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Operation Manual

knowledge

Action movie

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Contents

Read these operating instructions thoroughly before you use the **BÜCHI** Rotavapor **R-200/205**. Keep these instructions near the apparatus, so that they are quickly accessible.
Chapter two contains important safety instructions. This information is essential as regards safe operation of the rotary evaporator.

en, Version K (60 pages)	Order number
R-200/205 Operating Instructions	**96776**

1 Scope of Delivery

Picture 1: R-205 total view

Picture 2: Display module R-205

Base apparatus

Büchi Rotavapor R-200 including bath B-490
Büchi Rotavapor R-205 including bath B-490

Table 1: Base apparatuses

Caution
Condenser mounting (40607 + 40608) in combination with glass assesmbly A not included.

Glass assemblies

Glass assembly A uncoated or Plastic +Glas coated	**40630** **40632**
Glass assembly V uncoated or Plastic +Glas coated	**40600** **40602**
Glass assembly C uncoated or Plastic +Glas coated	**40640** **40642**
Glass assembly S uncoated or Plastic +Glas coated	**40650** **40652**
Glass assembly E uncoated or Plastic +Glas coated	**40660** **40662**
Glass assembly CR uncoated or Plastic +Glas coated	**40670** **40672**

Table 2: Glass assemblies

Standard accessories: Order number

1	Mains cable	**Bath**	**Rotavapor**
	Type CH plug type 12 or PNE, 2.5 m	**10010**	**40833**
	Type Schuko	**10016**	**40834**
	Type GB	**17835**	**40831**
	Type AUS	**17836**	**40832**
	Type USA	**10020**	**40830**
1	Operating instructions		
	German		**96775**
	English		**96776**
	French		**96777**
	Italian		**96778**
	Spanish		**96779**
BÜCHI Heating bath B-490 cpl.			
	230 V 50/60 Hz		**40400**
	100-120 V 50/60 Hz		**40404**

Table 3: Standard accessories

Picture 3: V-800 and V-805

Picture 4: Automatic sensor to V-805

Picture 5: Remote control to V-800/805

Additional accessories for advanced + professional resp. facultative accessories

Büchi Vacuum Controller V-800, 230 V	**40736**
Büchi Vacuum Controller V-800, 120 V	**40737**
Büchi Vacuum Controller V-805, 230 V	**40738**
Büchi Vacuum Controller V-805, 120 V	**40739**
Valve unit to V-800/805	**37968**
Holder for valve unit 37968 to Rotavapor R-200/205	**40810**
Remote control for V-800/805	**40735**
Automatic sensor to V-805 only for glass assembly V+S	**40741**
Kommunication set between V-800/805 and R-200/205	**40235**

Table 4a: Facultative accessories

Upgrade R-200 zu R-205

	Upgrade R-200 to R-205 Display for rotation and vapour (without probe)	**40320**
1	Sensor for measuring the vapour temperature (only with glass assembly V+S+E)	**40340**

Table 4b: Facultative accessories

2 Safety

This apparatus has been built according to state-of-the-art and recognised safety rules. Still, it can be associated with risks and hazards:

- If the apparatus is operated by insufficiently trained personnel.
- If the apparatus is not used properly.

2.1 Symbols

Stop
Information on hazards, which can lead to heavy material damages, to severe or life-threatening injuries.

Warning
Information on hazards which can be harmful to your health and lead to material damage.

Please note
Information, pointing to technical requirements. If these are not complied with, disturbances, reduced economic efficiency and product losses can result.

Warning
Surface temperature more than 60°C.

2.2. Requirements placed on operators

This apparatus can only be used by expert personnel or other persons, who, because of their education or profession are familiar with hazards, which can arise when this apparatus is operated.

Personnel lacking this kind of training or persons, still being trained, require thorough instructions. These operating instructions are the basis for such training measures.

2.3 Proper use

The Rotavapor is not intended for activities with excess pressure. Thus, you should make sure that no excess pressure develops in the Rotavapor.
This apparatus has been designed and built for laboratories. It is to be used for activities, associated with evaporating of solvents.

It is used for:

- Distilling solvents
- Vaporising of solvents and suspensions
- Recrystallisation
- Synthesis and cleaning of fine chemicals
- Soxhlet extractions

In the case of drying powders, electrostatic charges can form.

Proper use of the apparatus includes caring for it and carefully handling it in accordance with the instructions found in these operating instructions.
The heating bath is the heating source for distillation, whereby the heating medium must be water or heat carrier oil. (see Chapter Heating bath). The Rotavapor/Rotary Evaporator can only be operated with a heating bath.

2.4 Improper use

Applications not mentioned above are improper. Also, applications, which do not comply with the technical data are considered improper . The operator assumes sole risk for any damages, attributed to such improper use.

Especially the following uses are not permitted:

- Use of the apparatus in rooms, which require protected apparatuses.
- Calibration apparatus for other apparatuses.
- Determination of samples, which can explode or ignite (example: explosives, etc.) due to shock, friction, heat or spark formation.
- Work in excess pressure.
- Working with other water or oil baths other than the heating bath B-490, especially the use of heating sources with temperatures above 180°C (e.g. a Bunsen burner, etc.).
- Processing of hard, brittle materials (example: stones, soil samples, etc.), which can lead to destruction of the evaporating flask.
- 3 Kilogram in an evaporating flask is the maximum weight you can use with the Büchi Rotavapor. If the evaporating flask is overloaded the joint adapter or the flask could break.

2.5 Fundamental hazards

Fundamental hazards are associated with:

- Hot surfaces, occurring during operation
- Hot water or oil bath (up to 180 °C)
- Solvents, which can form peroxides (explosion hazards)
- Solvents with low ignition, flame, and/or explosion temperatures
- Mixtures with unknown compositions or contamination
- Combustible gases or solvent vapour in the immediate vicinity of the rotary evaporator
- Damaged glassware (implosions)
- Electrostatic charges when solvents are filled, or in the case of drying powder.

Contact with live parts can be fatal.

Covers can only be removed with conventional tools by authorised repair personnel. The apparatus cannot be put into operation with damaged glassware.

2.6 Safety measures

Regional and local laws and regulations must be respected.

Basically, personal protective equipment such as **protective eye goggles, protective clothing and gloves** are to be worn.

There is a risk of scalding when hot evaporating flasks are replaced. Suitable gloves can prevent this.

Use of optional Büchi protective equipment like PLASTIC+ GLAS coated glass components and protective shields protect operators in case of accidents.

You can only use recommended standard glass assemblies. You cannot assembly the unit from arbitrary glass components. Each glass parts have to be checked on damages before use. The joints have to be greased. All screw joints have to be protected against overloaded stress.

Only those components of the Rotavapor can be installed and removed, which fulfil the intended function. This can be done by hand or with the supplied tool. Only authorised repair personnel can remove protective equipment and covers with the help of conventional tools. You should only move the heating bath when it is cool.

If you use an oil bath, make sure that water cannot enter the bath, because hot oil can splash.

The operator is responsible for training his personnel. For this purpose, you can be order these operating instructions in other languages. These operating instructions must be available for operating personnel at the point of use of the apparatus as component of the rotary evaporator.

The operator shall inform the manufacturer immediately about any safety relevant events, occurring during use of the apparatus.

2.7 Modifications

Modifications to the apparatus or to spare parts and accessories as well as use of other spare parts and accessories than those mentioned in these operating instructions are only permitted with the written consent of Büchi Labortechnik AG.

2.8 Safety elements

Electric/ electronics
- The 230V baths are equipped with safety fuses.
- The bath is equipped with a mechanical and an electronic over-temperature protection

Operation/product contacting parts
- Safety catch for regulating the dip depth of the evaporating flask into the heating bath
- Combi-clips for fixing the evaporating flask and for safe loosening of fixed ground-glass joints (evaporating flasks)
- Ball joint clip for safe fixing of the receiving flask
- Rods and holders for fusing of the glass assemblies
- The electrical servo jack is equipped with an electronic over-temperature protection and a power-up time limit.
- The driving unit is equipped with an electronic over-temperature protection
- A safety spring protects the vapour duct from dropping out

Glass
- Use of high quality, inert 3.3 borosilicate glass
- Screw GL 14 tube nipples for preventing glass breakage

OPTIONAL:
PLASTIC + GLAS (abbreviated PLG) is a unique protective layer for glass components. It offers improved mechanical rupture resistance and increases protection against broken glass. It also makes sure that the sample is not lost in the receiving flask, if the flask is damaged.

The Büchi protective shield protects operators from flying broken glass, solvent splashes and hot bath liquid in case of accidents.

With the rod and pivoting clamp the condenser can be additionally clamped.

3 Function

3.1 Definitions

Some terms come up in these operating instructions, which require some clarification.

Glass assemblies:

A: with diagonal condensers, for standard distillations

V: with vertical condenser, for standard distillations, 17 cm less place requirement than glass assembly A

C: with cold traps for dry ice, for distilling solvents with low boiling points

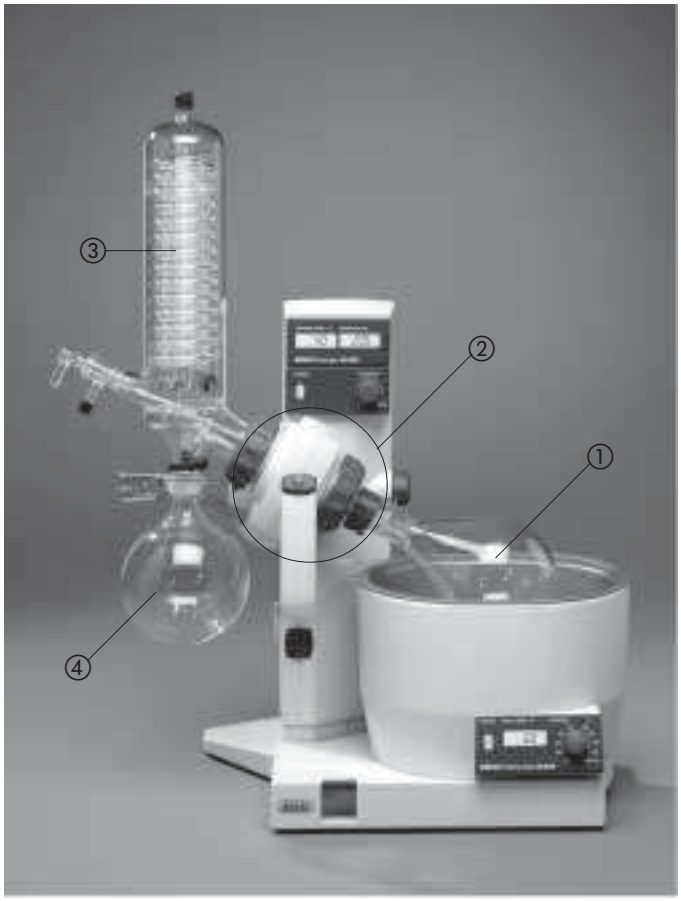
S: with vertical condenser and reflux capability

CR: with cold traps and reflux capability, for distilling solvents with low boiling points

E: with descending condenser without reflux capability, ideal for solutions, with tendency to foaming

PLASTIC+GLAS

PLASTIC + GLAS (abbreviated PLG) is a unique protective layer for glass components. It offers improved mechanical rupture resistance and increases protection against broken glass. It also makes sure that the sample is not lost in the receiving flask, if the flask is damaged.



Picture 6: R-205 Basic Glass assembly

3.2 Functional principle

With a vacuum rotary evaporator, single step distillations are performed quickly and in a product friendly manner. The basis of this procedure is the evaporation and condensation of solvents using a rotating evaporating flask.

Distillations can be performed under vacuum. This increases performance and helps to protect products. Distillations can be performed under vacuum and atmospheric pressure.

An example using the V assembly

① **Evaporation area**
The solvent is heated over a heating bath. In the rotating evaporating flask, a thin solvent film forms on the inside of the flask, resulting in increased evaporation rate. Rotation also results in even mixing of the sample and thus, prevents stationary over heating in the flask. (Maximum weight 3 kg)

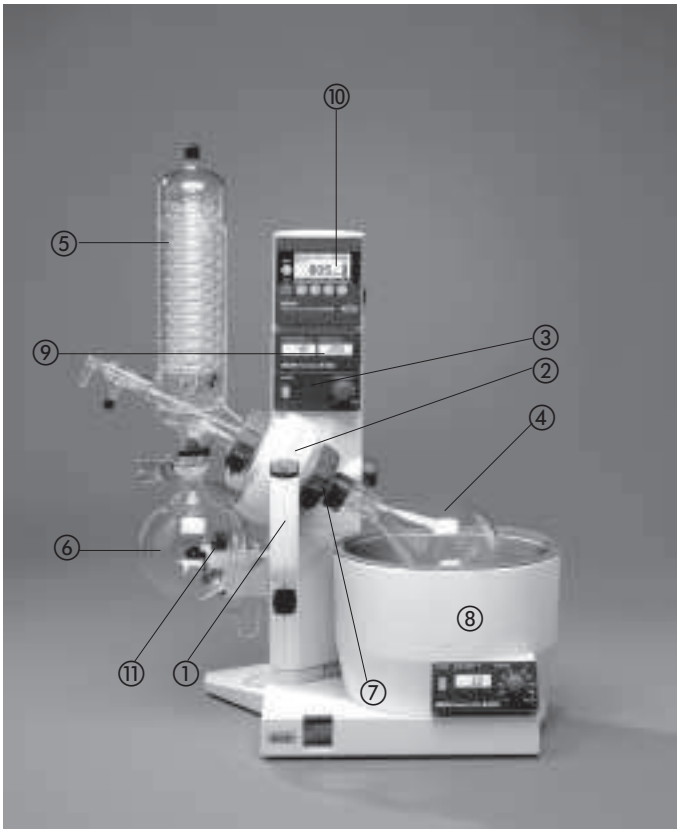
② **Rotation drive**
The drive unit makes sure that the evaporating flask rotates evenly with the resulting advantages (see item 1).

③ **Cooling area**
The solvent vapour flows very quickly in the condenser. Here, the energy in the solvent vapour is transferred to the cooling medium (mostly water) and the solvent condenses.

④ **Receiving flask**
The receiving flask receives the condensing solvent.

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

See Chapter 5.7, ”Selecting distillation conditions”, for information on selecting the optimum distillation conditions.



Picture 7: R-205 Professional with Glass assembly V

3.3 Overview of components

① Quick-action jack
② Drive part with sealing system
③ Electronics head
④ Evaporating flask
⑤ Glass assembly
⑥ Receiving flask
⑦ Combi-clip
⑧ Heating bath
⑨ Display module for rotation speed and vapour temperature (optional)
⑩ Büchi Vacuum Controller (optional)
⑪ Valve unit (optional)

4 Putting into operation

Look for damages when you unpack the unit. It is important that you detect any transport damages when you unpack. If necessary, you must prepare a status report immediately (informing postal company, railway company or transportation company).

Keep the original packaging in case the unit needs to be transported later.

4.1 Point of use

The apparatus must be placed on a stable, horizontal plane. Please take note of the max. product dimension. It cannot be used in EX-protected rooms. Normally, distillations are to be performed under vacuum with the rotary evaporator only in running hood.

If, for space related reasons, this is not possible, the optional protective shield should be mounted and the exhaust gas should be led from the pump into the running hood.

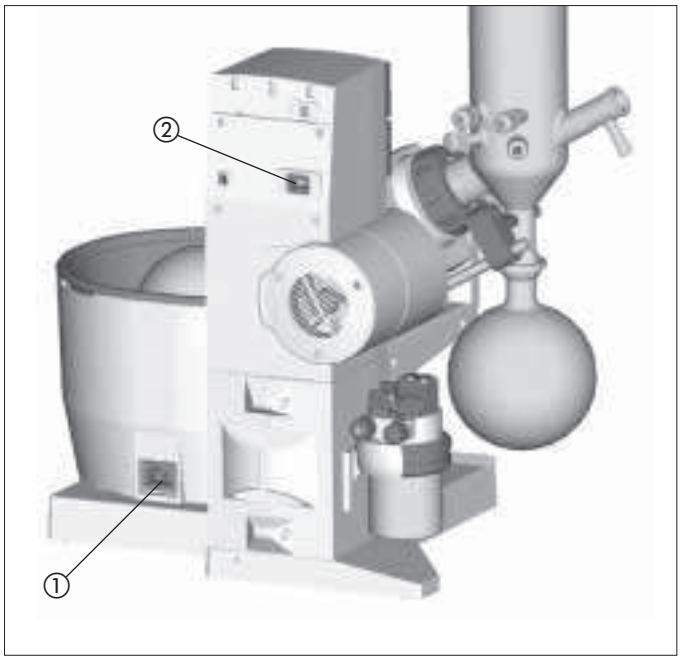
4.2 Electrical connections

Determine whether the voltage on the socket corresponds to the voltage given on the apparatus plate.

