Gerhardt

Vapodest 10s

Instruction Manual

Please read this manual carefully before you start operating the system!

Please observe the safety instructions of this manual, marked with ⚠ in order to avoid any dangers resulting from improper handling!

VAP 10
05. Nov. 2008_GB

LAB Online Exhibition

Operation Manual

knowledge

Action movie

www.1788lab.com E-mail:info@1788lab.com

Gerhardt

Contents

1 Safety

1.1 Application as directed

With the Vapodest 10 you have purchased an automatic distillation system for the steam distillation of Kjeldahl digestions and associated distillations.

Make sure to use the Vapodest 10 according to our instructions, especially:
- all instructions of this manual
- the regulations in place in the country the instrument is used

All other usage is not recommended!

C. Gerhardt GmbH & Co. KG is not liable for any damages caused due to non recommended usage
- any modifications are not allowed for safety reasons
- repairs of electric, electronic or mechanical components may only be done by authorized personnel!

1.2 Safety instructions

The Vapodest 10 corresponds to the technical standard used at this date and observes the safety rules and regulations in place.
It is understood that the user has to observe
- the accident prevention regulations in place
- the general accident prevention regulations
- EU-regulations or other country specific instructions

Make sure that no liquid gets into contact with cable connections or the interior electrical parts of the unit!
- Danger of electric shock!

In case of an emergency disconnect from mains immediately!

Always pull the mains plug before opening!
- Danger of electric shock!

1.3 Working bench/Authorized users

The distillation unit should be located on a fixed laboratory bench, close to the cold water connection and a drain.

The distillation unit must not be run in damp or hazardous location. The maximum humidity allowed is 80 %, the maximum room temperature must not exceed 40 °C!

The distillation unit may only be operated by trained staff.
The user has to:
- read, comprehend, and observe the operation manual
- wear suitable clothes for laboratory work
- deny access to any unauthorized personnel

2 Technical description

2.1. Warranty conditions

The distillation unit Vapodest 10 is manufactured following the high quality guidelines of EN ISO 9001:2000. On the basis of the C. Gerhardt conditions of warranty our products are guaranteed for 1 year, as long as the apparatus is used in accordance with the instructions mentioned in this manual.

Please note that the semi-consumable parts are excluded from warranty.

2.2. Technical data

Order No.:	7610
Nominal voltage:	230 VAC - 50/60Hz
Nominal Wattage:	1600 W
Cooling water:	about 3 litre per distillation minute
Cooling water pressure:	> 0,5 bar
Pump capacity:	
-Diaphragm pump H_2O	11 - ca. 30 ml/min with water
-Diaphragm pump Reagent	0 - ca. 170 ml/min with NaOH
Store tank:	any size, recommended: KAN 20
Dimensions:	440 x 690 x 340 mm (W x H x D)
Weight:	25 kg
Amount of distillate:	see table

	Steam capacity Level 10 (100 %)	**Steam capacity Level 1 (70 %)**
Dest.-time = 2 min	ca. 25 ml	ca. 15 ml
Dest.-time = 4 min	ca. 60 ml	ca. 40 ml
Dest.-time = 6 min	ca. 110 ml	ca. 60 ml
Dest.-time = 10 min	ca. 190 ml	ca. 110 ml

2.3. Operating conditions

Vapodest distillation systems can be run under normal laboratory conditions.

For the connection to the tap (cold water) a fixed connection with 1/2 inch thread is needed.

3 Description of the system

3.1. Check for transport damage

Check for transport damage

Before assembling the Vapodest 10 please check if the content of the box is complete and intact!

In case of any damage, please notify your carrier (post, rail, road) as well as your supplier!

The exact contents of the delivery can be checked by the following list.

