

## OPERATING MANUAL

### Witeg Hahnvapor



Model greaseless

2 600 000

2 610 000

witeg Labortechnik GmbH  
Am Bildacker 16  
97877 Wertheim  
Phone: +49 (0)9342 / 9301-0  
Fax: +49 (0)9342 / 9301-77

[www.witeg.de](http://www.witeg.de)  
[info@witeg.de](mailto:info@witeg.de)

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## 1. Safety

### 1.1 Symbols



#### **Stop**

“Stop” indicates any kinds of hazards that can cause heavy material damages, or even life-threatening injuries.



#### **Warning**

“Warning” indicates any kinds of hazard that can be harmful not only to the machine but also to your health.



#### **Note**

“Note” refers to technical requirements; if these requirements are not met, undesirable results, reduced efficiency and product losses can result.

### 1.2 Requirements placed on operators

Only technical experts are authorized for operating this product due to the typical hazards that can arise while this apparatus is operating. All users should be aware of possible dangers, and be fully acquainted with these instructions prior to use.

### 1.3 Proper usage

HAHNVAPOR has been designed and built for laboratory use only. It should be used for experiments associated with evaporation and condensation of solvents.

HAHNVAPOR is used for

- \* Distilling solvents
- \* Concentration of solvents and suspensions
- \* Synthesis and cleaning of fine chemicals
- \* Drying of powder and granule

## 1.4 Improper usage

Any uses of materials that do not comply with the technical data are considered as improper usage. All users are responsible for any damage or injury that can be caused by such improper usages.

The following are not permitted:

- \* Using the apparatus in non-laboratory areas.
- \* Determination of samples, which can explode or ignite (example: explosives, etc) due to shock, friction, heat or spark formation.
- \* Working in excess pressure.
- \* Using improper materials for heating bath of the Witeg Hahnvapor model, especially the use of heating sources with temperatures above 180C (e.g. a Bunsen burner, etc)
- \* Processing hard or brittle materials (example: stones, soil samples, etc.), which can lead to destruction of the evaporating flask.

## 1.5 Fundamental hazards



**HOT**

Fundamental hazards are associated with:

- \* Hot water in the water bath
- \* Solvents, which can form peroxide and other explosive gases
- \* Solvents with low ignition, flame, and/or explosion temperatures
- \* Mixtures with unknown compositions or contamination
- \* Combustible gases or solvent vapor in the immediate vicinity of the rotary evaporator

- \* Damaged glassware (implosions)
- \* Electrostatic charges when solvents are filled, or in the case of drying powder.



### **1.6 Safety measures**

An operator has to be fully trained with this manual prior to using HAHNVAPOR. All instructions should be followed. The operator should inform the manufacturer if any sort of problems or accidents that happen. Personal protective equipment such as protective eye goggles, protective clothing, and gloves must be worn during use. There is a risk of scalding when hot evaporating flasks are replaced. Suitable gloves must be worn to prevent any possible injury.

### **1.7 Modifications**



Modifications of the HAHNVAPOR machine, its parts, or accessories are not recommended. Using spare parts and accessories other than those mentioned in these operating instructions are only permitted with the written consent of Witeg Labortechnik. Check for any damage in glass parts prior to use.

### **1.8 Safety elements**

#### **Electronics**

- \* The 230V baths are equipped with safety fuses.
- \* The bath is equipped with both mechanical and an electrical temperature overload protection.

#### **Operation/product parts**

- \* The safety catch is for regulating the submersion depth of the evaporating flask into the heating bath

- \* The joint clamp is for fixing the evaporating flask and for safe loosening of fixed ground-glass joints (evaporating flasks)
- \* The ball joint clip is for safe attachment of the receiving flask
- \* Rods and holders are for holding of the glass assemblies

## **Glass**

- \* Using adiabatic All-Borosilicate Glass 3.3 / Pyrex / DURAN
- \* Connection of silicon hose that prevents glass damage
- \* The electrical servo jack is equipped with an electronic temperature overload protection and a power-up time limit.
- \* The driving unit is equipped with an electronic temperature overload protection
- \* A safety spring protects the vapor duct from dropping out.

## **2. Function**

### **2.1 Terms**

The following terms frequently show up in this manual, so they need to be clearly explained. Glass assembly S: Slant condenser Glass assembly V: Vertical condenser Glass assembly C: Cold condenser

### **2.2 Function principle**

HAHNVAPOR can perform quick single step distillations. The main principal of this procedure is the evaporation and condensation of solvents using a rotating evaporation flask. Distillations can be performed under vacuum and atmospheric pressure conditions.