Always connect the apparatus to a earthed socket. External connections and extension cables must lead a earthed conductor lead (3-pole couplings, cable or plug equipment). The earthed conductor lead cannot be interrupted. As a result, risks due to internal defects are avoided.

Electronstatic sparks may damage the apparatus.

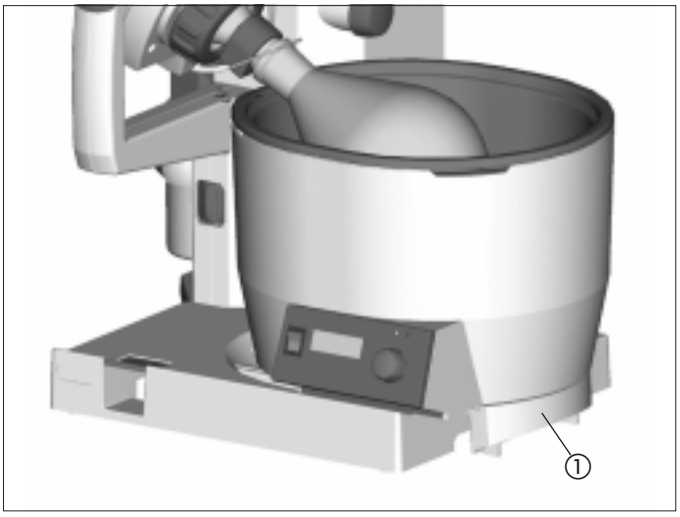
Bath and rotary evaporator are connected to the mains by the mains cables.



Picture 8: Power connection of the Bath and Rotavapor

Cabling

① mains supply bath
② mains supply rotary evaporator



Picture 9: Bath B-490

4.3 Heating bath

The bath is placed onto the base plate of the rotary evaporator. If you need to move the bath, you can pull on the inserted handle ① in the base plate.

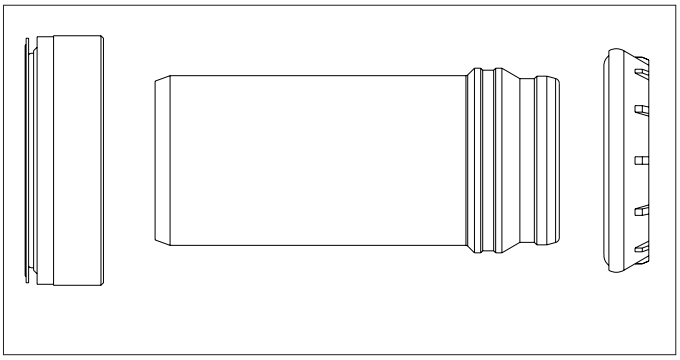
Heating medium
Never operate the heating bath without heating medium!

The following are suitable as heating medium:
- Distilled or deionised water for temperature range between 20 °C to 85 °C
- Heat carrier oil or water soluble polyethylene glycol (PEG) for a working range up to 250 °C.

Saving energy
In the case of heating baths, there are various ways to save energy. By using floating balls in the water bath, evaporation of water is reduced. As a result, heating of the bath is switched on less often. This measure helps to save energy up to 50 %. At the same time approximately 70 % less water is used. (see Chapter 8.11, Miscellaneous).

You should turn on the heating bath around 10 –15 minutes before starting the distillation, since the bath has a quick warm-up time. You should also turn off the heating bath after a distillation.

4.4 Steam tube and sealing system


Picture 10: Explosion drawing of sealing system

In contrast to previous generation of Büchi Rotavapor systems, the new Büchi Rotavapor R-200/205 needs only one sealing system, which is suitable for distillations under reflux.
All materials, which come into contact with chemicals are made of glass, PTFE and ETFE.

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

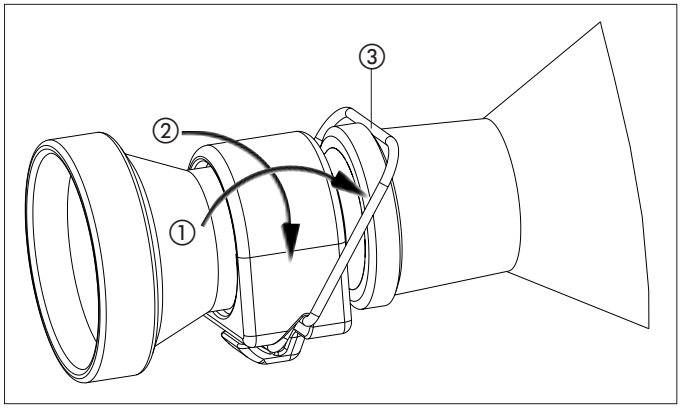
Seals:
- Never grease seals
- Never touch seals with sharp objects
- Clean seals with soap and water or ethanol
- Control seals regularly

4.5 Glass assembly

You can see the composition of the glass assembly on the illustrations in 8.4, Glass assemblies.

- All flanges (condenser, distribution heads, evaporating flasks, ground adapter) can be fastened, without having to remove the screw cap. They must only be opened enough so that the flange can be pushed through.
- Glass assemblies V, S, C, E, CR are to be secured using foreseen condenser fixation.
- The receiving flask is to be secured with the clip foreseen for this purpose.

Only glassware in perfect condition is to be used. The glassware cannot have tears, stars, or other damages. You must check glassware for damages before each use.
To achieve optimum tightness of the system, all joints are to be greased on the condenser side.



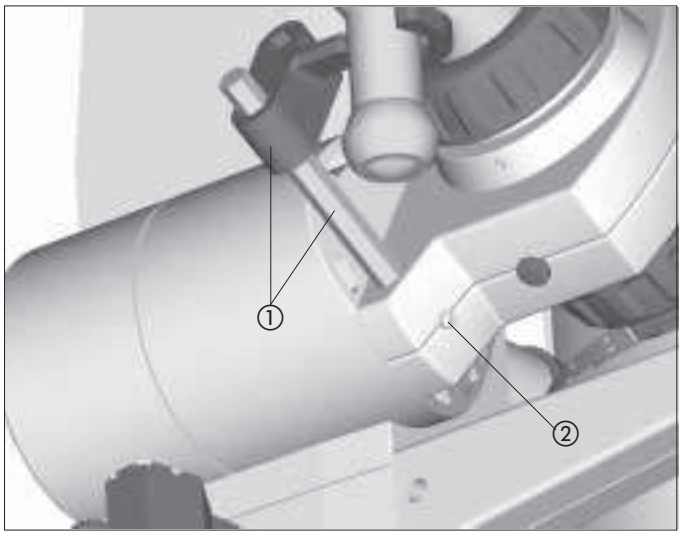
Picture 11: Combi-clip function

4.6 Combi-clip

The combi-clip fulfils two functions:

① Holding the evaporating flask
② Loosening of the evaporating flask
③ Handle

The handle ③ clicks in when it is in upward position.



Picture 12: Condenser fixation

4.7 Condenser fixation

① Condenser fixation with 3 adjustment possibilities, depending on the used glass assembly.
② Screw for tightening and loosening the rod.

4.8 Submerging angle into the heating bath

Picture 13: Drive unit with fixing screw

If, use of the Rotavapor requires employment of another angle than 30 °, the angle is to be set as follows:

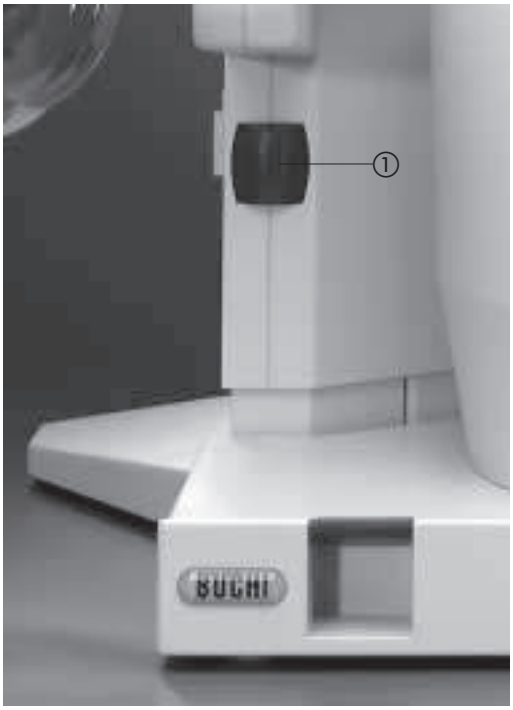
- Turn off the apparatus
- Hold the glass assembly with one hand and loosen the handle screw ① with the other hand
- Put the drive part ② into the desired position
- Retighten the handle screw ①

You cannot set the submerging angle when the apparatus is operating.

The lowest quantity of solvent is lost when the condenser is in a vertical position.

When the handle screw is loosen the glass assembly can tilt to the left, which can result in glass breakage. Hold the glass assembly when you loosen the handle screw.

4.9 End catch when submerging the evaporating flask



Picture 14: Screw for end catch of the servo-jack

By adjusting the catch screw ①, the lower catch of the quick-action jack can be set so that the evaporating flask can be lowered into the bath as you desire.

Setting is to be chosen so that:

- In the case of lower catch of the quick-action jack neither adapter or combi-clip nor evaporating flask touch the edge of the bath
- The flask is not on the bottom of the bath
- No heating bath liquid flows out of the bath when the flask is submerged

- The stop screw ① must be freely movable in the air.

Picture 15: Adjusting tension of the servo jack rope

4.10 Adjusting tension of the servo jack rope

It can happen that the servo jack can not be lowered to the very end, specially after transportation of the Rotavapor. In this case the tension of the rope has to be adjusted. This can be done by the customer.

1. If the servo jack can not be lowered to the end, turn the screws (1) on the front side of the rotavapor, 1/4 turn clockwise.

2. Repeat step 1 if the servo jack doesn't go properly down.

3. Turn the screws 1/4 turn unclockwise till the lever after pressing down is not comming up on it self.

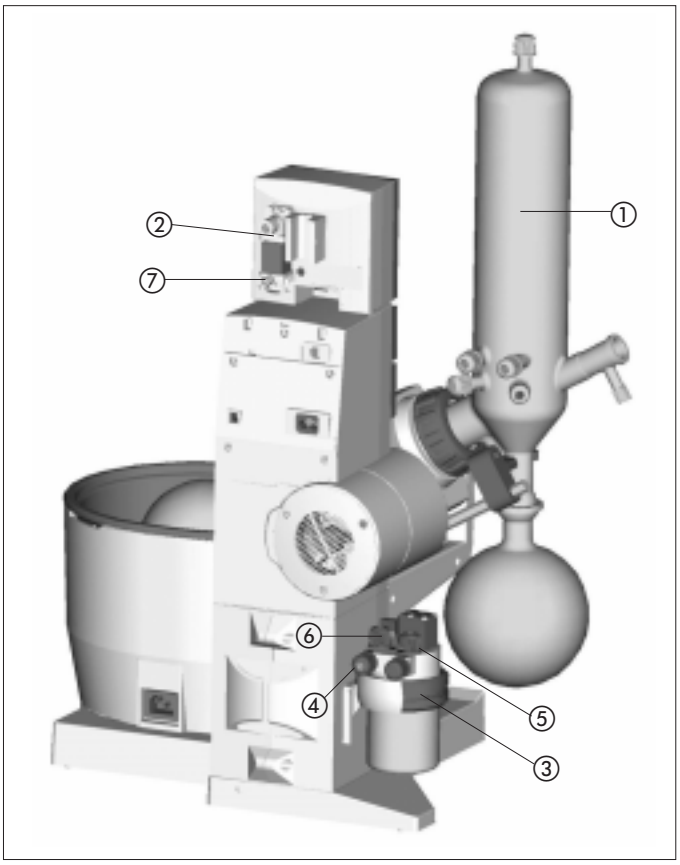
4.11 Tube connections

Cooling water

- Use GL-14 screwed connections
- The tubes used must all have the same inside diameter (approximately 6 mm)
- For safety reasons, the tubes are to be secured with commercial tube pivoting clamps or cable binders.
- To save cooling water, a recirculating chiller can be used.
- Brittle tubes are to be replaced.

Vacuum

- Use GL-14 screwed connections
- The tubes used must all have the same inside diameter (approximately 5 mm)
- Keep vacuum tubes as short as possible.
- If no Büchi Vacuum Controller is used, a Woulff bottle is to be connected between the vacuum source and Rotavapor.
- If a Büchi Vacuum Controller is used, a valve unit should be connected.
- Tubes do not need to be secured.
- Brittle tubes are to be replaced.

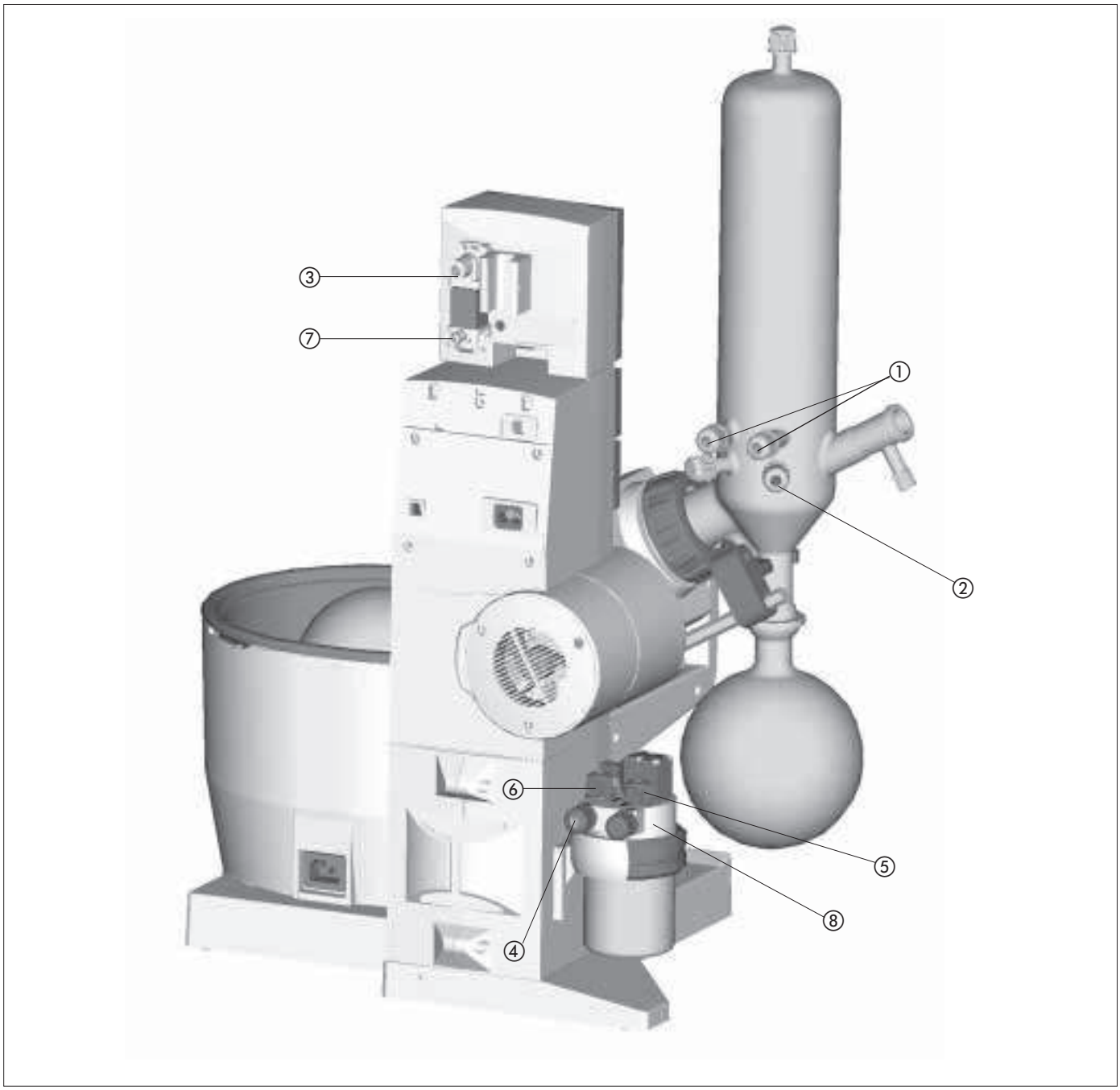


Picture 16: R-200/205 with Vacuum Controller

① Glass assembly
② Vacuum sensor (to valve unit ⑥)
③ Valve unit
④ Connection to glass assembly
⑤ Connection to pump
⑥ Connection to Vacuum Controller
⑦ Connection for inert gas

