection
	Use protective clothing		Use foot protection
	Pull the power plug after use Pull the power plug prior to opening the housing		Use ear protectors

Mandatory signs

Table 1-2: Icons and symbols

Warning signs

Icon	Explanation	Icon	Explanation
	Warning of a dangerous location		Warning of a risk of entanglement
	Warning of a hot surface		Warning of dangerous electric voltage
	Warning of hand injuries		Warning of vacuum
	Warning of automatic start		Warning of slippery conditions
	Warning of explosive materials		Warning of explosion-risk area

Warning signs

Table 1-3: Icons and symbols

Prohibitory signs

Prohibitory signs






Icon	Explanation	Icon	Explanation
	Fire, open flame and smoking prohibited		Prohibition for people with metal implants
	Prohibition for persons with a pacemaker		extinguishing with water is prohibited
	Depositing or storing is prohibited		

Table 1-4: Icons and symbols

Other icons and symbols

Other icons and symbols


Icon	Use	Explanation
✓	Prerequisite	This must be met prior to following any operating instructions.
➔	Operating instructions	You must do something here.
1. 2.	Operating instructions, multi-step	Operating instructions must be performed in the listed sequence. Deviations from the specified sequence may result in damages of the equipment and in accidents.
Actual	result	The result of a previous activity is described when indented.
• –	Listing, two-tiered	Something is listed here.
(see chapter 2)	Cross-reference	References for images, tables, other chapters or other instructions.
Example	Switch description	Emphasizing the description of switches/buttons.
	Note	Important information for the understanding of the equipment or for improved operation sequences.

Table 1-5: Icons and symbols

Images

Item numbers in the images in the text are conveyed in parentheses. If no image number is listed, the item number refers to the image/graphic directly above the text. If the reference is made to another image/graphic, the image number is specified accordingly, i.e. (Fig. 4-1 (11)).

2 Basic safety instructions

The rotary evaporator is constructed according to the current state of the art and accepted safety regulations. However, risks still exist during the installation, operation and maintenance of the product.

Basic safety instructions

→ Observe safety instructions and warnings.

The basic safety instructions in this chapter are supplemented in the following chapters of the operating instructions by concrete warnings. These warnings will precisely explain how you must conduct yourself to protect yourself, other persons and objects from injuries or damages.

These instructions are for the following evaporator models, the Hei-VAP Precision rotary evaporator.

→ Always keep the instructions available.

→ Pass the instructions on to subsequent owners.

2.1 General Safety Instructions

The rotary evaporator may only be used

General Safety Instructions

- in an operational condition consistent with full functionality of equipment,
- for the intended use described in section 2.2,
- if the operator has the required safety protection and awareness to hazards,
- if the instructions of these operating instructions are observed.

Malfunctions, especially those that may affect safety, must be repaired immediately!

2.2 Intended use

Hei-VAP Value, Hei-VAP Advantage, Hei-VAP Precision are rotary evaporators for:

Intended use

- distillation or evaporation of solvents
 - purification of chemicals, substances, mixtures and preparations
 - processing reaction batches
 - drying of powder
- If the equipment is used in corrosive atmospheres, the service life of the equipment will decrease based on concentration, volumes, and frequency of exposures to these corrosive materials, for example concentrated Hydrochloric Acid (HCl).

Any other or additional use is considered not to be in accordance with its designated use.

The manufacturer is not liable for damage resulting from this action.

The operator alone carries the responsibility to comply with the intended use outlined above. Observing these instructions and all references, especially safety instructions, as well as the adherence to inspection and maintenance requirements (see chapter 8.1) are a part of the designated use of Hei-VAP rotary evaporator.

2.3 Improper Use

- Applying excess pressure to the equipment is not permitted and can result in explosion of the system.
- Do not use the equipment in explosion-prone areas based on local ordinance and compliance of general laboratory equipment. The equipment is not protected against explosions in excessively volatile and poorly ventilated environments.

Improper Use

2.4 Use in explosion-prone areas

Use in explosion-prone areas

Do not use the equipment in explosion-prone areas. The equipment is not protected against explosions. It is not equipped with Ex or ATEX protection.

2.5 Responsibilities of the operator

Responsibilities of the operator

- ➔ Only operate the equipment in perfect condition, contact a certified Heidolph Service representative if equipment does not meet the outlined conditions for operation.
- ➔ Verify that only qualified personnel operate the equipment with the appropriate personal protective protection.
- ➔ Verify that personnel have received safety instructions for working responsibly and safely in the laboratory.
- ➔ Verify that the rotary evaporator is set up in a safe and suitable location.
- ➔ Verify that the basic device is only plugged to or unplugged from the heating bath if the main switch is switched off and/or the main power supply is disconnected.

Depending on the media (chemicals) used:

- ➔ Verify that the set up and the operation are only within the designated buildings with the proper equipment for laboratories.
- ➔ Verify that the rotary evaporator is only operated in conjunction with a ventilation system (refer to DIN EN 14175 and DIN 12924).

Ventilation system:

- at least 10 times the air exchange
- monitored for malfunctions

2.6 Responsibilities of the operating personnel

Responsibilities of the operating personnel

- ➔ Verify that the distillation material can be evaporated safely and that the distillation residue is not explosive.
- ➔ Verify that work using an open flame is not conducted in the surroundings of the rotary evaporator (explosion risk).
- ➔ Verify that the flow rate of < 1 m/s is guaranteed when suctioning liquids that contain combustible materials (electrostatic charge; ignition risk).
- ➔ Verify that gases of explosion group IIC do **not** occur in materials or chemical reactions, such as hydrogen.
- ➔ Verify that equipment that is an emission or radiation source (electromagnetic waves) for the frequency range ($3 \cdot 10^{11} \text{ Hz}$ to $3 \cdot 10^{15} \text{ Hz}$) is not operated or attached.
- ➔ Verify that equipment that is an emission or radiation source for ionizing waves or that is within the ultrasound range is not operated or attached.
- ➔ Verify that adiabatic compression and shock waves do not occur (shock wave ignition).
- ➔ Verify that the use of substances with the risk of an uncontrolled release of energy associated with a rise in pressure is prohibited (exothermic reaction; self-ignition of dust).
- ➔ Verify that the glass surfaces are wiped off by using only damp cloths.
- ➔ Wear suitable protective clothing for activities on the rotary evaporator a (with goggles and gloves, if necessary).
- ➔ Avoid pressure on the LCD screen, it is not intended to be a touch screen interface.
- ➔ Verify that the maximum excess pressure of the coolant equals no more than 1 bar in the condenser.
- ➔ Verify that the basic device is only plugged to or unplugged from the heating bath if the main switch is switched off and/or the main power supply is disconnected.

2.7 Qualifications of Personnel

The target group of the rotary evaporator is qualified personnel only. The rotary evaporator may only be used by personnel that have been trained in the proper operation by qualified personnel determined in accordance with the internal safety regulations of the facility in which the rotary evaporator is operated.

Qualifications of Personnel



This user's manual and all safety instructions must be observed, read and understood by all personnel working on the fixture (in particular in reference to the safety instructions).

2.8 Safety Conscious Working

Heidolph Instruments is not liable for personal injuries and / or property damages caused by an incorrect and improper usage of the rotary evaporator.

Safety Conscious Working

→ Observe the following regulations:

- Laboratory guidelines
- Accident prevention regulations
- Ordinance on Hazardous Substances
- Other generally accepted rules of safety engineering and occupational health
- Local regulations

2.9 Safety devices on the equipment

Heating bath

- Electronic and mechanical excess temperature protection
- Electronic temperature control

Safety devices on the equipment

Base unit

- Clamps to secure evaporation and receiving flasks
- Adjustable immersion depth of the evaporator flask
- The evaporator flask may be lifted from the heating bath, if required
- Overcurrent protection on lift motors (only Hei-VAP Advantage and Hei-VAP Precision)
- Thermal overtemperature protection on the drive motor
- Torque restrictor

Glassware set

- Borosilicate glass
- Screw connectors on the connections
- Support rod and clamp for glassware sets G3, G5 and G6

Optional

- Surlyn coating (Safecoat coating for glassware set G5) of the glassware parts
- Protective hood
- Protective shield

2.10 Signs on the equipment

Signs on the equipment




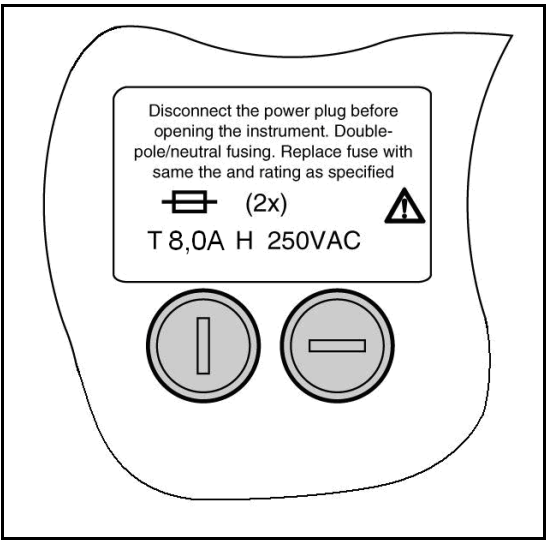
Sign	Designation
	Hot surface
	Risk of entanglement
	Model tag
	Fuse label (bottom of the device)

Table 2-1: Signs on the equipment

2.11 Remaining hazards

Remaining hazards

Obvious residual risks may still exist, despite all precautions!
Residual risks can be reduced if the safety instructions for the intended use and the operating instructions are all observed!



CAUTION **Unintentionally rotating drive!**
Injuries to hands.
→ Verify that the rotation is displayed.



WARNING **Danger of slipping!**
Risk of injury.
The floor near the machine may be dirty after the operation or during malfunctions in the machine. Water from the bath may spill or condensation from coolant may drip on to the floor near equipment.
→ Watch for contaminated areas and clean the floor, if necessary.



WARNING**Hot surfaces!**

Scalding and burns.

→ Let the heating bath and glass devices cool before handling.

**WARNING****Glass breakage!**

Cuts.



→ Work carefully.

**WARNING****Malfunctions!**

Risk of injury.

Malfunctions or operating conditions that may affect the safety of operating personnel require a shutdown of the equipment by disconnecting the power supplies.

→ A proper restoration of the normal state is required.

**WARNING****Unauthorized access is prohibited!**

Risk of injury.

Risks exist, if unauthorized personnel enter the danger zone of the evaporator.

→ The operator has to ensure that unauthorized persons (e.g. visitors) do not have any access to dangerous areas (service area, protected areas).

**WARNING****Risk of injury from operational noise!**

Hearing impairment from the continuous sound pressure level of the equipment may occur.

→ Protect against noise-induced hearing loss with ear protection.

**DANGER****Disregarding the danger, work and service area!**

There are risks due to electrical and mechanical energies, as well as specific residual risks.

Guarantee a safe distance of 800 mm around the evaporator components.

Do not deposit or store anything within the work and service area.

Accessories, chemicals or tools must be stored so that no risks arise for personnel.





WARNING

Imploding glass devices!

Serious injuries from shattering glass.



- Check glass devices for damages (stars, breaks, cracks, etc.).
- Only use perfect glass devices and replace all damaged glassware as soon as possible.
- Verify that the interior and exterior pressure variance equals no more than 2 bar.



DANGER

Potential loss of life due to dangerous electrical voltage!

Serious risk of injuries.



Residual electrical energy remains in the electrical wires, equipment and machines, when the evaporator is switched off.

- Inform operating personnel of outlets. Disconnect the sockets from the power source to completely de-energize.
- Work on the power supply must only be performed by an electrician. Switch off the power switch.
- Disconnect the evaporator from the power supply. Routinely check the electrical equipment (power lines) of the evaporator for any wear or fraying of wires.
- Replace burned or melted power lines. Routinely check all power cables for damages within the scope of maintenance and repair services.

Only disconnect the basic device with the heating bath if the device is de-energized. Unplug main power supply.



DANGER

Risks of injuries and mortal danger when disregarding safety instructions and safe distances!



Risk of injury.

Risks exist when disregarding safety instructions and the safe distance to the machine.

- Observe safety instructions and signs on the evaporator and in these operating instructions. Adhere to the corresponding safe distance to the equipment.



DANGER

Danger of fire and explosions!

Serious risk of fire and explosions.



A risk of fire and explosions exists in the vicinity of the evaporator. Fire, open flame and smoking are prohibited near the equipment.

- Flammable liquids may not be stored within the danger zone of the evaporator. A fire extinguisher must be kept near the equipment.
- Avoid potential ignition sources, such as ignitable atmospheres or reactions or electrostatic charges.
- Avoid exothermic reactions or the spontaneous ignition of dust.
- Avoid adiabatic compression and shock waves.
- Particular caution to reactions of explosion group IIC, in which hydrogen can develop.

3 Unit Description

Rotary evaporators Hei-VAP Value, Hei-VAP Advantage, Hei-VAP Precision serve the

Unit Description

- distillation or evaporation of solvents (chemicals)
- purification of chemicals, substances, mixtures and preparations
- processing reaction batches
- drying of powder

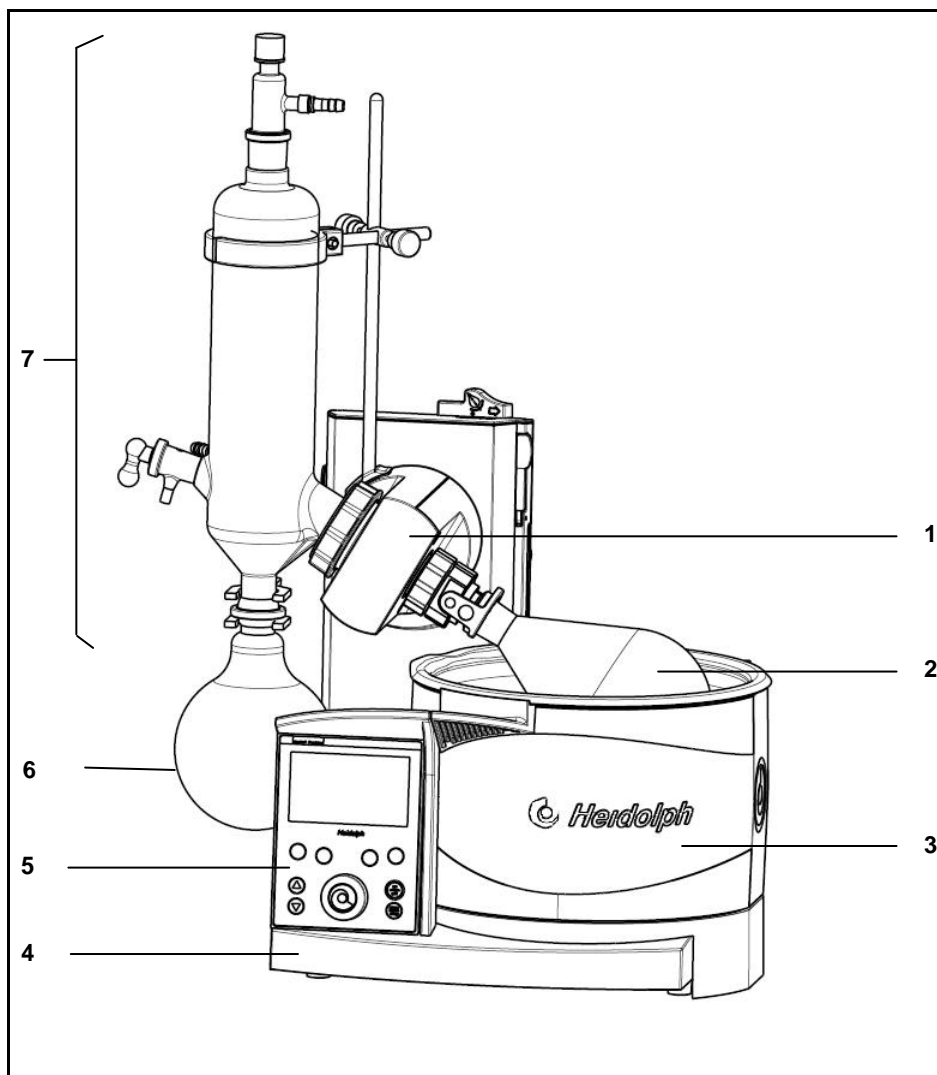


Figure 3-1: Rotary evaporator, here a Hei-VAP Precision with glassware set G3

- | | |
|--|-------------------|
| 1 Drive unit with vapor tube and coupling clamp duct | 4 Base unit |
| 2 Evaporator flask | 5 Control panel |
| 3 Heating bath | 6 Receiving flask |
| | 7 Condenser |

The solvent to be evaporated is present in the evaporator flask (2). Depending on the thermodynamic properties of the solvent, the solvent is evaporated by a suitably selected combination of the heating bath temperature (3) and the vacuum. The settings are made on the control panel (5) of the base unit (4). The drive unit (1) provides a rotation, which reduces the risk of vapor evaporation and accelerates the evaporation process by increasing the surface area of the solvent. The solvent vapor reaches the condenser (7) via the vapor tube, is condensed and then flows into the receiving flask (6).

4 Set-up and Start-up

4.1 Scope of delivery

	Description	Completion	Quantity	Hand lift truck (HL)		Motor lift (ML)	
		Glassware set		Standard	coated	Standard	coated
	Hei-VAP Value	G1 diagonal condenser	1	560-01100-00	560-01110-00		
or	Hei-VAP Value	G3 vertical condenser	1	560-01300-00	560-01310-00		
or	Hei-VAP Value	G5 cold trap	1	560-01500-00	560-01510-00		
or	Hei-VAP Value	G6 return condenser	1	560-01600-00	560-01610-00		
or	Hei-VAP Advantage	G1 diagonal condenser	1	561-01100-00	561-01110-00	562-01100-00	562-01110-00
or	Hei-VAP Advantage	G3 vertical condenser	1	561-01300-00	561-01310-00	562-01300-00	562-01310-00
or	Hei-VAP Advantage	G5 cold trap	1	561-01500-00	561-01510-00	562-01500-00	562-01510-00
or	Hei-VAP Advantage	G6 return condenser	1	561-01600-00	561-01610-00	562-01600-00	562-01610-00
or	Hei-VAP Precision	G1 diagonal condenser	1	563-01100-00	563-01110-00	564-01100-00	564-01110-00
or	Hei-VAP Precision	G3 vertical condenser	1	563-01300-00	563-01310-00	564-01300-00	564-01310-00
or	Hei-VAP Precision	G5 cold trap	1	563-01500-00	563-01510-00	564-01500-00	564-01510-00
or	Hei-VAP Precision	G6 return condenser	1	563-01600-00	563-01610-00	564-01600-00	564-01610-00

	Description	Quantity	Order No. Standard NS 29 / 32	Order No. NS 24 / 40
	Glassware set G1	1	513-00100-00	513-00140-00
or	Glassware set G3	1	513-00300-00	513-00340-00
or	Glassware set G5	1	513-00500-00	513-00540-00
or	Glassware set G6	1	513-00600-00	513-00640-00
or	Glassware set G1 coated	1	513-00110-00	513-00150-00
or	Glassware set G3 coated	1	513-00310-00	513-00350-00
or	Glassware set G5 coated	1	513-00510-00	513-00550-00
or	Glassware set G6 coated	1	513-00610-00	513-00650-00

Included with the equipment:

	Description	Quantity	Order number
	Vapor tube coupling clamp with swing clamp	1	23-09-03-01-03
	Tension spring	1	22-03-02-01-05
	PTFE 26 vacuum seal	1	23-30-01-01-30
	Clamping piece 26	1	23-30-01-05-31
	Operating instructions Hei-VAP Value / Hei-VAP Advantage	1	01-005-004-79
	Operating instructions Hei-VAP Precision	1	01-005-004-92
	Warranty / declaration of non-objection	1	01-006-002-58

	Description	Quantity	Order number
	Power cable (EC)	1	14-300-009-81
	Power cable for the US	1	14-300-009-82
	Power cable for GB	1	14-300-009-83
	Power cable for Switzerland	1	14-300-009-84

	Description	Quantity	Order No. Standard NS 29	Order No. NS 24
	Swing clamp	1	23-30-01-05-29	23-30-01-05-57

Table 4-1: Scope of delivery

Accessories

	Description	Quantity	Order number
	Upgrade kit Advantage Precision-HL	1	569-30009-00
	Upgrade kit Advantage Precision-ML	1	569-40009-00

Table 4-2: Accessories

- ➔ Unpack the rotary evaporator and check for completeness any potential shipping and damages.
- ➔ Inform the Service Department of Heidolph Instruments in case of any damages (see chapter 8.4).

4.2 Transport

Transportation safety device

The motor lift units have a transportation safety device, which must be removed prior to the initial start-up of the unit or reattached prior to the return shipment. This is very important in shipping any return or repair of motor lift unit to make sure transport lock is assembled.

A brief description of the procedure for removing and reattaching the transportation safety device may be found in the following.

The transportation safety device consists of three M5x8 screws and a connecting plate with holes for fixing the position.

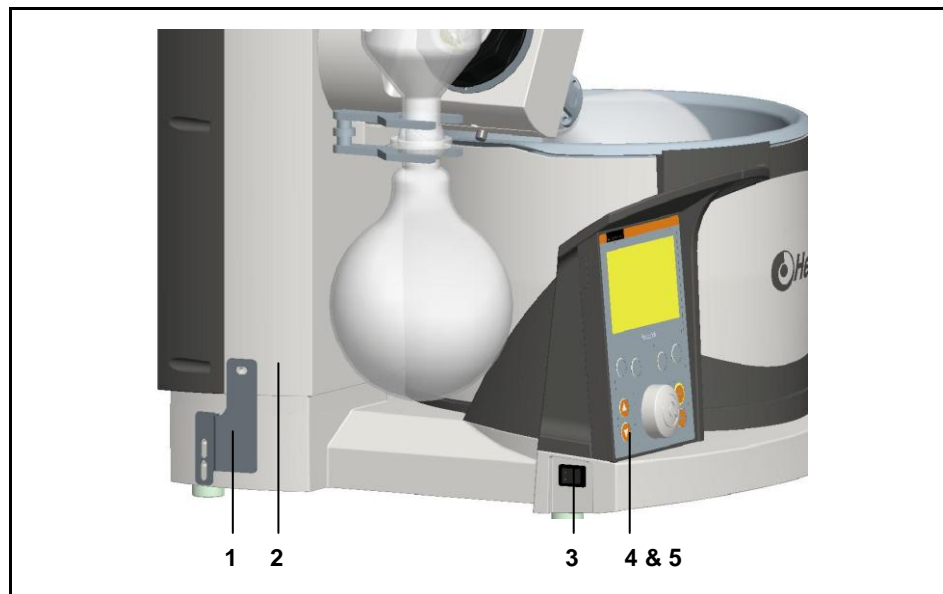


Figure 4-1: Transportation safety device

- | | | | |
|---|------------------------------|---|--------------------|
| 1 | Transportation safety device | 4 | Button - lift down |
| 2 | Front shell of lift | 5 | Button - lift up |
| 3 | Power switch | | |

4.2.1 Removing the transportation safety device

- ✓ All hose and cable connections to other devices, and the coolant/vacuum connection are disconnected.
- ✓ Connect the unit and set the power switch (3) at on.

1. Remove the top screw (in the front shell of the lift (2)) and the lower screw of the transportation safety device (1) in the switched state. Never tighten in the top position!
2. Remove the screws and the transportation safety device (1) and store.
3. Move the hoist up by using the "lift up" (5) button. Switch the unit off and on.

4.2.2 Attaching the transportation protection device before packing

- ✓ All hose and cable connections to other devices and the coolant/vacuum connection are disconnected.

Connecting the unit

1. Continue pressing the lift position contact down when switching the unit on (this will suppress the "lift to the top when power off" function).
2. Move the hoist down by using the "hoist down" (4) button
Please pay attention to the lift-height stop!

3. Hold the transport safety device as shown in Figure 4-1 and fix it with the screws M5x8 (3 pieces).
4. Switch off the unit.
5. Remove the plug.
6. Package the unit.

CAUTION**Vibrations and shocks!**

Damaging the housing and the mechanical system of the equipment.

→ Avoid vibrations and shocks.



→ Carry the basic unit from below.