### **An example using the assembly V**

## 1) Evaporation area

The solvent is heated over a water bath within the HAHNVAPOR. During heating, a thin solvent film forms on the inside of the rotating evaporating flask, resulting in increased evaporation rate.

## 2) Rotation drive

The drive unit makes sure that the evaporating flask rotates evenly to produce the best results.

## 3) Cooling area

The solvent vapor flows into the condenser very quickly. In this area, the solvent vapor transfers its energy to the cooling medium, and then condenses.

## 4) Receiving flask

The receiving flask collects the condensing solvent

## 5) Vacuum

The vacuum reduces the boiling temperature and increases the performance of distillation. Evaporating performance is influenced by distillation pressure, heating bath temperature, rotation speed and size of evaporating flask.

## 3. Electrical connections



The correct voltage must be identified. The voltage on the socket corresponds to the voltage given on the apparatus plate (220V 50/60Hz). Always connect the apparatus to a properly grounded socket. External connections and extension cables must have a grounded conductor lead (3-pole couplings, cable or plug equipment). The grounded conductor lead should always

be connected. Electrostatic sparks may damage the apparatus if the ground is not connected.

The bath and rotary evaporator are connected to the system by the main cables.

## Cabling

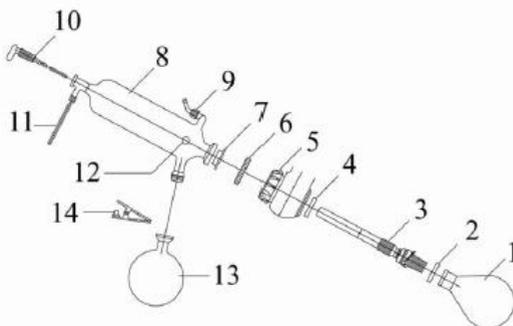
- 1) Main supply bath
- 2) Main supply rotary evaporator

## 3.1 Water Bath

- 1) Use clean water or oil.
- 2) Place evaporating flask in the proper position of the water bath

## Heating medium

Never operate the heating bath without a heating medium. Suitable heating mediums are as follows: Distilled water for temperature ranges between 20°C to 85°C Heat carrier oil or water soluble polyethylene glycol (PEG) for a working range up to 180°C.



## 3.2 Sealing system

HAHNVAPOR has two types of ducts. These types are dependant on the condenser configurations. The duct is assembled with

a vacuum seal and is suitable for distillation. The HAHNVAPOR

duct is made of Borosilicate glass 3.3, which is highly resistant to chemical solutions. The vacuum seal is composed of PTFE and Latex. Care should be taken when the seal is installed as to avoid damaging the sealing surfaces.

To prolong the service life of seals, the following should be performed:

- \* Clean seals with soap, water, or alcohol on a regular basis.
- \* Do not grease seals.
- \* Worn seals should be replaced prior to use.
- \* This is a list of the components that contain seals:

- |                             |                            |
|-----------------------------|----------------------------|
| 1. Evaporating flask        | 2. Joint clamp             |
| 3. HAHNVAPOR Duct           | 4. Duct Screw Cap          |
| 5. Condenser Screw Coupling | 6. Condenser Holder Spring |
| 7. Vacuum Seal              | 8. Assembly Condenser      |
| 9. Vacuum Connector         | 10. Vacuum adapter         |
| 11. Vacuum Stop-cock        | 12. Drawing Teflon Hose    |
| 13. Receiving Flask         | 14. Receiving Flask Clamp  |

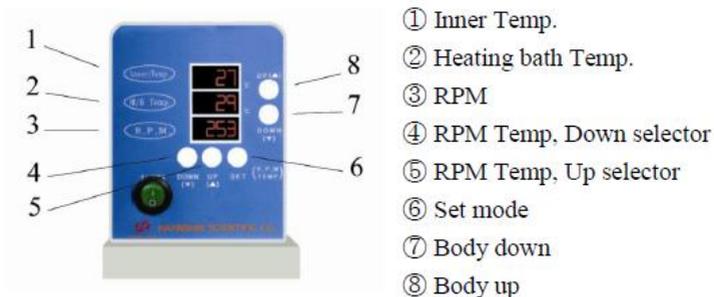
### **3.3 Glass assemblies**

- 1) Connect the Hahnvapor duct with a screw connector

- 2) Insert the connected Hahnvapor duct through the vacuum seal
- 3) Then, connect the condenser to the other screw connector
- 4) Connect the evaporating flask

### 3.4 Joint clamp

- 1) Holding the evaporating flask
- 2) Loosening of the evaporating flask



### Display guide

- ① Push the set mode. Then the heating bath temp display will blink. Please set the temperature value by using the up and down selectors, then push set mode.
- ② After temperature setting is done, please push the set mode button. The RPM display window will blink. By using the up and down arrow buttons please set the RPM value, then push set

mode button again. The window goes back to the original value again.