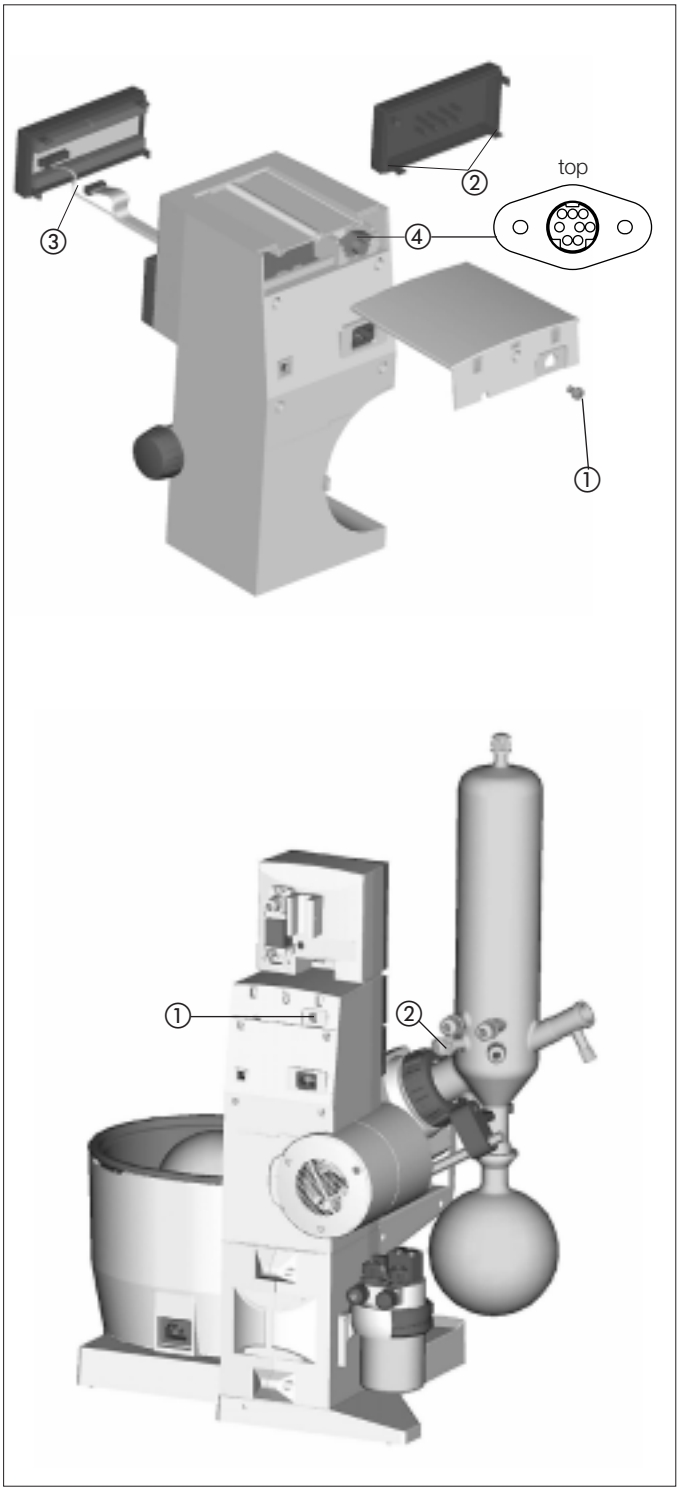
The separator of the valve unit or a Woulff bottle serves as safety, so that contamination, solvent or water (if a water jet pump is used) cannot pass through the tubing neither from the vacuum source into Rotavapor nor vice versa.

4.12 Tube schema



Picture 17: Tube schema

① Cooling Water
② Vacuum connection (to valve unit ④)
③ Vacuum sensor (to valve unit ⑥)
④ Connection to glass assembly ②
⑤ Connection to pump
⑥ Connection to Vacuum Controller
⑦ Connection for inert gas
⑧ Valve unit (see end of chapter 4.13)



Picture 18: V condenser with position vapour temperature sensor, and rear of the display module

4.13 Display module for vapour temperature and rotation speed

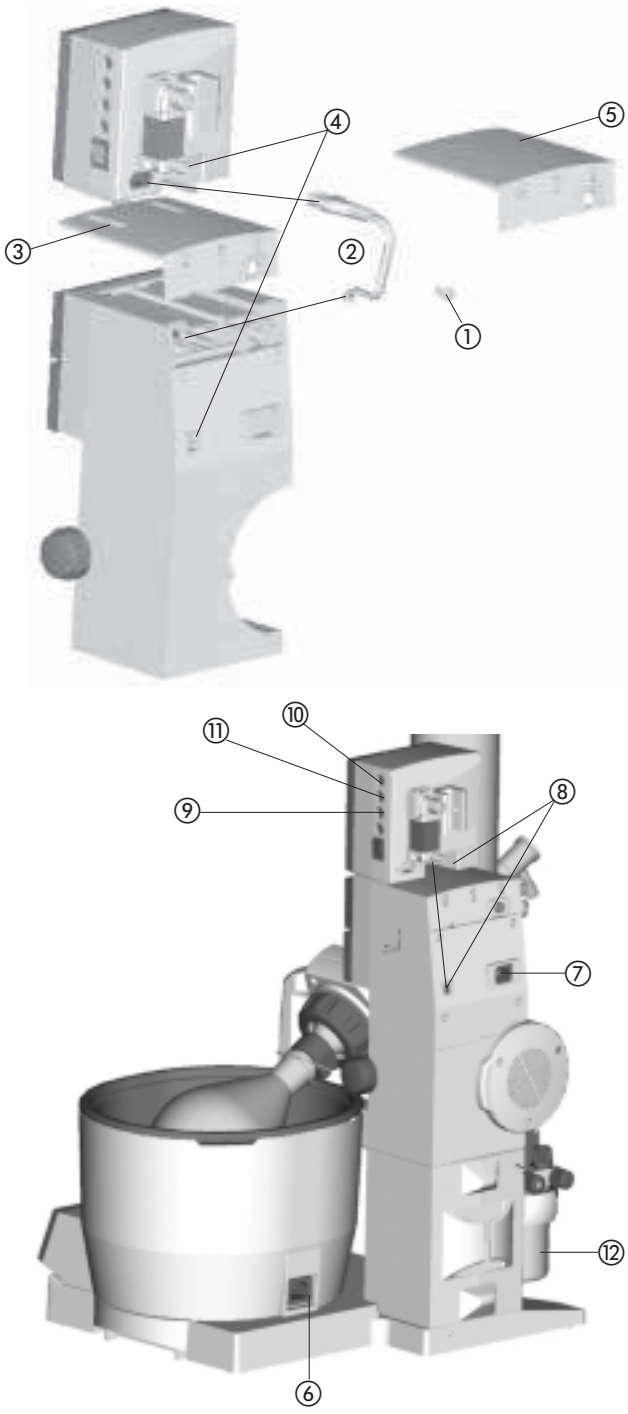
Installing the display module

When the display module is installed into a Büchi Rotavapor R-200, the unit becomes the Büchi Rotavapor R-205. If you order R-205, this display module is already installed. If this module is ordered separately, you can retrofit it as follows:

① Screw out screw ① and pull the cover plate to the back.
② Lift the lower spring-loaded catch of the front plate and remove the front plate
③ Connect the display module with the flat belt cable in the apparatus
④ Connect the 2 pole cable with the display module. Latch display module from the front to the Rotavapor and insert it on the rear of the plug socket into the foreseen holder (as shown in the picture ④).
⑤ Screw the tower cover back on.

Installing the vapour temperature sensor

So that the vapour temperature can be displayed, the accompanying sensor must be connected. It is plugged into the socket ① located on the rear of the module.
The Sensor is lead into the corresponding opening of the condenser ② and screwed.



Picture 19: Installation of Vacuum Controller on Rotavapor

4.14 Combination with Büchi Vacuum Controller V-800/805

The new Büchi Vacuum Controllers V-800/805 are optimally adapted to the design of the Rotavapor R-200/205.

Scoe of delivery

If the Vacuum Controller V-800/805 and valve unit are ordered together with the Rotavapor R-200/205, these are already installed into the units.

Retrofitting

If a Rotavapor R-200 or R-205 is retrofitted, you must proceed as follows:

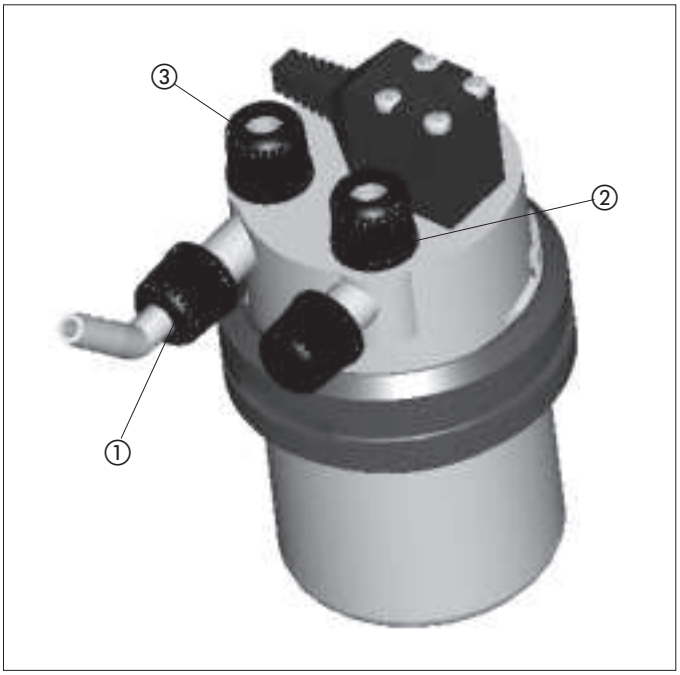
Fixation

- Screw out screw ① and pull the cover plate to the back. This cover ⑤ will not be used any more.
- Remove the cable socket ② and plug it into the Vacuum Controller.
- Place the Vacuum Controller V-800/805 on the special cover ③ and draw the cover from the rear side on the Rotavapor. Fix the cover with the screw.
- Control cable ④ for the Rotavapor

The holding device for the valve unit can be fixed on the left side of the tower of the Rotavapor. The valve unit can be fixed on the holding device.

Cabeling of the Rotavapor

⑥ Connect mains supply bath to the mains
⑦ Connect mains supply of rotary evaporator to the mains
⑧ R socket on Vacuum Controller is connected to the socket on the Rotavapor
⑨ Switchbox socket on the V-500 is connected to the "PUMP" socket on the Vacuum Controller
⑩ Valve socket on Vacuum Controller is connected to the valve unit ⑫
⑪ CW socket on Vacuum Controller is connected to the cooling water valve
⑫ Valve Unit



Picture 20: Valve unit

Cabling with valve unit

① Connection "R1" of the valve unit is connected to the glass assembly
② "Pump" connection of valve unit is connected to the pump inlet
③ "V.Contr" connection of valve unit is connected to the Vacuum Controller

Function of individual elements

Connecting cable Controller – Rotavapor

The apparatuses are connected together in such a manner, that, if you so desire, the start/stop of rotation and raising and lowering of the evaporating flask, can function via the Vacuum Controller, i.e.:

- When distillation is started via the Vacuum Controller V-800/805, the evaporating flask moves to the previously set end catch and rotation is switched on.
- When distillation is stopped via the Vacuum Controller V-800/805, rotation switches off and the evaporating flask is raised from the bath.

Valve unit

When the set point on the Vacuum Controller is reached, the valve unit shuts off the connection to the pump. At the same time, the valve unit serves as separator, i.e., the pump is protected against contamination.

Switchbox of V-500

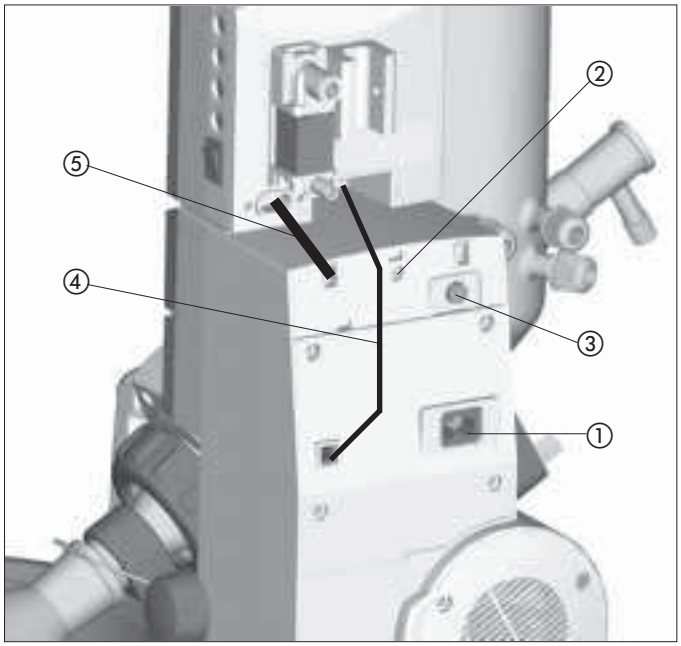
When the set point on Vacuum Controller is reached, the pump is switched off. If the system pressure increases above the hysteresis set on the Vacuum Controller, the pump is switched back on.

Fixation and current supply are only suitable for Büchi Vacuum Controller V-800 and 805. Older Büchi Controllers or other Controllers can be mounted on an extra rod and must not be connected to the power supply of the Rotavapor.

See relevant operating instructions for detailed information on operation of the Vacuum Controller.

5 Operation

Note that the apparatus must be properly put into operation in accordance with the instructions in Chapter 4, Putting into operation



Picture 21: Rear electronics head and Vacuum Controller

5.1 Rear connections

① Mains supply for R-200/205

② Fastening screw for top plate of R-200/205

③ Socket for vapour temperature sensor (only for R-205)

④ Control cable of Vacuum Controller on R-200 or R-205

⑤ Mains supply for V-800/805

Picture 22: Front panel R-200

5.2 Controls Büchi Rotavapor R-200

① Main switch On/Off

② Setting of rpm
Rotation can be set infinity variably between 20 and 280 rpm. When the Rotavapor is turned on by ①, the rotation starts with the preselected rotation speed.

Picture 23: Front panel R-205

5.3 Controls Büchi Rotavapor R-205

① Main switch On/Off

② Setting of RPM
Rotation can be set variably between 20 and 280 rpm. When the Rotavapor is turned on by ①, the rotation speed starts with the preselected rotation speed.

③ Display for rotation speed in RPM.

④ Display for vapour temperature in °C (only with vapour temperature sensor for glass assembly V, S, or E.

Picture 24: Lowering and raising the evaporating flask

5.4 Lowering and raising the evaporating flask

With the electric quick-action jack, the evaporating flask can be lowered into and raised from the water bath. This operation requires no physical effort. Motion is effected by an integrated motor. The button ① for the corresponding direction is located on the handle of the quick-action jack.

If there is a technical defect or current is interrupted, the evaporating flask can also be moved from the bath manually. By pressing the lever ② on the front of the bottom plate, the brake of the lift is released. Depending on glass assembly, lowering to be supported by hand.

For adjusting the quick-action jack see Chapter 4.10.

5.5 Heating bath

As soon as the mains 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.

Temperatures up 180 ° are possible with the heating bath.
To avoid accidents:

- Never remove rotating flasks from the bath because splashing oil can lead to burns
- Make sure that no liquid can flow from the bath when the evaporating flask is submerged.
- Installation of protectiv shield only if if heating bath is cold.