4.3 Setting up the basic unit

Chemicals may reach the atmosphere (via the pump) when handling hazardous materials and distilling solvents.

Where?

- Verify that harmful fumes or gases do not affect the operating personnel. The pump exhaust air must be channeled to an exhaust hood or condensate condenser.
- Verify that the interior and exterior pressure variance equals no more than 2 bar.
- Verify that the emergency stop for the power supply is always easy to reach.



Avoid setting up the rotary evaporator in corrosive atmospheres. This reduces the service life of the equipment.

CAUTION**Tilting the heating bath!**

Damaging the housing and risk of injuries.

→ Place the basic unit on a solid level surface with sufficient room.



→ Select a level, solid, and heat resistant surface.

4.4 Start-up

4.4.1 Installing the heating bath

- ✓ The basic unit is located on a suitable place.

*Start-up
Installing the heating bath*

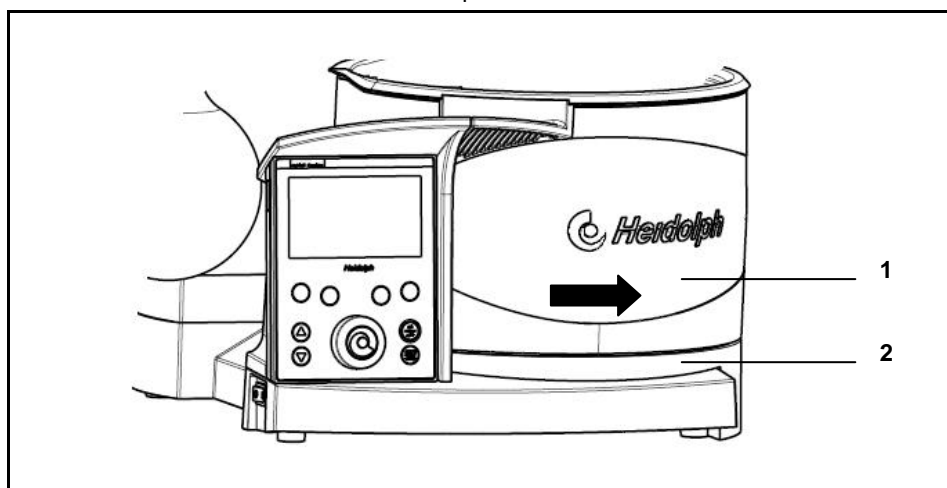


Figure 4-2: Heating bath

1 Heating bath

2 Base plate

1. Place the base plate (2) on the surface for the heating bath (1) into the provided rail, so that the heating bath cannot tilt.
2. Place the heating bath into the rails by its feet. Be careful that the heating bath connection points to the right rear.

4.4.2 Fill the heating bath

Fill the heating bath

The heating bath can be filled with various heat transfer fluids.



When using de-ionized or distilled water:

- ➔ Offset water with 0.2 % borax ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10 \text{H}_2\text{O}$) to prevent corrosion associated with these purified waters to the stainless steel of the heating bath.



The minimum-/maximum specifications in the heating bath refer to the liquid level when the evaporator flask is immersed.

1. Select a liquid suitable for your application, such as tap water, water-soluble polyethylene glycol or oil of a lower viscosity (40 cP) and flash point (observe the Safety Data Sheet) > 260 °C.
2. Immerse the evaporator flask.
3. Fill the heating bath with the media of choice. The level should be within the minimum and the maximum marking in the heating bath.

4.4.3 Offsetting the heating bath

Offsetting the heating bath

It will be necessary to expand the distance of the heating bath to the drive unit when using large evaporator flasks or intermediate pieces between evaporator flasks and the vapor tube, such as bump flasks or foam brake flasks.

- ➔ Shift the heating bath including the base plate by the handle on the rail and position accordingly (Figure 4-2).

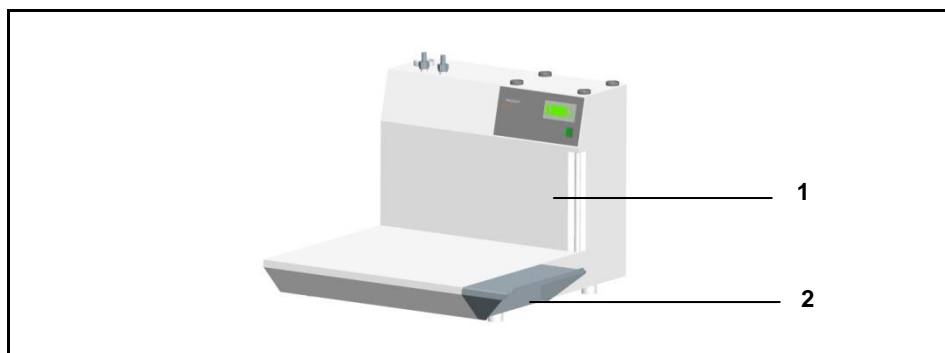


Location of the heating bath

- ➔ The base unit is located on a suitable surface.
Verify that sufficient space (approx. 20 cm around the evaporator) and a solid seating are available in the shifting area.
- ➔ Verify a solid seating of the heating bath base and the bath.

4.4.4 Heating bath set-up when using Rotacool

Heating bath set-up when using Rota-cool



1 Rotacool

2 Rotacool extension plate



Location of the heating bath when using Rotacool

- ➔ The base unit is located on a suitable surface. Verify that sufficient space (approx. 20 cm around the evaporator) and a solid seating are available in the shifting area and the Rotacool.
- ➔ Verify a solid seating of the heating bath base and the bath as well as the Rotacool extension.

1. Place the two screws on the right side of the extension plate of the Rotacool. (Contact a local Heidolph Distributor if using a previously purchased Rotacool before July, 2009 for proper attachments of the extension plate.
2. Check the extension plate (2) for proper seating.

4.4.5 Connect the base unit

CAUTION



Supply voltage and the voltage information on model tag do not match!

Damage due to incorrect voltage.

- ➔ Verify that the voltage specified on the model tag corresponds with the mains voltage.

Only disconnect the basic device with the heating bath if the device is de-energized. Unplug main power supply.

Connect the base unit



CAUTION



The drive unit and the heating bath may be switched on accidentally!

Injuring and burning hands.

Risk of entanglement



Injuries to hands.

- ➔ Verify that the power switch for the base unit and the heating bath is switched off by the rocker switch.



Country-specific equipment connection cable

The design of the equipment is equipped with a Euro connector (EN 50075) for 230/240 V by default, and with a US standard plug (NEMA Pub. No. WDI. 1961 ASA C 73.1 for a design for 120 V. 1961, page 8, 15 A 125 V).

The main power cable of the device has an integrated protective ground connection.

Please note if the appropriate equipment connection cable for your country was included and use it.

Equipment connection cable for:

- EU
- Great Britain
- Switzerland
- USA

In order to operate the equipment in a country with a different connector system, one can use approved adapters only or have a licensed electrician replace the plug with one suitable and approved for the power supply with protective ground connection.

Connection versions

The plug sockets are located on the back of the unit.

- ✓ The unit is switched off.
- ✓ The heating bath is installed on the base console.

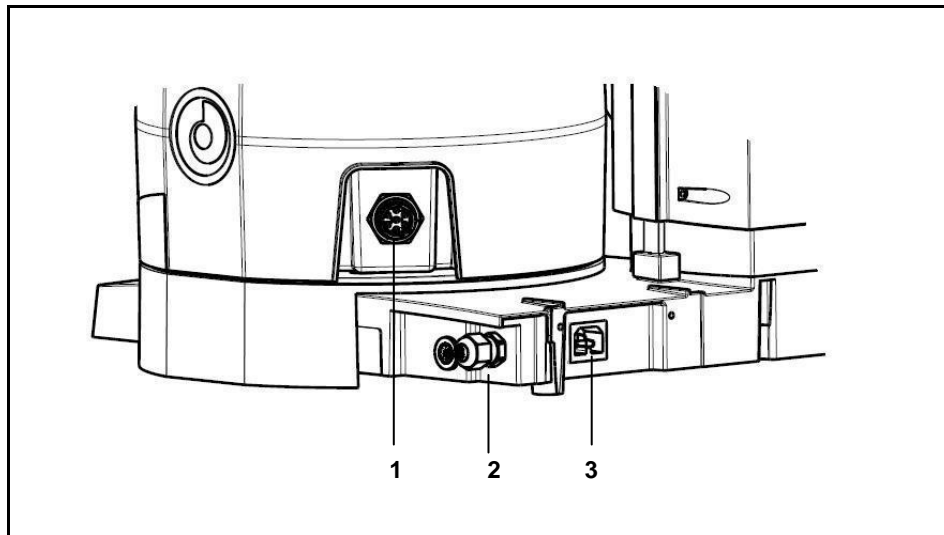


Figure 4-3: Connections

- 1 Heating bath unit plug
- 2 Heating bath connecting line (symbolically without a cable and connector)
- 3 Power supply connector

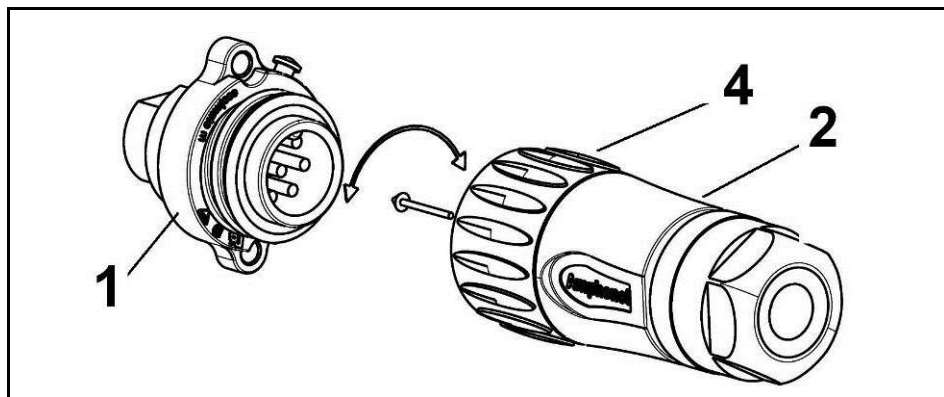


Figure 4-4: Heating bath connector

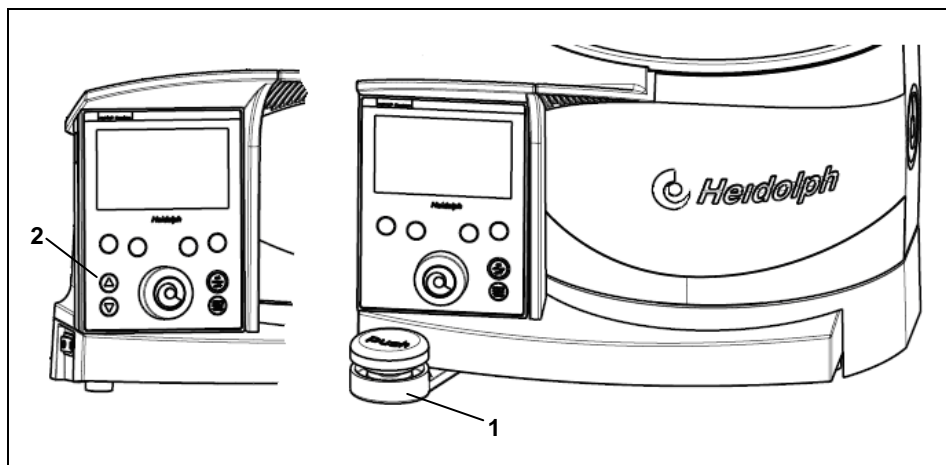
1. Plug the socket of the heating bath connecting cable (2) of the Hei-VAP base into the appropriate connector (1).
2. Plug the socket (2) with the cap nut (4) of the heating bath connecting cable (7-pin) into the heating bath:
 - Press the socket into the connector so that the locking stub fits into the groove.
 - Grab the socket (2) on the knurled nut (4) and turn the knurled nut clockwise to fix it.
3. Plug the power supply cable into the power supply plug on the back panel of the base unit.
4. Connect the power cable to the power supply.

4.4.6 Operating the lift

In order to be able to control the immersion depth of the evaporator flask, the height of the drive unit must be adjusted.



Only immerse the flask so far in the heating bath, so that it does not contact the edge or the bottom of the bath.



Hand lift

Figure 4-5: Hand/motor lift

- 1 Hand lift 2 Motor lift arrow keys

Version Hei-VAP Value, Hei-VAP Advantage, Hei-VAP Precision (hand lift)

1. Push the hand lift (1) down and shift to the left (lower) or right (upward) while keeping the handle depressed.
2. Release the hand lift (1) at the desired position.

The drive unit snaps into the appropriate position when released.

Version Hei-VAP Advantage, Hei-VAP Precision (motor lift)

Motor lift

- ✓ The base unit is installed.
- ➔ Press the respective arrow key (up/down) (see Figure 4-5 (2)) and release the pushbutton at the desired position of the drive unit.

The drive unit remains in the proper position set by the operator.

4.5 Assemble glassware sets

Assembling the glassware sets will be described in the following. The rotary evaporators can be equipped with various glassware sets.

Assemble glassware sets

- ✓ The base unit is set up and installed.
- ✓ A water or coolant connection is available (does not apply for glassware set G5).
- ✓ Lift is in the top position (see chapter 4.4.6).



WARNING

Glass breakage!

Serious injuries from shattering and breaking glass.



- Check glass devices for damages (stars, breaks, etc.).
- Only use perfect glass devices and replace all damaged glassware as soon as possible.
- Work carefully.



CAUTION

Unintentionally rotating drive!

Injuries to hands.

- Verify that the rotation is displayed.



4.5.1 Install the condenser mounting (G3-G6)

Install the condenser mounting

In order to protect the glassware sets with vertical condensers from accidentally tilting, they are supported by a condenser mounting and support rod.

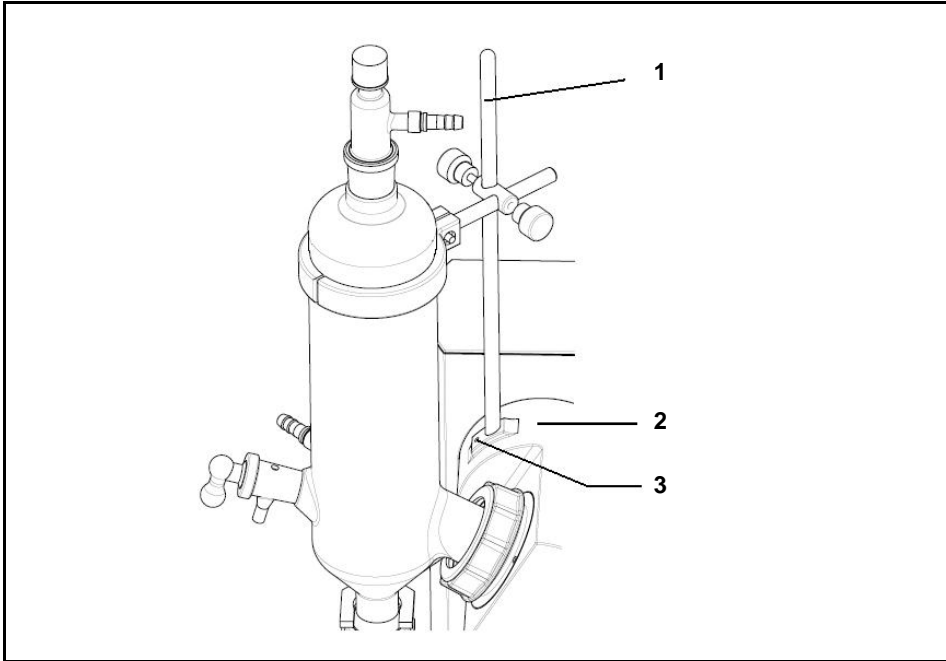


Figure 4-6: Install the condenser mounting

- 1 Support rod
- 2 Drive unit
- 3 Fastening screw - support rod



CAUTION

Unintentionally rotating drive!

Injuries to hands.

- Verify that the rotation is displayed.



WARNING**Risk of injuries due to retracting or entrapment!**

Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

- ➔ Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.



Attach the support rod (1) to the drive unit (2) via a fastening screw (3).

4.5.2 Install the vapor tube

The evaporator flask and the vapor tube are connected with the condenser and the rotation of the evaporator flask is made possible by the drive unit.

Install the vapor tube

WARNING**Glass breakage!**

Serious injuries from shattering and breaking glass.

- ➔ Check glass devices for damages (stars, breaks, etc.).
- ➔ Only use perfect glass devices and replace all damaged glassware as soon as possible.
- ➔ Work carefully.

**CAUTION****Unintentionally rotating drive!**

Injuries to hands.

- ➔ Verify that the rotation is displayed.

**WARNING****Risk of injuries due to retracting or entrapment!**

Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

- ➔ Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.



1. Remove the vapor tube from the packaging.

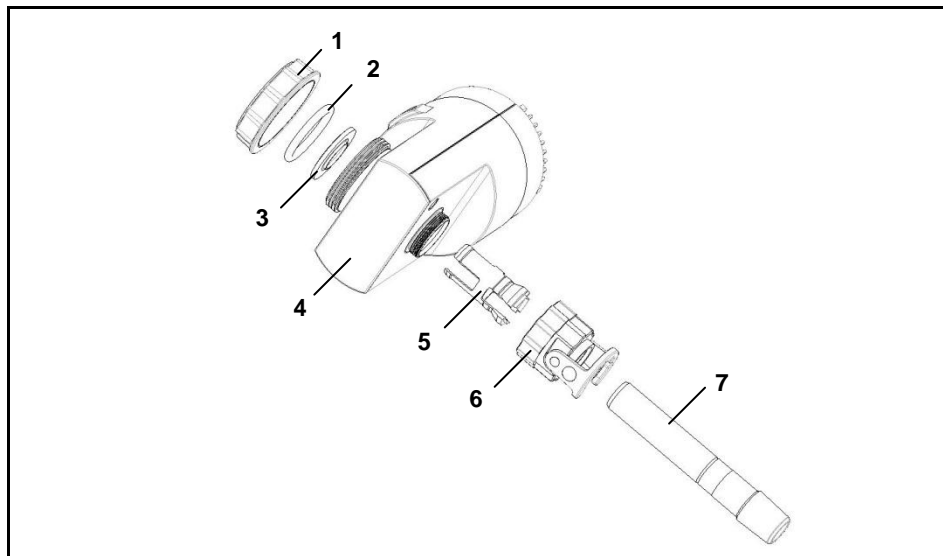


Figure 4-7: Install the vapor tube

2. Remove the threaded clamping screw (1) on the drive unit; remove the tension spring (2) and PTFE 26 vacuum seal (3).

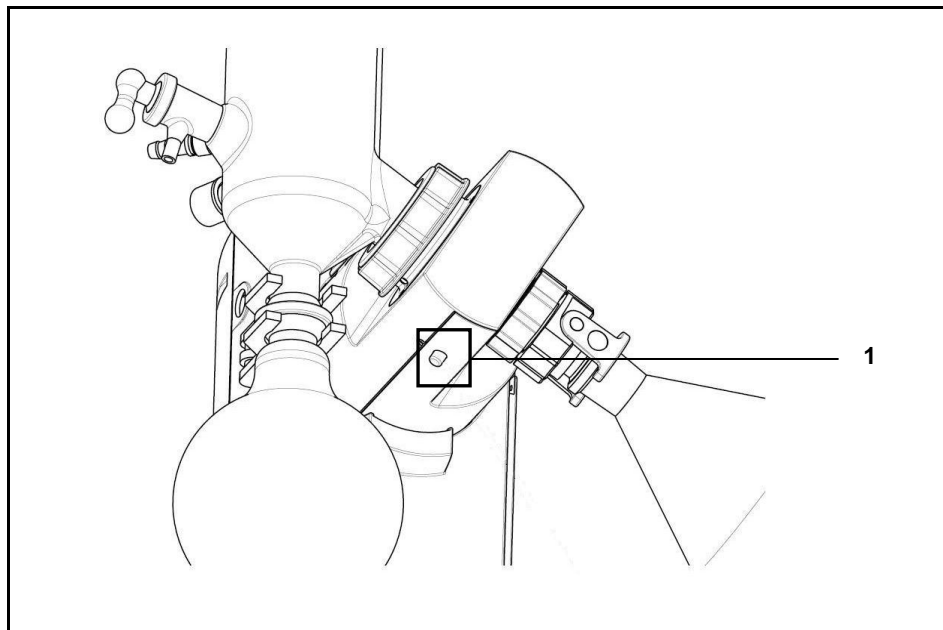
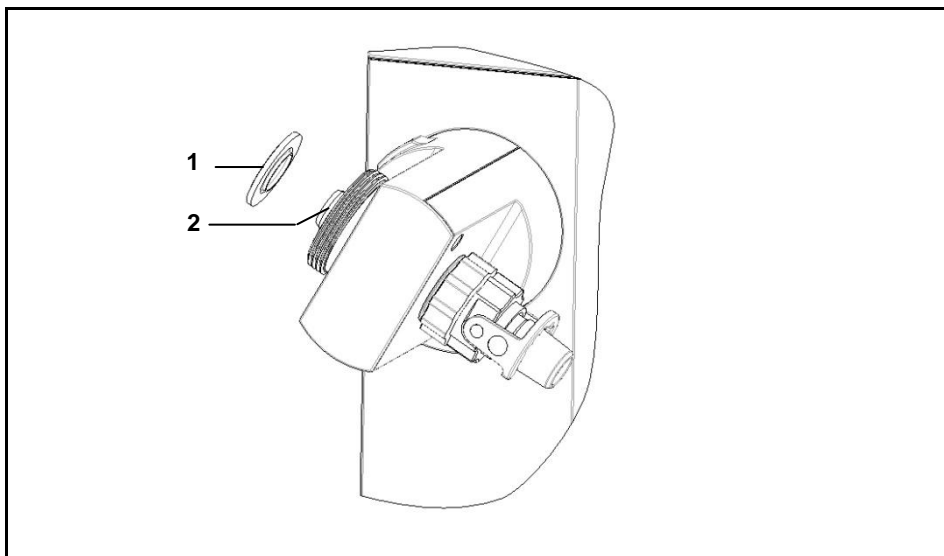


Figure 4-8: Locking button

Locking buttons

3. Continue to press the locking button (Figure 4-8 (1)).
4. Remove the screw coupling connection of the vapor tube (Figure 4-7 (6)) from the drive unit.
5. Pull out the clamping sleeve (Figure 4-7 (5)).
6. Push the vapor tube coupling clamp (Figure 4-7 (6)) and clamping sleeve (Figure 4-7 (5)) with the bead first to the vapor tube (Figure 4-7 (7)). Verify that the bead audibly snaps into the groove of the vapor tube (Figure 4-7 (7)).
7. Push the vapor tube (Figure 4-7 (7)) into the drive unit with the pre-assembled parts.
8. Continue to press the locking button (Figure 4-8 (1)).
9. Manually tighten the vapor tube coupling clamp (Figure 4-7 (6)) with the threaded connection of the motor drive (Figure 4-7 (4)) till a tight connection is made.



PTFE 26 vacuum seal on the vapor tube

Figure 4-9: Placing the PTFE 26 vacuum seal on the vapor tube

- 1 PTFE 26 vacuum seal 2 Vapor tube



Do not bend the PTFE 26 vacuum seal or scratch it with pointed fingernails.

10. Push the PTFE 26 vacuum seal (1) onto the vapor tube (2) with the sealing lip in front (labeling on the **drive side** in the direction of the drive unit).

4.5.3 Install the condenser

- ✓ The threaded clamping screw is removed from the drive head.
- ✓ Spring is removed from the drive head.
- ✓ The vapor tube is installed on the drive.
- ✓ PTFE 26 vacuum seal is installed on the vapor tube.

Install the condenser

WARNING

Glass breakage!

Serious injuries from shattering and breaking glass.



- Check glass devices for damages (stars, breaks, etc.).
- Only use perfect glass devices and replace all damaged glassware as soon as possible.
- Work carefully.



CAUTION

Unintentionally rotating drive!

Injuries to hands.

- Verify that the rotation is displayed.





WARNING



Risk of injuries due to retracting or entrapment!

Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

➔ Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.

