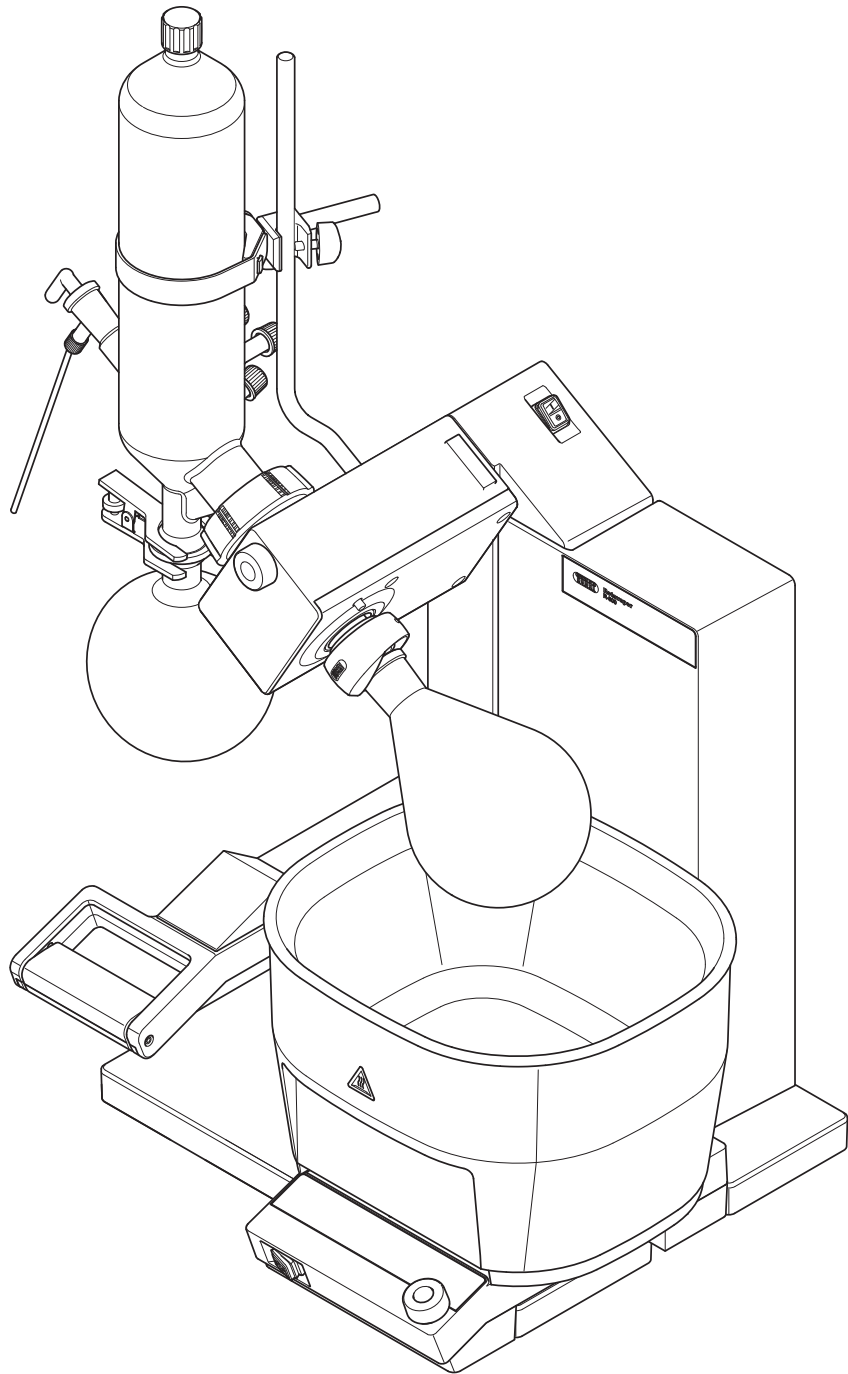




Rotavapor® R-300 Operation Manual



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Contents

1	About this document.....	6
1.1	Warning notices in this document.....	6
1.2	Symbols.....	6
1.2.1	Warning symbols.....	6
1.2.2	Mandatory directive symbols.....	7
1.2.3	Other symbols.....	7
1.3	Available languages.....	7
1.4	Trademarks.....	7
2	Safety.....	8
2.1	Intended use.....	8
2.2	Use other than that intended.....	8
2.3	Staff qualification.....	9
2.4	Residual risks.....	9
2.4.1	Dangerous vapors.....	9
2.4.2	High internal pressure.....	10
2.4.3	Hot surfaces and liquids.....	10
2.4.4	Rotating parts.....	10
2.4.5	Faults during operation.....	10
2.4.6	Glass breakage.....	10
2.5	Personal protective equipment.....	10
2.6	Modifications.....	11
3	Product description.....	12
3.1	Description of function.....	12
3.2	Options.....	13
3.3	Configuration.....	14
3.3.1	Front view.....	14
3.3.2	Rear view.....	15
3.3.3	Heating bath user interface.....	16
3.3.4	Type plate.....	17
3.3.5	Warning symbols on the device.....	18
3.3.6	Cover for Heating Bath B-305 (optional).....	18
3.4	Specifications supplied.....	19
3.5	Technical data.....	20
3.5.1	Rotavapor® R-300.....	20
3.5.2	Heating bath base, B-300.....	20
3.5.3	Heating bath.....	20
3.5.4	Ambient conditions.....	21
3.5.5	Materials.....	21
3.6	Safety features.....	22
3.6.1	Overheat cut-out.....	22
3.6.2	Protection against electrical overload.....	22
3.6.3	Clips and holders.....	22
3.6.4	Glassware.....	22
3.6.5	Optional accessories.....	22
3.6.6	Earthquake safety.....	22
4	Transport and storage.....	23
4.1	Transport.....	23
4.2	Storage.....	23

5	Installation.....	24
5.1	Installation site	24
5.2	Securing against earthquakes	24
5.3	Fitting the vapor duct, vacuum gasket and cooling condenser	26
5.4	Fitting the glass stopcock	27
5.5	Fitting PTFE stopcock (optional accessory)	28
5.6	Fitting the Interface I-300/I-300 Pro (optional accessory).....	29
5.7	Mounting VacuBox on R-300 (optional accessory).....	31
5.8	Mounting LegacyBox on R-300 (optional accessory).....	32
5.9	Fitting the Woulff bottle (optional accessory).....	33
5.10	Fitting AutoDest sensor and vapor temperature sensor (optional accessory).....	34
5.11	Fitting a foam sensor (optional accessory).....	36
5.12	Connecting vacuum and coolant tubing.....	38
	5.12.1 Overview: vacuum and coolant tubing	39
5.13	Setting up the heating bath.....	40
5.14	Fitting the protection shield (optional).....	41
5.15	Fit the splash guard (optional accessory).....	42