Picture 25: Front panel of heating bath B-490

If the desired temperature is set via the turn button-the display jumps from ACTUAL to SET point. The DESIRED temperature can now be set. After approximately 2 seconds, the display jumps back to the ACTUAL value.

The temperature scale via the SET point potentiometer is 2-coloured. Blue marks the water range, i.e. the temperature range below 100 °C, orange marks the oil range, i.e. temperature above 100 °C. For safety related reasons, when activities are performed above 100 °C, the regulator is to be turned over the 100 °mark against a mechanical resistance.
To be able to regulate the upper range, heat transfer oil for a operating range up to 250 °C must be used.

① Main switch
② Potentiometer for setting the bath temperature in °C
③ Display of actual bath temperature
④ Green indication lamp means ”bath is warming up”
⑤ Orange indication lamp means ”temperature above 100 °C”

Attention: Hot surface

5.6 Distilling

In this section, starting, optimising and ending a distillation are shown on the basis of a checklist.

Apparatus is completely installed

- All electrical connections are correct
- All sealings have been correctly inserted
- All joints have been greased
- Evaporating flask is empty mounted

Evacuating apparatus in order to test tightness

(see 6.5, Functional test) max 3 mbar pressure increase/min.

Setting heating bath to desired value

Heating liquid has reached set temperature

Open cooling water

Allow cooling water to flow through the condenser at approximately 40 – 50 l/h and not warmer than 20 °C.

Fill solution into the evaporating flask

- The solution can also be sucked in using vacuum

Start evacuation process

- Choose pressure in such a way that the boiling point of the solvent is 40 °C (see Table, Chapter 5.7)
- Set rotation
- Use quick-action jack to sink flask into the bath
- After set vacuum has been reached, wait for 1- 2 minutes to see whether distillation begins
- If distillation does not start, parameters must be optimised again (Sink pressure gradually or increase bath temperature)

In the optimum case, condenser is to be 2/3 to 3/4 burdened, otherwise sink the pressure until this is the case (Not possible for all distillation operations!).

When distillation «dies out»

Replace the receiving flask, to eliminate the risk of back evaporating. Then, continue distillation. Repeat this process until all desired solvent is distilled off.

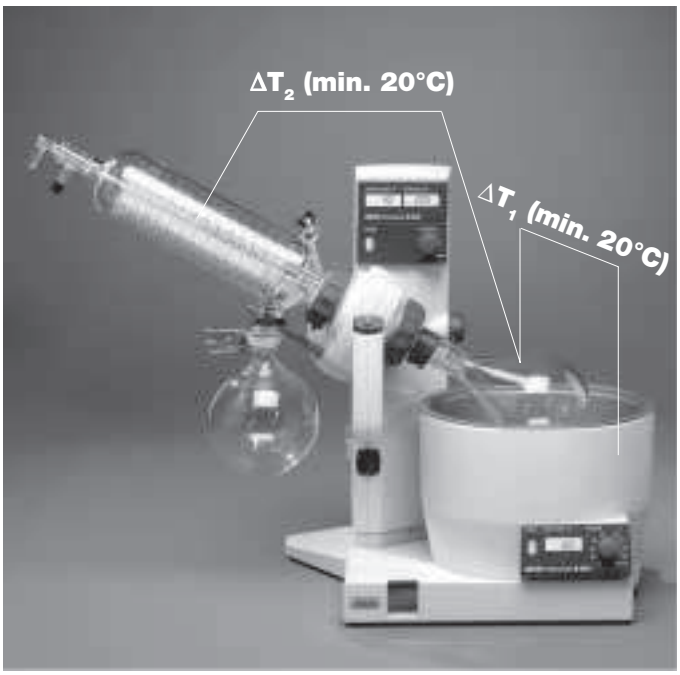
At the end of distillation, start rotation, pull up the flask and vent the system.

Turn off the heating bath to save energy, if you do not intend to immediately perform another distillation.

5.7 Choosing distillation conditions

To achieve optimum distillation conditions 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	Vapour	Bath
Max. 20°C	40°C	60°C



Picture 26: R-205: 20–40–60° C rule

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 l/h
- The working vacuum is to be chosen, so that the boiling point of the solvent is 40 °C. You can get the corresponding pressure from the Solvent Table (next page).

Advantages associated with 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 energy is employed at a good degree of efficiency.

This rule can also be applied to lower bath temperatures, for example:

Cooling water	Vapour	Bath
max. 0°C	20°C	40°C

Optimising distillation:

Depending on distilled solvent, distillation may have to be optimised again. However, before you optimise distillation again, the heating bath must have reached 60 °C.

The following applies: condensation of solvent should be 2/3 to 3/4 of the existing condenser coil.

There are basically two possibilities for optimising distillation:

1. Slowly reduce pressure again

Bath must have reached 60 °C (Boiling point is reduced, increase of ΔT1, resulting in increase of distillation capacity)

or

2. increasing bath temperature

(Increase of ΔT1, resulting in increase of distillation capacity).

By increasing the bath temperature, not all of the additional energy is supplied to distillation, but more is also discharged into the environment. This is due to the increase temperature difference between bath and environmental temperature.

5.8 Solvent table

Solvent	Formula	Molar Mass in g/mol	Evaporation energy in J/g	Boiling point at 1013 mbar	Density in g/cm³	Vacuum in mbar for boiling point at 40°C
Acetone	C3H6O	58.1	553	56	0.790	556
n-amylalcohol, n-pentanol	C5H12O	88.1	595	37	0.814	11
Benzene	C6H6	78.1	548	80	0.877	236
n-butanol, tert.butanol	C4H10O	74.1	620	118	0.810	25
(2-methyl-2-propanol)	C4H10O	74.1	590	82	0.789	130
Chlorobenzene	C6H5Cl	112.6	377	132	1.106	36
Chloroform	CHCl3	119.4	264	62	1.483	474
Cyclohexane	C6H12	84.0	389	81	0.779	235
Diethylether	C4H10O	74.0	389	35	0.714	Atmospheric
1,2-dichloroethane	C2H4Cl2	99.0	335	84	1.235	210
1,2-dichloroethylene (cis)	C2H2Cl2	97.0	322	60	1.284	479
1,2-dichloroethylene (trans)	C2H2Cl2	97.0	314	48	1.257	751
Diisopropyl ether	C6H14O	102.0	318	68	0.724	375
Dioxane	C4H8O2	88.1	406	101	1.034	107
DMF (dimethyl-formamide)	C3H7NO	73.1		153	0.949	11
Acetic acid	C2H4O2	60.0	695	118	1.049	44
Ethanol	C2H6O	46.0	879	79	0.789	175
Ethylacetate	C4H8O2	88.1	394	77	0.900	240
Heptane	C7H16	100.2	373	98	0.684	120
Hexane	C6H14	86.2	368	69	0.660	335
Isopropylalcohol	C3H8O	60.1	699	82	0.786	137
Isoamylalcohol,						
3-methyl-1- butanol	C5H12O	88.1	595	129	0.809	14
Methylethylketone	C4H8O	72.1	473	80	0.805	243
Methanol	CH4O	32.0	1227	65	0.791	337
Methylene chloride, dichloromethane	CH2Cl2	84.9	373	40	1.327	Atmospheric
Pentane	C5H12	72.1	381	36	0.626	Atmospheric
n-propylalcohol	C3H8O	60.1	787	97	0.804	67
Pentachloroethane	C2HCl5	202.3	201	162	1.680	13
1,1,2,2-tetra-chloroethane	C2H2Cl4	167.9	247	146	1.595	35
Tetrachlorocarbon	CCl4	153.8	226	77	1.594	271
1,1,1-trichloroethane	C2H3Cl3	133.4	251	74	1.339	300
Tetra-chloro-ethylene	C2Cl4	165.8	234	121	1.623	53
THF (tetrahydrofurane)	C4H8O	72.1		67	0.889	357
Toluene	C7H8	92.2	427	111	0.867	77
Trichloroethylene	C2HCl3	131.3	264	87	1.464	183
Water	H2O	18.0	2261	100	1.000	72
Xylene (mixture)	C8H10	106.2	389			25
0-xylene	C8H10	106.2		144	0.880	
m-xylene	C8H10	106.2		139	0.864	
p-xylene	C8H10	106.2		138	0.861	

Table 5: Solvent table (CRC Handbook 65th Ed)5.9 Troubleshooting

5.9 Troubleshooting

Malfunction	Possible cause	Remedy
Apparatus does not work	Main switch is off	Turn mains switch on
	Apparatus is not connected to the mains supply	Check mains connections
Bath does not warm up	Main switch is off	Turn mains switch on
	Apparatus is not connected to the mains supply	Check mains connections
	Over-temperature protection reacts	Automatic reset after cooling
	Internal fuse is defect (only 230V)	Call customer service
Servo lift without function	Various causes	Call customer service
Flask does not rotate	Rotary knob is set to 0	Turn rotary knob clockwise, until rotation starts
	Apparatus has been switched on again	Turn rotary knob to ”0” and then turn it clockwise, until rotation starts
System is not tight	Joints have not been greased	Grease joints
	Hose nipples have not be screwed correctly or they are defect	Check hose nipples
	Tubes are untight (brittle)	Replace tubes
	Sealing system has been installed incorrectly	Check sealing system
	Seal is defect	Replace seals
Frequent switching of valve or pump	System is untight	Control all sealing points (tubes and their connections)
	Hysteresis is too small	Choose larger hysteresis (if end vacuum is greater than 700 mbar, set to automatic hysteresis)
Valve does not switch	Valve does not shut off	• Valve is dirty • Valve cable is not plugged in
Vacuum is not reached	Back evaporation Rotavapor	Drain receiving flask
	Water pressure of water jet pump is too low	Open water tap completely
Distillation has ”abated”	Manually sink pressure until the distillation starts again	
Distillation has ended despite not dried out completely	a) Back evaporation from the receiving flask is too strong (especially solvent mixtures), drain receiving flask and start distillation again b) Malfunction in distillation procedure is not exactly defined (for example, sudden cooling, heat flow is too low, etc.)	
Display E1	Actual temperature was >3°C above the target value when heating was turned on	AUTO RESET after cooling off, upon second occurrence; Call customer service

Table 6: Troubleshooting

6 Maintenance

You must observe all instructions, aimed at keeping the Rotavapor functional. This includes periodically cleaning and checking for damages.

Before carrying out maintenance work on the apparatus, make sure that vapour supply and current supply have been turned off. When repair work is done to the lower part of the bath, always support the bath.

6.1 Cleaning

Housing

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

Tube connections

Visually examine tube connections. Tears, brittleness are to be corrected by replacing with suitable new tubes.

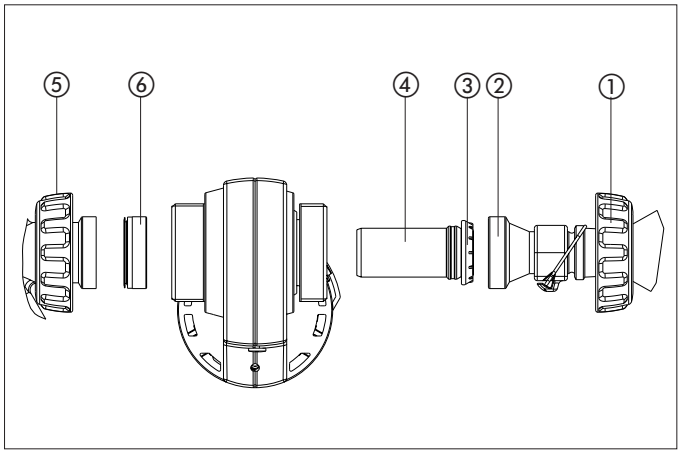
Sealing system

Visually check seal KD-34 and if it is strongly worn, replace it with a new seal.

- Do not grease seal (abrasion and fat have abrasive effect).
- Cleaning by rinsing and drying with a soft cloth 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.

Disassembling:

- Completely loosen screwed connection ① on the evaporation side. Press the knob on the lower side of the drive to block the screwed connection. Remove flange adapter ② and black screwed connection ①.
- Remove flange seal ③ and steam tube ④ via the evaporator side.
- Completely loosen screwed connection ⑤ on the condenser side. Hold and secure condenser when you do this.
- Remove seal ⑥ and clean it.



Picture 27: Explosion illustration of sealing system with drive

Assembling:

- Insert seal ⑥ on the condenser side.
- Place flange seal ③ onto steam tube ④ and insert via the evaporator side.
- Tightly screw flange adapter ② with screwed connection ① onto the evaporator side. Press the button on the bottom of the drive to block the screwed connection.
- Fasten condenser with screwed connection ⑤ onto drive.

Heating Bath

The heating bath does not require any maintenance. You should clean it occasionally. It should be cleaned, if:

- The water bath is calcified or contaminated
- The oil in the oil bath has changed (colour, viscosity, polymerises) or is contaminated.

Remove the bath to clean it.

Minor furring can be removed with non-abrasive cleaning agents (for example bathroom cleaners). If calcification is persistent, you can use acetic acid to remove it. Then, you must thoroughly rinse the bath.

Clean the housing with a moisten cloth, without using solvents. Visually inspect the housing for defects (controls, plug).

Glass components

Rinse glass components with commercial cleaners (for example mild soap solution). Use suitable cleaning material (you may have to allow it to act for awhile) to remove dirt adhering in the condenser coil (for example algae). Remove grease from joints. After you have cleaned and completely dried each glass component, visually inspect each glass component for glass splinters or tears. Since glass components are under vacuum when the rotary evaporator is operating, you must carefully visually control them!

6.3 Functional test

The unit is to be assembled from dry, solvent-free glass components.

Vacuum tightness

The apparatus is evacuated while flask is rotating. If there is a pressure measuring device, it is determined whether the vacuum remains constant in the system. For this purpose, the vacuum tube between the vacuum source and the pressure measuring device is interrupted by careful bending. Pressure increase per minute should be less than 3 mbar.

Setting capability of rotation speed

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

6.4 Customer service

Only authorised service personnel can perform work on or in the apparatus. These persons have a comprehensive technical training and knowledge about hazards, resulting when safety stipulations are not complied with. BÜCHI Customer Service Office have apparatus specific Service Manual, which can only be obtained by authorised personnel.

Addresses of official BÜCHI Customer Service Offices are given on the last page of these operating instructions. If your apparatus malfunctions or you have technical questions or application problems, contact one of these offices.

BÜCHI Customer Service offers the following services:

- Spare parts
- Repairs
- Maintenance
- Technical advise

7 Taking out of operation

You must remove dangerous substances and thoroughly clean the apparatus. As a result, people will not be injured from contact with dangerous substances.

7.1 Storage/transportation

Clean the apparatus thoroughly. Residues of chemicals must be removed completely and glass components must be cleaned.
Keep and transport the apparatus in its original packaging.

7.2 Disposal

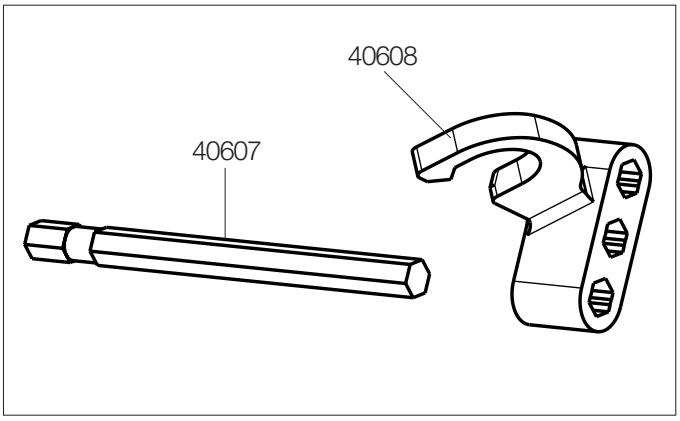
So that the apparatus can be disposed of in an environmentally friendly manner, there is alist of materials used in Chapter 9, Annex. This helps to ensure that the components are separated and recycled.

Please observe valid regional and local laws concerning disposal.

8 Spare parts and accessories

Only BÜCHI original accessories and spare parts guarantee safety and that the apparatus functions correctly. You can only use spare parts and accessories from other companies if BÜCHI consents. During assembling and disassembling the general safety rules and Chapter 6 are to be respected. Before placing the apparatus into operation, check to make sure that it operates correctly according to Chapter 6.2. Manufacturing according to this Manual is prohibited.