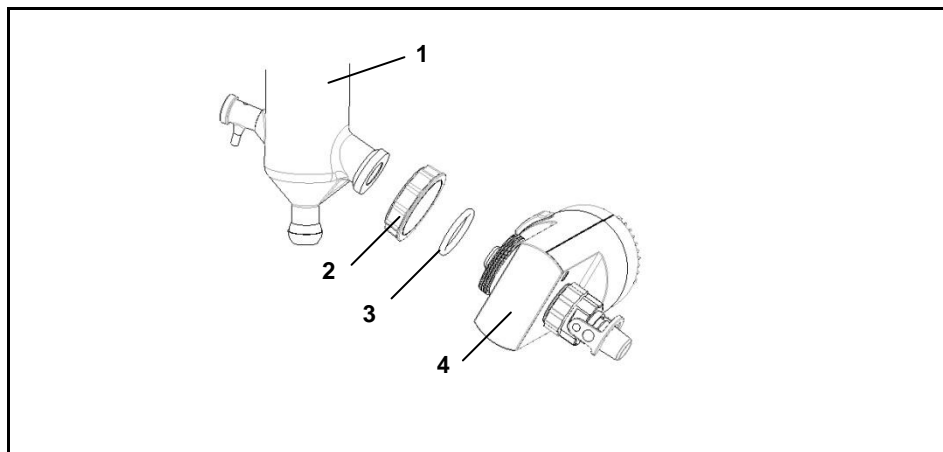


Figure 4-10: Assemble the glassware set (the example here is glassware set G1)

- | | | | |
|---|-------------------------|---|----------------|
| 1 | Condenser | 3 | Tension spring |
| 2 | Threaded clamping screw | 4 | Drive unit |

1. Version glassware sets G1 and G3:
 - Push the threaded clamping screw (2) over the condenser flange.
 - Push the spring (3) over the condenser flange.
 - Attach the condenser (1) to the drive unit (4) with the threaded clamping screw.
2. Version **glassware set G5 (depending on coolant)**:
 - Push the threaded clamping screw (2) over the cold trap jacket flange.
 - Push the spring (3) over the cold trap liner flange.
 - Screw the cold trap jacket with the threaded clamping screw to the drive unit.
 - Insert the o-ring in the sealing groove of the cold trap jacket.
 - Insert the PTFE centering ring in the cold trap jacket and insert the cold trap insert (cold finger).

The flange is suctioned compressed by the vacuum and the system is closed vacuum-tight by the inserted o-ring.

3. Version **glassware set G6 (condenser for return flow distillation)**:

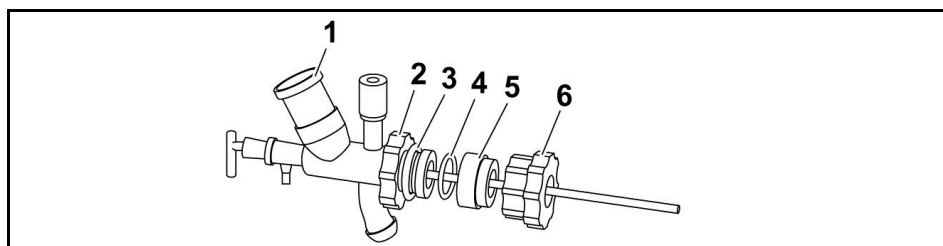


Figure 4-11: Glassware set G6

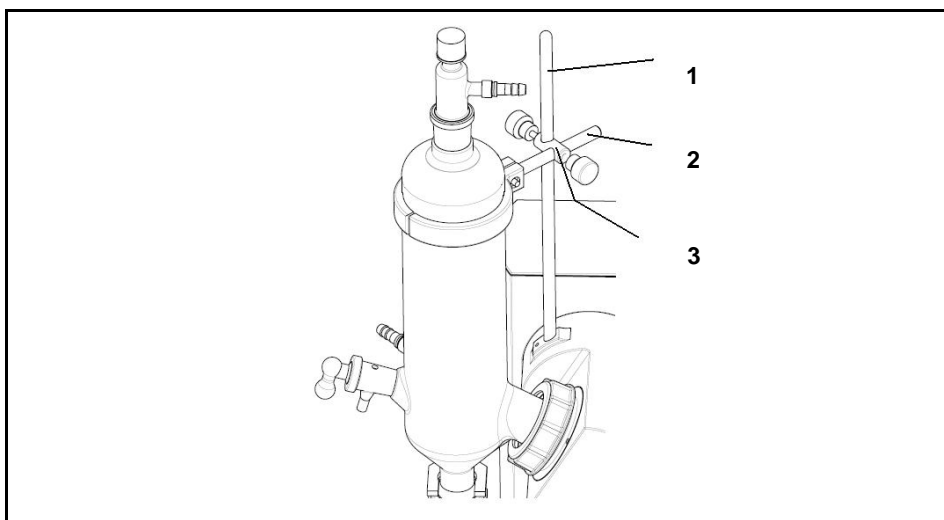
- | | | | |
|---|---------------------|---|--------------------------|
| 1 | Center piece | 4 | Gasket G6 |
| 2 | Threaded connection | 5 | G6 intermediate part (5) |
| 3 | Tension spring | 6 | G6 threaded coupling |

- Push the threaded connection (2) over the condenser flange.
- Push the spring (3) over the condenser flange.
- Screw the G6 (6) gland on the drive head (Figure 4-10 (4)).
- Insert the G6 intermediate part (5) with seal G6 (4) into the gland G6 (6).
- Screw the center piece (1) with the screw (2) on gland G6 (6).
- Insert the condenser in the upper cut on the center piece (1).

4.5.4 Mount the vertical condenser (G3-G6) in the condenser bracket

This step is omitted for horizontal condensers (G1).

- ✓ The support rod is installed.



Condenser mounting

Figure 4-12: Condenser bracket (Glassware set G3 and G6)

- | | |
|-------------------|-------------------|
| 1 Support rod | 3 Boss head clamp |
| 2 Condenser clamp | |

Version **glassware set G3 and G6**:

1. Push the boss head clamp (3) onto the support rod (1) and position with the clamping screw.
 2. Place the condenser clamp (2) around the condenser and attach on the support rod by using the clamping screw.
- Position the support rod with Allen screws (also refer to chapter 4.5.1).

Version **glassware set G5** (depending on coolant):

- Completely place the cold trap bracket into the lateral hole of the boss head clamp (2).
- Lock with the clamping screw.
- Place the cold trap bracket on the liner cold trap jacket.
- Position the liner cold trap jacket with the tension band on the cold trap bracket.
- Position the support rod (1) with an Allen screw (also refer to chapter 4.5.1).

4.5.5 Install the evaporator flask



WARNING

Glass breakage!

Serious injuries from shattering and breaking glass.



- Check glass devices for damages (stars, breaks, etc.).
- Only use perfect glass devices and replace all damaged glassware as soon as possible.
- Work carefully.



CAUTION

Unintentionally rotating drive!

Injuries to hands.

- Verify that the rotation is displayed.



WARNING

Risk of injuries due to retracting or entrapment!

Risk of injury.

- A risk of entanglement exists on the movable parts of the unit.
- Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.



Install the evaporator flask

- Install the evaporator flask with a permanent flask clamp on the vapor tube.

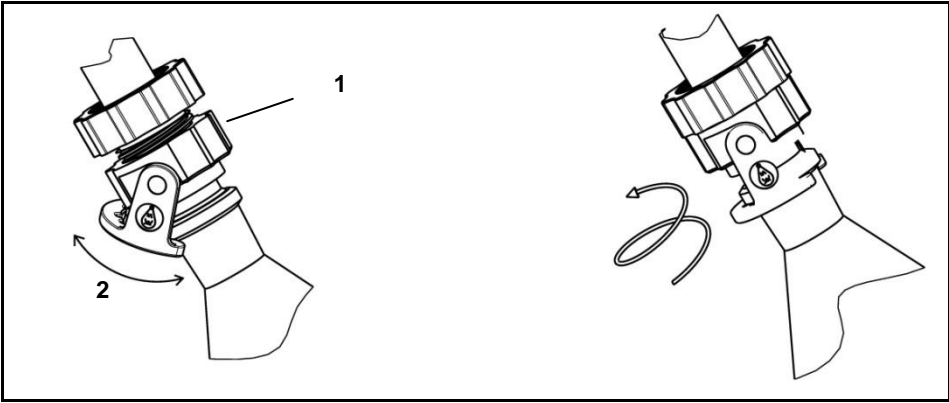


Figure 4-13: Flask clamp (swing clamp)

1 Jacknut

2 Swing clamp



The correct seating of the swing clamp on the flange of the evaporator flask must be observed!

4.5.6 Setting the evaporator flask inclination

The inclination of the evaporator flask can be set by turning the drive unit.

Setting the evaporator flask inclination

CAUTION



Unintentionally rotating drive!

Injuries to hands.

→ Verify that the rotation is displayed.



WARNING



Risk of injuries due to retracting or entrapment!

Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

→ Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.



WARNING



Glass breakage!

Serious injuries from shattering and breaking glass.

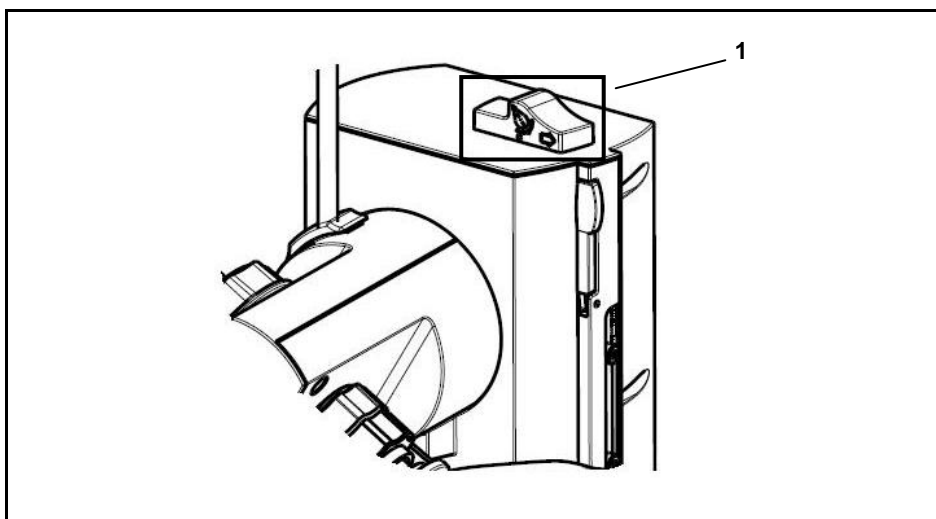


→ Check glass devices for damages (stars, breaks, etc.).

→ Only use perfect glass devices and replace all damaged glassware as soon as possible.



→ Work carefully.



Evaporator flask inclination and immersion depth

Figure 4-14: Evaporator flask inclination / immersion depth

1. Grasp the condenser with the left hand.
2. Unlock the locking device (1) at the lift column toward the right by applying pressure with your right hand.
3. Set the evaporator flask inclination by carefully swinging the condenser.
4. Position the locking device by releasing and snapping it in.

4.5.7 Setting the immersion depth of the evaporator flask



CAUTION



Unintentionally rotating drive!

Injuries to hands.

→ Verify that the rotation is displayed.



WARNING



Risk of injuries due to retracting or entrapment!

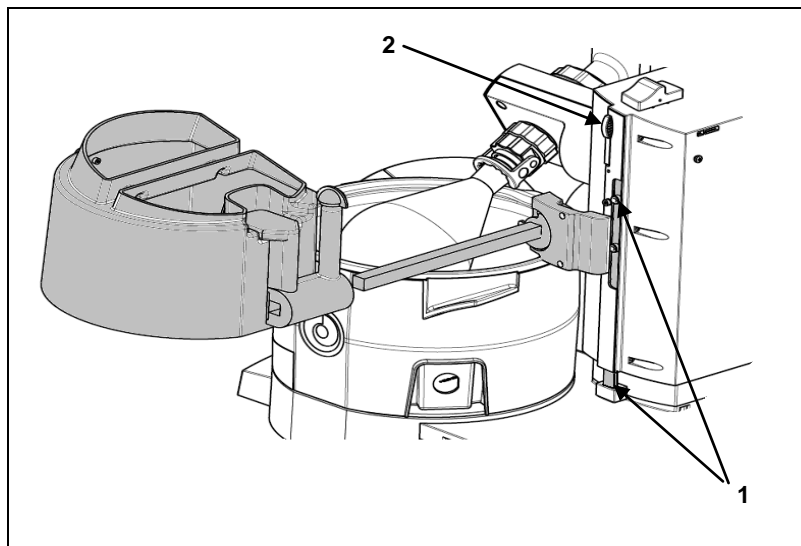
Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

→ Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.



In order to always guarantee the same immersion depth of the evaporator flask, we recommend locking the immersion depth.



✓ Height stop (1) in the top position.

1. Version without a protective cover:

- Open the locking lever of the height (2) on the right of the lift column.

Manually push the height stop (1) down.

- Move the lift down until the desired immersion depth is reached.

2. Close the locking lever on the right of the lift column.

- The immersion depth of the evaporator flask is locked.

3. Version **with a protective cover**:

- Move the lift down until the desired immersion depth is reached.

- Hold the protective cover with your hand.

- Open the locking lever on the right of the lift column.

4. Feed the protective cover with your hand.

5. Close the locking lever on the right of the lift column.

The immersion depth of the evaporator flask is locked.

4.5.8 Release the evaporator flask from the vapor tube

WARNING

Glass breakage!



Serious injuries from shattering and breaking glass.



- Check glass devices for damages (stars, breaks, etc.).
- Only use perfect glass devices and replace all damaged glassware as soon as possible.
- Work carefully.



CAUTION

Unintentionally rotating drive!



Injuries to hands.

- Verify that the rotation is displayed.



WARNING

Risk of injuries due to retracting or entrapment!



Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

- Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.



WARNING

Hot media!



Burns.

- Do not touch the interior and the upper edge of the heating bath, the evaporator flask and the heating bath liquid.

- Wear suitable heat protection gloves when changing the evaporator flask.



1. Switch off the rotation.
2. Move the evaporator flask up from the bath (see chapter 4.4.6).
3. Let the evaporator flask cool.
4. Release the vapor tube coupling clamp flask ejector nut.

WARNING

Glass breakage!



Serious injuries from shattering and breaking glass.



- Check glass devices for damages (stars, breaks, etc.).
- Work carefully.



5. Release the flask from the vapor tube (Figure 4-6 (7)) by turning the vapor tube coupling clamp flask ejector nut counter-clockwise by supporting the flask.
6. Hold the evaporator flask and release the flask clamp.
7. Carefully remove the flask.

4.5.9 Insert the inlet tube

Insert the inlet tube

The inlet tube consists of:

- Stopcock (Stopper)
- PTFE tube
- Drain-off plate

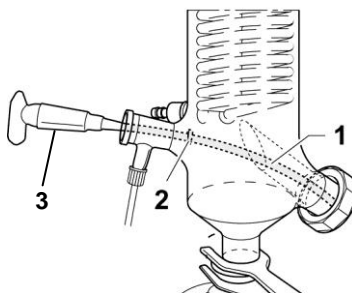


Figure 4-15: Insert the inlet tube

- | | |
|-------------|-------------------|
| 1 PTFE tube | 2 Drain-off plate |
| 3 Stopcock | |

1. Shorten the PTFE tube (1) to the desired length.
2. Grease the stopcock (3) (optional) for ideal vacuum.
3. Position the drain-off plate (2) so that the condensed liquid cannot return to the evaporator flask via the PTFE tube (1).
4. Insert the inlet tube

4.5.10 Assemble the inlet tube

Assemble the inlet tube

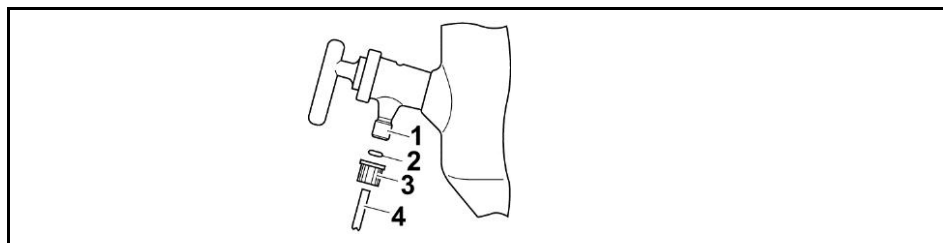


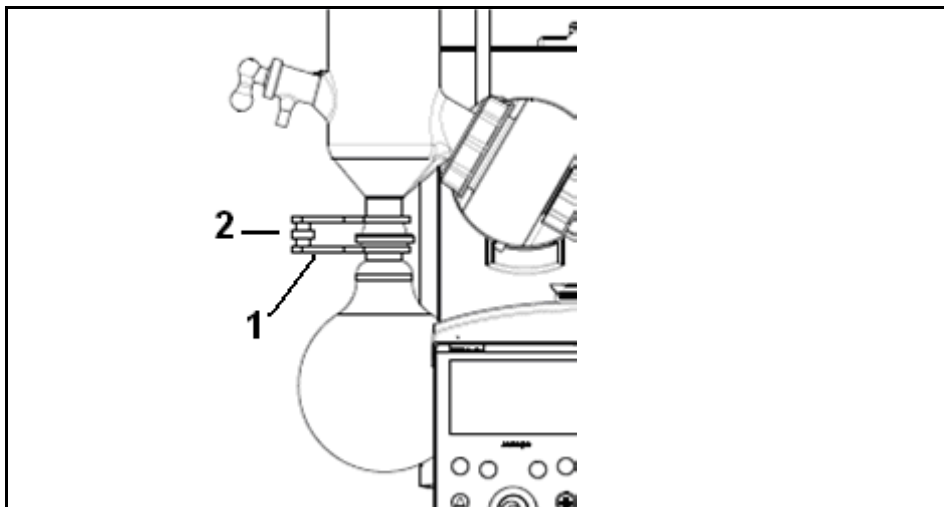
Figure4-16: Assemble the inlet tube

- | | |
|--------------------------|--------------|
| 1 Inlet valve connection | 3 Cap |
| 2 Seal | 4 Inlet tube |

1. Guide the inlet tube (4) through the cap (3) and seal (2) assembled on the inlet valve connection (1).
2. Turn the cap (3) to the right on the inlet valve connection (1).

The inlet tube (4) is assembled on the inlet valve connection (1).

4.5.11 Assemble the collecting flask



1. Hold the receiving flask with the ball-socket clamp KS 35 (1) to the condenser.
2. Secure with a knurled head screw (2).

The socket joint of the receiving flask is attached to the ball joint of the condenser via pinch clamp KS 35.

4.5.12 Connect the cooling medium (except G5)

- Use a suitable tube with an inner diameter of 7-8 mm (i.e. hose set (see accessories 10.2))

Connect the cooling medium

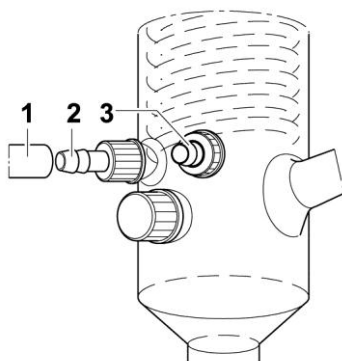


Figure 4-17: Connect the coolant

- | | |
|-----------------------------|-------------------------|
| 1 Tube (coolant inlet) | 3 Return (GL hose barb) |
| 2 Connectors (GL hose barb) | |

3. Push the tube (coolant supply) (1) onto the hose barb of the inlet connector. Proceed accordingly with the return hose barb (3) of the coolant.
4. Secure with hose clamps.

Feed and return of the coolant are connected by screwing caps onto glass threads.

4.5.13 Connect the vacuum

Woulff flask with vacuum valve

The Woulff flask is connected to the vacuum valve (except in the Hei-VAP Precision with Rotavac vario control or with Rotavac vario tec).



WARNING

Imploding glass devices!

Serious injuries from shattering glass.



- Check glass devices for damages (stars, breaks, etc.).
- Only use perfect glass devices and replace all damaged glassware as soon as possible.

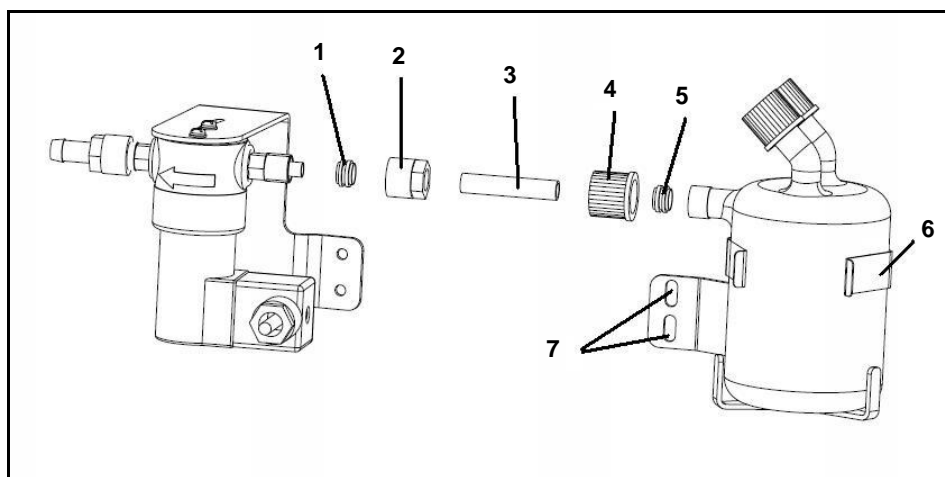
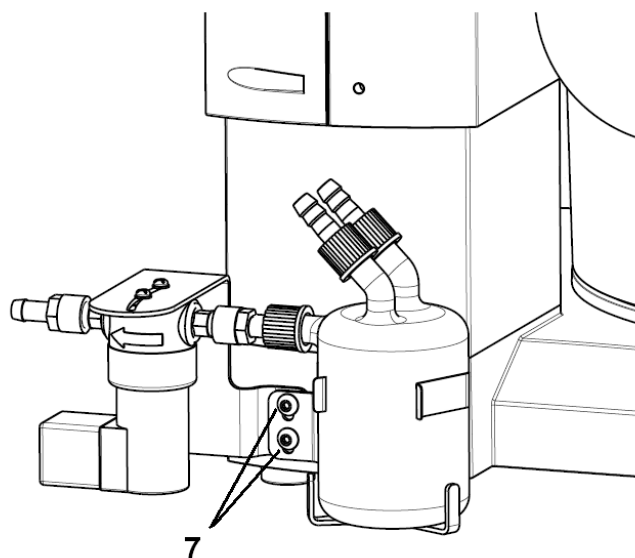


Figure 4-18: Connect the Woulff flask with vacuum valve

- | | | | |
|---|------------------------------|---|------------------------|
| 1 | Ferrule for the vacuum valve | 5 | Ferrule for the bottle |
| 2 | Cap nut | 6 | Mounting brackets |
| 3 | PTFE tube section | 7 | Screws |
| 4 | Threaded fitting cap | | |



1. Unscrew the threaded fitting (4) from the Woulff bottle, remove the hose clamp ring (5).
 2. Place the enclosed PTFE tube section (3) in the cap nut (2) and tighten the cap nut (2).
 3. Push the threaded connection (4) on the PTFE tube section (3), also push on the ferrule compression fitting (5).
 4. Connect the Woulff bottle with the ferrule compression fitting (1).
 5. The vacuum valve and Woulff bottle are connected.
 6. Attach the connected Woulff bottle and the vacuum valve with the mounting brackets (6) and two screws (7) to the base unit.
- ✓ Suitable vacuum source is available.
 - ✓ Suitable vacuum tube (7-8 mm) is available.