Example: When you want to set Heating bath: 80°C RPM : 100

- ① Upon pushing the set mode button, please set 80 on heating temperature window by using the up and down arrow buttons.
- ② When you push set mode button again, the display will show the RPM window. Please push set mode button after setting 100 by using the up and down arrow buttons.

## **4. Operation**

### **4.1 Lowering and raising the evaporation flask**

With the up and down buttons, the evaporating flask can be lowered or raised from the water bath. This operation requires no physical effort. All motion is controlled by an integrated motor.

### **4.2 Heating bath**

As soon as the main plug is plugged in, the bath starts to warm up, provided the main switch is turned on. Thus, make sure that there is always heating bath liquid in the bath. The heating bath can raise the temperatures up to maximum of 100°C.

#### **To avoid accidents:**

\* Never remove rotating flasks from the bath as splashing oil can lead to severe burns.

- \* Make sure that no liquid can flow from the bath when the evaporating flask is submerged.
- \* Install protective shield prior to heating.

If the desired temperature is set via the two push buttons, the display jumps from ACTUAL to SET point. The DESIRED temperature can now be set. After approximately 20 seconds, the display jumps back to the ACTUAL value.

### Heating bath

#### Specification

**Bath Dimensions (Ø×H): 250×115mm**

**Capacity: 4.3ℓ**

**Material: SUS304 (Stainless steel)**

**Temp. controller: Amb.~ 180°C**

**Temp. setting/Display; Digital**

**Power source: AC 220V 50/60Hz, 4.5A**

**Heater: 1000W**

**Water level sensor: Magnetic Type**



In case that the heating bath water evaporates, the unit will shut off. The unit contains an interlocked double sensor which gives you safety and convenience.

## 4.3 Distilling

This section describes how to start, operate and end the distillation by using a check list.

**To insure that the apparatus is completely installed check the following:**

- \* All electrical connections are correct.
- \* All seals have been correctly inserted.
- \* All joints are greaseless.

\* Evaporating flask is emptied before it is mounted.

**Set heating bath to desired value** Then the heating liquid will reach the predetermined temperature.

**Open cooling water** Allow cooling water to flow through the condenser at approximately 40-50 liter/hour, but do not allow the temperature to rise above 20°C.

**Fill the evaporating flask with solution** The solution can be sucked in using vacuum pressure

### **Start evacuation process**

Choose pressure in such a way that the boiling point of the solvent is 40°C

\* Set rotation

\* Use up and down arrow buttons to lower the flask into the bath

\* After pre-determined vacuum has been reached, wait for 1-2 min to see if distillation begins

\* If distillation does not start, parameters must be optimized again (Reduce pressure gradually or increase bath temperature).

### **When distillation ends**

In order to eliminate the risk of back evaporating, replace the receiving flask. You may continue distillation after that. Repeat this process until all desired solvent is evaporated off. At the end of distillation, start rotation, raise the flask using the arrow buttons. Turn off the heating bath to save energy if you do not intend to immediately perform another distillation.

## 4.4 Choosing distillation conditions

In order to achieve an optimum distillation condition when rotary evaporators are used, the energy supplied for distillation from the heating bath must be removed via the condenser. To guarantee this, operations should be performed according to this rule of thumb.

Cooling water	Vapor	Bath
Max. 20°C	40°C	60°C

How can you achieve these conditions?

- \* Set the bath temperature to 60°C
- \* Set cooling water temperature no higher than 20°C
- \* Allow cooling water to flow through the condenser at approximately 40-50 liter/hour
- \* Selecting the optimum working vacuum condition so that the boiling point of the solvent stays at 40°C. You can get the corresponding pressure from the Solvent Table (next page)

Advantages associated with a 60°C bath temperature:

- \* The evaporating flask can be replaced without risk of scalding.
- \* The evaporation rate of the water from the heating bath is not very high (energy loss).
- \* The heating bath operates at a good degree of efficiency.
- \* This rule can also be applied to lower bath temperatures, for example:

Cooling water	Vapor	Bath
Max. 20°C	40°C	60°C

## Optimizing distillation:

Depending on the distilled solvent, distillation may have to be optimized again. However, before you optimize distillation again, the heating bath must be at 60°C.

## 5. Maintenance

All users must be well acquainted with all instructions in order to keep the Rotary Evaporator fully functional. Users should periodically clean and check for damages.