8.1 Condenser fixation



Picture 28a: Rod and holder

Name	Order number
Rod	**40607**
Holder	**40608**

Table 7a: Condenser fixation

Set 4 Tube nipples straight	**37642**
Set 4 Tube nipples bent	**37287**
Set Tube nipples 4 straight / 2 bent	**38000**

Table 7b: Tube nipples

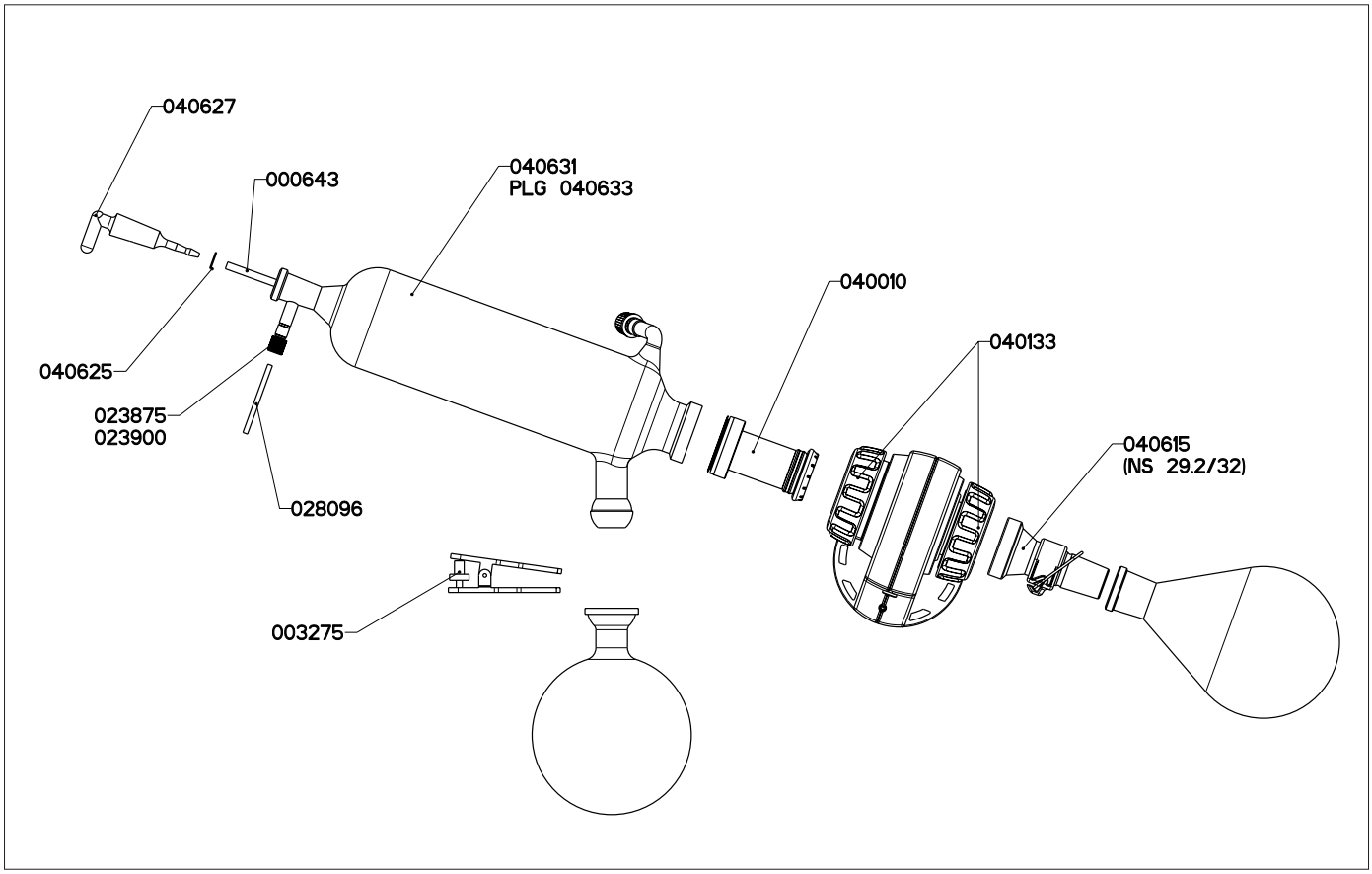
8.2 Deflector ring for Condenser / Coldtrap

Picture 28 b : Glass assembly with Deflector ring

In a warm environment condensation can form on the outside of the Condenser or Coldtrap. To prevent condensation collecting behind the plastic screw coupling the Deflector ring should be fitted as illustrated.

Name	Order number
Set of 5 Deflector rings	**40822**

Table 7c: Deflector rings

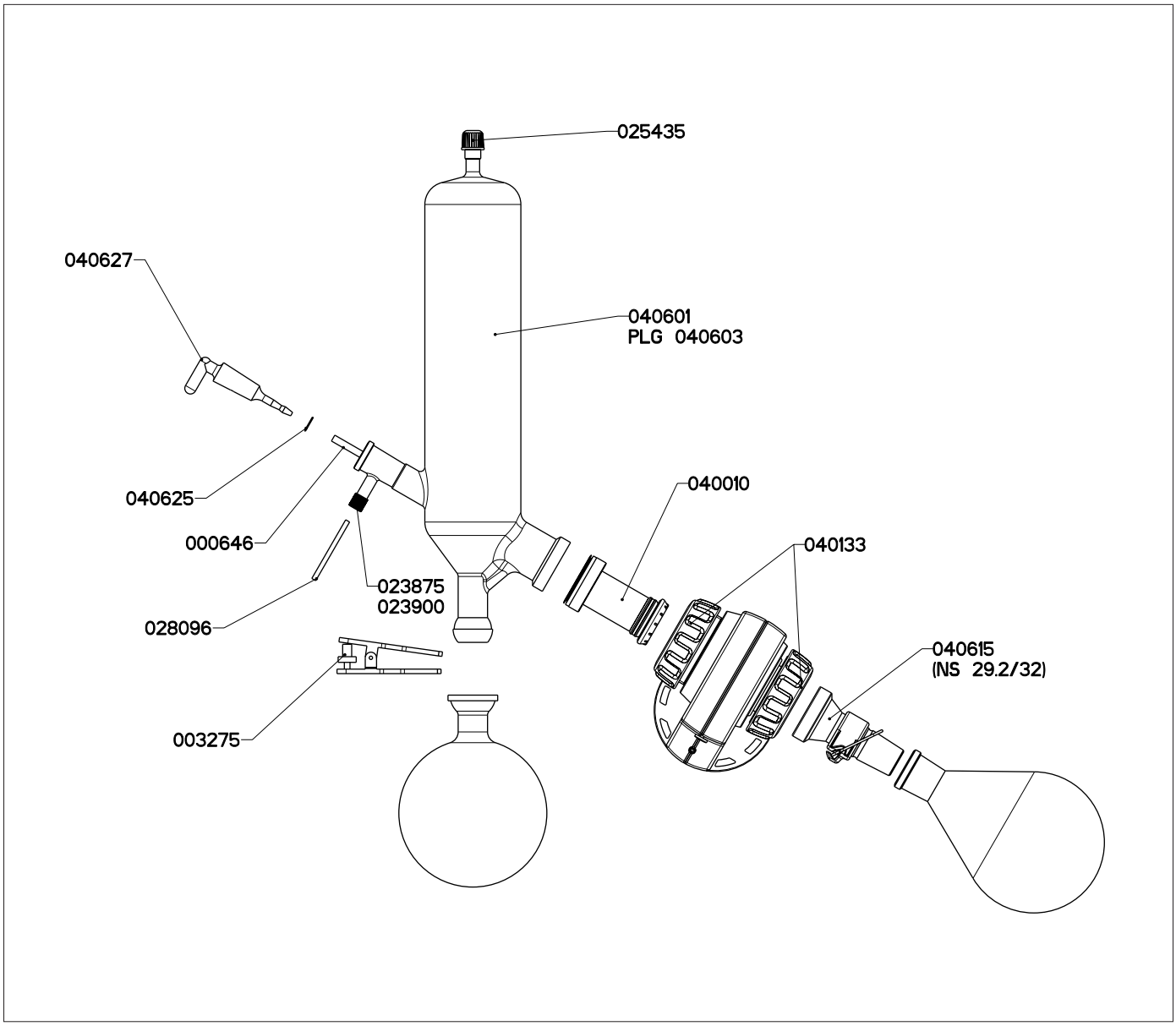


Picture 29: Explosion illustration glass assembly A

8.3 Glass assembly A

Name	Order number
PTFE tube 460 mm	**00643**
Clip for receiving flask	**03275**
Screw cap GL-10	**23875**
O ring 3 x 2,7 mm	**23900**
PTFE tube, 600 mm	**28096**
Tube nipple GL-14, bend, cpl, 4 units	**37287**
Seal complete (with steam tube, seal condenser side, Teflon ring evaporator side)	**40010**
Set flange screwed connection	**40133**
Joint adapter with combi-clip, NS 29.2/32, complete	**40615**
PTFE drain disk	**40625**
Stop cocks NS 18.8/38	**40627**
Glass assembly A complete with 1 l receiving flask (03275 + 40627 + 00643 + 40625 + 28096 + 40631)	**40630**
Diagonal condenser A (23875 + 23900 + Tube nipple GL-14 compl.)	**40631**
PLASTIC + GLAS (PLG)	
Glass assembly A complete, PLG with 1 l coated receiving flask (40633 + 03275 + 40627 + 00643 + 40625 + 28096)	**40632**
Diagonal condenser A PLG (23875 + 23900 + Tube nipple GL-14 compl.)	**40633**

Table 8: Spare parts glass assembly A

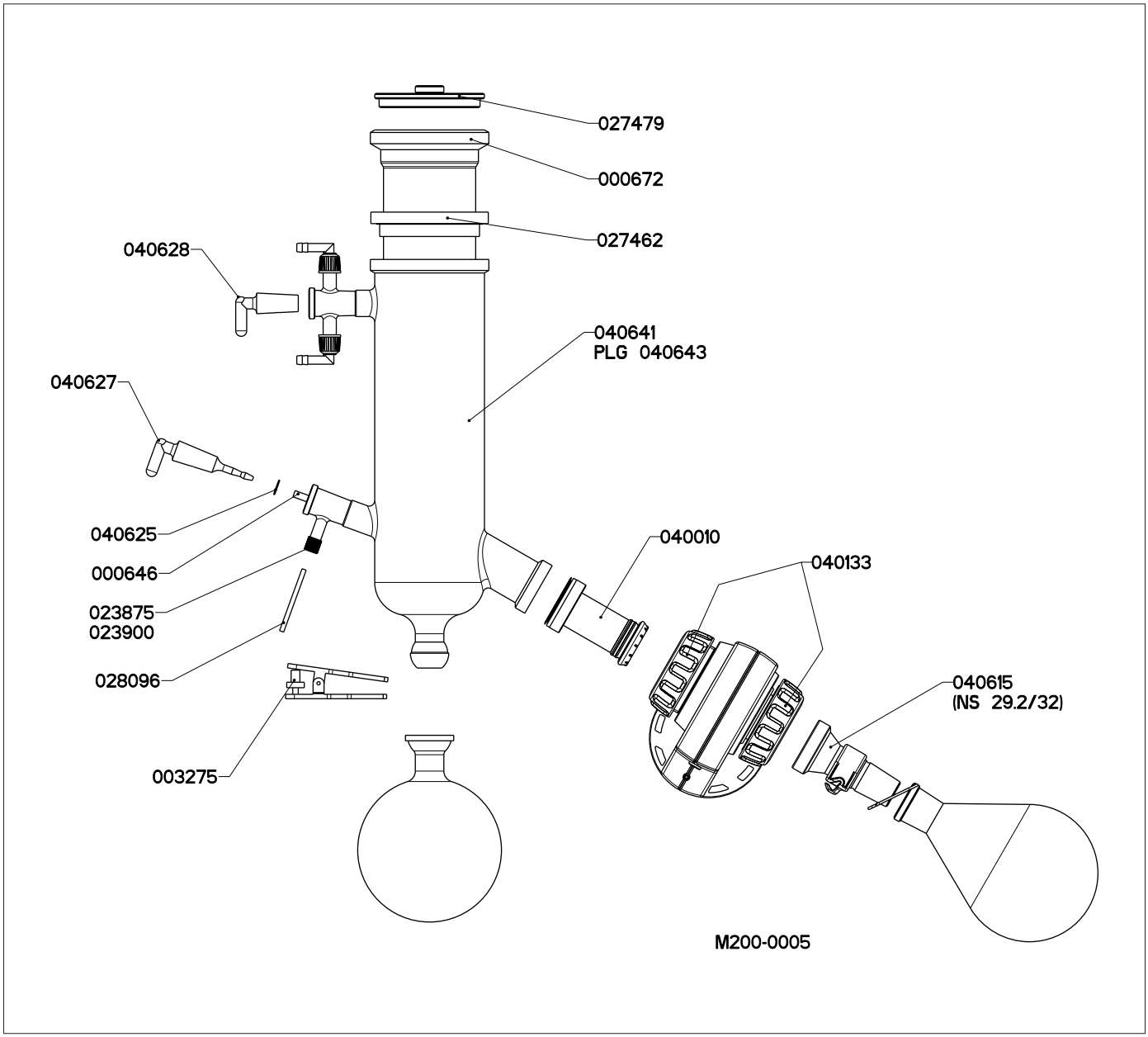


Picture 30: Explosion illustration glass assembly V

8.4 Glass assembly V

Name	Order number
PTFE tube 300 mm	**00646**
Clip for receiving flask	**03275**
Screw cap GL-10	**23875**
O ring 3 x 2,7 mm	**23900**
Screw cap GL-14	**25435**
PTFE tube, 600 mm	**28096**
Tube nipple GL-14, bend, cpl., 4 units	**37287**
Seal complete (with steam tube, seal condenser side, Teflon ring evaporator side)	**40010**
Set flange screwed connection	**40133**
Glass assembly V complete with 1 l receiving flask (40601 + 40604 + 03275 + 40627 + 00646 + 40625 + 28096)	**40600**
V condenser (23875 + 23900 + 25435 + Tube nipple GL-14 compl.	**40601**
Joint adapter with combi-clip, NS 29.2/32, complete	**40615**
PTFE-disk (drain disk)	**40625**
Stop cocks NS 18.8/38	**40627**
PLASTIC + GLAS (PLG)	
Glass assembly V complete, PLG with 1 l coated receiving flask (40603 + 03275 + 40627 + 40625 + 28096)	**40602**
V condenser PLG (23875 + 23900 + 25435 + Tube nipple GL-14 compl.)	**40603**