Connection
Vacuum to the
glassware set

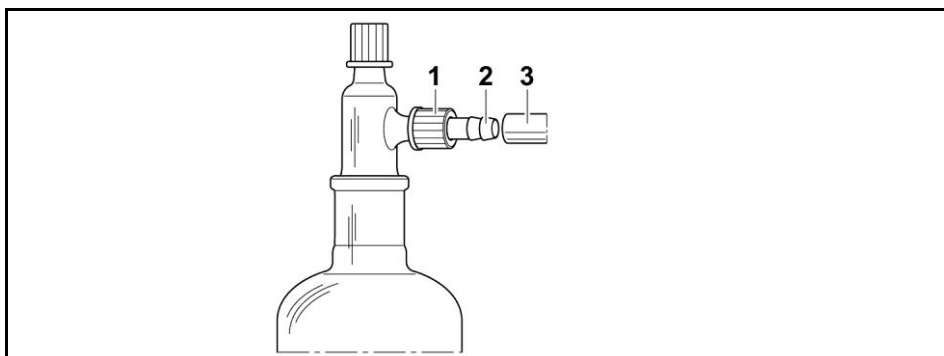


Figure 4-19: Vacuum connection

- | | |
|---|----------------------|
| <p>1 Threaded fitting cap</p> <p>2 Connector (GL hose barb)</p> | <p>3 Vacuum tube</p> |
|---|----------------------|

1. Connect the vacuum hose (3) to the hose barb connector (2) to the threaded fitting cap (1).

Hose connection of individual vacuum systems, refer to the following pages.

Vacuum connec-
tion

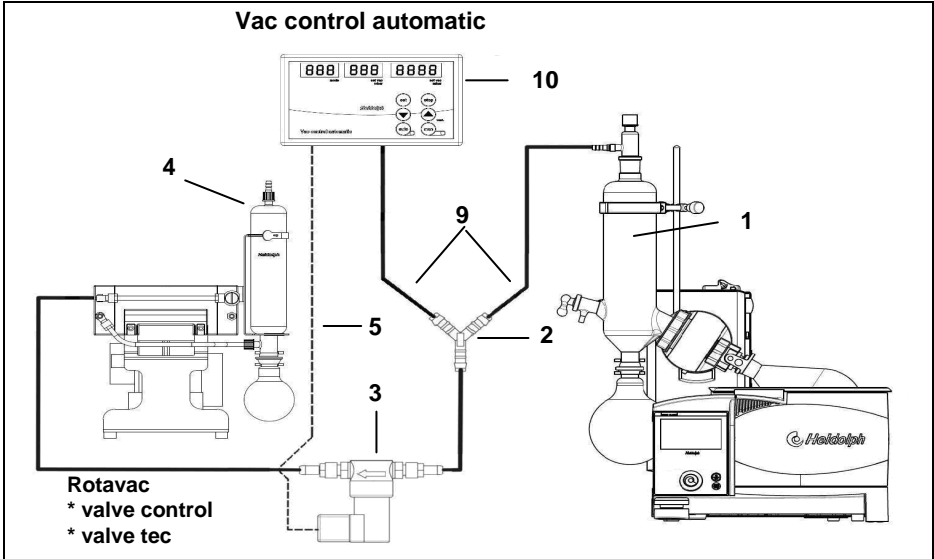


Figure 4-20: Hei-VAP Advance with Rotavac valve control and Vac control automatic

- | | | | |
|---|------------------------------|----|-----------------------|
| 1 | Condenser | 8 | |
| 2 | Y-piece | 9 | Vacuum tube |
| 3 | Vacuum valve | 10 | Vac control automatic |
| 4 | Condensate cooler (optional) | 11 | |
| 5 | Vacuum valve cable | 12 | |
| 6 | | 13 | |
| 7 | | | |

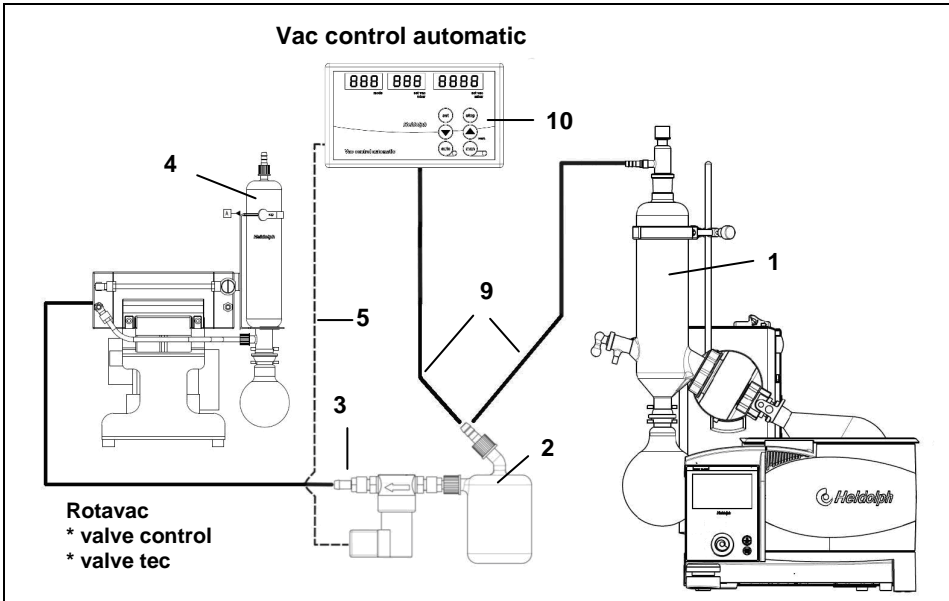


Figure 4-21: Hei-VAP Advance with Rotavac valve control and Vac control automatic and with Woulff bottle

- | | | | |
|---|------------------------------|----|-----------------------|
| 1 | Condenser | 8 | |
| 2 | Woulff bottle | 9 | Vacuum tube |
| 3 | Vacuum valve | 10 | Vac control automatic |
| 4 | Condensate cooler (optional) | 11 | |
| 5 | Vacuum valve cable | 12 | |
| 6 | | 13 | |
| 7 | | | |

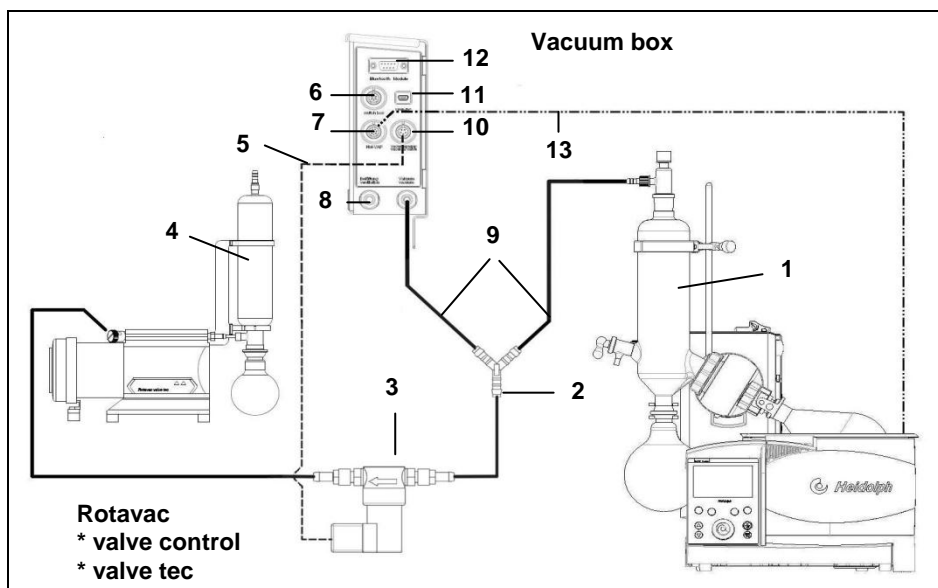


Figure 4-22: Hei-VAP Precision with Rotavac valve control and vacuum box

- | | | | |
|---|------------------------------|----|-------------------------------|
| 1 | Condenser | 8 | Ventilation / inert gas |
| 2 | Y-piece | 9 | Vacuum tube |
| 3 | Vacuum valve | 10 | Vacuum valve cable connection |
| 4 | Condensate cooler (optional) | 11 | USB PC connection |
| 5 | Vacuum valve cable | 12 | Bluetooth module |
| 6 | Switch box connection | 13 | Data cable |
| 7 | Hei-VAP connection | | |

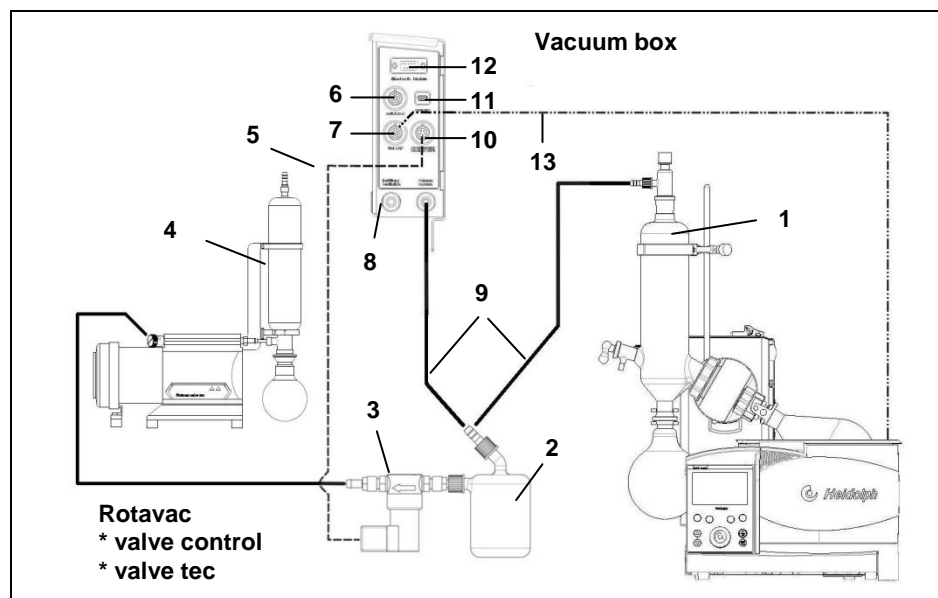


Figure 4-23: Hei-VAP Precision with Rotavac valve control and vacuum box and with Woulff bottle

- | | | | |
|---|------------------------------|----|-------------------------------|
| 1 | Condenser | 8 | Ventilation / inert gas |
| 2 | Woulff bottle | 9 | Vacuum tube |
| 3 | Vacuum valve | 10 | Vacuum valve cable connection |
| 4 | Condensate cooler (optional) | 11 | USB PC connection |
| 5 | Vacuum valve cable | 12 | Bluetooth module |
| 6 | Switch box connection | 13 | Data cable |
| 7 | Hei-VAP connection | | |

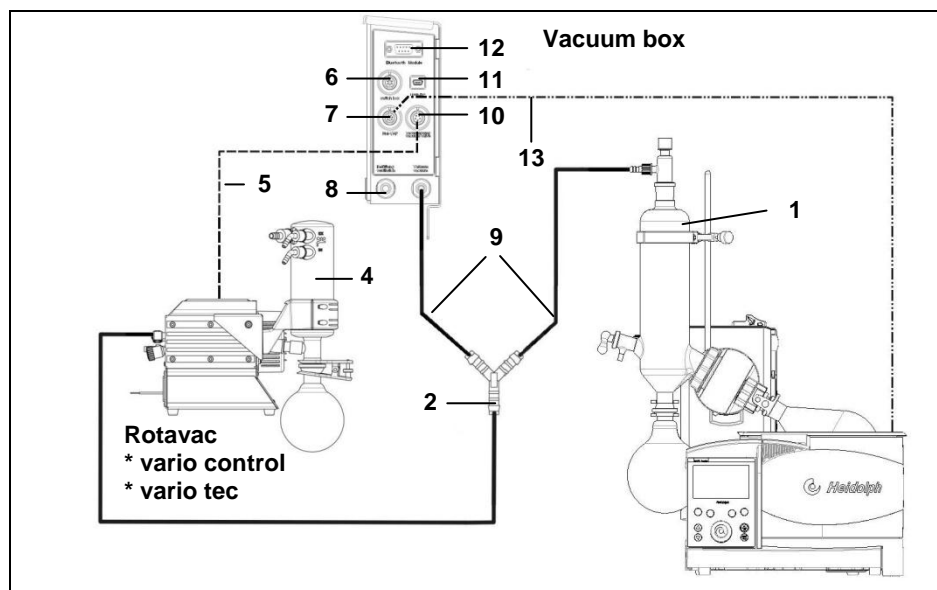


Figure 4-24: Hei-VAP Precision with Rotavac vario tec and vacuum box

- | | | | |
|---|---|----|-------------------------|
| 1 | Condenser | 7 | Hei-VAP connection |
| 2 | Y-piece | 8 | Ventilation / inert gas |
| 4 | Emission condensate cooler (optional) | 9 | Vacuum tube |
| 5 | Control cable | 10 | Vacuum pump connection |
| | Rotavac vario control / Rotavac vario tec | 11 | USB PC connection |
| 6 | Switch box connection | 12 | Bluetooth module |
| | | 13 | Data cable |

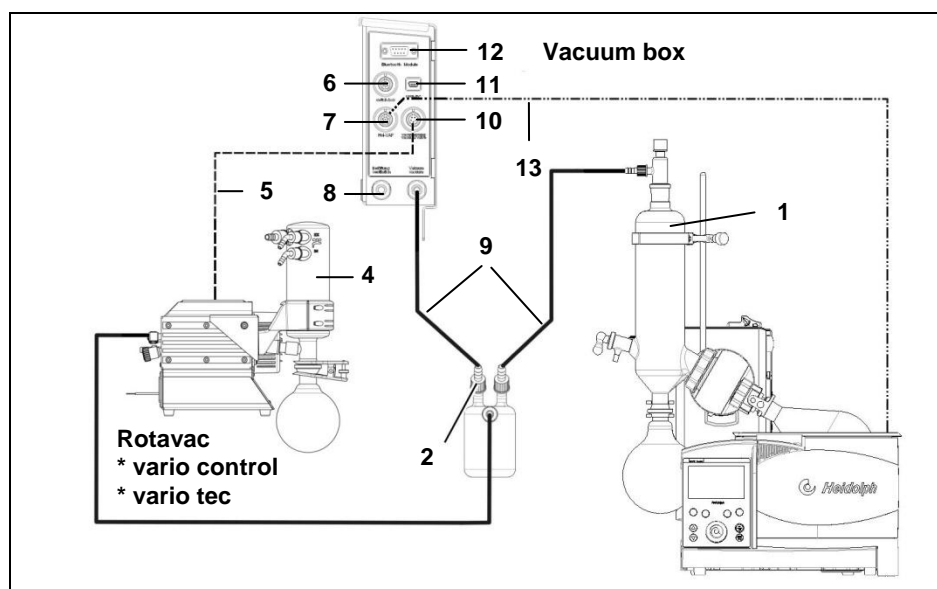


Figure 4-25: Hei-VAP Precision with Rotavac vario tec and vacuum box with Woulff bottle

- | | | | |
|---|---|----|-------------------------|
| 1 | Condenser | 7 | Hei-VAP connection |
| 2 | Woulff bottle | 8 | Ventilation / inert gas |
| 4 | Emission condensate cooler (optional) | 9 | Vacuum tube |
| 5 | Control cable | 10 | Vacuum pump connection |
| | Rotavac vario control / Rotavac vario tec | 11 | USB PC connection |
| 6 | Switch box connection | 12 | Bluetooth module |
| | | 13 | Data cable |

4.6 Feed the distilled material

Additional distillation material can be supplied during the distillation under vacuum via the inlet tube and the inlet pipe.

Inlet tube

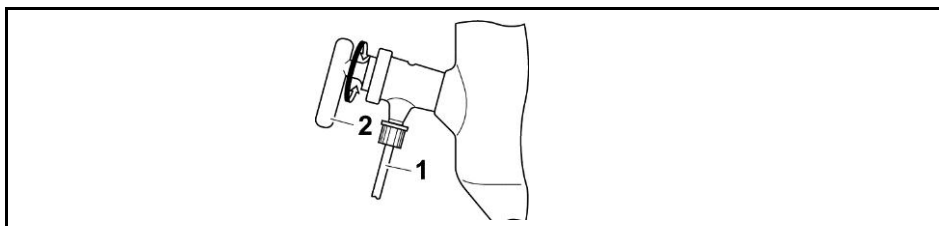


Figure 4-26: Inlet tube

- 1 Inlet tube 2 Stopcock

1. Place the inlet tube (1) in the additional distillation material.
2. Turn the stopcock (2) parallel to the inlet tube (1).

The additional distillation material is suctioned into the evaporation flask while system is under vacuum.

4.7 Ventilate manually

The system can be ventilated with the valve stopcock (Figure 4-26 (2)) of the inlet pipe.

- ➔ Slowly turn the stopcock (Figure 4-26 (2)) of the inlet tube upward.

The system will be ventilated.

4.8 Assemble / connect accessories

Protective hood

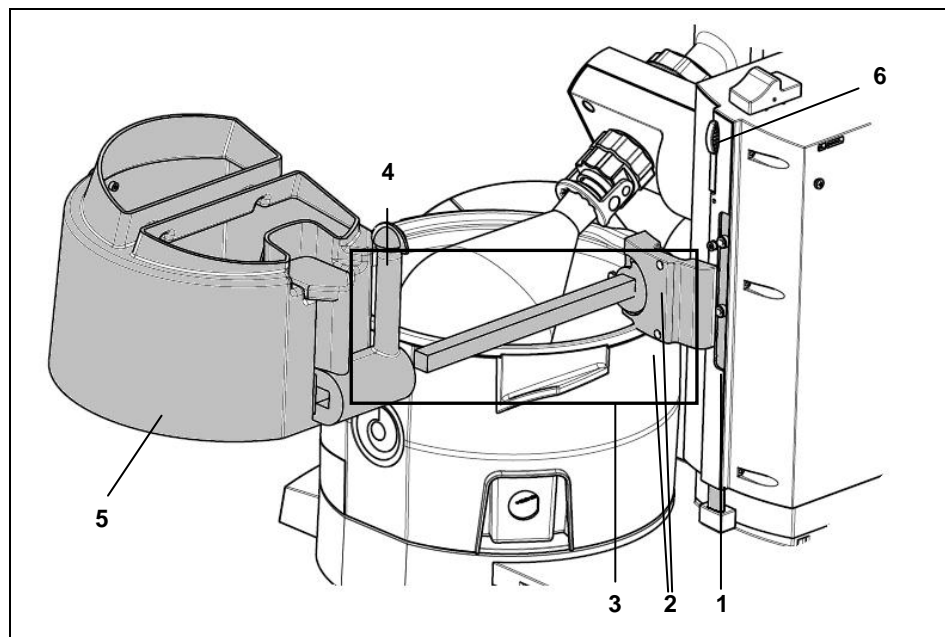


Figure 4-27: Assemble the protective cover

- | | | | |
|---|---------------|---|------------------|
| 1 | Height stop | 4 | Lock screw |
| 2 | Allen screws | 5 | Protective hood |
| 3 | Support cover | 6 | Height stop lock |

1. Screw the support cover (3) to the height stop (1) by using the two enclosed Allen screws (2).
2. Release the clamping screw (4) and align the cover (5) over the heating bath by shifting horizontally.
3. Tighten the clamping screw.

The cover is assembled. The cover can be opened by the handle.

Protective shield

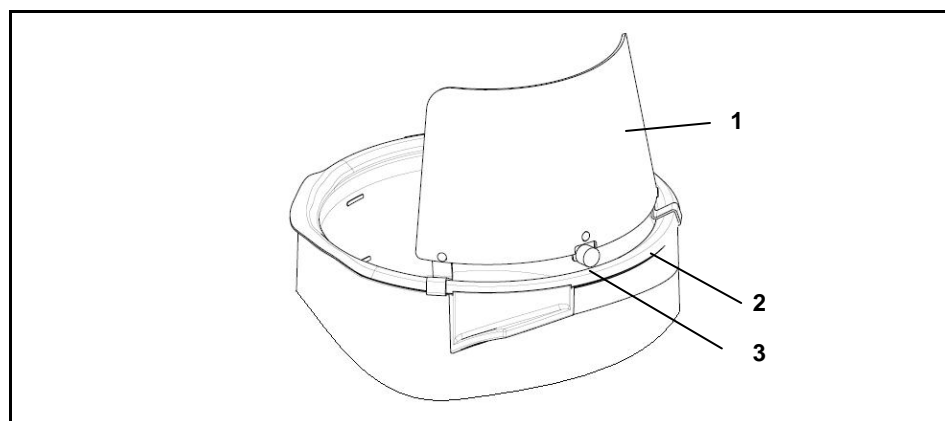


Figure 4-28: Assemble the protective shield

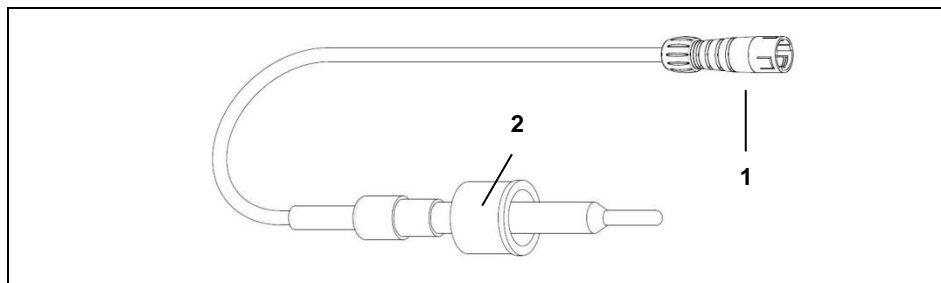
- | | | | |
|---|-------------------|---|-----------------|
| 1 | Protective shield | 3 | Eccentric screw |
| 2 | Heating bath | | |

1. Move the lift upward.
2. Attach the protective shield (1) on the edge of the heating bath (2) and position so that the (possibly available) cover can be easily opened.

- Turn the eccentric screw (3) by 180° and use it to attach the protective shield on the heating bath.



When using the cover and the protective shield, take care that the two parts do not jam.



Vapor temperature sensor (Hei-VAP Advantage, Hei-VAP Precision)

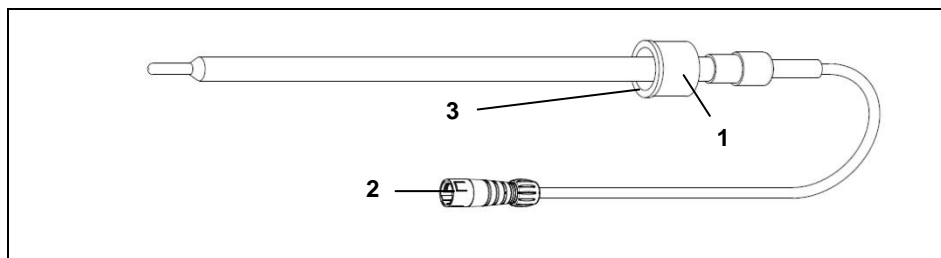
Figure 4-29: Vapor temperature sensor

- | | |
|------|------|
| 1 | 2 |
| Plug | Seal |



The vapor temperature sensor cannot be used when using the temperature sensor Auto_{accurate} sensor.

- Unscrew the threaded fitting on the condenser.
- Insert the vapor temperature sensor so in the condenser that the white PTFE side of the seal (2) points to the glass thread.
- Screw the vapor temperature sensor together with the threaded fitting.
- Connect the plug (1) in the socket on the tower to the left of the unit (see chapter 5).



Temperature sensor Auto_{accurate} sensor

Figure 4-30: Temperature sensor Auto_{accurate} sensor

- | | |
|----------------------|-------------------------------|
| 1 | 3 |
| Threaded fitting cap | PTFE side of the sealing tube |
| 2 | |
| Plug | |

Only in conjunction with glassware sets G3 and G6.



Set the depth at which the temperature sensor Auto_{accurate} sensor projects into the condenser so that the lower edge of the sensor is located at 2/3 of the condenser's height.

- Unscrew the threaded fitting on the vacuum port.
- Insert the Auto_{accurate} sensor into the vacuum port so that the white PTFE side (3) of the seal points to the glass thread.
- The depth of the Auto_{accurate} sensor is set on the condenser by adjusting the Auto_{accurate} sensor.
- Screw together the Auto_{accurate} sensor with the threaded fitting (1).
- Connect the plug (2) in the socket on the tower to the left of the unit (see chapter 5).