3.2. Parts list

1 x Distillation system Vapodest 10, complete

1 x Water inlet tubing 10/17mm with connections of 1/2 inch and 3/4 inch, 2m
Order-No.: 22802

3 x PVC-tubing 8/12, 2 m, order no.: 22604

1x PVC-tubing 4/7, order no.: 22601
mounted with tubing reduction PP and PVC-tubing 8/12, 60 mm long

1 x PVC-pipe 10x1, 400 mm, order no.: 25451

1 x PVC-pipe 6x1, 400 mm, order no.: 25450

1 x Mains cable, order no.: 1311

1x Diode dummy plug, order no.: 12700

1 x Kjeldatherm-digestion tube, 250, order no.: 6100

1 x Instruction manual

1 x Test report

3 Description of the system

3.3. Front view

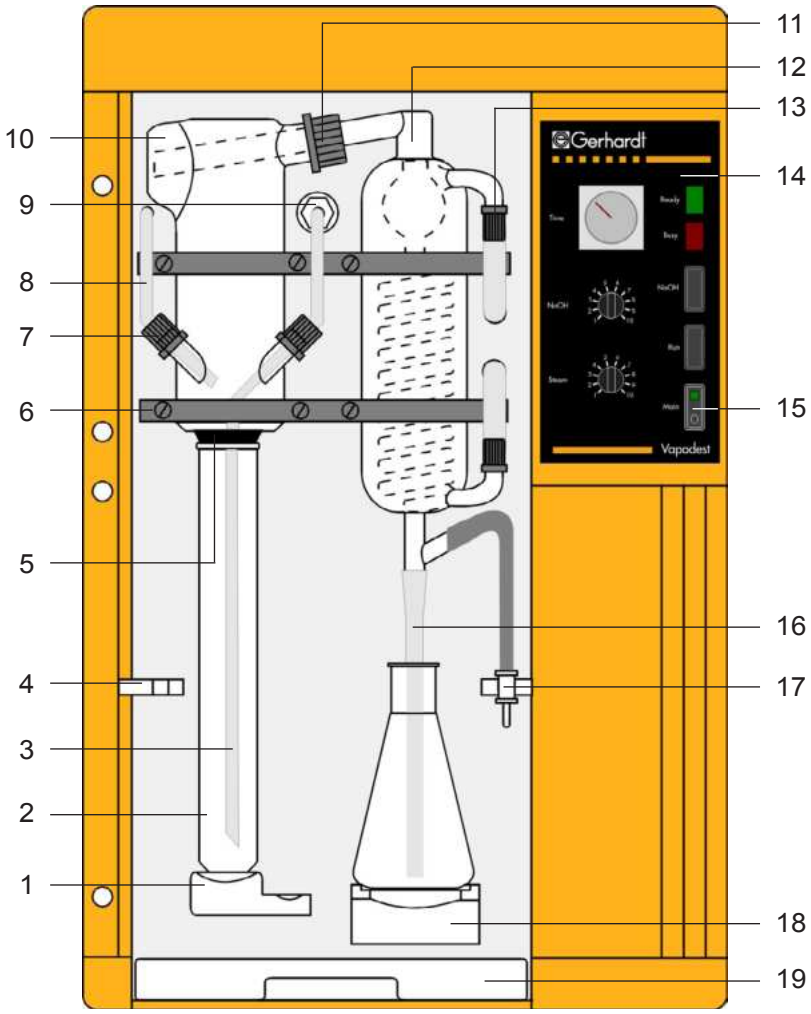


Fig. 3.3: Front view Vapodest 10

Structural components and parts

1 Quick clamping device with wedge
2 Digestion tube, Order No.: 6100
3 PTFE-Inlet tubing, steam, Art.-Nr.: 11815
4 Holder for steam inlet tubing
5 Viton-cone, Order No.: 6470
6 Clamping for glassware
7 Screw cap GL 18 with silicone seal, Order No.: 16602
8 PTFE-Inlet tubing, NaOH, Order No.: 11819
9 PP-distributor with PP-threaded joint
10 Distribution head, glass, Order No.: 7472
11 Screw cap GL 32 with silicone seal, Order No.: 16604
12 Distillation condenser, Order No.: 7673
13 Screw cap GL 14 with plastic screw connection, Order No.: 16601
14 Keyboard, Description see chapter 5.1. "Keyboard"
15 Mains switch, green, illuminated, Order No.: 11750
16 Distillate outlet tubing, silicone 8/12 mm Order No.: 22704
17 Ventilation valve, Order No.: 6474
18 Platform
19 Drip tray, Order No.: 50015