Table 9: Spare parts glass assembly V

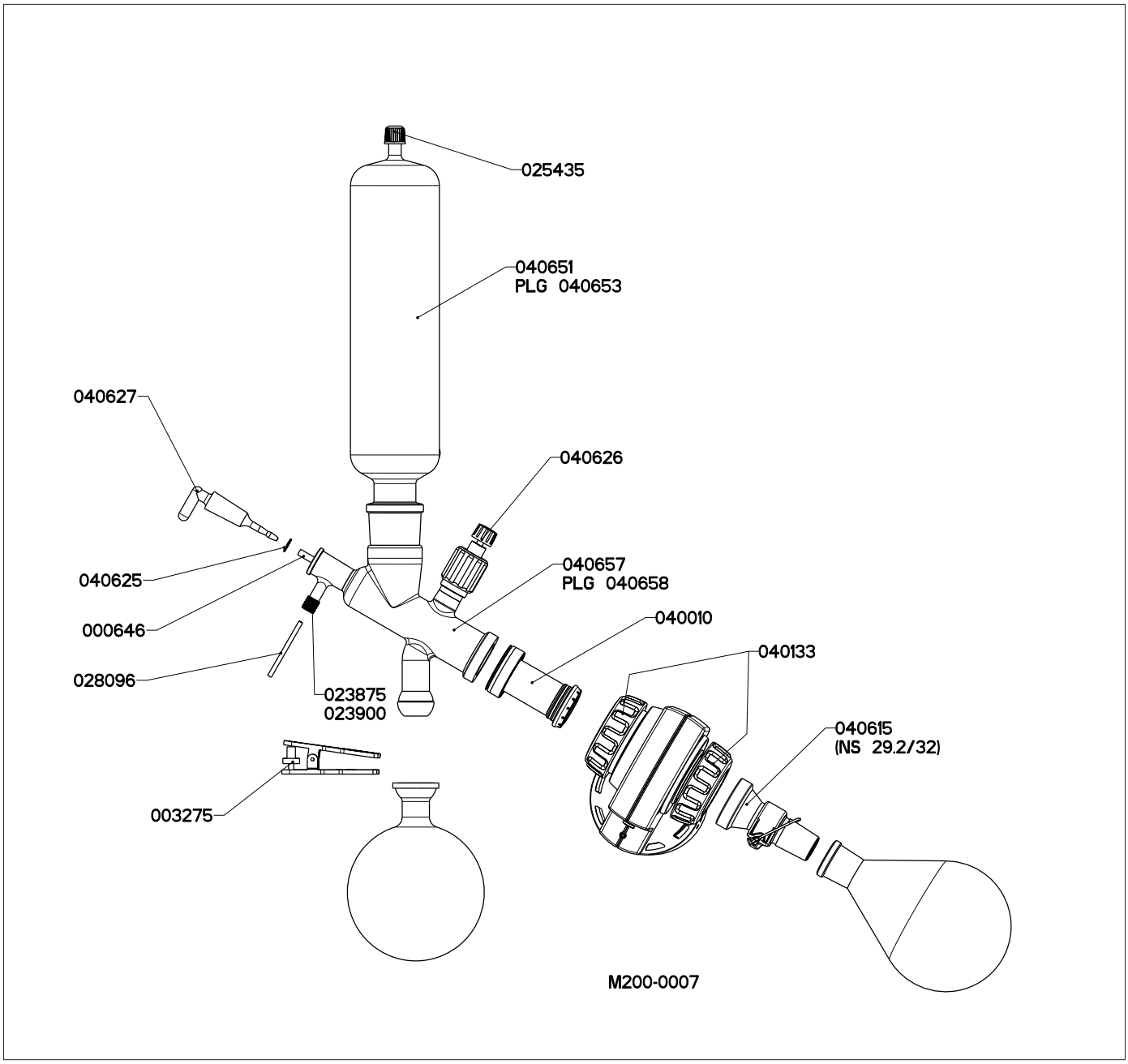


Picture 31: Explosion illustration glass assembly C

8.5 Glass assembly C

Name	Order number
PTFE tube 300 mm	**00646**
Cold trap	**00672**
Clip for receiving flask	**03275**
Screw cap GL-10	**23875**
O ring 3 x 2,7 mm	**23900**
Seal PTFE/Viton complete	**27462**
Cap for cold trap	**27479**
PTFE tube, 600 mm	**28096**
Tube nipple GL-14, bend, cpl., 4 units	**37287**
Seal complete (with steam tube, seal condenser side, Teflon ring evaporator side)	**40010**
Set flange screwed connection	**40133**
Joint adapter with combi-clip, NS 29.2/32, complete	**40615**
Stop cocks NS 18.8/38	**40627**
Stop cocks NS 18.8/38	**40628**
Glass assembly C complete with 1 l receiving flasks (03275 + 00646 + 04625 + 40628 + 28090 + 40627 + 40645)	**40640**
Cold trap outer part (incl. 23900 + 23875 + Tube nipple GL-14 compl.)	**40641**
Cold trap complete (40641 + 23900 + 23875 + 00672 + 27462 + 27479)	**40645**
PLASTIC + GLAS (PLG)	
Glass assembly C complete, PLG with 1 l coated receiving flask (40646 + 03275 + 00646 + 40625 + 40628 + 28096)	**40642**
Cold trap outer part PLG (incl. 23900 + 23875 + Tube nipple GL-14 compl.)	**40643**
Cold trap complete PLG (23900 + 27875 + 00672 + 27462 + 27479 + Tube nipple GL-14 compl.)	**40646**

Table 10: Spare parts glass assembly C

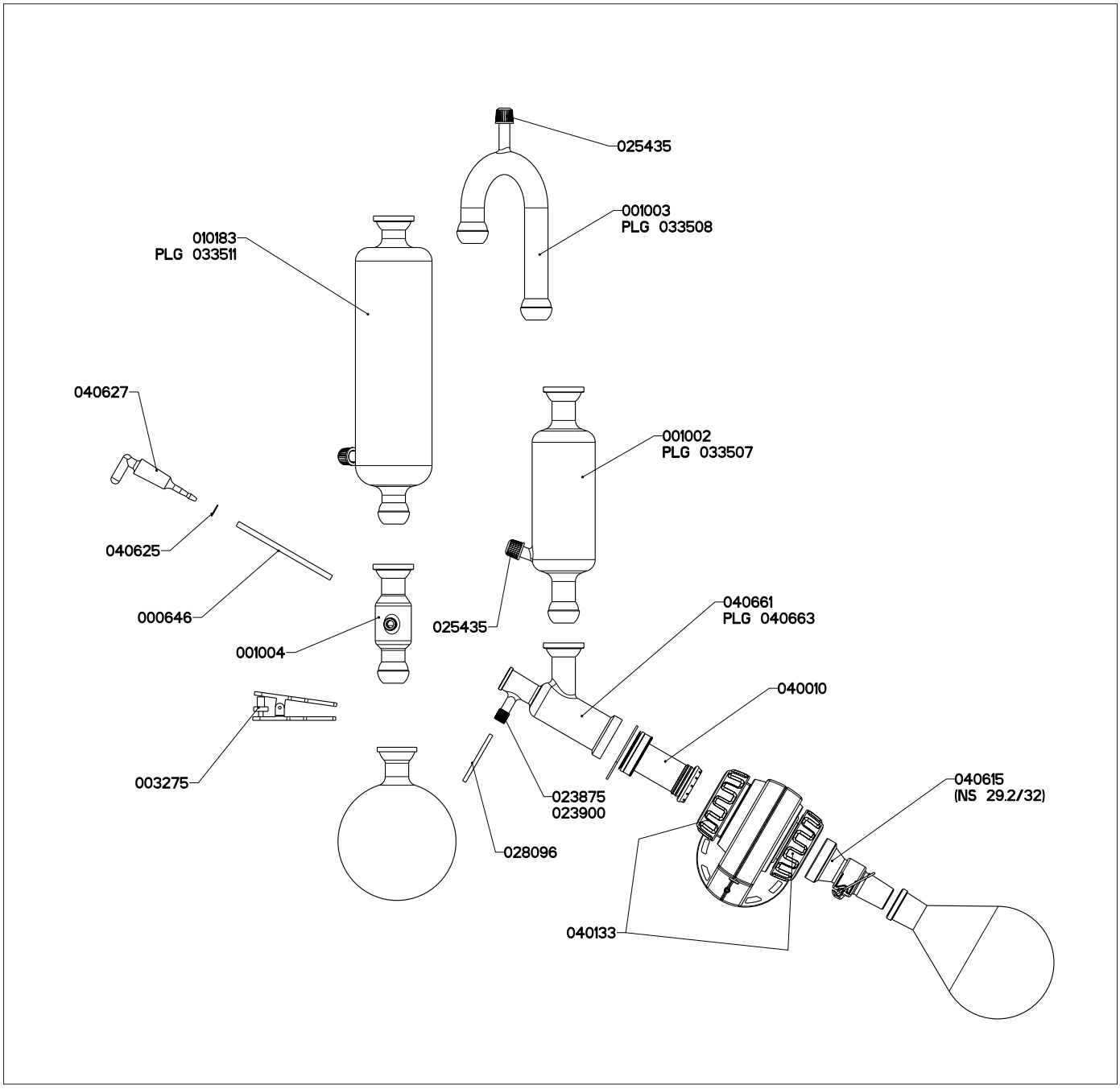


Picture 32: Explosion illustration glass assembly S

8.6 Glass assembly S

Name	Order number
PTFE tube 300 mm	**00646**
Clip for receiving flask	**03275**
Screw cap GL-10	**23875**
O ring 3 x 2,7 mm	**23900**
Screw cap GL-14	**25435**
PTFE tube, 600 mm	**28096**
Tube nipple GL-14, bend, cpl., 4 units	**37287**
Seal complete (with steam tube, seal condenser side, Teflon ring evaporator side)	**40010**
Set flanged screwed connection	**40133**
Joint adapter with combi-clip, NS 29.2/32, complete	**40615**
PTFE disk (drain disk)	**40625**
Shut-off tap	**40626**
Stop cocks NS 18.8/38	**40627**
Glass assembly S complete with 1l receiving flasks without vacuum connector 1006 (40651 + 40657 + 40626 + 03275 + 40627 + 40625 + 28096)	**40650**
Vertical condenser S, including Tube nipple GL-14 complete	**40651**
Distribution head including 23900 + 23875	**40657**
PLASTIC + GLAS (PLG)	
Glass assembly S complete, PLG with 1 l coated receiving flask (40653 + 40658 + 40626)	**40652**
Vertical condenser S PLG (25435 + Tube nipple GL-14 compl)	**40653**
Distribution head PLG incl. 23900 + 23875	**40658**

Table 11: Spare parts glass assembly S

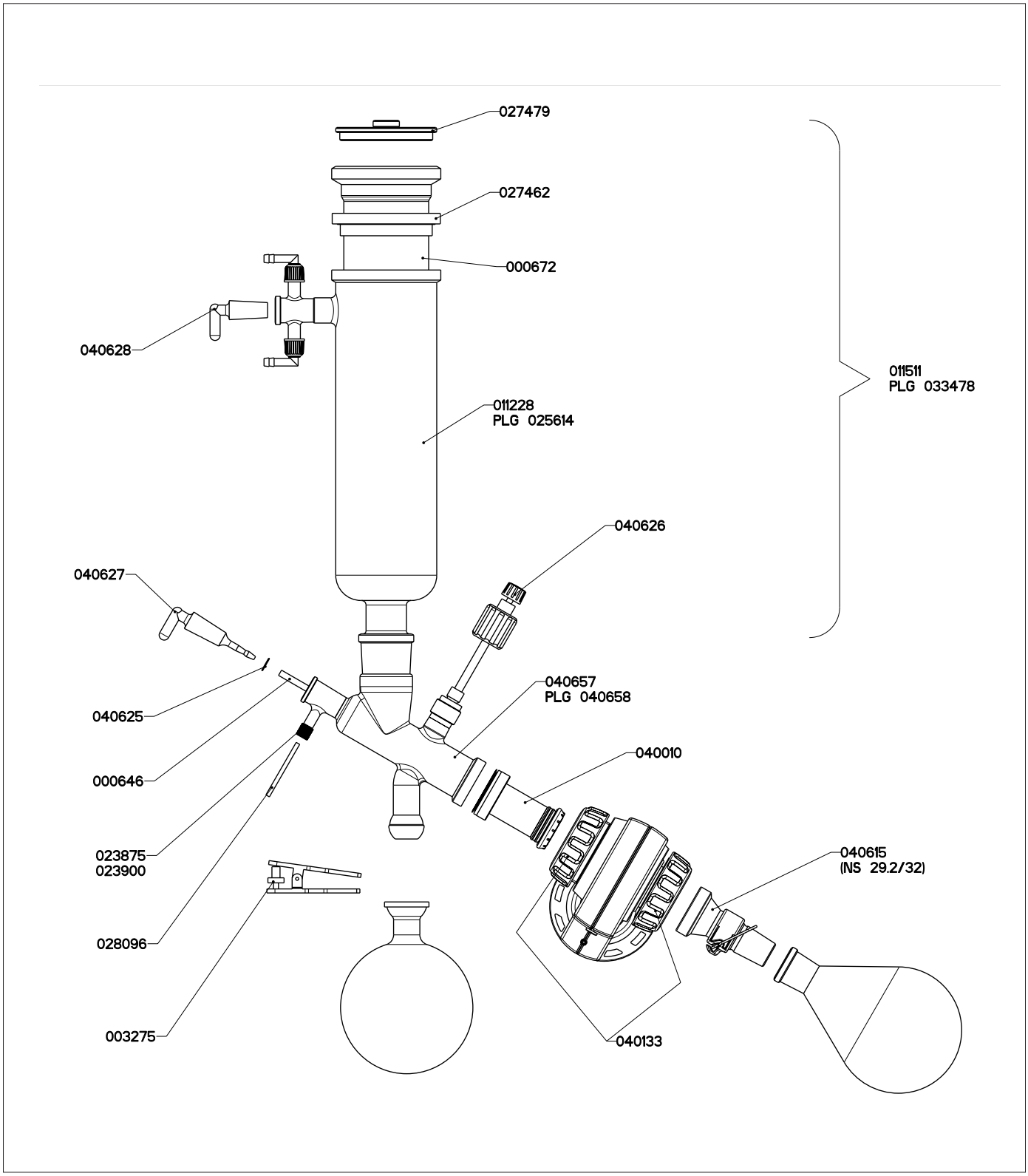


Picture 33: Explosion illustration glass assembly E

8.7 Glass assembly E

Name	Order number
PTFE tube 300 mm	**00646**
Expansion vessels (including 25435)	**01002**
U tube (including 25435)	**01003**
Vacuum connector (including Tube nipple GL-14, complete)	**01004**
Clip for receiving flask	**03275**
Condenser (incl. Tube nipple GL-14 compl.)	**10183**
Condenser pivoting clamp	**11151**
Screw cap GL-10	**23875**
O ring 3 x 2,7 mm	**23900**
Screw cap GL-14	**25435**
Cross sleeve	**27344**
PFTE tube, 600 mm	**28096**
Tube nipple GL-14, bend, cpl., 4 units	**37287**
Seal complete (with steam tube, seal condenser side, Teflon ring evaporator side)	**40010**
Set flange screwed connection	**40133**
Rod	**40609**
Joint adapter with combi clip, NS 29.2/32, complete	**40615**
PTFE disk (drain disk)	**40625**
Stop cocks NS 18.8/38	**40627**
Glass assembly E complete with 1 l receiving flask (10183 + 01003 + 01002 + 40661 + 01004 + 03275 + 40627 + 00646 + 40625 + 28096)	**40660**
Distribution head (including 23875 + 23900)	**40661**
PLASTIC + GLAS (PLG)	
Expansion vessel PLG (incl. 25435)	**33507**
U tube PLG (including 25435)	**33508**
Condenser PLG (including Tube nipple GL-14 complete)	**33511**
Glass assembly E complete, PLG with 1 l coated receiving flask (33511 + 33508 + 33507 + 40663 + 01004)	**40662**
Distribution head PLG (including 23875 +23900)	**40663**

Table 12: spare part glass assembly E



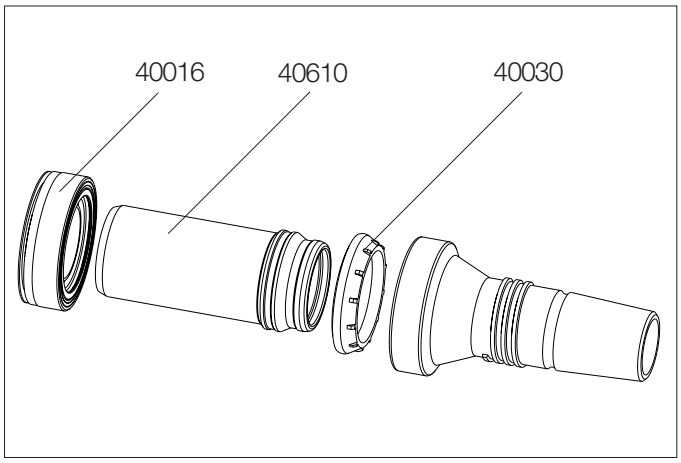
Picture 34: Explosion illustration glass assembly CR