4.9 Operating the control panel

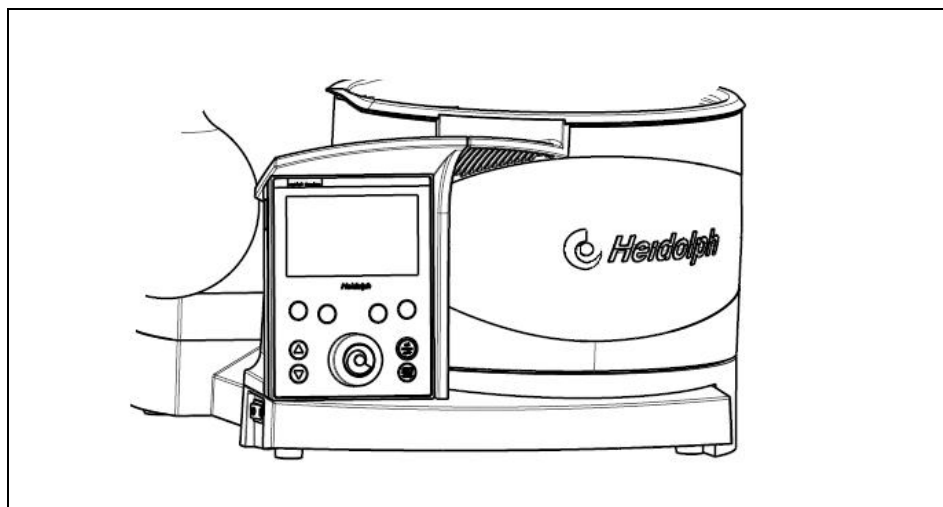


Figure 4-31: Control panel (for Hei-VAP Precision)



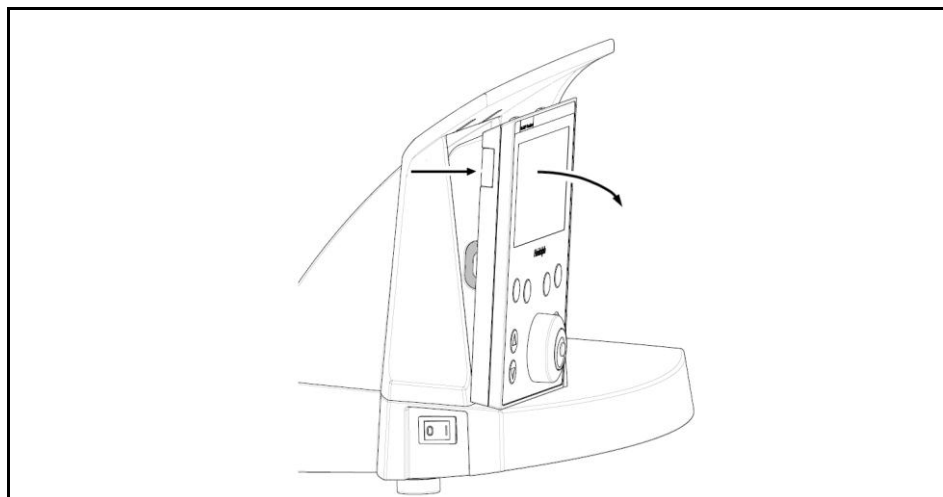
The control panel can be removed from the base unit.

The 1.3 m connecting cable between the control panel and the base unit can be adjusted to the optimal length by a cable run and reel.

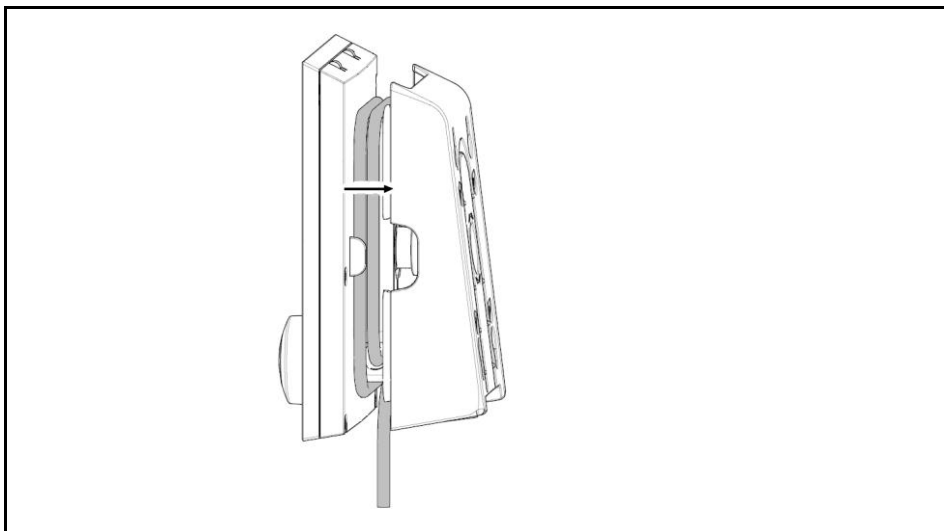
The control panel can therefore be placed on a shelf and offers a slight inclination for a view from above.

The control panel can be attached to a wall by pre-fabricated holes or by an enclosed Velcro-connection.

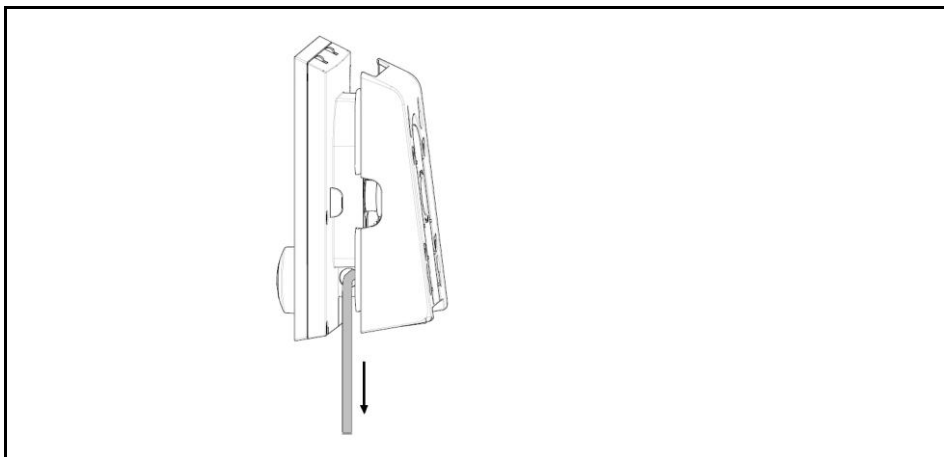
Remove the control panel



1. Grasp the control panel on the left and pull it forward from the base unit.
Avoid pressure on the LCD screen.

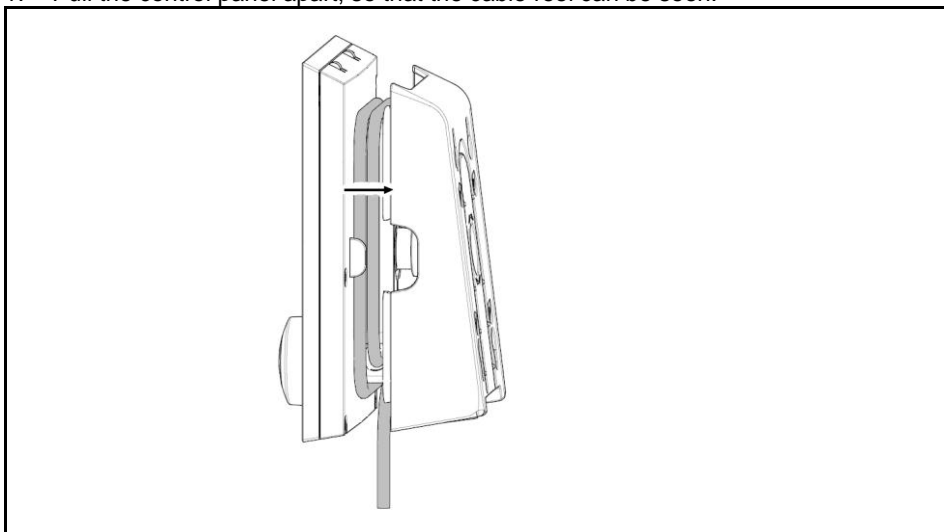


2. The cable reel is surrounded by a shell.
3. Pull the control panel apart, so that the cable reel can be seen.
The cable reel is surrounded by a shell.



4. Reel in the cable to the desired length by wrapping the cable around the reel.
5. Press the shell to the control panel.

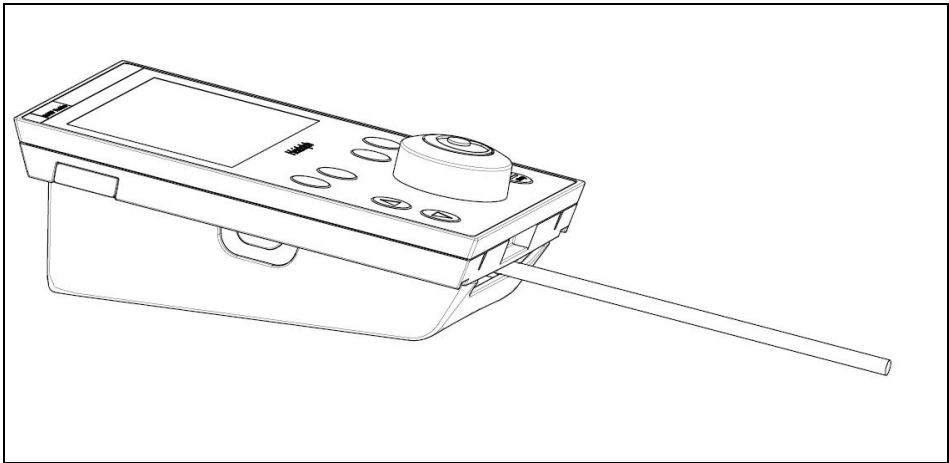
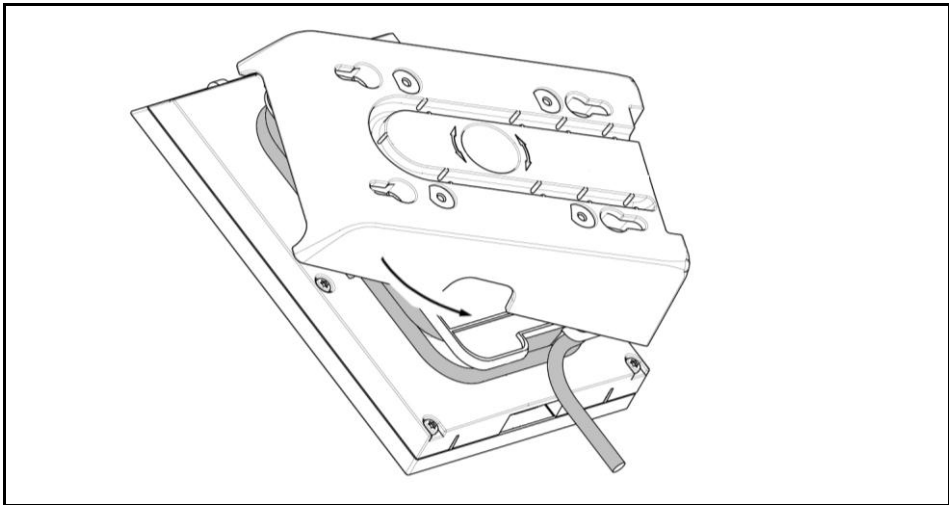
1. Pull the control panel apart, so that the cable reel can be seen.



2. Reel in the cable to the desired length by wrapping the cable around the reel.
3. Press the shell to the control panel.

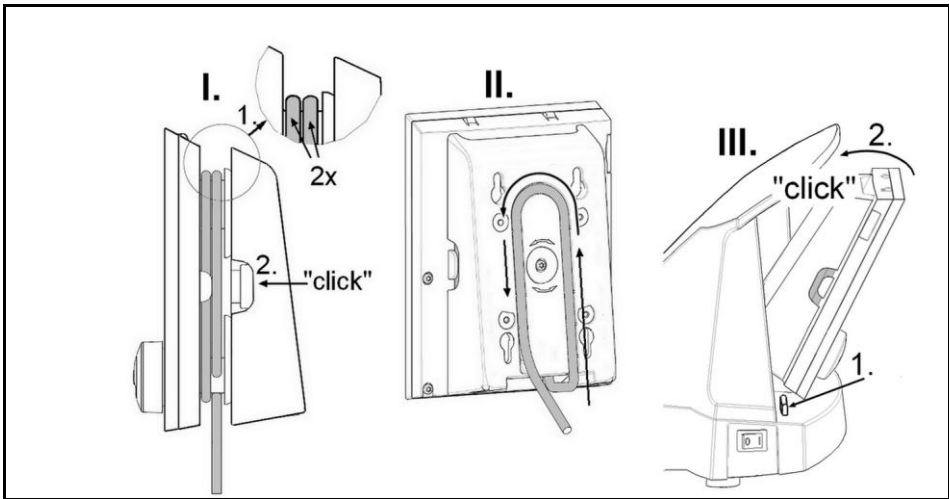
Control panel. Operation

The shell can be turned by 180° as desired, in order to adjust the surface and view to the control panel.

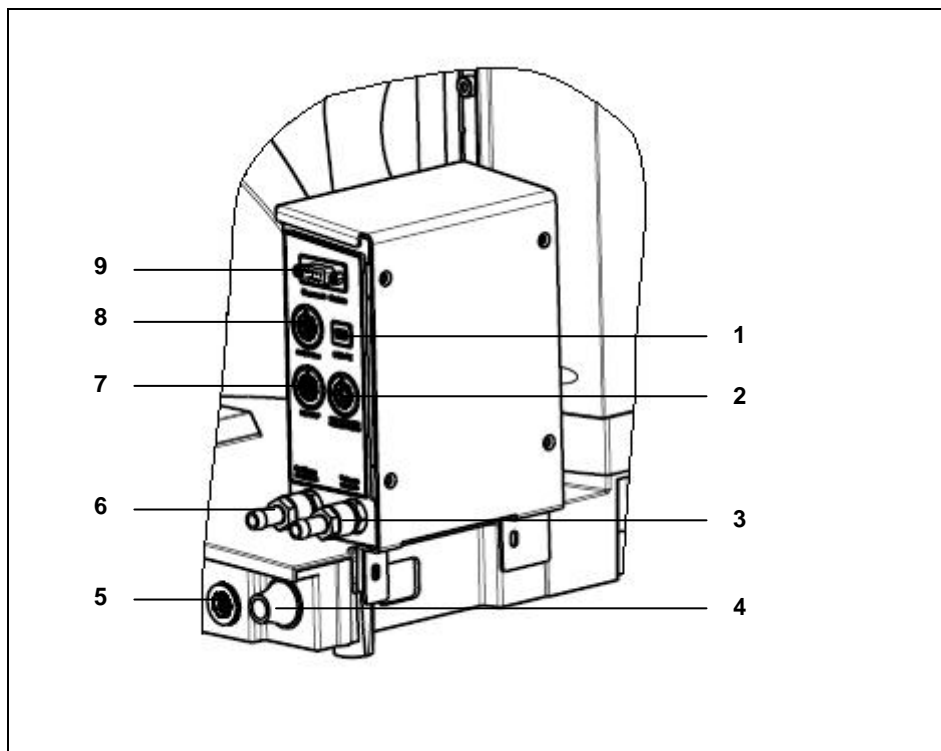


4. Place the control panel on the prefabricated guide rails that snap in and attach on the wall or deposit it on a stable surface.

Attaching the control panel to a fixture



1. Attach the control panel back to the basic device.



*Hei-VAP Precision
with vacuum box*

Figure 4-32: Vacuum box (for Hei-VAP Precision)

- 1 USB PC connection
 - 2 Vacuum pump/Vacuum valve connection
 - 3 Suction side of vacuum
 - 4 Connecting line outlet to the heating bath
 - 5 Vacuum box connection
 - 6 Ventilation / inert gas
 - 7 Hei-VAP connection
 - 8 Switch box connection
 - 9 Bluetooth module
1. Place the vacuum box on the guiderails behind the heating bath. The vacuum box bracks must be located above the holes.
 2. Place the enclosed screws (2 pieces) in the holes with thread through the bracket of the vacuum box.
 3. Tighten the fastening screw.
 4. Insert the necessary or applicable connections (2, 3, 4, 5, 7, 8) into the Vacuum box.

5 Switching on the base unit

1. Switch on the base unit by pressing the toggle switch of the power switch.
2. The power switch of the base unit must be in the "1" position.



Figure 5-1: Base unit

1 Power switch

2 Temperature sensor connector

6 Operation of the Hei-VAP Precision

The basic steps of operating the rotary evaporator Hei-VAP Precision will be explained in this chapter.

The parameters for the distillation are set and monitored via the control panel.

The set parameters are stored. The last used parameters will appear after a restart.



Figure 6-1: Control panel of Hei-VAP Precision (with Motor Lift)

- 1 Pushbutton for the button activation of soft key display
- 2 Menu line of programs
- 3 Pushbutton heating bath on/off (hard key)
- 4 Soft key display functions
- 5 Pushbutton rotation start/stop (hard key)
- 6 Rotary pushbutton controller (Hei-GUIDE)
- 7 Pushbutton lift down
- 8 Pushbutton lift up

The actual value display is always the start screen. All current actual values are displayed as large numbers and the target values as small numbers.

The programs of the top menu bar are highlighted by turning the rotary pushbutton controller **Hei-GUIDE**. The **Hei-GUIDE** walks through the programs going from left and right. An "<" or ">" shows the direction in which the rotary pushbutton controller can be turned, in order to reach the non-visible menu elements.

The highlighted menu element is activated by pressing the **Hei-GUIDE** and the status screen changes to the respective menu.

The user can change the displayed settings in these menus.

Turning the **Hei-GUIDE** is sufficient to change between individual entries. The selected entry is always highlighted.

The selected entry will be called up when pressing the **Hei-GUIDE**. The desired value can be set when turning the **Hei-GUIDE**.

The lower functions in the menu are activated via the grey softkeys.

6.1 Setting the language

- ✓ The unit is switched on.
- 1. Activate the menu line function "**Setup**" by using the rotary pushbutton controller **Hei-GUIDE** (6).
- 2. The menu opens by pressing the **Hei-GUIDE** (6).
- 3. Activate the entry "**language**" highlighted in blue.
The currently set language is located next to the "language" entry.
- 4. The marking changes to orange after pressing the **Hei-GUIDE** (6) and is activated for setting the parameter.
- 5. Select the desired language by using the rotary pushbutton controller **Hei-GUIDE** (6).
- 6. The setting is accepted by pressing it again.
The text will be displayed in the selected language.
- 7. You will change to the actual value display by selecting the menu entry "**accept (OK)**".
All changes in the menu view are discarded with soft key "**Esc**" (1).

6.2 Context Help

The context sensitive help menu function shows detailed information of the just selected menu item (such as "heating bath", "rotation"...). This provides additional information to aid operator in use of the Hei-VAP Precision controller.

It can be switched on and off in the setup menu. When the context-sensitive help is shown, it hides all current actual values on the right side.



The context help is switched off when shipped.
➔ Activation via the "setup" menu.

- ✓ The unit is switched on.
- 1. Activate the menu element "**Setup**" by using the rotary pushbutton controller **Hei-GUIDE** (6).
- 2. The menu opens by pressing the **Hei-GUIDE** (6).
- 3. Activate the entry "**context help**" highlighted in blue.
- 4. The marking changes to orange after pressing the **Hei-GUIDE** (6) and activated for setting the parameter.
- 5. Select the desired status "**on/off**" by turning the **Hei-GUIDE** (6).
- 6. The selection is confirmed by pressing the **Hei-GUIDE** (6) again.
Context help will be displayed.
- 7. You will change to the actual value display by selecting the menu entry "**accept (OK)**".
All changes in the menu view are discarded with softkey "**Esc**" (1).

6.3 Setting the rotation speed (actual value displays of all modes)

- ✓ The unit is switched on.
- ✓ The rotation is switched off (pushbutton **Rotation start/stop**).
- ✓ Actual value display



The range can be set from 10 - 280 [rpm] in 1 [rpm] increments.
100 [rpm] are set as default when shipping from the factory.

1. Select the entry "rotation" by turning the **Hei-GUIDE** (6) and call up the selected entry to be changed by pressing the **Hei-GUIDE** (6) again.
2. Turn the rotary pushbutton controller **Hei-GUIDE** (6) to set the desired rotation speed. The rotation speed is readjusted synchronously as an active rotation.
3. Pressing it again confirms the change. The entry is exited after 10 seconds, in order to rule out accidental adjustments.
4. Activate the **Rotation start/stop** (5) pushbutton to start the rotation.

The set speed appears on the screen.

6.4 Setting the heating bath temperature (Actual value displays of all modes)

- ✓ The heating bath is filled with heat transfer liquid.
- ✓ The rotary evaporator is operational and switched on at the power switch of the base unit (Figure 5-1 (1)).



WARNING

Hot surfaces during the operation of the heating bath!



Burns.

- ➔ Do not touch the interior and the upper edge of the heating bath, the evaporator flask and the heating bath liquid.
- ➔ Wear suitable heat protection gloves when changing the evaporator flask.



CAUTION

Overheated heating bath!



Property damage and visual changes of the heating bath.

- ➔ Never operate the heating bath without liquid.



The range can be set from 20 - max. temperature of the heating bath [°C] in 0.5 [°C] increments. 20 C [°C] are set as default when shipping from the factory.



Only use suitable oil as heat carrier for target temperatures above 100 °C (observe safety data sheets, refer to chapter 11.3 and chapter 4.4.2).

1. Switch on the heating bath by pressing the pushbutton **heating bath on/off** (3).
The illuminated yellow control ring of pushbutton **heating bath on/off** (3) shows that the heating bath is activated. An icon [heat waves] in the display shows that the bath is in the heating phase (current flows into the heating coils of the bath).
2. Select the entry "heating bath" by turning the **Hei-GUIDE** (6) and call up the selected entry to be changed by pressing the **Hei-GUIDE** (6) again.
3. Pressing it again confirms the change.

6.5 Calculating the vapor temperature (with an optional vapor temperature sensor)



- If a vapor temperature sensor is connected during the operation:
- ➔ Switch the unit off and on to activate the program part.

The vapor temperature is displayed on the screen of the control panel when the vapor temperature sensor is connected.

6.6 Process modes

The Hei-VAP Precision forms a unit with the control panel, the vacuum box and the vacuum valve, in which the vacuum is controlled by opening and closing a valve. The vacuum valve is not required when using a speed-controlled pump.



The ventilation valve in the vacuum box is always open when the vacuum control is switched off.

WARNING**Imploding glass devices!**

Serious injuries from shattering glass.



- ➔ Check glass devices for damages (stars, breaks, etc.).
- ➔ Only use perfect glass devices and replace all damaged glassware as soon as possible.



6.7 SET_{pressure} mode

The vacuum is controlled and maintained at the set pressure in the SET_{pressure} mode.

6.7.1 Menu display

The following values can be changed in the menu view:

Heating bath	Setting of the bath temperature. Setting range is between 20 °C and maximum heating bath temperature (MAX TEMP is adjustable in Setup) with a highest range of 210 °C.
Rotation	Setting of rotation speed of the distillation flask. Setting range is between 10 and 280 rpm.
Vacuum	Setting of the absolute pressure in the rotary evaporating system. Setting range is between 1 and safety pressure (SAFETY PRESSURE is adjustable in Setup) with a high limit of 1200 mbar.
Max. power pump	Vacuum pump (Vario Models) throughput % to maximize pump power. Setting range is between 10 and 100 %. Reduction of the throughput leads to higher solvent recovery rates.
Hysteresis	The value of the hysteresis indicates how much the pressure may rise (in mbar) before the vacuum valve is opened. Setting range is between 1 and 50 mbar (only by using valve controlled pumps Rotavac valve control, Rotavac valve tec, or House vacuum source).
Timer	Setting of the timer to shut down the process. Setting range is between 1 and 1440 minutes. For continuous operation choose "off" for Timer setting. The heating bath at the end of a timed run can be set to turn off (Parameter found in Setup).

Selecting the entry by turning the **Hei-GUIDE** (6)

1. Call up the selected entry to be changed by pressing the **Hei-GUIDE** (6) (entry will be highlighted in orange).
2. Set the value by using the rotary pushbutton controller **Hei-GUIDE** (6).
3. Pressing it again confirms the change. Softkey "**Esc**" (1) terminates the change of the currently processed entry.
4. The new settings are accepted by the "**accept**" entry. It is changed to the actual value display.