** Plexiglas protection door (not illustrated) Order No.: 19017

3 Description of the system

3.4. Rear view

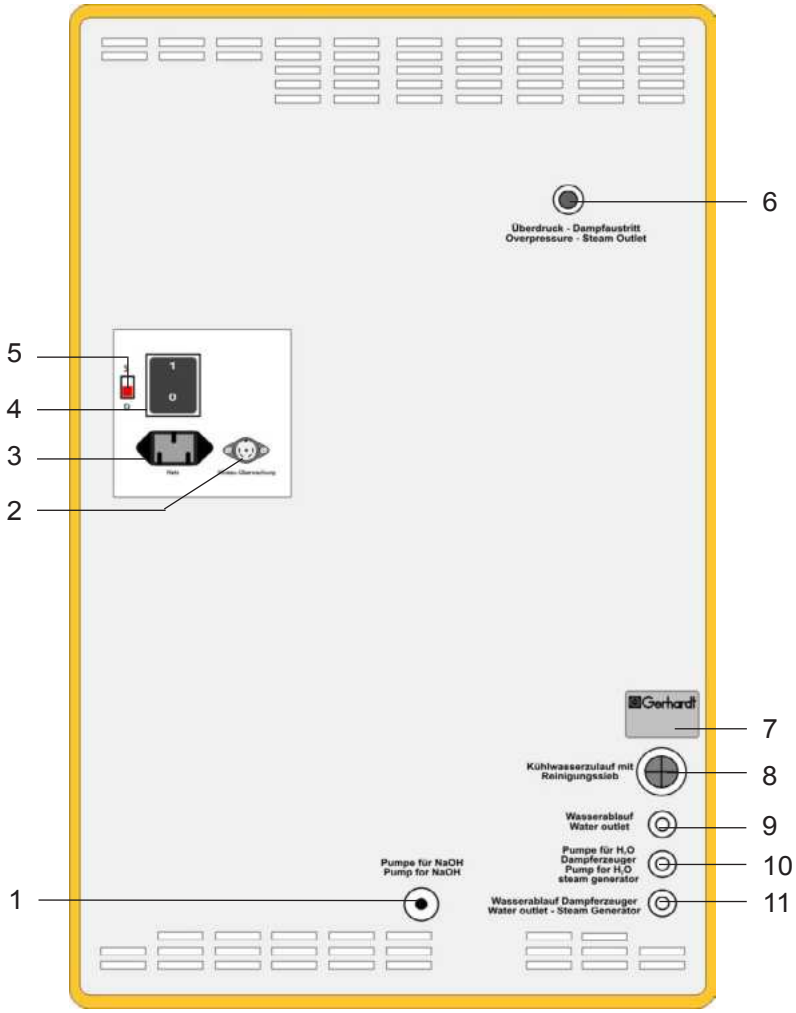


Fig. 3.4: Rear view Vapodest 10

Structural components and parts

1 Inlet for NaOH
Connection PVC-tubing 8/12, Order-No.: 22604
2 Level detector:
Connector for diode plug, 3-pin or level detector for set of storage tanks KAN 20
3 Appliance plug with mains cable
Connection for mains cable, Order-No.: 1311
4 Excess current switch, 10 A, Order-No.: 15378
Cuts off in case of excessive current consumption
5 Switch to rinse the steam generator
Also see Chapter 7.2.2. 'Cleaning of steam generator'
6 Excess pressure - steam outlet
7 Type plate
8 Cooling water inlet with sieve:
Connection thread 3/4 Zoll for water inlet tubing 10/17, Order-No.: 22802
9 Cooling water outlet
Connection for PVC-tubing 8/12, Order-No.: 22604
10 Water inlet for H_2O steam generator
Connection for PVC-tubing 8/12, Order-No.: 22604
11 Water outlet steam generator
Connection PVC-tubing 8/12, Order-No.: 22604

4 Assembly and setting into operation

4.1. General

Please observe the local water and waste regulations and those of your public water supply company!!

Please note that the length of the inlet and outlet tubing is restricted to 2 metres.

The appliance should be located on a fixed laboratory bench, close to the cold water connection and a drain.

There should be sufficient space for the set of tanks below the work bench.

Connect the water inlet tubing to a dedicated cold water tap.

The water pressure must be at least 0,5 bar in order to operate the integrated pressure controller.

The Vapodest 10 comes completely preassembled. Please unpack the instrument with care!

1. Place instrument on work bench.
2. Unpack accessories.
3. Place set of tanks for distilled water and sodium hydroxide below the bench.