8.8 Glass assembly CR

Name	Order number
PTFE tube 300 mm	**00646**
Cold trap	**00672**
Vacuum connection incl. cock (optional)	**01006**
Clip for receiving flask	**03275**
Cold trap CR outer part (including Tube nipple GL-14 compl.)	**11228**
Cold trap CR complete (00672 + 40628 + 11228 + 27462 + 27479 + Tube nipple GL-14 compl.)	**11511**
Screw cap GL –10	**23875**
O ring 3 x 2,7 mm	**23900**
Seal PTFE/Viton complete	**27462**
Cap for cold trap	**27479**
PTFE tube, 600 mm	**28096**
Tube nipple GL-14, bend, cpl., 4 units	**37287**
Seal complete (with steam tube, seal condenser side, Teflon ring evaporator side)	**40010**
Set flange screwed connection	**40133**
Joint adapter with combi-clip, NS 29.2/32, complete	**40615**
PTFE disk (drain disk)	**40625**
Shut-off valve	**40626**
Stop cocks NS 18.8/38	**40627**
Stop cocks NS 18.8/38	**40628**
Distribution head (iincl. 23900 + 23875)	**40657**
Glass assembly CR complete with 1 l receiving flask without 1006 (11228 + 00672 + 40657 + 40626 + 27462 + 27479 + 03275 + 40627 + 40628 + 00646 + 40625 + 28096)	**40670**
PLASTIC + GLAS (PLG)	
Cold trap CR outer part PLG (including Tube nipple GL-14 compl.)	**25614**
Cold trap complete (00672+40628+25614+ 27462+27479+Tube nipple GL-14 compl.)	**33478**
Distribution head PLG (incl. 23875 + 23900)	**40658**
Glass assembly CR complete, PLG with 1 l coated receiving flask (25614 + 00672 + 40658 + 40626 + 27462 + 27479 + 03275 + 40627 + 40628 + 00646 + 40625 + 28096)	**40672**

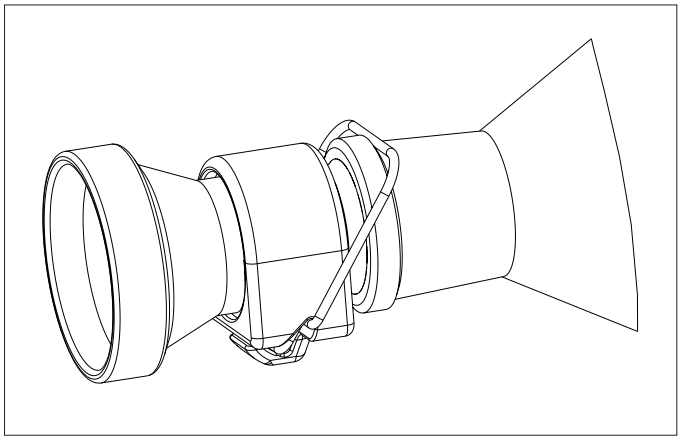
Table 13: Spare parts glass assembly CR

8.9 Various glass parts



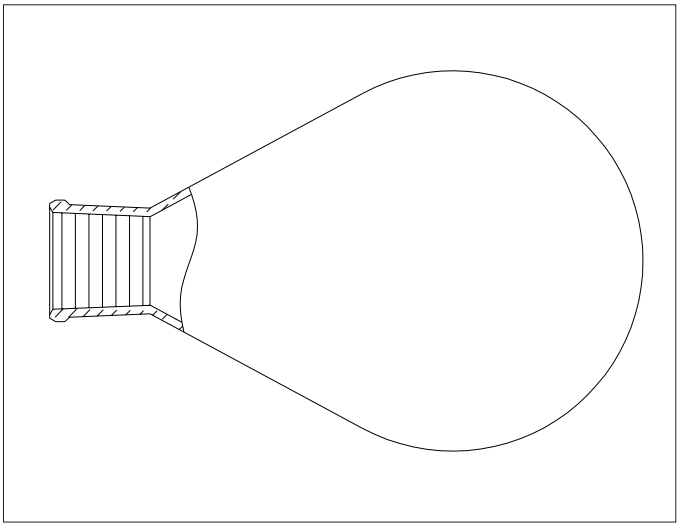
Picture 35: Sealing system and joint adapter

Name	Order number
Sealing system	
Joint adapter, complete with combi-clip To 29.2/32 joint	**40615**
Joint adapter, complete with combi-clip To 24/40 joint	**40616**
Joint adapter, complete with combi-clip To 29.2/42 Joint	**40617**
Joint adapter, complete with combi-clip To 34.5/35 Joint	**40618**
Vapour duct	**40610**
Set adapter seal, complete (2 units)	**40030**
Seal KD 34, complete	**40016**



Picture 36: Combi-clip

Name	Order number
Combi-Clip	
Standard joint	
SJ 29,2/32	**40620**
SJ 29,2/42	**40620**
SJ 24/40	**40620**



Picture 37: Evaporating flask

Standard joint evaporating flask (pear-shaped)

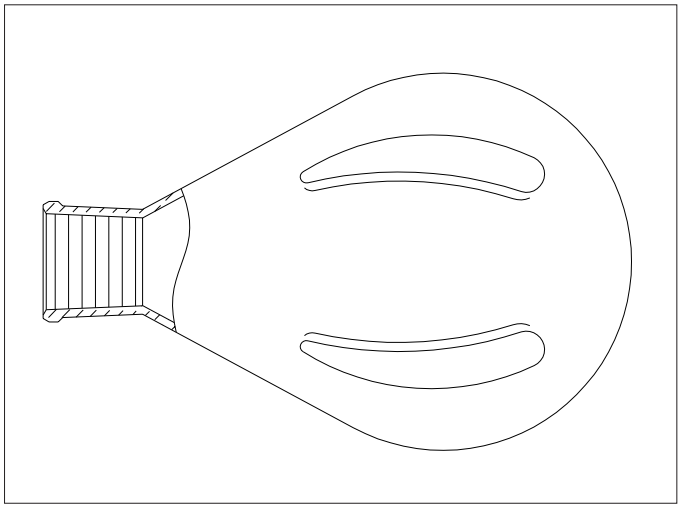
Content	SJ 29.2/32	SJ 24/40	SJ 29.2/42
50 ml	**00431**	**08750**	**08736**
100 ml	**00432**	**08751**	**08737**
250 ml	**00433**	**08754**	**08738**
500 ml	**00434**	**08758**	**08739**
1000 ml	**00435**	**00440**	**08762**
2000 ml	**00436**	**08765**	**08769**
3000 ml	**00437**	**08767**	**08770**

SJ Evaporating flask (pear-shaped) PLASTIC+GLAS

Content	SJ 29.2/32	SJ 24/40	SJ 29.2/42
50 ml	**33405**		
100 ml	**33404**		
250 ml	**25520**		
500 ml	**25322**	**25261**	
1000 ml	**20729**	**20730**	**25517**
2000 ml	**25323**	**25262**	
3000 ml	**25324**	**25263**	**27346**

The use of the plastic + glass coating is according to manufacturers' instructions in water up to 60° possible.

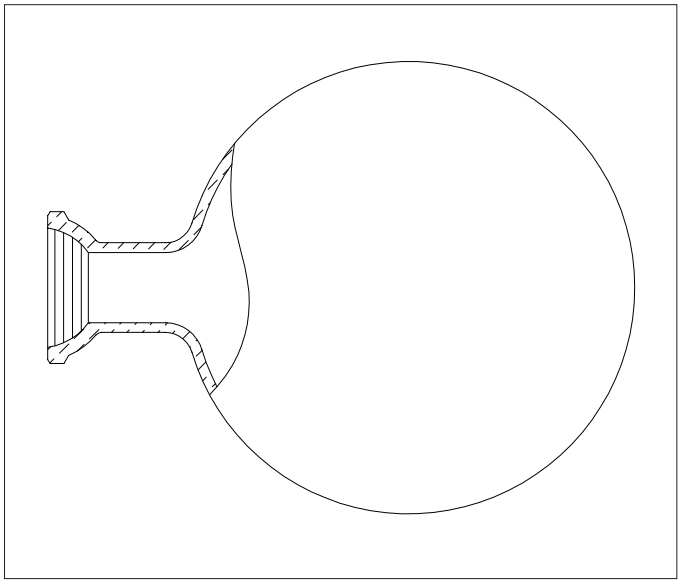
The cleaning of the glass parts should be done by hand.



Picture 38: Drying flask

SJ Drying flask (pear-shaped)

Content	SJ 29.2/32	SJ 24/40
500 ml	**00452**	**11579**
1000 ml	**00453**	**00420**
2000 ml	**00454**	**11580**



Picture 39: Receiving flask

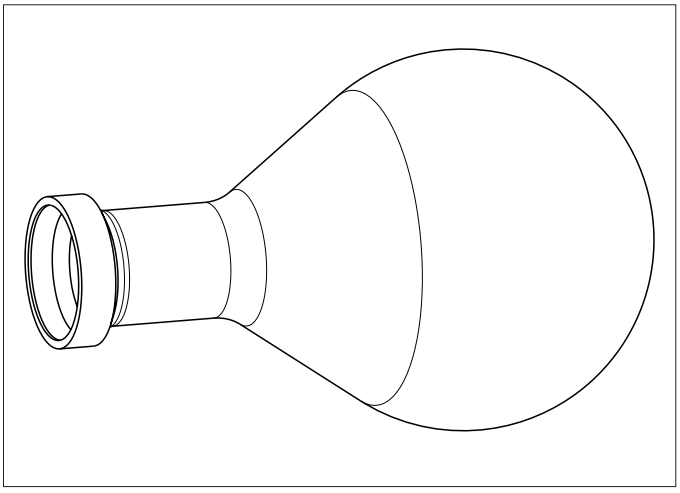
Receiving flask (with ball joint 35/20)

Content	uncoated	Plastic+Glas	Plastic+Glas Low temperature*
50 ml	**00421**		
100 ml	**00422**		
250 ml	**00423**		
500 ml	**00424**	**25264**	**40774**
1000 ml	**00425**	**20728**	**40775**
2000 ml	**00426**	**25265**	**40776**
3000 ml	**00427**	**25266**	**40777**

* For the use with BÜCHI Cold Trap

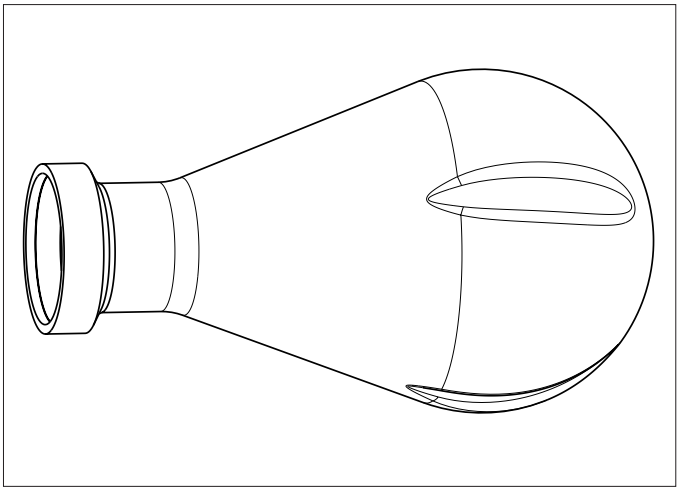
The use of the plastic + glass coating is according to manufacturers' instructions in water up to 60° possible.

The cleaning of the glass parts should be done by hand.



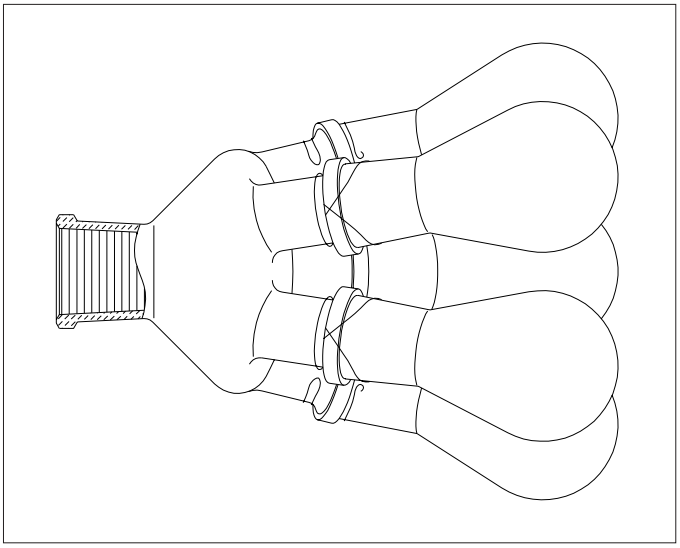
Picture 40: Flanged evaporating flask

Name	Order number
Flanged evaporating flask	
100 ml	**40675**
250 ml	**40676**
500 ml	**40677**
1000 ml	**40678**
2000 ml	**40679**
3000 ml	**40680**



Picture 41: Flanged drying flask

Flanged drying flask	
500 ml	**40682**
1000 ml	**40683**
2000 ml	**40684**

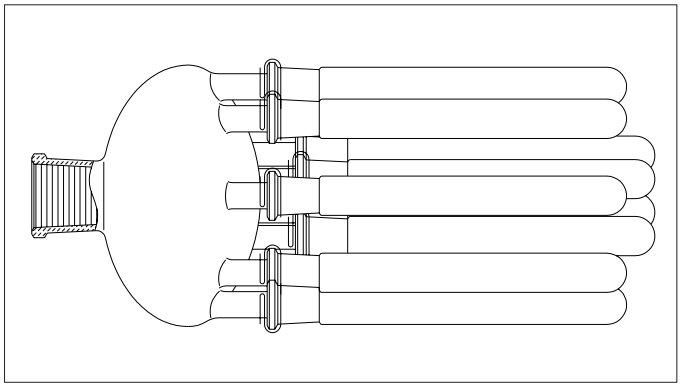


Picture 42: Distillation spider

Distillation spider

For simultaneous distillation from 5 evaporating flasks

Content	
Complete with flask for	**SJ 29.2/32**
50 ml	**01332**
100 ml	**01333**

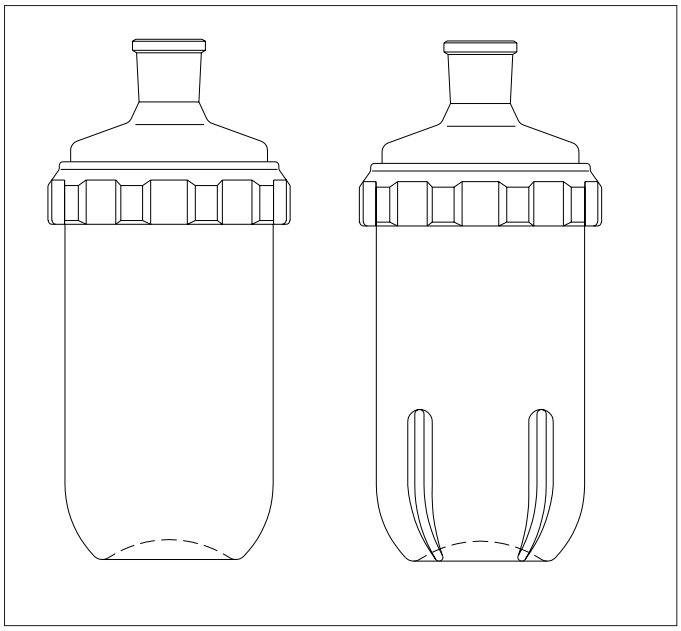


Picture 43: Distillation spider 20 ml

Name **Order number**

Distillation spider
For simultaneous distillation from 20 ml cylinder flask with SJ 14.5/23

Number of flasks	**SJ 29.2/32**
6	**01334**
12	**01335**
20	**01336**
20 ml evaporating flask to spider	**00477**



Picture 44: Beaker flask

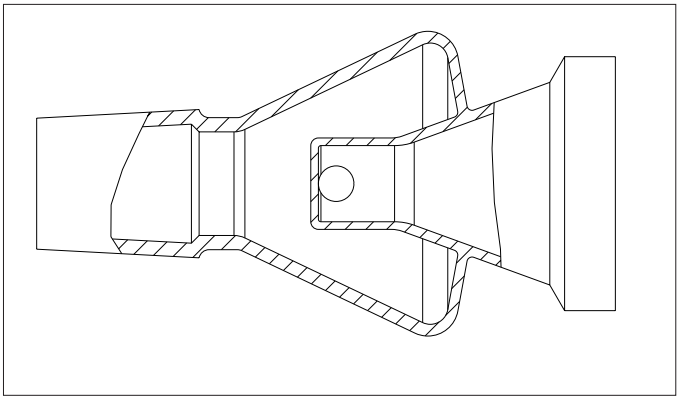
Beaker flask
For working with high viscosity and solid substances. The large opening allows for smooth draining and cleaning. Foaming solutions can be better processed in a beaker flask.