All changes in the menu view are discarded with softkey "**Esc**" (1).

The parameters are stored under a name to be selected by using softkey "**Store Favorite**" (1).

6.7.2 Actual value display

- ✓ The evaporator is in the SET_{pressure} mode



The setting range of the menu entry "vacuum" can be set between 1 and the safe pressure in [mbar], however, not higher than 1200 mbar.

Rotation speed and heating bath can be changed as described in 6.3 and 6.4.

Vacuum control

1. Select the entry "**vacuum**" by turning the **Hei-GUIDE** (6) and calling up the selected entry to be changed by pressing the **Hei-GUIDE** (6) again.
2. Set the absolute pressure by using the rotary pushbutton controller **Hei-GUIDE** (6). The pressure is readjusted synchronously at an active vacuum control.
3. Pressing it again confirms the change.
4. The entry is exited after 10 seconds, in order to rule out accidental adjustments.

6.7.3 Softkey "Start all" and "Stop all"

Starting and closing distillation

A distillation can be started and stopped automatically by using softkey "**Start all**" (1) and „**Stop all**" (1), as described in 6.14.

6.8 Auto_{easy} mode

The required vacuum is automatically calculated based on a pressure measurement in the "AUTO_{easy}" mode. The boiling pressure is detected and maintained automatically.

The "AUTO_{easy}" mode is configured for easy handling and for common heating bath and cooling media temperature. In case the amount of steam produced is insufficient and the evaporation does not start, increase the heating bath temperature. Decrease the cooling media temperature or heating bath temperature in case of insufficient reclaim of solvent.

6.8.1 Menu display

The following values can be changed in the menu view:

Heating bath	Setting of the bath temperature. Setting range is between 20 °C and maximum heating bath temperature (MAX TEMP is adjustable in Setup) with a highest range of 210 °C.
Rotation	Setting of rotation speed of the distillation flask. Setting range is between 10 and 280 rpm.
Timer	Setting of the timer to shut down the process. Setting range is between 1 and 1440 minutes. For continuous operation choose "off" for Timer setting. The heating bath at the end of a timed run can be set to turn off (Parameter found in Setup).
Pump Type	Selects the connected pump type. The internal control parameters are adjusted according to the connected pump (only by using rpm controlled pump Rotavac vario control or Rotavac vario tec.)

Selecting the entry by turning the **Hei-GUIDE** (6)

1. Call up the selected entry to be changed by pressing the **Hei-GUIDE** (6) (entry will be highlighted in orange).
2. Set the value by using the rotary pushbutton controller **Hei-GUIDE** (6).
3. Pressing it again confirms the change. Softkey "**Esc**" (1) terminates the change of the currently processed entry.
4. The new settings are accepted by the "**accept**" entry. It is changed to the actual value display.

All changes in the menu view are discarded with softkey "**Esc**" (1).

The parameters are stored under a name to be selected by using softkey "**Store Favorite**" (1).

6.8.2 Actual value display

- ✓ Prerequisite: The evaporator is in the AUTO_{easy} mode

Rotation speed and heating bath can be changed as described in 6.3 and 6.4.

6.8.3 Softkey "Start all" and "Stop all"

A distillation can be started and stopped automatically by using softkey "**Start all**" (1) and "**Stop all**" (1), as described in 6.14.

Starting and closing distillation

6.9 Auto_{accurate} Mode

The vacuum in the Auto_{accurate} mode is controlled by the temperature sensor Auto_{accurate}.

This mode offers the following advantages:

- Only low quantities of solvent are suctioned by this vacuum pump.
- The vapor point is detected automatically and supplemented for mixtures.
- Multiple solvent distillation is possible without any manual adjustments.
- Knowledge of the thermodynamic material data is not required.

The system controls the vacuum so that a temperature increase occurs on the AUTO_{accurate} sensor via the produced vapor quantity. The temperature increase refers to the starting temperature during the de-activated process. It is also necessary that a constant temperature (Heidolph Rotacool or Rotachill recommended) is present in the condenser prior to the start of the process. The Hei-VAP Precision automatically checks the temperature consistency and informs the user, if necessary. The temperature difference between the condenser temperature and the temperature at the AUTO_{accurate} sensor used for controlling the vacuum will be increased when increasing the Distillation rate (dT). This results in increasing the distilled solvent quantity per time.

- ✓ Temperature sensor Auto_{accurate} sensor (569-00040-00) is installed (see chapter 10.2). The cooling medium has run for 15 min (Auto_{accurate} sensor shows a constant temperature).

Setting the Auto_{accurate} mode



A distillation with optimal recurring data results at low values for the **Distillation rate (dT)** (1-3).

Low values result in a slow distillation and high values to a quick distillation.

- ➔ Select the optimal general conditions.
- ➔ Auto_{Accurate} mode can only be run in G3 and G6 glassware configurations.

6.9.1 Menu display

The following values can be changed in the menu view:

Heating bath	Setting of the bath temperature. Setting range is between 20 °C and maximum heating bath temperature (MAX TEMP is adjustable in Setup) with a highest range of 210 °C.
Rotation	Setting of rotation speed of the distillation flask. Setting range is between 10 and 280 rpm.
Distillation rate (dT)	Setting of the distillation rate. Setting range is between 1 and 10. A high numeric value leads to a higher rate of distillation.
Max. power pump	Vacuum pump (Vario Models) throughput % to maximize pump power. Setting range is between 10 and 100 %. Reduction of the throughput leads to higher solvent recovery rates. (only by using rpm controlled pump Rotavac vario control or Rotavac vario tec.)
Hysteresis	The value of the hysteresis indicates how much the pressure may rise (in mbar) before the vacuum valve is opened. Setting range is between 1 and 50 mbar. (only by using value controlled pump Rotavac valve control, Rotavac valve tec, or House vacuum.)
Multiple Solvents	If multiple solvents is set to "no" then the pressure is not reduced further after the detection of the first boiling point. If multiple solvents is set to "yes" then the pressure is reduced until the user defined final pressure is reached.
Final pressure	Setting of the absolute pressure where the distillation process is terminated. Setting range is between 1 mbar and the safety pressure (see Setup for Safety Pressure).
Timer	Setting of the timer to shut down the process. Setting range is between 1 and 1440 minutes. For continuous operation choose "off" for Timer setting. The heating bath at the end of a timed run can be set to turn off (Parameter found in Setup).

Selecting the entry by turning the **Hei-GUIDE** (6)

1. Call up the selected entry to be changed by pressing the **Hei-GUIDE** (6) (entry will be highlighted in orange).
2. Set the value by using the rotary pushbutton controller **Hei-GUIDE** (6).
3. Pressing it again confirms the change.

Softkey "**Esc**" (1) terminates the change of the currently processed entry.

Multiple Solvent distillation = no:

Must be selected, if the first vapor point must be calculated and the pressure should not be reduced further; for example, when roughly separating 2 solvents.

The resulting pressure is accepted as target value for the vacuum. The pressure (after reaching the vapor point) cannot be reduced further in the system when the temperature at the Auto_{accurate} sensor drops.

Multiple Solvent distillation = yes:

This must be selected, if the pressure should be reduced further after detecting the first vapor point; for example, for completely distilling solvent mixtures.

The entry "final pressure" can be only selected with the entry " Multiple distillation = yes". If the temperature on the _{accurate} sensor drops, the pressure in the system is further reduced until

- a.) the control temperature is reached again or
- b.) the final pressure is reached.

The system responds similar to "stop all" in case b.) (see 6.14).

The new settings are accepted by the "**accept**" entry. It is changed to the actual value display.

All changes in the menu view are discarded with softkey "**Esc**" (1).

The parameters are stored under a name to be selected by using softkey "**Store Favorite**" (1).



If the distillation will not be terminated after reaching a defined pressure, enter value 1 as **final pressure**.



✓ Valve-controlled pump is installed.
The setting range can be adjusted in the menu entry "hysteresis" (range 1 to 50 mbar).



✓ Speed-controlled pump is installed.
The setting range is adjustable from 10 - 100 [%] in 10% increments in the "speed" menu entry.

6.9.2 Softkey "Start all" and "Stop all"

A distillation can be started and stopped automatically by using softkey **"Start all"** (1) and **"Stop all"** (1), as described in 6.14.

Starting and closing distillation

6.10 Timing functions

6.10.1 Timer

The timer function stops the distillation after a set period.

Setting the timer function



The setting range is adjustable from 1 - 1440 [min] in 1 minute increments in the "timer" menu entry. Setting "off" is comparable to 0.

Selecting the entry by turning the **Hei-GUIDE** (6)

1. Select the entry "timer" by turning the **Hei-GUIDE** (6) and call up the selected entry to be changed by pressing the **Hei-GUIDE** (6) again.
2. Set the desired timer function for the desired time by using control knob **Hei-GUIDE** (6).
3. Pressing it again confirms the change.

The time is running backwards at the start with pressing the "Start Vacuum" soft key and "Start All" soft key. The distillation is interrupted after completing the set time.

- The system will be ventilated.
- The rotation is switched off.

The lift is raised (only Hei-VAP Precision).

Define the shutoff response of the heating bath in the setup.

1. Select the menu element program "Setup" by turning the rotary pushbutton controller **Hei-GUIDE** (6).
2. Select the entry "Bath Power at End" by turning the **Hei-GUIDE** (6) and call up the selected entry to be changed by pressing the **Hei-GUIDE** (6) again.

The heating bath will not be switched off after the termination of the timer at the end of the process "on" and will shut off if "off" is selected.

3. Pressing it again confirms the change.
4. Select **"accept (OK)"** to change the actual value display.

6.11 Managing the distillation parameters: Favorites

Up to 30 different data records can be stored.

Managing the distillation parameters

A data record contains all parameters required for the respective process management based on the modes.

**Storing the data
record****6.11.1 Storing the data record**

- ✓ The vacuum control is not activated.
- ✓ Parameters are set.
- ✓ You are in the menu view of a mode (SET_{pressure}, AUTO_{easy}, AUTO_{accurate}, gradient)
- ✓ Press softkey "**Store Favorite**".



The entry is set to lowercase letters with element "abc".

The entry is set to uppercase letters with element "Abc".

The last character on the right side is deleted by briefly pressing the "delete" element.

1. Select the letter by using the **Hei-GUIDE** (6) and combine a name by pressing the **Hei-GUIDE** (6).
2. Accept the name with softkey "**Store Name**" (1) or discard the name with "**Esc**" (1) and interrupt the storage.

You will return to the menu view of the respective mode after saving.

6.11.2 Call up a data record (Menu favorites)

- ✓ The vacuum control is not activated.

Calling up the data record

1. Select the menu element "**Favorites**" by turning the rotary pushbutton controller **Hei-GUIDE** (6).
2. Select the program name by turning the **Hei-GUIDE**.
3. Call up the options by pressing **Hei-GUIDE**; the following options will be available:

- Apply
- Rename
- Copy
- Delete

Apply data record

The data record is called up and the stored mode is activated. The actual value display is then changed to the stored parameters on the display.

Apply data record

The process can be started with "**start vacuum**" or "**start all**".

Rename the data record

The name can be entered similar to the "**save**" function. The system checks for duplicates when naming.

Rename the data record

Copy data record

The data record is copied and saved under a new name. An entry of the new program name will be required. A duplication of the issuance of the program name will be checked.

Copy data record

Delete data record

Deletes the data record permanently.

Delete data record

6.12 Gradient function

A pressure ramp can be programmed with the gradient function, with which various pressure values can be accessed. The respective pressures are controlled linear over time. A pressure drop, i.e. by 50 mbar within 10 minutes, therefore results in a slight increase of the pressure/time curve than the same pressure reduction in 5 minutes. The maximum attainable increase of the pressure/time curve is limited by the pump capacity and the leak rate of the system.

6.12.1 Programming the pressure ramp (menu display)

The user can set the pressure and time in each line with gradient increments (but not the sum time (total), since this is calculated automatically). The selected element is always highlighted. The displayed gradient increments and the special elements on the right of the menu entries are automatically scrolled upward and downward, since there is a total of 20 gradient increments.

Programming the pressure ramp

The currently selected entry (a pressure or a time) is called up by pressing the Hei-GUIDE and the user can set the desired value by turning the Hei-GUIDE. Pressing the Hei-GUIDE again will confirm the set value.

Entering and confirming value = "---" at "Vacuum" or "Duration" will delete the respective values. The following value pairs slide upward by one increment.

Last increment with a value of > 0 at duration results in the total processing period.

The following values can be changed in the menu view:

Heating bath	Setting of the bath temperature. Setting range is between 20 °C and max. heating bath temperature (MAX TEMP is adjustable in Setup) with a highest range of 210 °C.
Rotation	Setting of rotation speed of the distillation flask. Setting range between 20 and 280 rpm.
Max. power pump	Setting the maximum suction power of vacuum pump. Setting range from 10 to 100%. A reduction of the suction power results in a higher return rate of the solvent.
Hysteresis	Setting the pressure difference of the target value at which the vacuum is re-adjusted. Setting range 1 – 50mbar (only by using value controlled pump Rotavac valve control or Rotavac valve tec, or House vacuum.)
Enter Pressure/Time Steps	Changes the sub-menu for programming the pressure-time ramps.

1. The data record can be saved by using softkey "**Store Favorite**" (1).
2. Softkey "**Esc**" (1) discards the changes and returns to the actual value display.
3. The gradients can be entered in sub-menu "**Enter pressure/time steps**".
4. Up to 20 gradient steps can be entered, whereby each gradient step consists of pressure and time.



The pressure and time can be set in each line. However, the Sum of time cannot be set, since this is automatically calculated.



The starting point is always at a time value of 0 and the atmospheric pressure.

1. Select the pressure/time step to be changed by turning the rotary pushbutton controller **Hei-GUIDE** (6).
2. Confirm the selection by pressing the **Hei-GUIDE** (6).
3. The value can be changed by turning the **Hei-GUIDE** (6) to the left or right.
4. The current setting is accepted by pressing the **Hei-GUIDE** (6).

The data record can be saved by using softkey "**Store Favorite**" (1).

Softkey "**Esc**" (1) discards the changes and returns to the actual value display.

A graphic overview of the programmed ramp is displayed by using softkey "**Graph**" (1).

The gradient diagram presents the time on the x-axis in [min] and the related pressure on the y-axis in [mbar].

The scaling of the x and y axes is illustrated so that all of the entered times or pressures are illustrated.

The entry "enter basic settings" returns to the time-unrelated basic values of the heating bath, rotation, hysteresis, and the max. power pump.

6.12.2 Start pressure ramp

Start pressure ramp

The pressure ramp is started with softkey "**start all**" (1) or "**start vacuum**" (1). The pressure/time segments are processed.

Note: The maximum attainable increase of the pressure/time curve is limited by the pump capacity and the leak rate of the system.

The process is terminated when reaching the last entry. The vacuum control is switched off, the system is ventilated. The lift is raised with a motorized lift. The heating bath is switched off depending on the setting in the setup.

6.12.3 Calling up the pressure ramp

Pressure ramps can be called up via the **Favorites** menu.

The programmed pressure ramps can be edited when the process is de-activated by changing the respective parameters (see chapter 6.12.1).

Calling up the pressure ramp

6.13 Softkey Graph

The pressure curve is displayed in the graphic view of the actual value display. The time is illustrated in [min] on the x axis and the associated pressure in [mbar] on the y axis.

Softkey "Graph"



Switching over between "graph" and "values" is not possible when the vacuum control unit is switched off.

Only the section for which pressure values are available is shown on the pressure axis.

The displayed time range on the x axis is set in the setup. If the set time range is exceeded, the time window will be continuously shifted.

6.14 Softkey "Start all" and "Stop all"

A distillation can be started and stopped automatically by using softkey **"Start all"** (1) and **"Stop all"** (1).

Automatically starting and terminating the distillation

- ✓ The unit is operational.
- ✓ The immersion depth of the evaporator flask is set (see chapter 4.5.7).
- ✓ The desired settings are completed.



Caution - Glass breakage! The immersion depth of the evaporator flasks must be set correctly to prevent lowering of flask into bottom of heat bath on motor lift models.

"Start all"

The lift moves down (only for the motor lift unit), rotation, vacuum control and timing are started.



All parameters of the distillation can be changed during the course of the "start all" function.

"Stop all"

The lift moves upward (only for the motor lift unit), rotation, vacuum control and timing are stopped.

6.15 Calibrating the pressure sensor

Pressure sensor

The pressure sensor of the vacuum box can be calibrated.

- ✓ Vacuum gauge is available.
 - ✓ The unit is connected.
1. Interconnect the vacuum gauge near the condenser (for example, with a Y-piece).
 2. Switch on the vacuum pump.
 3. Change to the setup menu and select calibration p-sensor.
 4. Confirm with "Yes".
 5. Enter the atmospheric pressure calculated by an external pressure gauge and confirm by pressing the **Hei-GUIDE**.
 6. The vacuum control now automatically reduces the pressure in the system.
Please wait until the pressure value is stable.
 7. Enter the displayed pressure calculated by an external pressure gauge and confirm by pressing the **Hei-GUIDE**.


The calibration is completed.

6.16 Connecting to a PC

The vacuum box can be connected to a PC via USB.

1. Connect the vacuum box to a PC using an USB cable.
2. Configure HyperTerminal on the PC.
3. Interface settings:
 - Bits per second: 115200
 - Data bits: 8
 - Parity: none
 - Stop bits: 1
 - Stream control: none
4. The protocol values are displayed in HyperTerminal:
 - For example: 20;31.4;25.3;976
 - Rotation = „20“
 - HB-Temperature = „31.4“
 - Ext. Sensor-Temperature = „25.3“
 - Vacuum = „976“

6.17 Overview of all softkeys

Softkey	Function
Store Favorite	Storing the data record for Favorites (program list).
Esc	Cancelling the entry and backing up on step, no storage of changes
Hold	The vacuum is held at the value when soft key is depressed.
Start all	Vacuum control on, rotation on, lower motor lift
Stop all	Vacuum control off, rotation off, raise motor lift
Start Vacuum	Vacuum control on
Stop Vacuum	Vacuum control off, ventilate system
Graph	Display of diagram of pressure/time curve The actual curve is displayed in the actual value display. The tabular entries are visualized in the menu program gradient.
Max. Vacuum	Vacuum control on, system is evacuated to the minimum pressure value allowable considering pump and air leaks.
Continue	Vacuum control on (after Hold)
Values	The actual value screen or gradient increments screen is displayed.
Accept	The current actual value of the pressure is accepted as a new set value
List	Display of all lists of the stored Favorites.
Scroll Help 	Scrolling within the context help to visualize hidden text.

6.18 Setup

Online Help	Shows Online-Help instead of the actual values in the menu SET _{pressure} , AUTO _{easy} , AUTO _{accurate} , Gradient, Favorites and Setup.
Safety pressure	If the system reaches the setting of the Safety Pressure point, the vacuum control and flask rotation is stopped, the evaporator is vented and the motor lift is raised (ML only). Setting range is between 900 and 1200 mbar.
Heating Bath Media	Allows switching between different heating bath media and sets a limit to the maximum heating bath temperature for the media for operator safety.
Max. Temp. Heating Bath	Sets the limit of the maximum heating bath temperature which can be set. The chosen bath media has an influence on the temperature range. Maximum set range between 20 and 210 °C.
Language	Sets language of the interface.
Bath Power at End	Sets the state of the bath after the process has ended. When setting is "off" the bath is powered down after the process is terminated.
Brightness Display	Changes brightness of the display.
Calibrate p-sensor	Opens sub-menu for calibration of the pressure sensor.
Error history	Shows the errors and history of occurrence for service data.
Reboot setup	All settings of the Setup are put into the state of factory setting when Reboot engaged.
Scale time axis	Sets range of the visible time frame in the graphical "display actual values". Set range is between 1 and 120 minutes.

6.19 Error messages

Error messages are only displayed in the event of an error. The error text and its troubleshooting are explained in chapter 7, "Errors and Troubleshooting".

6.20 Menu topology

6.20.1 Actual value display for all modes

Menu entry	Value range
Vacuum	1 and 1200 mbar; default value: 1000 mbar
Vapor	Vapor temperature measured at the vapor temperature sensor.
Rotation	10 and 290 rpm in 1 rpm increments; default value: 100 rpm
Heating bath	20 °C and the max. temperature of the heating bath (to be assigned in Setup), however, no more than 210 °C.

Softkey 1	Start vacuum
Softkey 2	Start all Stop all
Softkey 3	Max. vacuum
Softkey 4	Stop vacuum

6.20.2 SET_{pressure} mode

Menu entry	Value range
Heating bath	20 °C and the max. temperature of the heating bath (to be assigned in Setup), however, no more than 210 °C.
Rotation	10 and 290 rpm in 1 rpm increments; default value: 100 rpm
Vacuum	1 and 1200 mbar; default value: 1000 mbar
Hysteresis	1 to 50 mbar; default value: 10 mbar
Timer	1 to 1440 min; in 1 min; default value: 0 min; 0=off
Accept (OK)	

Softkey 1	Store Favorite
Softkey 4	Esc

6.20.3 Auto_{easy} mode

Menu entry	Value range
Heating bath	20 °C and the max. temperature of the heating bath (to be assigned in Setup), however, no more than 210 °C.
Rotation	10 and 280 rpm in 1 rpm increments; default value: 100 rpm
Pump Type	“vario control” and “vario tec” ; default value: “variocontrol” Blank out by using vacuum-valve
Timer	1 to 1440 min; in 1 min; default value: 0 min; 0=off
Accept	

Softkey 1	Store Favorite
Softkey 4	Esc

6.20.4 Auto_{accurate} Mode

Menu entry	Value range / status
Heating bath	20 °C and the max. temperature of the heating bath (to be assigned in Setup), however, no more than 210 °C.
Rotation	10 and 280 rpm in 1 rpm increments; default value: 100 rpm
Distillation rate (dT)	1 to 10 1-3 "low" 4-6 "medium" 7-10 "high"
Hysteresis	Hysteresis value 1 to 50 mbar; default value: 10 mbar
Multiple sol-vent	yes/no; default value: No
Final pressure	1 mbar ... Safety pressure in 1 mbar; default value: 1000 mbar
Timer	1 to 1440 min; in 1 min; default value: 0 min; 0=off
Accept	

Softkey 1	Store Favorite
Softkey 4	Esc

6.20.5 Gradient

Menu entry	Sub-menu	element	Value range
Heating bath			20 °C ... max. temp. of the heating bath not higher than 210 °C.
Rotation			10 ... 280 rpm in 1 rpm increments; default value: 100 rpm
Hysteresis			1 to 50 mbar; default value: 10 mbar
Enter Pres- sure/Time Steps	Pressure/time		
		Step	Program step; 20 program steps consisting of the duration and pressure can be entered.
		Vacuum	1 to 1200 mbar; default value: 1000 mbar
		Duration	Duration of a program step in minutes. The pressure is reduced linear or increased as ramp during this time, depending on which pressure was entered during the previous step.
		Sum of Time (Total time)	Adds the duration of the previous steps. The number specifies the time since the start of the process. The last number equals the total processing time.
	Enter basic Settings	Jump back to main menu "gradient"	
	Accept (OK)		
	Store Favorite -> store under		
		abc	Sets the entry to lowercase letters.
		ABC	Sets the entry to uppercase letters.
		Delete	Briefly pressing the Hei-GUIDE deletes the last character on the right side, pressing for an extended period (>1.5 s) deletes all characters of a program name.
		[Character]	a b ... z A B ... Z 0 ... 9 . ; , ... ‘
		enter at least one character	
Accept			

Softkey 1	Store Favorite
Softkey 3	Graph/Table
Softkey 4	Esc

6.20.6 Favorites

Menu entry	Value range / status
(empty)	
[name of Favorite]	<ul style="list-style-type: none"> • Apply • Rename • Copy • Delete
Back	

Softkey 4	Esc	Cancelling the entry and backing up on step, no storage of changes
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6.20.7 Setup