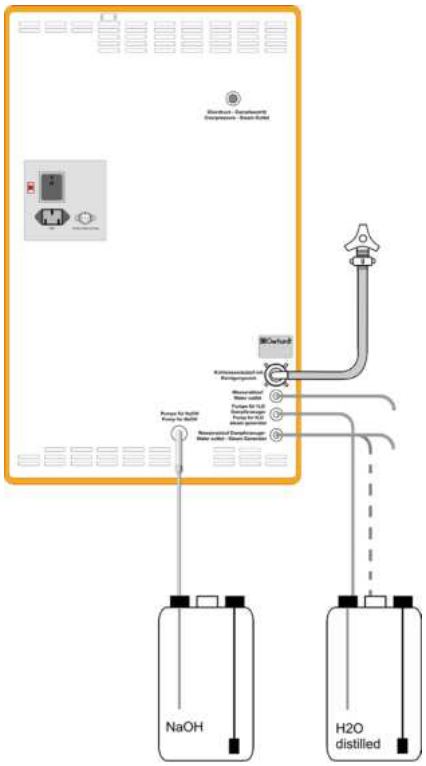
Make sure that the set of tanks are not placed any higher than the distillation unit!

4.2. Tubing connections

When connecting the tubings please observe the inscription on the connection pipes at the back of the equipment

- Connect inlet tubing for NaOH (PVC-tubing 4/7) to corresponding pipe at the rear of the equipment and link it to the NaOH tank.
- Connect cooling water inlet tubing (pressure proof tissue tubing 10/17) to cooling water inlet and laboratory water supply.
- Connect cooling water outlet tubing (PVC-tubing 8/12) to corresponding pipe at the rear of the equipment and place in the drain.
- Slide inlet tubing for H_2O steam generator (PVC tube 8/12) on the connection at the rear of the instrument and link it to the distilled water tank.
- Connect water outlet tubing for steam generator (PVC-tubing 8/12) to corresponding pipe at the rear of the equipment and link it to the drain **or** to the distilled water tank for recycling.

Fig. 4.1.
Tubing connections



4 Assembly and setting into operation

Use of the set of tanks KAN 20 (optional):

- Connect the diode plugs of the level detectors to the distribution box and connect to the socket level detector (see fig. 3.4, pos. 4).
- Blank off the remaining diode sockets of the distribution box with the dummy diode plugs enclosed.

Usage of other set of tanks without level sensor control

- Put the diode dummy plug on the connection of level sensor control (see ill. 3.4., pos.4).

4.3. Mains connection

⚠ Please check the nominal voltage on the type plate before connecting to the mains. Should the nominal voltage deviate more than +/- 10%, then you have to contact your service engineer.

- Make sure that the mains switch at the front of the instrument is in position "0"
- Connect the mains cable to the rear appliance plug first
- Connect the mains cable to the shockproof socket

4.4 Setting into operation

⚠ Attention when working with acids and alkali! Make sure you observe the safety instructions concerning work with hazardous materials!

Always close the plexiglass doors of the distillation unit before operating!

1. Fill the set of tanks with chemicals:
   - H2O distilled or demineralized
   - NaOH 32 %
2. Turn on the water tap.
3. Before you set the Vapodest into operation make sure that the excess current switch at the rear is in position 1.
4. Turn on the Vapodest 10 using the mains swich of the instrument.
5. The Vapodest 10 is ready to use