### 5.1 Cleaning and Maintenance of the Heating Bath

The heating bath does not require any maintenance. However, users should keep it clean all the time. It should be cleaned if:

- \* The water bath is calcified or contaminated.
- \* The oil in the oil bath has changed or is contaminated.

### Glass components



Rinse glass components with commercial cleaners (for example mild soap solution). Use suitable cleaning materials to remove dirt adhering in the condenser coil (for example algae). After each glass component is cleaned and completely dried, carefully inspect each glass component for glass splinters or cracks. When the rotary evaporator is operating, glass components can contain vacuum pressure; users must carefully control the pressure!

### Sealing system

Carefully check the seals. Replace it with a new one if the seal is seriously worn.

- \* A proper cleaning and drying prolongs the service life of seals.

- \* This also helps to keep solvents from getting into the unit.
- \* Clean seals and glass components regularly, especially after boiling delays and/or work with crystalline products.

## **Housing**

Use a moist cloth to clean the housing. Never use chemical solvents. Check the housing for defects (controls, plugs)

## **Tube connection**

Carefully examine tube connections. Torn or broken tubes should be replaced with suitable new tubes

## **5.2 Functional test**

Frequent maintenance reduces the possibility of breaking down and promises long service life of the HAHNVAPOR. A periodical maintenance (at least once in three months) is recommended.

## **Vacuum tightness**

The apparatus is evacuated while flask is rotating. By using a pressure gauge, the user can insure the vacuum pressure remains constant. For this purpose, the vacuum tube between the vacuum source and the pressure measuring device is interrupted by careful bending. The amount of pressure change per minute should be less than 3mbar.

## **Setting rotation speed**

The regulator for rotation speed is slowly turned from the minimum setting to the maximum catch (clockwise). The motor should be operated without interruption in each position of the regulator.

## **Bath temperature control**

The operator should be aware of bath temperature at all times. Heating time should not be more than 15 minutes.

### **5.3 Customer service**

Only authorized service personnel can repair the apparatus. These persons are technically trained and aware of any possible hazardous situations. The address of the official witeg customer service office is given on the cover sheet of these operating instructions. If the apparatus malfunctions or you have any technical questions, contact this office.

witeg Customer Service offers the following services:

- \* Spare parts supply (clarify the part number that is on the last page of these operating instructions.)
- \* Repair and Maintenance
- \* Technical advice

## **6. Taking HAHNVAPOR out of operation**

Make sure to remove dangerous substances and thoroughly clean the apparatus prior to storage, to prevent any kind of injury.

### **6.1 Storage/transportation**

Clean the apparatus thoroughly. Residues of chemicals must be removed completely, and the glass components must be

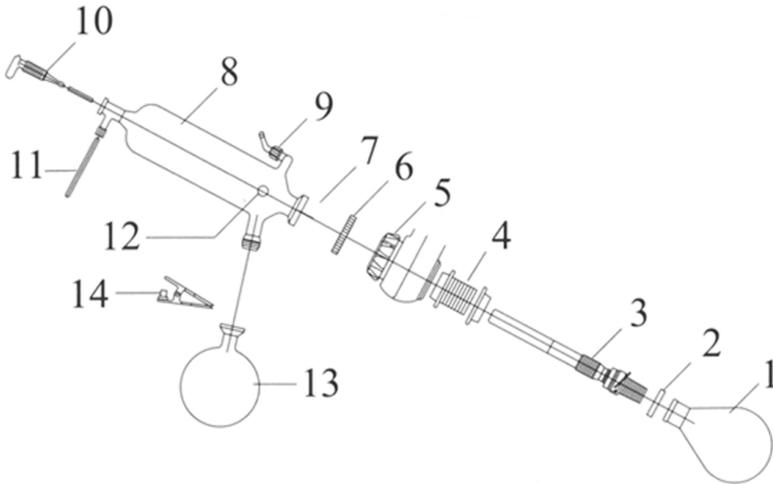
cleaned. Keep and transport the apparatus in its original packaging.

## **6.2 Disposal**

The apparatus must be disposed of in environmentally friendly method. There is a list of materials used. This helps to ensure that the components are separated and recycled. Please observe all regional and local laws concerning disposal.