Menu entry	Value range / status
Online-Help	On/Off
Safety pressure	900 ... 1200 mbar
Heating bath media	Water; PEG; OIL; Default value: Water
Max. Temp. Heating Bath	20 to 210 °C [max. heating bath temp.] in 0.5 °C; default value: 20 °C Water: = 90 °C; 20 ... 95 in 1 °C PEG, OIL = 210 °C; 20 ... 210 °C in 1 °C
Language	German, English, Spanish, French, Italian
Bath Power at End	On/Off; default value: On
Brightness Display	10 ... 100 % in 10 % segments
Calibration of the p-sensor	yes/no; default value: No
Error history	yes/no; default value: No
Reboot setup	yes/no; default value: No
Scale time axis	Setting range of 1 to 120 minutes.
Accept (OK)	

Softkey 4	Esc	Cancelling the entry and backing up on step, no storage of changes
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7 Errors and Troubleshooting

7.1 General errors

Error / message	Cause	Remedy
Unit cannot be switched on	Main plug not connected to the main power supply	→ Connect the main plug with the power supply
	Fuses defective or blown fuse	→ Replace fuses (see chapter 8.2)
No heating function	Master switch is deactivated	→ Activate main switch
	Fuses defective or blown fuse	→ Replace fuses (see chapter 8.2)
	Master switch is defective	→ Contact service
	The connecting cable of the heating bath is not connected.	→ Connect the connecting cable of the heating bath
	The heater of the heating bath is defective	→ Contact service
	The maximum temperature limiter responded	→ If the medium was in the heating bath: Let the heating bath cool and reset the maximum temperature limiter → If the medium was not in the heating bath: Contact service
Drive unit is not rotating	Master switch is defective	→ Contact service
	Speed controller is on the left stop (Hei-VAP value)	→ Turn the speed controller to the right
	Drive unit is defective	→ Contact service
	Fuses defective or blown fuse	→ Replace fuses (see chapter 8.2)
Motor lift is not functioning	Master switch is deactivated	→ Activate main switch
	Master switch is defective	→ Contact service
	Fuses defective or blown fuse	→ Replace fuses (see chapter 8.2)
	Lift is at end stop	→ Activate other arrow key
	Mechanical system / motor is defective	→ Contact service
	Height stop is not set accurately	→ Perform height adjustment (see chapter 4.5.7)

Error / message	Cause	Remedy
No evacuation	Power switch Rotavac vario control or Rotavac vario tec is not activated.	→ Activate the power switch
	Vacuum valve is defective.	
Insufficient vacuum	Fuses defective or blown fuse	→ Replace fuses
	System leaks	→ Check seals, tubing and connections → Check stopcock, grease if necessary
	Vacuum pump is defective	→ Observe manufacturer's instructions of the vacuum pump
Unit suddenly switches off (Hei-VAP Precision and Hei-VAP Advantage)	Timer is programmed	→ Check and switch off the timer, if necessary (see chapter 6.10.1)
	Fuses defective or blown fuse	→ Replace fuses (see chapter 8.2)
Unit suddenly switches off (Hei-VAP Precision)	When pressure is detected, the Hei-VAP Precision is emergency stopped. Check the settings in the setup menu.	→ The Hei-VAP Precision is reset to the starting condition when pressing any key. → Calibrate the vacuum sensor (see chapter 6.15)

Table 7-1: Troubleshooting table

7.2 Additional conditions

Additional conditions	Reaction
Auto _{accurate} sensor is not connected	<ul style="list-style-type: none"> – Change to the SETpressure mode – The current pressure value is accepted as target value, similar to Hold/Accept in the SETpressure mode – Auto_{accurate} mode cannot be selected
Vapor sensor is defective	<ul style="list-style-type: none"> – The actual value curve “- - -” is displayed instead of the vapor temperature.
The vapor sensor is not connected	<ul style="list-style-type: none"> – The vapor temperature is not displayed in the actual value display
Heater can only be activated at > 0 °C	

Table 7-2: Additional conditions

7.3 Hei-VAP Precision

Error / message error text	Cause	Remedy
The temperature sensor for calculating the vapor temperature is not connected, defective or the temperature is above the measured range.	<ul style="list-style-type: none"> – Vapor sensor broken – not connected – above the temp. range 	<ul style="list-style-type: none"> ➔ Let the boiling temperature sensor cool ➔ Connect the vapor temperature sensor ➔ Perform visual check ➔ Contact service
The vapor temperature sensor is defective or the temperature is below the measured range	<ul style="list-style-type: none"> – Short circuit of the vapor sensor – below the temp. range 	<ul style="list-style-type: none"> ➔ Heat the boiling temperature sensor ➔ Perform visual check ➔ Contact service
The Auto _{accurate} sensor is defective or the temperature is below the measured range.	<ul style="list-style-type: none"> – Auto_{accurate} sensor short circuit – below the temp. range 	<ul style="list-style-type: none"> ➔ Heat the Auto_{accurate} sensor ➔ Perform visual check ➔ Contact service
The Auto _{accurate} sensor is defective or the temperature is above the measured range.	<ul style="list-style-type: none"> – Auto_{accurate} sensor is broken – not connected – above the temp. range 	<ul style="list-style-type: none"> ➔ Let the Auto_{accurate} sensor cool ➔ Connect the Auto_{accurate} sensor ➔ Perform visual check ➔ Contact service
The transportation protection device is active, please raise the lift and briefly switch the unit off and then on again.	<ul style="list-style-type: none"> – The transportation protection device is still activated. 	<ul style="list-style-type: none"> ➔ Please raise the lift and briefly switch the unit off and then on again.
An error occurred in the data bus.	<ul style="list-style-type: none"> ➔ Cable connection between the control panel and the base unit was disconnected. An error occurred in the data bus. 	<ul style="list-style-type: none"> ➔ Restore the cable connection between the control panel and the base unit. Switch the power switch off and on again! ➔ Contact service
The overheating protection was triggered or the heater is defective.	<ul style="list-style-type: none"> – Heater is defective, i.e. the overheating protection was triggered. 	<ul style="list-style-type: none"> ➔ If the medium was in the heating bath: Let the heating bath cool and reset the maximum temperature limiter ➔ If the medium was not in the heating bath: Contact service
A temperature above the safety temperature was measured in the heating bath. The temperature measurement is defective or the medium filled in was too hot.	<ul style="list-style-type: none"> – Heating bath safety temperature is exceeded 	<ul style="list-style-type: none"> ➔ Switch off units ➔ Cool the heating bath medium ➔ Contact Service if media was not filled in
The heating bath is completely evaporated. Please refill the heating bath medium.	<ul style="list-style-type: none"> – Heating bath is completely evaporated. 	<ul style="list-style-type: none"> ➔ Deactivate the unit ➔ Check if the maximum temperature limiter has responded. If yes, reset (see chapter 8.1.1) ➔ Fill in heat transfer fluid

Error / message error text	Cause	Remedy
An illogical temperature difference was measured between the heating bath sensors. The temperature measurement is defective.	<ul style="list-style-type: none"> – Heating bath sensor variance > 10 K 	<ul style="list-style-type: none"> ➔ Contact service
The temperature sensor for the heating bath control is defective. (hardware monitoring unit)	<ul style="list-style-type: none"> – Sensor monitoring via hardware – Heating bath sensor is broken or short circuited 	<ul style="list-style-type: none"> ➔ Contact service
The temperature sensor for the heating bath control unit is broken or bath medium that is too hot was filled in.	<ul style="list-style-type: none"> – Heating bath sensor is broken – Heating bath is more than 217 °C 	<ul style="list-style-type: none"> ➔ Contact service
The temperature sensor for the heating bath control unit is defective or bath medium that is too cold was filled in.	<ul style="list-style-type: none"> – Heating bath sensor short circuit – Heating bath is below 0 °C 	<ul style="list-style-type: none"> ➔ Switch off units ➔ Cool the heating bath medium ➔ Contact Service if media was not filled in
The lift motor is defective or blocked.	<ul style="list-style-type: none"> – Lift end stop switch is not reached after 10 seconds. 	<ul style="list-style-type: none"> ➔ Contact service
The set safety pressure was exceeded.	<ul style="list-style-type: none"> – Pressure sensor safety pressure is exceeded. 	<ul style="list-style-type: none"> ➔ Deactivate the unit ➔ Check if the pressure sensor has responded. If yes, reset (see chapter 8.1.1) ➔ Contact service
The vacuum box is not connected or defective.	<ul style="list-style-type: none"> – Vacuum box is not connected or defective 	<ul style="list-style-type: none"> ➔ Check the connection between the vacuum box and the evaporator. ➔ Contact service
The aeration valve is defective.	<ul style="list-style-type: none"> – Vacuum valve short circuit 	<ul style="list-style-type: none"> ➔ Contact service
The vacuum valve is not connected or defective.	<ul style="list-style-type: none"> – The vacuum valve is not connected – The connection between the vacuum box and the vacuum valve is interrupted 	<ul style="list-style-type: none"> ➔ Connect the vacuum valve ➔ Check the connection between the vacuum box and the vacuum valve.
The vacuum valve is defective.	<ul style="list-style-type: none"> – The vacuum valve is short circuited 	<ul style="list-style-type: none"> ➔ Replace the vacuum valve
The vacuum pump is not connected or defective.	<ul style="list-style-type: none"> – The vacuum pump is not connected – The connection between the vacuum box and the vacuum pump is interrupted 	<ul style="list-style-type: none"> ➔ Connect the vacuum pump ➔ Check the connection between the vacuum box and the vacuum pump.
The rotation drive was overloaded or is defective.	<ul style="list-style-type: none"> – Drive unit is defective – Motor overload shutdown 	<ul style="list-style-type: none"> ➔ Deactivate the unit ➔ Stop drive unit for cooling down ➔ Contact service

Table 7-3: Troubleshooting table - Hei-VAP Precision

The rotary evaporator is checked after "power on" in an initialization phase for connected components. The function scope of the rotary evaporator is based on the connected units.

Missing component	Description and response of the evaporator	Remedy
Vacuum box	<p>No vacuum box is connected:</p> <ul style="list-style-type: none"> – Actual value display of the vacuum is not displayed – The vacuum entry is not displayed – "Auto_{easys}", "Auto_{accurate}" and "Gradient" modes are not displayed. <p>Note: An evaporator can be operated with a separate pump stand in this condition.</p>	<p>➔ Connect component</p> <p>➔ Reset via power off/on</p>
Vacuum valve or vacuum pump	<p>No vacuum valve or vacuum pump is connected.</p> <ul style="list-style-type: none"> – Vacuumcontroller is not active – "Auto_{easys}", "Auto_{accurate}" and "Gradient" modes are not displayed. <p>Note: An evaporator can be operated with a separate pump stand in this condition.</p>	<p>➔ Connect component</p> <p>➔ Reset via power off/on</p>
Temperature sensor T boiling	<p>The temperature sensor for calculating the boiling temperature is not connected:</p> <ul style="list-style-type: none"> – The vapor temperature is not displayed 	➔ Connect component
Temperature sensor Auto _{accurate} sensor	<p>The temperature sensor for controlling the Auto_{accurate} mode is not connected:</p> <ul style="list-style-type: none"> – "Auto_{accurate}" mode is not displayed 	➔ Connect component

Table 7-4: Missing components

8 Maintenance, cleaning, service

8.1 Maintenance

Maintenance

➔ Only use genuine parts approved by the manufacturer!

The vapor tube and PTFE 26 vacuum seal must be routinely serviced.

1. Remove and clean the vapor tube and the PTFE 26 vacuum seal (see chapter 4.5.2).
2. Check the PTFE 26 vacuum seal for damages and wear, replace if necessary.

8.1.1 Resetting the maximum temperature limiter

Maximum temperature limiter

In the event that the temperature controller malfunctions and the heating bath temperature exceeds the maximum temperature of 250 °C, the maximum temperature limiter will switch off the heating bath.

✓ The heating bath is cooled and disconnect from power-supply. Power-switch off.



WARNING

Hot surfaces!



Burns.

➔ Cool the heating bath.



WARNING



Verify that the basic device is only plugged to or unplugged from the heating bath if the main switch is switched off and/or the main power supply is disconnected.

1. Remove the heating bath liquid from the heating bath.

Maximum temperature limiter

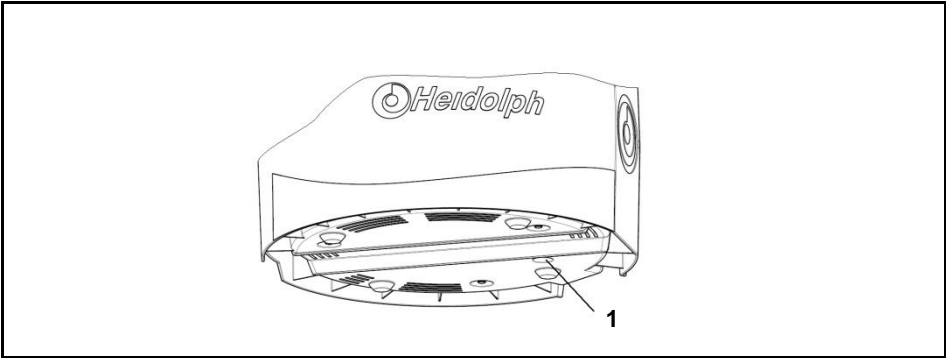


Figure 8-1: Maximum temperature limiter

2. Press the maximum temperature limiter (1), possibly with a pointed object.

8.1.2 Evacuate the heating bath

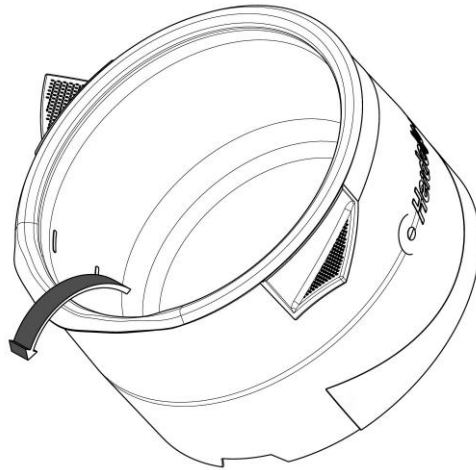
WARNING


Verify that the basic device is only plugged to or unplugged from the heating bath if the main switch is switched off and/or the main power supply is disconnected.



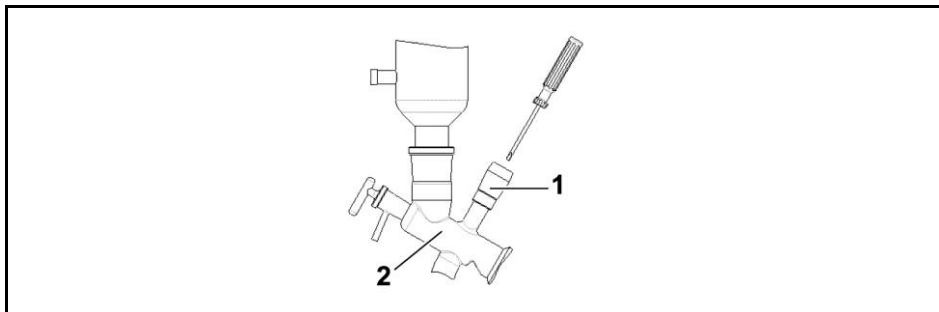
1. The heating bath is cooled and disconnect from power-supply. Power-switch off.
2. Take the heating bath from off the device.

Evacuating the heating bath



3. The edge of the heating bath is designed to easily evacuate the heating bath. Evacuate the heating bath.

8.1.3 Readjust the vacuum seal (glassware set G6)



Vacuum seal

Figure 8-2: Readjust the vacuum seal - glassware set G6

- 1 Valve 2 Center piece G6

The seal in the valve (1) can be readjusted with a screwdriver.

WARNING

Glass breakage!

Cuts.



➔ Work carefully; do not readjust the adjusting screw too much.



1. Screw the valve into the G6 center piece (2) up to the stop.
2. Turn the adjusting screw clockwise until a white ring can be seen at the shaft of the glass.

8.2 Replacing the fuses

The fuses are located on the bottom of the unit.

Fuse

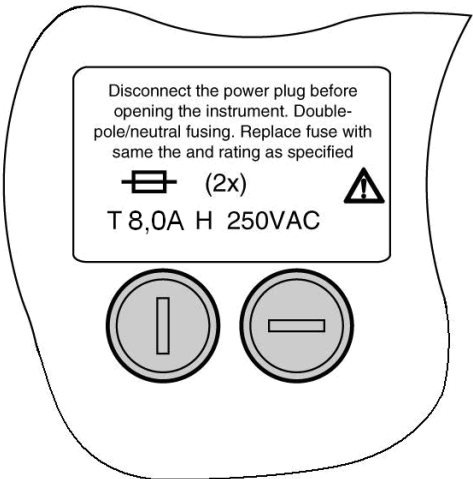


Figure 8-3: Fuse on the bottom of the unit



CAUTION

The drive unit and the heating bath may be switched on accidentally!



Injuring and burning hands.



- Verify that the power switch for the base unit and the heating bath is switched off via the pushbutton.



WARNING

Risk of injuries due to retracting or entrapment!



Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

- Wear suitable protective clothing for activities on the rotary evaporator with goggles and gloves.



1. Disconnect the unit from the power plug.
2. Remove evaporating flask.
3. Cool the heating bath liquid and remove the heating bath from the base unit by disconnecting the power plug.
4. Carefully tilt the unit and pour out the bath media.
5. Dry the bath and turn it over with the bottom facing upward.
6. Remove the defective fuse by using a screwdriver.
7. Insert a suitable new fuse and tighten with a screwdriver.

The fuse has been replaced. The unit can be returned to active heating operation.

8.3 Cleaning

CAUTION



Damages due to corrosive cleaning agents!

Damages on the surface of the unit.

- ➔ Use only mild soap solutions. Never use chlorine bleach or cleaning agents that are chlorine based. Never use abrasives, ammonia, cleaning rags or cleaning agents with metal parts.



- ➔ Wipe the surfaces of the unit with a damp cloth (mild soap solution).

8.4 Service

Your unit is not working?

1. Please contact Heidolph Instruments or your authorized Heidolph Instruments dealer via telephone or email.

In Germany,
Austria and Switzerland:

Tel: 0800-HEIDOLPH or
0800-4 34 3 6 5 7 4 (Free call)
+49 (0) 91 22 99 20 69
Fax: +49 (0) 91 22 99 20 65
E-mail: sales@heidolph.de

*Addresses and
telephone numbers*

2. After consulting with a Heidolph service employee:
 - Copy and complete a declaration of non-objection from these instructions, if necessary
 - Package the unit for shipping per the recommended methods of the service department and mail to the following including the declaration of non-objection:

Heidolph Instruments GmbH & Co. KG

Vertrieb Labortechnik

Walpersdorfer Str. 12

91126 Schwabach / Germany

9 Dismantling, storage, disposal

9.1 Disassembly



CAUTION

Unintentionally rotating drive!



Injuries to hands.

→ Verify that the rotation is displayed.



WARNING

Risk of injuries due to retracting or entrapment!



Risk of injury.

A risk of entanglement exists on the movable parts of the unit.

→ Wear suitable protective clothing for activities on the rotary evaporator a with goggles and gloves.



WARNING

Hot surfaces!



Scalding and burns.

→ Let the heating bath and glass devices cool.



WARNING

Glass breakage!



Cuts.



→ Work carefully.



→ Dismantle the glassware sets in reverse sequence of the assembly (see chapter 4.5).

9.1.1 Remove the Woulff bottle

Woulff bottle



WARNING

Glass breakage!



Cuts.

→ Work carefully.



→ Remove the Woulff bottle in reverse sequence of the assembly (see chapter 4.5.13).

9.1.2 Disconnecting the coolant / vacuum

1. Verify that the coolant and vacuum supply is switched off and that the system is at atmospheric pressure.
2. Disconnect the tubes from the condenser and drain coolant safely into a storage container.

*Coolant /
vacuum*

9.1.3 Remove the heating bath

WARNING

Hot surfaces!



Scalding and burns.

→ Cool the heating bath.



- Remove the heating bath in reverse sequence of the assembly.

*Remove the heat-
ing bath*

9.2 Storage

Evaporator

- The unit may be stored in a dry location.
- Store the unit in the original packaging (only possible with the transportation protection device attached).
- Close the packaging with adhesive tape.

Where?

How?

Glassware set

- The glassware set may be stored in a dry location.
- Empty and clean the glassware set.
- Store the glassware set in the original packaging.
- Close the packaging with adhesive tape.

Where?

How?

9.3 Disposal

- Properly dispose of the unit according to the valid national and legal regulations pertaining to disposal of used laboratory equipment.

Disposal

10 Accessories, spare parts

10.1 Glass devices

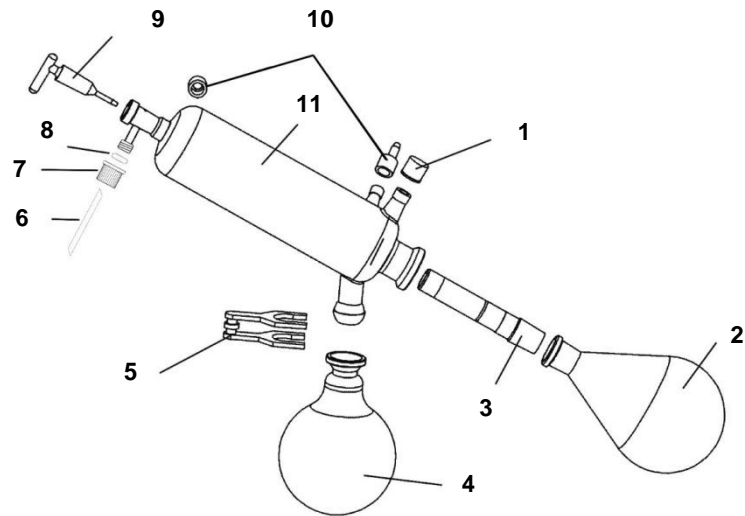


Figure 10-1: Glassware set G1

Order description	Position	Order No.	Piece at delivery
Threaded fitting GL 18	1	23-09-03-01-24	1
Evaporator flask 1,000 ml, NS 29/32	2	514-74000-00	1
Evaporator flask 1,000 ml, NS 24/40	2	514-74000-05	(1)
Vapor tube NS 29 / 32	3	514-00000-01	1
Vapor tube NS 24 / 40	3	514-00020-03	(1)
Receiving flask 1000 ml, S 35/20	4	514-84000-00	1
Receiving flask 1000 ml, S 35/20, plastic coated	4	514-84000-02	(1)
Condenser clamp S 35/20	5	515-42000-00	1
Inlet tube (PTFE-) 3.5/4.5x600	6	23-30-01-04-72	1
Threaded fitting GL10 red	7	23-30-01-04-69	1
Seal O-ring 3.2x2.5	8	23-08-06-03-26	1
Inlet pipe (stopcock)	9	514-51000-00	1
Threaded fitting GL 14	10	23-09-03-01-27	3
Connector for the threaded fitting GL 14	10	11-300-005-22	3
Condenser G1	11	514-00100-00	1
Condenser G1B, plastic coated	11	514-00110-00	(1)

Table 10-1: Glassware set G1

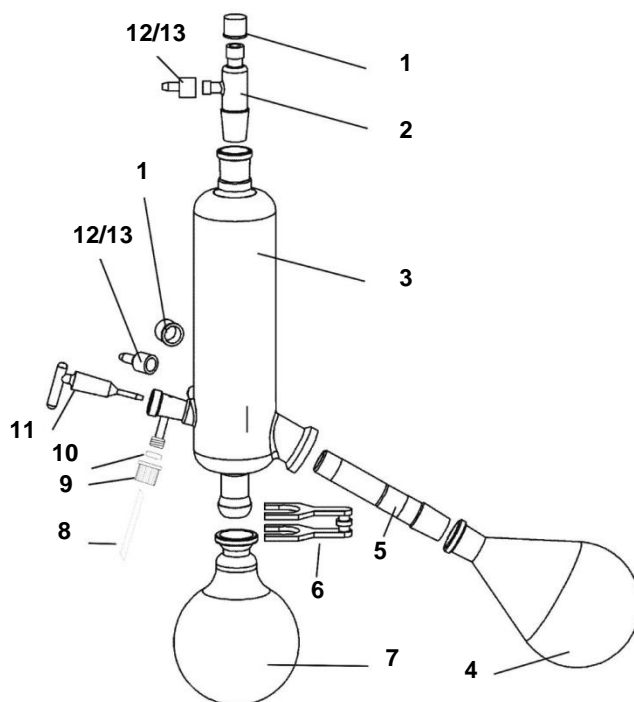


Figure 10-2: Glassware set G3

Order description	Position	Order No.	Piece at delivery
Threaded fitting GL 18	1	23-09-03-01-24	2
Vacuum fitting NS 29 / 32	2	514-00001-00	1
Condenser G3	3	514-00300-00	1
Condenser G3B, plastic coated	3	514-00310-00	(1)
Evaporator flask 1,000 ml, NS 29/32	4	514-74000-00	1
Evaporator flask 1,000 ml, NS 24/40	4	514-74000-05	(1)
Vapor tube NS 29 / 32	5	514-00000-01	1
Vapor tube NS 24 / 40	5	514-00020-03	(1)
Condenser clamp S 35/20	6	515-42000-00	1
Collecting flask 1000 ml, S 35/20	7	514-84000-00	1
Collecting flask 1000 ml, S 35/20, plastic coated	7	514-84000-02	(1)
Inlet tube (PTFE-) 3.5/4.5x600	8	23-30-01-04-72	1
Threaded fitting GL10 red	9	23-30-01-04-69	1
Seal O-ring 3.2x2.5	10	23-08-06-03-26	1
Inlet pipe (stopcock)	11	514-51000-00	1
Threaded fitting GL 14	12	23-09-03-01-27	3
Connector for the threaded fitting GL 14	13	11-300-005-22	3
Condenser mounting		569-00050-00	1