5 Operation

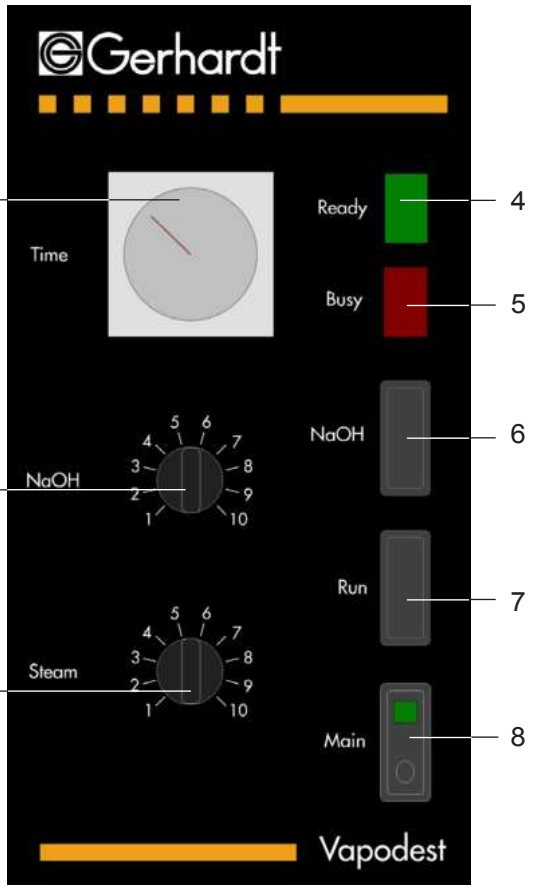
Safety instructions

Attention when handling acids and alkalies! Please observe your national safety regulations!

Use gloves when removing the glass digestion tube as this will be very hot, and there is danger of burning!

Take care when handling glass parts and follow the national safety regulations concerning the handling of glass parts!

5.1. Keyboard



1 Steam power, range 1 - 10
1 = ca. 70 %, 10 = 100 %)
You find the table for the amount of distillate in chap. 2.2. 'Technical data'

2 Addition "Reagent", range 1 - 10 *
Example: Position 1 corresponds to 0 ml NAOH 32%, Position 5 corresponds to about 80 ml NaOH 32 % at an ambient temperature of 20 °C.

3 Distillation time, See chap. 5.2. 'Setting of timer'
See chap. 5.2. 'Setting of timer'

4 Display of status steam power,
Green= Instrument is ready for operation (about 2 minutes after turning it on)

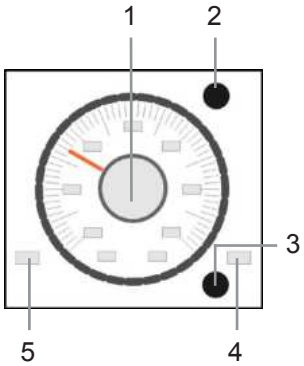
5 Display of status operating mode
Red = distillation is running

6 Switch "Addition reagent" = Manual addition of Reagent

7 Switch "Run", start the distillation

8 Mains switch

* The delivery volume depends on the following factors: length of the tubing, ambient temperature, placement of tank, chemicals used. When the operation of the instrument is started, the exact amounts needed have to be checked.



5.2. Setting of timer

1 Setting of distillation time (any changes will be accepted immediately)
2 Selection of the scale graduation: 12 respectively 30.
Any changes may only take place when the instrument is turned off!
3 Selection of the time unit: 0,1 s - 1 s - 10 s - 1 min - 10 min - 1 h - 10 h
Any changes may only take place when the instrument is turned off!
4 LED 1:
radiates = voltage on, blinking = time is running, no light = no voltage
5 LED2: radiates = relay is on

5 Operation

5.3. Priming the tubes

Please make sure that the tubes are fully primed. This must be performed before for the initial start, after longer working inter-missions (holidays etc.) and each time after the inlet and outlet tubes have been removed.

1. Switch the distillation system on.
2. Check the chemical tanks.
3. Turn on the tap
4. Insert the steam inlet tubing into the digestion tube
5. Lower the quick clamping device and insert the digestion tube
6. Ensure there is a tight fit between the tube and the Viton cone.
7. Close the protection door and wait for readiness.
8. Keep the key „Reagent“ pressed until the sodium hydroxide solution runs into the digestion tube.
9. Lower the quick clamping device and remove the digestion tube.

The tube is now primed.

5.4.Test run

Each day before starting to distill samples you should do a distillation without sample.
Don’t be disturbed by noises deriving from the approx. 106 °C hot steam being fed into the digestion tube.

The test run can be interrupted any time by pressing the mains switch.

1. Switch the distillation system on
2. Check the chemical tanks, turn on the tap
3. Fill a digestion tube with about 50 ml distilled H_2O and insert the steam inlet tube.
4. Lower the quick clamping device and place the digestion tube into position.
5. Ensure there is a tight fit between the tube and the Viton cone.
6. Insert the distillate outlet tube into an empty Erlenmeyer flask, and place the flask into position.
7. Close the protection door
8. Set the distillation time (ca. 4.5 minutes). The amounts of distillate are listed in chap. 2.2. under 'Technical data'
9. Set dosage to 'reagent'. (make sure to use alkali only)

5 Operation

10. After the system is ready (green LED) press the key "Run" to start the distillation.

11. Remove the digestion tube after the distillation is finished.

⚠ Use gloves when removing the glass digestion tube as this will be very hot, and there is danger of burning!