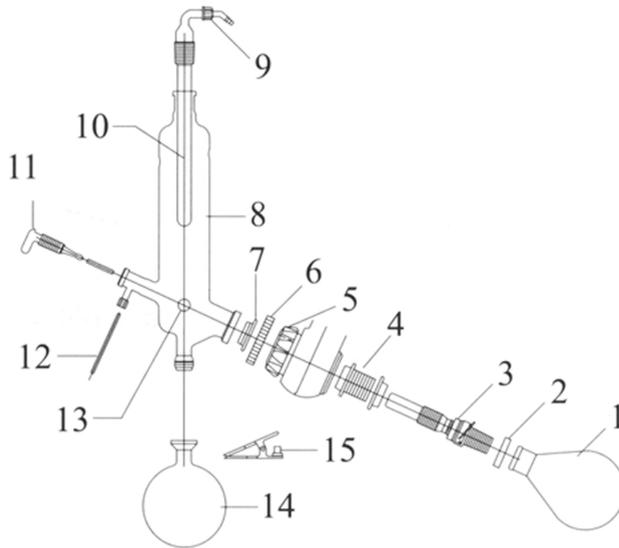


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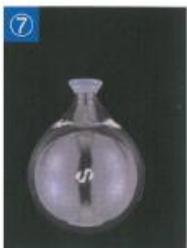
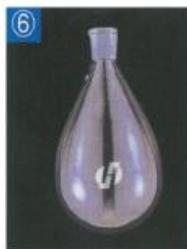


1	Evaporating Flask	0 655 001 FCH-V
2	Joint Clamp	0 131 329   0 131 629
3	HAHNVAPOR Duct	2 600 0072 PTFE
4	Duct Screw Cap	2 600 040
5	Condenser Screw Coupling	2 600 041
6	Condenser Holder Spring	2 600 042
7	Vacuum Seal	2 600 018
8	Assembly Condenser	2 600 009
9	Vacuum Connector	2 600 044
10	Vacuum Stop-cock	2 600 010
11	Drawing Teflon Hose	2 600 019
12	Vapor Sensor	2 600 020
13	Receiving Flask	0 644 500 ROT
14	Receiving Flask Clamp	0 133 035

2 610 000



1	Evaporating Flask	0 655 001 FCH-V
2	Joint Clamp	0 131 329   0 131 629
3	HAHNVAPOR Duct	2 600 0072 PTFE
4	Duct Screw Cap	2 600 040
5	Condenser Screw Coupling	2 600 041
6	Condenser Holder Spring	2 600 042
7	Vacuum Seal	2 600 018
8	Assembly Condenser	2 600 006
9	Vacuum Connector	2 600 045
10	Vacuum Adapter	2 600 044
11	Vacuum Stop-cock	2 600 010
12	Drawing Teflon Hose	2 600 019
13	Vapor Senser	2 600 020
14	Receiving Flask	0 644 500 ROT
15	Receiving Flask Clamp	0 133 035



- 1 HAHNVAPOR duct:** ST 29/32, PTFE, l=312mm 2 600 0071 PTFE  
 ST 29/32, PTFE, l=200mm 2 600 0072 PTFE  
 ST 29/32, glass, l=312mm 2 600 0071  
 ST 29/32, glass, l=200mm 2 600 0072
- 2 Bulbs for flask ST 29/32:** l=100mm 1 430 190  
 l=250mm 1 430 200
- 3 Four neckbulbs for flask:** 29/32 cone 1 430 400
- 4 Stop-cock ST 19/38, glass, with PTFE-tubing:**  
 NEW PTFE version 4/1 2 601 030  
 4/2 2 600 010 PTFE
- 5 Connecting Adapters:** ST 29 socket 0 510 003  
 ST 14/23 cone  
 ST 29 socket 0 510 023  
 ST 29/32 cone
- 6 Evaporating flask greaseless:**

		ST 29/32	standard:
			ST 29/32
Capacity:	50ml	0 655 050 FCH-V	0 655 050
	100ml	0 655 100 FCH-V	0 655 100
	250ml	0 655 250 FCH-V	0 655 250
	500ml	0 655 500 FCH-V	0 655 500
	1l	0 655 001 FCH-V	0 655 001
	2l	0 655 002 FCH-V	0 655 002
	3l	0 655 003 FCH-V	0 655 003
- 7 Receiving flask greaseless:**

		S 35/20	standard:
			S 35/20
Capacity:	100ml	0 644 100 ROT	0 644 100
	250ml	0 644 250 ROT	0 644 250
	500ml	0 644 500 ROT	0 644 500
	1000ml	0 644 001 ROT	0 644 001
	2000ml	0 644 002 ROT	0 644 002
	3000ml	0 644 003 ROT	0 644 003



**Joint Clamp**  
0 131 329



**Joint Clamp**  
0 131 629



**Vacuum Seal**  
2 600 018



**Receiving Flask**  
**Ball Clamp**  
0 133 035



**Condenser-A**  
2 600 009



**Condenser-B**  
2 610 006