Table 10-2: Glassware set G3

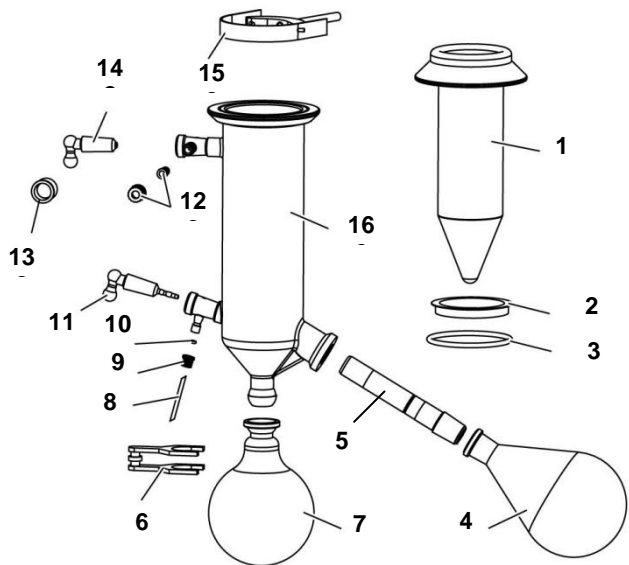


Figure 10-3: Glassware set G5

Order description	Position	Order No.	Piece at delivery
Insert cold trap	1	514-00501-00	1
Centering ring	2	23-30-01-04-88	1
Seal G5 (silicone)	3	23-30-01-01-88	(1)
Gasket G5	3	23-30-01-01-39	1
Evaporator flask 1,000 ml, NS 29/32	4	514-74000-00	1
Evaporator flask 1,000 ml, NS 24/40	4	514-74000-05	(1)
Vapor tube NS 29 / 32	5	514-00000-01	1
Vapor tube NS 24 / 40	5	514-00020-03	(1)
Condenser clamp S 35/20	6	515-42000-00	1
Receiving flask 1000 ml, S 35/20	7	514-84000-00	1
Receiving flask 1000 ml, S 35/20, plastic coated	7	514-84000-04	(1)
Inlet tube (PTFE-) 3.5/4.5x600	8	23-30-01-04-72	1
Threaded fitting GL10 red	9	23-30-01-04-69	1
Seal O-ring 3.2x2.5	10	23-08-06-03-26	1
Inlet pipe (stopcock)	11	514-51000-00	1
Threaded fitting GL 14	12	23-09-03-01-27	2
Connector for the threaded fitting GL 14	12	11-300-005-22	2
Threaded fitting GL 18	13	23-09-03-01-24	1
Stopper NS 19 / 38 (stopcock)	14	15-003-003-24	1
Holder, complete	15	569-00051-00	1
Liner cold trap	16	514-00500-00	1
Liner cold trap, plastic coated	16	514-00510-01	(1)

Table 10-3: Glassware set G5

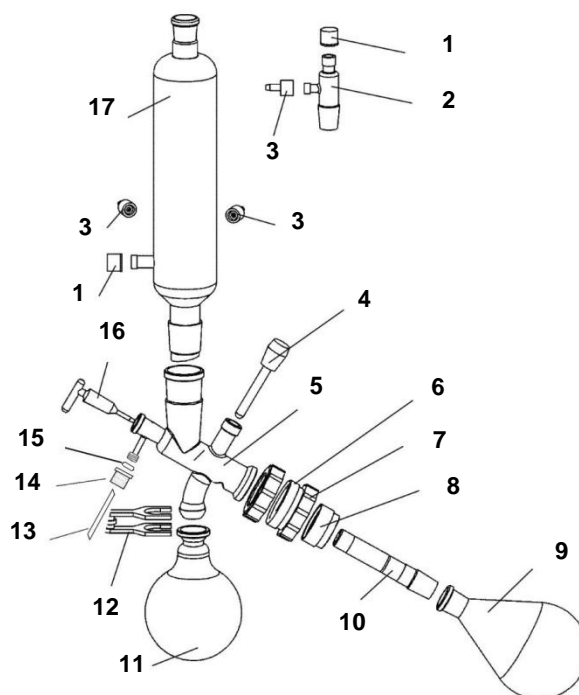


Figure 10-4: Glassware set G6

Order description	Position	Order No.	Piece at delivery
Threaded fitting GL 18	1	23-09-03-01-24	2
Vacuum fitting NS 29 / 32	2	514-00001-00	1
Threaded fitting GL 14	3	23-09-03-01-27	3
Connector for the threaded fitting GL 14	3	11-300-005-22	3
Valve	4	514-48000-00	1
Center piece G6	5	514-00601-00	1
Center piece G6B, plastic coated	5	514-00611-00	(1)
G6 threaded coupling	6	515-62000-00	1
Gasket G6	7	23-30-01-01-35	1
Intermediate part G6	8	22-30-01-05-02	1
Evaporator flask 1,000 ml, NS 29/32	9	514-74000-00	1
Evaporator flask 1,000 ml, NS 24/40	9	514-74000-05	(1)
Vapor tube NS 29 / 32 G6	10	514-00000-05	1
Vapor tube NS 24 / 40 G6	10	514-00020-06	(1)
Receiving flask 1000 ml, S 35/20	11	514-84000-00	1
Receiving flask 1000 ml, S 35/20, plastic coated	11	514-84000-02	(1)
Condenser clamp S 35/20	12	515-42000-00	1
Inlet tube (PTFE-) 3.5/4.5x600	13	23-30-01-04-72	1
Threaded fitting GL10 red	14	23-30-01-04-69	1
Seal O-ring 3.2x2.5	15	23-08-06-03-26	1
Inlet pipe (stopcock)	16	514-51000-00	1
Condenser G6	17	514-23000-00	1

Condenser G6B, plastic coated	17	514-23000-02	(1)
Condenser mounting		569-00050-00	1

Table 10-4: Glassware set G6

10.2 Accessories

Order description	Order No. 230 V 50/60 Hz	Order No. 115 V 50/60 Hz	Comments
Protective hood	569-00010-00		
Protective shield	569-00020-00		
Vapor temperature sensor	569-00030-00		
Temperature sensor Auto _{accurate} sensor	569-00040-00		
Vacuum pump ROTAVAC valve control	591-00130-00	591-00130-01	
Condensate cooler for ROTAVAC valve control	591-00081-00		
Vacuum pump ROTAVAC valve tec	591-00160-00	591-00160-01	
Condensate cooler for ROTAVAC valve tec	591-00083-00		
Vacuum pump ROTAVAC vario control	591-00141-00	591-00141-01	
Condensate cooler for ROTAVAC vario control	591-00084-00		
Vacuum pump ROTAVAC vario tec	591-00171-00	591-00171-01	
Condensate cooler for ROTAVAC vario tec	591-00084-00		
Vacuum box	569-00100-00		
Vacuum controller VAC control automatic	569-00340-00	569-00340-01	
Vacuum switch box for 3 consumers	569-00400-00	569-00400-01	
Vacuum valve	569-00060-00		
Woulff bottle	569-00070-00		
Vacuum controller, manual	591-26000-00		
Tube set	591-35000-00		
Heating bath liquid (up to 180 °C)	515-31000-00		
PTFE 26 Vacuum seal	23-30-01-01-30		
Clamping sleeve	23-30-01-05-31		
Transportation safety device	11-300-006-28		

Table 10-5: Accessories

11 Appendix

11.1 Technical data

Basic Device	Basis Hei-VAP Value	Basis Hei-VAP HL.	Basis Hei-VAP ML	Basis Hei-VAP HL	Basis Hei-VAP ML
Dimensions (WxDxH) of drive unit in the lowest position without a glassware set ****	393 x 449 x 427 mm	393 x 449 x 427 mm	393 x 411 x 427 mm	393 x 449 x 427 mm	393 x 411 x 427 mm
Connected load	1400 W				
Connected voltage	230 V / 50/60 Hz or 115 V / 50/60 Hz				
Drive unit	EC motor with electronic speed control				
Drive unit of lift	Manual	Manual	Motor	Manual	Motor
Speed range	10–280/min				
Weight incl. heating bath without glassware set	16 kg	16 kg	16 kg	17 kg	17 kg
Lifting speed	manual	manual	approx. 40 mm/s	manual	approx. 40 mm/s
Length of stroke	155 mm				
Cooling surface	1,200 cm ²				
Panel	Bedienpanel Value or Bedienpanel Collegiate	Bedienpanel Advantage- HL	Bedienpanel Advantage ML	Bedienpanel Precision HL	Bedienpanel Precision ML
Connected load	24V dc				
Connected voltage	1W			2W	
display	Scale	3.5" LCD screen	3.5" LCD screen	4.3" LCD color screen	4.3" LCD color screen
Control panel					
– Lift	-	-	yes	-	yes
– Start Rotation	yes	yes	yes	yes	yes
– Start Vakuum	-	-	-	yes	yes
– Start Heizbad	yes	yes	yes	yes	yes
– Start Timer	-	yes	yes	yes	yes
Heating Bath	Heizbad Hei-VAP				
Heating capacity	1300 W				
Diameter of heating bath	255 mm				
Heating bath material	V4A (1.4404)				
Heating bath temperature range	20–210 °C				
Heating bath control accuracy	±1 K				
Heating bath temperature control	electronic/digital				

Degree of protection	IP 20				
Airborne sound level	Clearly lower than 85 db(A)				
Permissible ambient conditions	5 – 31 °C at 80 % relative humidity 32 – 40 °C decreasing linear to a max. rel. humidity of 50% 0 - 2000m absolute altitude Pollution Degree 2 Installation Category II				
Connected voltage *** $\pm 10\%$	230 V / 50/60 Hz	230 V / 50/60 Hz	230 V / 50/60 Hz	230 V / 50/60 Hz	230 V / 50/60 Hz
	115 V / 50/60 Hz	115 V / 50/60 Hz	115 V / 50/60 Hz	115 V / 50/60 Hz	115 V / 50/60 Hz
Evaporation rate (L/h) ΔT^* 20/40 °C					
– Toluene	4,1 / 8,2	4,1 / 8,2	4,1 / 8,2	4,1 / 8,2	4,1 / 8,2
– Acetone	2,4 / 4,7	2,4 / 4,7	2,4 / 4,7	2,4 / 4,7	2,4 / 4,7
– Ethanol	1,6 / 3,2	1,6 / 3,2	1,6 / 3,2	1,6 / 3,2	1,6 / 3,2
– Water	0,5 / 1,0	0,5 / 1,0	0,5 / 1,0	0,5 / 1,0	0,5 / 1,0

Table 11-1: Technical data

* ΔT = Difference between the heating bath temperature and the vapor temperature

** Only possible in conjunction with vacuum systems

*** Standard 230 V/50/60 Hz: other connecting voltages upon request

**** Ready to connect including the power plug

Unit configuration

Hei-VAP Value:

- With manual control valve for limiting the vacuum and a Rotavac valve vacuum pump
 - Manual vacuum controller for limiting the vacuum with the ROTAVAC valve control
 - Manual vacuum controller for limiting the vacuum with the ROTAVAC valve tec
- Without a controller with a Rotavac valve vacuum pump
 - ROTAVAC valve control or ROTAVAC valve tec
- With a controller and valve-controlled vacuum pump
 - Vac control automatic with vacuum valve (optional Woulff bottle) and ROTAVAC valve control
 - Vac control automatic with vacuum valve (optional Woulff bottle) and ROTAVAC valve tec
- With controller and vacuum
 - Valve Control automatic with vacuum valve (optional Woulff bottle) and vacuum
- With manual control valve and vacuum
 - Manual vacuum controller for limiting the vacuum with vacuum

Hei-VAP Advantage:

- Without a controller with a Rotavac valve vacuum pump
 - ROTAVAC valve control or ROTAVAC valve tec
- With a controller and valve-controlled vacuum pump
 - Vac control automatic with vacuum valve (optional Woulff bottle) and ROTAVAC valve control
 - Vac control automatic with vacuum valve (optional Woulff bottle) and ROTAVAC valve tec
- With controller and vacuum
 - Valve Control automatic with vacuum valve (optional Woulff bottle) and vacuum
- With vacuum
 - vacuum only

Hei-VAP Precision:

- Rotary evaporator Hei-VAP with valve-controlled vacuum pump
 - Vacuum valve (optional Woulff bottle) and ROTAVAC valve control
 - with vacuum valve (optional Woulff bottle) and ROTAVAC valve tec
- Rotary evaporator Hei-VAP with speed-controlled vacuum pump
 - with ROTAVAC vario control
 - with ROTAVAC vario tec
- Rotary evaporator Hei-VAP with vacuum
 - with vacuum valve (optional Woulff bottle) and vacuum
- Expanded function of the above listed configurations
 - Function "Auto_{accurate} " with Auto_{accurate} sensor
 - Display of the vapor temperature with vapor temperature sensor

11.2 Technical data o the vacuum box Hei-VAP

	Order No. 569-00100-00
Connected voltage	24 V DC
Connected load	3 W

Table 11-2: Technical data o the vacuum box

11.3 Solvent data

The graph shows the relationship between the pressure and vapor temperature of a selection of solvents.



The temperature difference between the vapor temperature and the cooling medium should be at 20 K to result in sufficient condensation.

The temperature difference between the heating bath and vapor temperature should be at 20 K to reach a sufficient Distillation rate (dT).

i.e.: Set a vacuum for a vapor point at 40 °C, set the heating bath temperature at 60 °C.

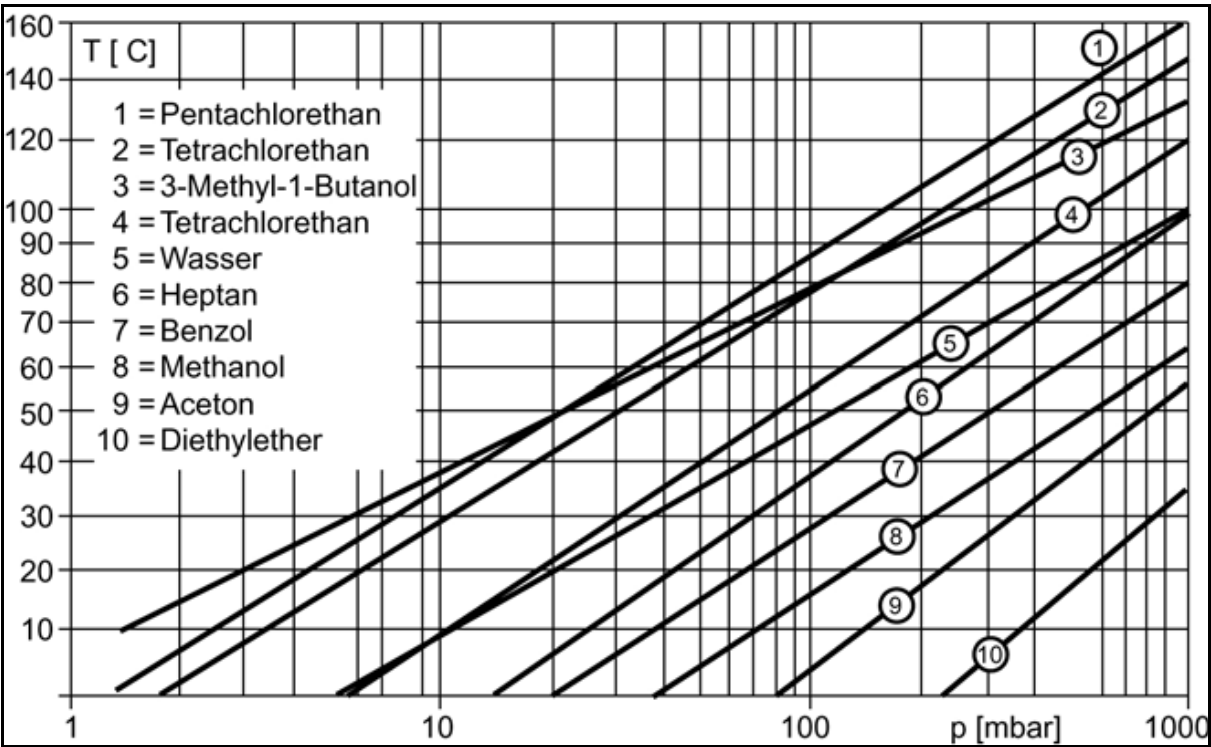


Figure 11-1: Graph

Torr to mbar conversion: [mmHg] \approx 3/4 [mbar]

Solvent data

Solvents	Total formula	MW [g/mol]	Vapor point [°C]	ΔH_{vap} [J/g]	Vacuum for a vapor point at 40 °C	
					[mbar]	[mm(Hg)]
Acetone	C ₃ H ₆ O	58,08	56,5	550	556	387
Acetonitrile	C ₂ H ₃ N	41,05	81,8	833	230	173
Benzene	C ₆ H ₆	78,11	80,1	549	236	177
n-butanol (butyl alcohol)	C ₄ H ₁₀ O	74,12	117,5	619	25	19
tert.-butanol (tert-butyl alcohol)	C ₄ H ₁₀ O	74,12	82,9	588	130	98
2-Butanone (methyl ethyl ketone)	C ₄ H ₈ O	72,11	79,6	473	243	182
Chlorobenzene	C ₆ H ₅ Cl	112,60	132,2	375	36	27
Cyclohexane	C ₆ H ₁₂	84,16	80,7	389	235	176
1.2 Dichloroethane	C ₂ H ₄ Cl ₂	98,96	82,4	336	210	158

Solvents	Total formula	MW [g/mol]	Vapor point [°C]	ΔH_{vap} [J/g]	Vacuum for a vapor point at 40 °C	
					[mbar]	[mm(Hg)]
1,2 Dichloroethylene (cis)	C ₂ H ₂ Cl ₂	96,94	59,0	320	479	134
1,2 Dichloroethylene (trans)	C ₂ H ₂ Cl ₂	96,94	47,8	313	751	563
Dichloromethane (methylene chloride)	CH ₂ Cl ₂	84,93	40,7	373	atm.	atm.
Diethyl ether	C ₄ H ₁₀ O	74,12	34,6	392	atm.	atm.
Diisopropyl ether	C ₆ H ₁₄ O	102,20	67,5	318	375	281
Dimethylformamide	C ₃ H ₇ NO	73,09	153,0		11	8
1,4-Dioxane	C ₄ H ₈ O ₂	88,11	101,1	406	107	80
Ethanol	C ₂ H ₆ O	46,07	78,4	879	175	131
Ethylacetate	C ₄ H ₈ O ₂	88,11	77,1	394	240	180
Heptane	C ₇ H ₁₆	85,09	98,4	439	120	90
Hexane	C ₆ H ₁₄	86,18	68,7	370	335	251
Methanol	CH ₄ O	32,04	64,7	1225	337	253
3-Methyl-1-butanol (Isoamyl alcohol)	C ₅ H ₁₂ O	88,15	130,6	593	14	11
Pentachlorinated Ethane	C ₂ HCl ₅	202,30	160,5	203	13	10
Pentane	C ₅ H ₁₂	72,15	36,1	382	atm.	atm.
n-Pentanol (amyl alcohol)	C ₅ H ₁₂ O	88,15	137,8	593	11	8
1-Propanol (n-propyl alcohol)	C ₃ H ₈ O	60,10	97,8	787	67	50
2-Propanol (isopropyl alcohol)	C ₃ H ₈ O	60,10	82,5	701	137	103
1,1,2,2-Tetrachloroethane	C ₂ H ₂ Cl ₄	167,90	145,9	247	35	26
Tetrachloroethylene	C ₂ Cl ₄	165,80	120,8	233	53	40
Tetrachloromethane (carbon tetrachloride)	CCl ₄	153,80	76,7	225	271	203
Tetrahydrofuran (THF)	C ₄ H ₈ O	72,11	66,0	–	357	268
Toluene	C ₇ H ₈	92,14	110,6	425	77	58
1,1,1-Trichloroethane	C ₂ H ₃ Cl ₃	133,40	74,1	251	300	225
Trichloroethylene	C ₂ HCl ₃	131,40	86,7	265	183	137
Trichloromethane (chloroform)	CHCl ₃	119,40	61,3	263	474	356
Water	H ₂ O	18,02	100,0	2259	72	54
Xylene (isomers mixture)	C ₈ H ₁₀	106,20	137–143	390	25	19

Table 11-3: Solvent data

11.4 EC Declaration of Conformity

We, Heidolph Instruments GmbH & Co. KG,
Heidolph Instruments GmbH & Co. KG
Vertrieb Labortechnik
Walpersdorfer Str. 12
91126 Schwabach / Germany

declare that the rotary evaporators of the Hei-VAP series for:

- distillation, evaporation
- purification of chemicals, substances, mixtures and preparations
- processing reaction batches
- drying of powder

Construction year: since 2009
Serial number: see model plate
Component number: see model plate

comply with the following standards and standardized documents:
EMV guideline 2004/108/EG:

- | | |
|-------------------------------------|--|
| • EN 61326-1:2006 + correction 2006 | • EN 61000-3-2:2006 |
| • EN 61326-2-1:2006 | • EN 61000-3-3: 1995 + 2006 + A1:2001 + A2: 2005 |
| • EN 61326-2-2:2006 | • EN 61000-4-2:1995 +A1:1998+A2:2001 |
| • EN 61326-2-3:2006 | • EN 61000-4-3:2006 +A1:2008 |
| • EN 61326-2-4:2007 | • EN 61000-4-4:2004 |
| • EN 61326-2-5:2007 | • EN 61000-4-5:2006 |
| • EN 61326-2-6:2007 | • EN 61000-4-6:2007 + corrigendum 2007 |
| • EN 61326-3-1:2008 | • EN 61000-4-11:2004 |
| • EN 61326-3-2:2008 | |
| | • EN 60529: 1991 + A1 : 2000 |

Low Voltage Directive:
2006/95/EG

- EN 61010-1:2001 + first correction: 2002 + second correction 2002
- EN 61010-2-010:2003

Airborne noise emission:
EN ISO 3744:1995 and EN ISO 2151:2008

This declaration is void if modifications were performed on the unit without our prior consent.
The declaration of conformity was created according to DIN EN ISO/IEC 17050-1 "General criteria for supplier's declaration of conformity".

Date: 18.07.2009
Signature: _____



Name of the undersigned: S. Richter

11.5 Warranty Statement



Heidolph Instruments guarantees a warranty of three years for the products described here (except glass and wear parts) if you are registering with the enclosed warranty card or via the Internet (www.heidolph.com). The warranty begins with the registration. The serial number of the unit is valid without the registration. This warranty covers material and manufacturing defects. Transport damages are excluded.

In the event of a warranty claim, please contact Heidolph Instruments (Tel: (+49) 9122 - 9920-69) or your local Heidolph Instruments dealer.

If it is a material or manufacturing defect, the unit will be repaired or replaced free of charge within the scope of the warranty.

Heidolph Instruments will not assume any guarantees for damages due to improper treatment.

Heidolph Instruments GmbH & Co. KG

Vertrieb Labortechnik

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