12. Remove the Erlenmeyer flask.

    The distillation system Vapodest 10 is now ready for the distillation of samples.

5.5. Distilling a sample

The distillation can be interrupted any time by pressing the mains switch.

1. Switch the distillation system on

2. Prepare the receiver solution:
   Fill an Erlenmeyer flask with about 50 ml boric acid and place into position.

3. Manually dilute the sulphuric acid digestion with the 5-fold amount of distilled H_2O.

4. Insert the steam inlet tube into the digestion tube.

5. Lower the quick clamping device and place the digestion tube into position.

6. Ensure there is a tight fit between the tube and the Viton cone.

7. Close the protection door

8. Set the distillation time.

9. Set dosage 'reagent' (also see chapt. 5.1. pos. 2)

10. After the system is ready (green LED) press the key "Run" to start the distillation.

11. Remove the digestion tube after the distillation is finished.

⚠ Use gloves when removing the glass digestion tube as this will be very hot, and there is danger of burning!

12. Remove the Erlenmeyer flask.

If you have finished all distillations, switch the unit off.

6 Errors

6.1. Distillation does not start or is interrupted

Error description	Cause of failure and correction
Vapodest is not ready for operation (green display is out)	
- No cooling water	Check cooling water inlet - Turn on the tap - Cooling water pressure too low < 0,5 bar.
- Steam generator is not ready	- Check water supply to the steam generator. - Steam generator is filled with water, wait till water is evaporated. - Overheat protection has activated, turn off the unit and wait for about 70 min. Should the problem occur again, call customer service!
- protection door opened	- Close the protection door
- No sample tube	- Insert the sample tube
- Chemical tank NaOH or H_2O is empty	- Check the tanks and fill with chemicals
- Diode dummy plug is missing	- Put the diode dummy plug on the connection for level sensor control (only necessary, if the set of tanks KAN 20 is not used).
The excess current switch cuts off in case of excessive current consumption.	Switch on the excess current switch again. If this problem reoccurs, call service!
Even though instrument is ready for operation there is no steam input.	**Check water supply to the steam generator.**

6.2. Results too high

Error description	Cause of failure and correction
The chemicals used are contaminated with nitrogen compounds.	Check the chemicals one after the other, get a blank value, a replacement of the chemicals might be recommended.
Strong reaction in the digestion tube, caustic soda drops got into the receiver.	Increase the amount of water.
Part of the glass condenser is broken, drops of the caustic soda got into the receiver.	Exchange the glass condenser.
Tubes are contaminated with nitrogen	Clean the tubes without detergent or rinsing agent.
Carry over of ammonia from the previous sample	Extent the distillation time or check whether sufficient alkali was added.

6 Errors

6.3. Results too low or no results

Error description	Cause of failure and correction
Distillation has not been complete or distillation time has been too short.	No quantitative carry over of the ammonia content, the amount of the distillate should be 100ml.
Ammonia escapes at leaks.	- Contaminated or detective viton cone; clean or replace. - Check seals at the distribution head and if necessary, replace it. - Non return valve at the condenser is bonded, clean or replace it. - Digestion tube is damaged at the wide neck opening. - Glass of the distribution head is leaking, replace it!
Amount of caustic soda which is added is too low, no release of ammonia.	Check the amount delivered by the NaOH pump; about 4 ml should be delivered per second.
Not enough boric acid in the receiver, escaping ammonia is not entirely absorbed.	Increase of the amount of boric acid.
Tube is not immersed entirely into the boric acid receiver.	Increase of the amount of acid.
Formation of ammonia complexes which are not destroyed by the caustic soda.	This problem only occurs with catalysts containing mercury, sodium thiosulphate solution destroys these complexes.

7 Maintenance

In case of replacements of parts make sure that only original C. Gerhardt products are used!