5.16	Connecting the Rotavapor to the power supply.....	44
5.17	Assembling the BUCHI distillation system.....	47
	5.17.1 Overview: setting up communication connections	48
	5.17.2 Connecting communication cables to the Rotavapor.....	49
	5.17.3 Overview: setting up coolant tubing connections	50
	5.17.4 Overview: setting up vacuum tubing connections.....	51
5.18	Basic settings.....	52
5.19	Quick check	53
6	Operation.....	54
6.1	Preparations	54
	6.1.1 Preparing the heating bath.....	54
	6.1.2 Fitting the evaporating flask	55
	6.1.3 Adjusting immersion angle of evaporating flask.....	56
	6.1.4 Fitting the receiving flask	57
	6.1.5 Raising and lowering rotary drive unit.....	58
6.2	Performing distillation	62
	6.2.1 Operating the Rotavapor without control system (interface).....	63
	6.2.2 Operating Rotavapor with Interface I-300/I-300 Pro	64
	6.2.3 Adjusting distillation conditions	65
	6.2.4 Optimization distillation	65
	6.2.5 Adding solvent during distillation.....	67
6.3	Finishing distillation.....	68
	6.3.1 Removing the evaporating flask.....	68
	6.3.2 Removing the receiving flask	69
7	Cleaning and servicing	70
7.1	Inspecting and cleaning the vapor duct	70
7.2	Checking the system for leaks.....	71
7.3	Cleaning the splash guard (optional accessory).....	71
7.4	Fitting GL14 cap nut with tube seal	72
7.5	Checking seals	73
7.6	Cleaning the glassware	75
7.7	Cleaning the heating bath.....	75
7.8	Cleaning the Woulff bottle.....	75
7.9	Removing solvent accumulations	76

8	Help with faults	77
8.1	Faults, possible causes and remedies.....	77
8.2	Resetting safety functions.....	79
8.2.1	Resetting overheat safety cut-out on heating bath	79
8.2.2	Replacing fuse in heating bath base.....	80
9	Taking out of service and disposal.....	81
9.1	Taking out of service.....	81
9.2	Disposal	81
10	Appendix	82
10.1	Solvent table	82
10.2	Spare parts and accessories	83
10.2.1	Glass assembly A	83
10.2.2	Glass assembly V	84
10.2.3	Glass assembly C	85
10.2.4	Glass assembly S	86
10.2.5	Glass assembly CR	87
10.2.6	Glass assembly E	88
10.2.7	Glass assembly BY	89
10.2.8	Accessories.....	89
10.2.9	Wearing parts.....	100
10.2.10	Spare parts	101
10.3	List of abbreviations.....	105
10.4	Health and safety approval	105
10.5	Health and safety	106
10.6	Rotavapor® induction training	107

1 About this document

These operating instructions describe the Rotavapor® R-300 at the time supplied. They are an integral part of the product and contain important information that is necessary for safe operation and maintenance.