1,5l Version	**Beaker flask cpl.**	**Drying flask cpl.**
With flange	**40696**	**40697**
SJ 29,2/32	**34230**	**34269**
SJ 24/40	**34247**	**34770**

0,5l Version	**Beaker flask cpl.**	**Drying flask cpl.**
With flange	**40692**	**40693**
SJ 29,2/32	**34764**	**34767**
SJ 24/40	**34765**	**34768**

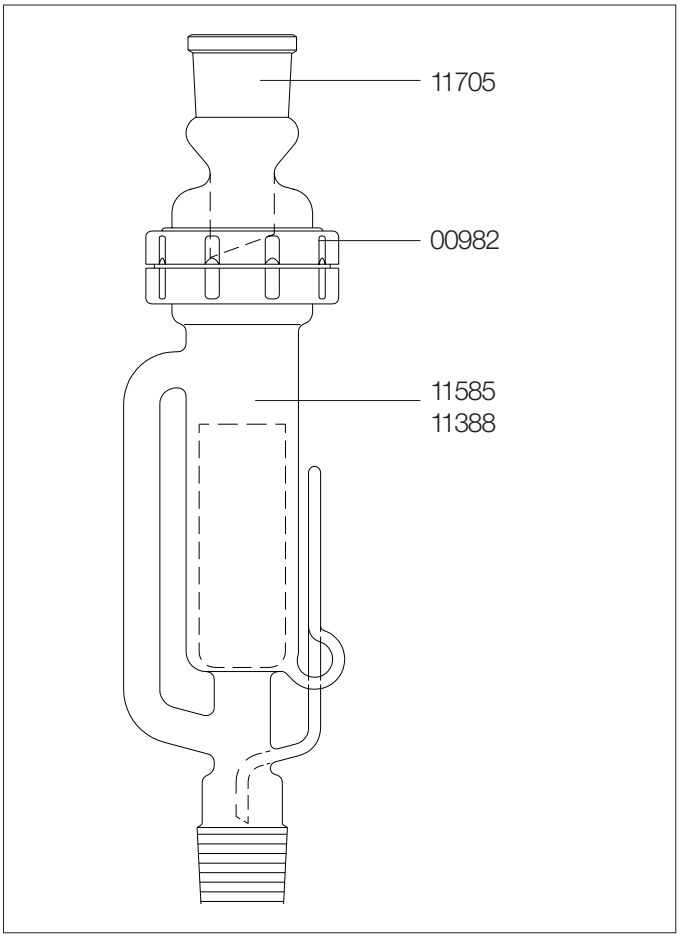
Filled volume

1,5 l Version = 500 ml
0,5 l Version = 150 ml



Picture 45: Reitmeyer trap

Name	Order number
Reitmeyer trap	
For slightly foaming solutions	
Flange with NS 29.2/32	**40667**
Flange with NS 24/40	**40668**



Picture 46: Soxhlet extraction unit

Extraction unit "Soxhlet"

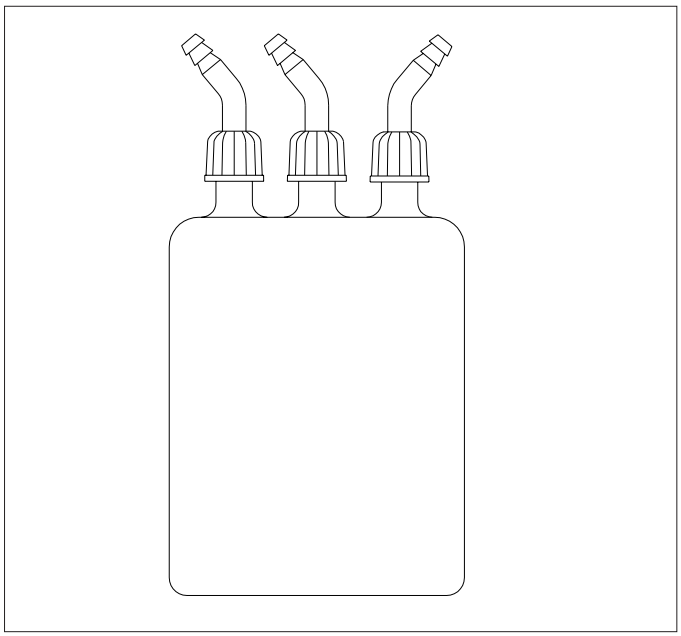
When this accessory is combined with glass assembly S, extractions can be performed.
This extraction unit can be obtained for 200 ml or 500 ml.

Extraction unit complete 200 ml (40699+ 11705+11585+11904+19051+00982+08560)	**11744**
Extraction unit complete 500 ml (40699+ 11705+11388+11904+19051+00982+00989)	**11745**
Reducing unit For 200 and 500 ml version	**11705**
Extraction unit lower part 200 ml	**11585**
Extraction unit lower part 500 ml	**11388**
Rod 12 x 750 mm (R-114 - 144)	**11904**
Rod 1000 mm (R-200/5)	**40699**
Cross sleeve cpl.	**27344**
Condenser clamp	**11151**
PTFE O ring	**19051**
Complete screwed connection	**00982**
1 x extraction thimbles for 200 ml	**08560**
1 x extraction thimbles for 500 ml	**00989**
25 x extraction thimbles for 200 ml	**18106**

8.10 Miscellaneous

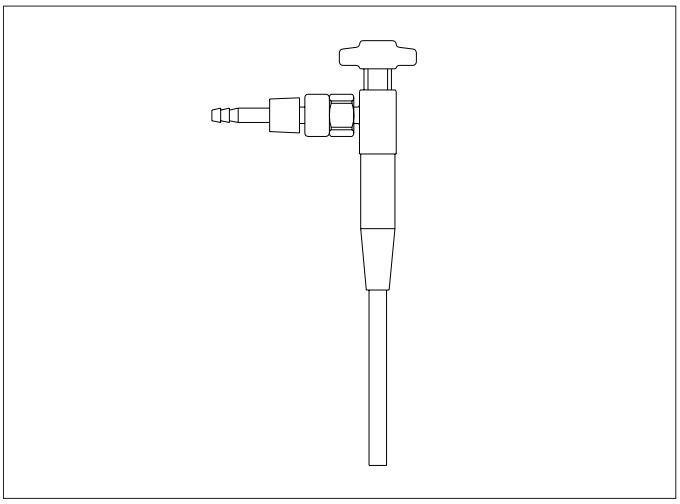
Picture 47: Floating balls in waterbath

Name	Order number
Floating balls The floating balls on the water surface behave like a cover. As a result, energy consumption is reduced.	
250 pieces	**36405**



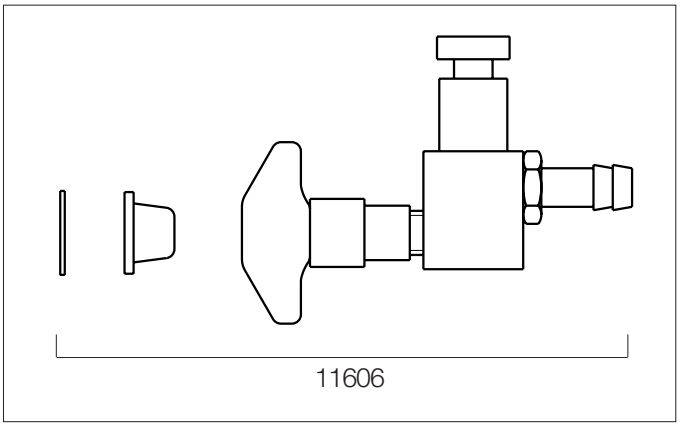
Picture 48: Woulff bottle

Woulff bottle The Woulff bottle acts as volume buffer between pump and rotary evaporator. It protects the pump against contamination and thus increases its service life.	
Woulff bottle, complete (25518+32885)	**25519**
Woulff bottle	**25518**
Tube nipple GL-14, bend, cpl.. 4 units	**37287**



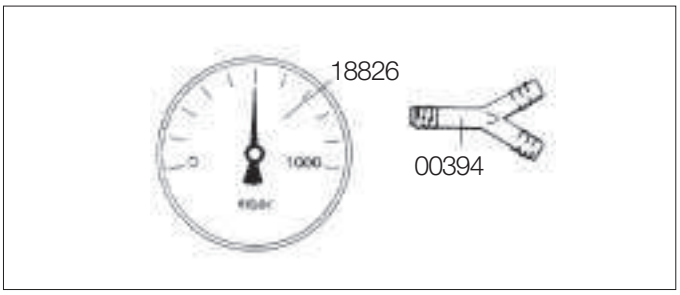
Picture 49: Water jet pump

Name	Order number
Water jet pump plastic	
Water jet pump	**02913**



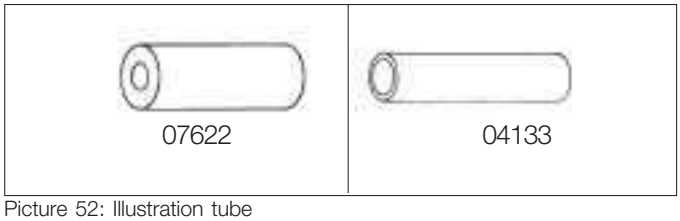
Picture 50: Water control valve

Water control valve ½”	
Water control valve ½ ” complete	**11606**

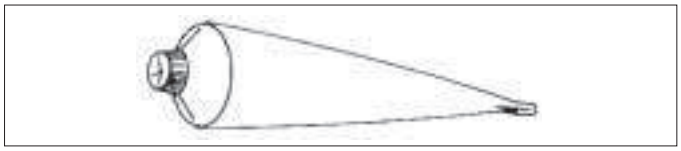


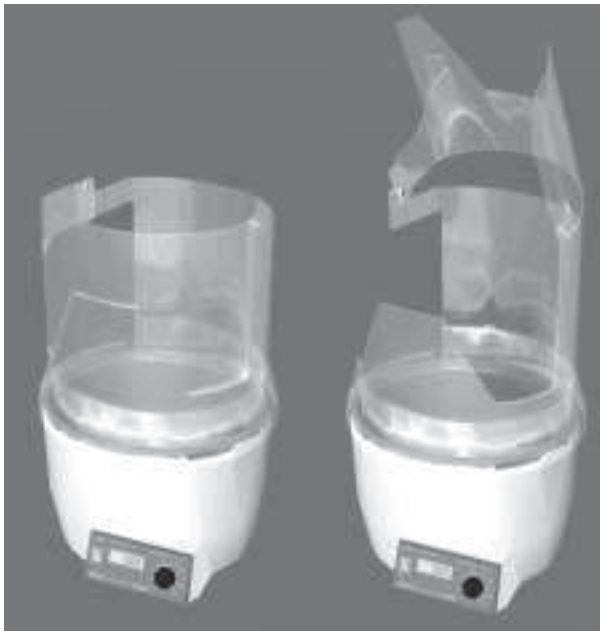
Picture 51: Vacuum gauge unit

Vacuum gauge unit	
Vacuum gauge	**18826**
Y piece ø 10 mm	**00394**



Picture 52: Illustration tube


Picture 53: Illustration of glisseal laboratory grease


Picture 54: Illustration of protective shield


Picture 55: Photograph of valve unit

Name	Order number
Tubes	
Vacuum tube 16/6 mm	**17622**
Nyflex tube 14 x 8 (Alternative to vacuum tube 17622))	**04113**
Cooling water tube silicone 9/6 mm	**04133**
Glisseal laboratory grease	
60 g tube	**01330**
Protective shield	
Protective shield, complete	**40440**

Valve unit

This valve unit with integrated separator is a necessary accessory, if vacuum is controlled with a vacuum controller. It interrupts the connection between the pump and rotary evaporator and protects the pump against contamination.

Valve unit, complete	**37968**

9 Appendix

9.1 Technical Data

	R-200	**R-205**	**B-490**
Type of apparatus	Rotavapor Basic	Rotavapor with display	Heating bath
Glass assembly	A,V,C,S,E,CR	A,V,C,S,E,CR	
Dimensions (wxhxd)	544 x 697 x 367	544 x 697 x 367	280 x 191 x 250
Weight	16 - 18 kg Depending on glass assembly	16 - 18 kg Depending on glass assembly	3.3 kg
Voltage	100, 120, 230 V	100, 120, 230 V	120, 230 V
Mains connection	3-pole (P,N,E) via power cable	3-pole (P,N,E) via power cable	3-pole (P,N,E) via power cable
Tolerance	-10% to 10%	-10% to 10%	-10% to 10%
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Power consumption	120W	120W	1400W
Overvoltage category	2	2	2
IP class			
Contamination degree	2	2	2
Rotation speed range	20-280 rpm	20-280 rpm	
Maximum size of flask	3 lt (max. 3 kg)	3 lt (max. 3 kg)	3 lt (max. 3 kg)
Temperature range			20 °C – 180° C
Display	None	Vapour temp./rotation	Set/Actual temp.
Accuracy of measured Temperature	20 °C to 100 °C 100°C to 180°C	20 °C to 100 °C 100°C to 180°C	± 1°C ± 2°C
Environmental temperature	10°C up to 35°C	10°C up to 35°C	10°C up to 35°C
Bath content			4 lt
Over-temperature protection			250° C
Pressure of the condensing coil	max. 2.7 bar abs. pulsation free	max. 2.7 bar abs. pulsation free	

Table 14: Technical Data

9.2 Materials used

Component	Material / Name	Abbreviation
Quick-action jack	Aluminium cast alloy	AlMg 9
Electronics housing	Aluminium cast alloy	AlMg 9
Bottom plate	Aluminium cast alloy	AlMg 9
Bath insulation	Plastic	PBT 30 GF
Bath coating	Polytetrafluor ethylene	PFA
Bath construction	Aluminium cast alloy	AlMg 9
Bad lower part	Aluminium cast alloy	AlMg 9
Seal KD-34	Polytetrafluor ethylene	PTFE
Flange seal	Ethylene tetrafluor ethylene	ETFE

Table 15: Materials used

9.3 FCC requirements (for USA and Canada)

English:

This equipment has been tested and found to comply with the limits for a Class A digital device, pusuant to both Part 15 of the FCC Rules and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is like to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Français:

Cet appareil a été testé et s'est avéré conforme aux limites prévues pour les appareils numériques de classe A et à la partie 15 des règlementation FCC à la règlementation des radio-interférences du Canadian Department of communications. Ces limites sont destinées à fournir une protection odéquate contre les interférences nétastes lorsque l'appareil est utilisé dans un environnement commercial.

Cet appareil génère, utilise et peut radier une énergie à fréquence radioélectrique, il est en outre susceptible d'engendrer des interferences avec les communications radio, s'il n'est pas installé et utilisé conformément aux instructions du mode d'emploi. L'utilisation de cet appareil dans les zones résidentielles peut causer des interférences nèfastes, auquel cas l'exploitant sera amené à prendre les dispositions utiles pour polier aux interférences à ses propres frais.

9.4 Declaration of conformity

We

BÜCHI Labortechnik AG
Postfach, CH-9230 Flawil, Switzerland

Declare, solely under our responsibility, that the product:
BÜCHI Rotavapor **R-200/R-205**

On which this declaration is based, complies with the following standards:

EN 61010-1:1993 (~ IEC 1010-1, VDE 0411-1)
Safety specifications for electrical measurement, control and laboratory equipment: General requirements

EN 61326-1: 1997
Electrical equipment for measurement technique, control and laboratory use
-EMC requirements

EN 55011:1991/B (~ VDE 0875/B, VDE 0871/B)
Limit values and measuring methods for interference of industrial, scientific and medical high frequency instruments

EN 61000-3-2: 1995/1996
Limits for harmonic current emissions
EN 61000-3-3: 1995
Limitation of voltage fluctuations and flicker

Canadian Radio Interference Regulations
ICES-001 Notice for Industrial, Scientific and Medical Radio Frequency Generators:
This ISM apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Please note that this requirement is only for generators which operate at over 10,000 Hz.

In accordance with specifications of the EU Directive:
73/23/EEC (Electrical equipment/low voltage directive)
89/336/EEC (Electromagnetic compatibility)

Flawil, 16.08.2001

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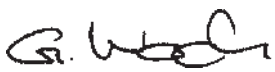

Guido Worch
Qualitymanager