7.1. Spare parts and accessories

Distillation condenser	7673
Plastic screw connection for distillation condenser	16609
Ventilation valve	6474
Distribution head, glass	7472
Viton cone	6470
PTFE- inlet tubing, steam	11815
Teflon sieve for 11815	30698
PTFE -inlet tubing, NaOH	11819
PP-distributor	50024
PP-tube joint	17542
Screw cap GL 14	16601
Screw cap GL 18	16602
Screw cap GL 32	16604
Silicone seal GL 18	16606
Silicone seal GL 32	16607
Plexiglass protection door	19017
Door handle black	18251
Door hinges, black, 1 pair	18250
Rubber foot GF21, self-adhesive	17945
Drip tray, PP	50015
Water inlet tubing 10/17, 2 m	22802
PVC-tubing 4/7, 2 m	22601
PVC-tubing 8/12, 2 m	22604
PVC-pipe 6x1, 400 mm	25450
PVC-pipe 10x1, 400 mm	25451
Set of tanks KAN 20, 2 pieces	7629

Further accessories and information about the Vapodest program can be found in the product catalogue or at your local dealer!

7.2. Service and cleaning

Regularly check the tubings and tubing connections.

To minimize malfunctions of the Vapodest 10, we recommend having it checked by authorized service personnel annually.

Condensate that might escape is collected in the drip tray. Please clean the drip tray regularly.

7 Maintenance

7.2.1. Cleaning the glass parts

Glass parts should be cleaned before long periods of non-usage (i.e. holidays). This way obstructions caused by crystalline deposits are avoided.

The following settings should be used:

Addition NaOH: 0
Distillation time: 4 min
Steam power: 100 %

It is recommended that the NaOH line is flushed daily so that no NaOH is left in the chemical lines overnight.

Place a digestion tube with 70 ml H_2O and an Erlenmeyer flask into position, and start the distillation.

7.2.2. Cleaning the steam generator

In case of contamination, the steam generator has to be cleaned.

- Turn off the instrument
- The water tank must be filled with a minimum of 5 litres distilled water.
- Set switch for rinsing on 'S' (see ill. 3.4, pos.7).
- Turn on instrument to start rinsing process.
- If tank and steam generator are empty, set switch to 'D'.

The water pump delivers about 120ml/min. in the rinsing mode. However, due to its capacity, the steam generator can evaporate 35-36ml/min. only. The remaining water is blown out with the steam and thus, brings the desired cleaning result.

7.3. Trouble shooting / Contact the Service

Make sure to handle error messages as described in chapter "6. Errors".

In case of breakdown or failure of your Vapodest 10, please contact your local dealer or:

C. Gerhardt GmbH & Co. KG
Cäsariusstr. 97
53639 Königswinter

E-Mail: service@gerhardt.de
www.gerhardt.de

7 Maintenance

7.4. Disposal

The disposal of the packaging and the parts used has to be done according to the rules and regulations which are valid in the country of installation. Should the product itself be disposed of, make sure to observe the local rules and regulations..

7.4.1. Information for the Disposal of Electric and Electronic Instruments within the European Union

The disposal of electrically operated instruments is settled within the European Union by national regulations, which are based on the EU-directive 2002/96EC about electric and electronic used-instruments (WEEE). Thus, all instruments delivered after August 13th 2005 must not disposed into the communal domestic waste.

Since the regulations about disposal of waste might vary from one country to the other within the European Community, we kindly ask you to contact your supplier or dealer.

In Germany, this obligation for identification will be valid as of March, 23rd 2006. As of this date, C. Gerhardt will take back all instruments delivered after August, 13th, 2005 without charges and will dispose of them according to the regulations, or Gerhardt will come to an agreement with the last user of the unit. For all instruments delivered prior to August 13th, 2005 the last user will be held responsible for the proper disposal. The only crucial factor accepted, for the chronological placement, it the serial number at the back of the instrument.

7.4.2. Ban on Materials according to ROHS Regulation 2002/95/EG

Ban on materials from the ROHS regulation 2002/95/EG is not valid for the electro- and electronic instruments of category 8 and 9 and thus not for those instruments described in this instruction manual. However, we want to draw your attention to the fact that we feel obliged to observe the regulations for the RoHs for all our products. Please be kind enough to contact us if you have any further questions.

7.4.3. Transfer

We kindly ask you to always make sure to add this instruction manual to the product in case of transferring it to another party.