These operating instructions apply to all variants of the Rotavapor® R-300 and are intended primarily for laboratory staff.

- ▶ To ensure safe and trouble-free operation, read these operating instructions before starting up the device and follow the guidance they contain.
- ▶ Keep the operating instructions somewhere near to the device.
- ▶ Pass on the operating instructions to any subsequent owner or user.

BÜCHI Labortechnik AG accepts no liability whatsoever for any faults or damage that result from the failure to follow these operating instructions.

- ▶ If you still have any questions after reading these operating instructions, please contact BÜCHI Labortechnik AG Customer Service. Contact details for your local agents can be found on the back cover of these operating instructions or on the Internet at <http://www.buchi.com>.

1.1 Warning notices in this document









Warning notices warn you of dangers that can occur when handling the device. There are four danger levels, each identifiable by the signal word used.





Signal word	Meaning
DANGER	Indicates a danger with a high level of risk which could result in death or serious injury if not prevented.
WARNING	Indicates a danger with a medium level of risk which could result in death or serious injury if not prevented.
CAUTION	Indicates a danger with a low level of risk which could result in minor or medium-severity injury if not prevented.
IMPORTANT	Indicates a danger that could result in damage to property.

1.2 Symbols





The following symbols may be displayed in this instruction manual or on the device:

1.2.1 Warning symbols

Symbol	Meaning	Symbol	Meaning
	General warning		Corrosive substance
	Dangerous electrical voltage		Flammable substance
	Biological hazard		Potentially explosive atmosphere
	Breakable items		Dangerous gases

Symbol	Meaning	Symbol	Meaning
	Hot surface		Health-harming or irritant substances
	Risk of hand injury		Strong magnetism

1.2.2 Mandatory directive symbols

Symbol	Meaning	Symbol	Meaning
	Wear safety goggles		Wear protective clothing
	Wear protective gloves		Heavy load, do not lift without assistance

1.2.3 Other symbols



NOTE

This symbol draws attention to useful and important information.

- This character draws attention to a requirement that must be met before the instructions below are carried out.
- This character indicates an instruction that must be carried out by the user.
- This character indicates the result of a correctly carried out instruction.

1.3 Available languages

These operating instructions were originally produced in German and have been translated into several other languages. The translations are available on the enclosed CD or can be obtained as a PDF file via <http://www.buchi.com>.

1.4 Trademarks

Product names and registered or unregistered trademarks that are used in this instruction manual are used only for identification and remain the property of the owner in each case.

For example, Rotavapor® is a registered trademark of BÜCHI Labortechnik AG.

2 Safety

2.1 Intended use

The Rotavapor® R-300 is intended for evaporating and condensing solvents. It can be used in laboratories and production facilities for the following operations:

- Evaporating solvents
- Synthesis and purification of chemicals
- Recycling and concentration of solvents
- Recrystallization
- Drying of powders and granulates

2.2 Use other than that intended

Use of any kind other than that described in Chapter 2.1 "Intended use", page 8 and any application that does not comply with the technical specifications (see Chapter 3.5 "Technical data", page 20) constitutes use other than that intended.

In particular, the following applications are not permissible:

- Use of the device in an environment with a potential risk of explosion or areas which require explosion-safe apparatus
- Use of the device for processing substances in the food, animal feed or cosmetics industries
- Production and processing of substances that can lead to spontaneous reactions, e.g. explosives, metal hydrides or solvents that can form peroxides
- Working with explosive gas mixtures
- Drying hard, brittle substances (e.g. stone or soil samples) that could damage the evaporating flask
- Shock-cooling of the evaporating flask or other glass components

Damage or hazards attributable to use of the product other than as intended are entirely at the risk of the user alone.

2.3 Staff qualification

Unqualified persons are unable to identify risks and are therefore exposed to greater dangers.

The device may only be operated by suitably qualified laboratory staff.

These operating instructions are aimed at the following target groups:

Users

Users are persons that meet the following criteria:

- They have been instructed in the use of the device.
- They have completed the induction training for the Rotavapor®. See Chapter 10.6 "Rotavapor® induction training", page 107.
- They are familiar with the contents of these operating instructions and the applicable safety regulations and apply them.
- They are able on the basis of their training or professional experience to assess the risks associated with the use of the device.

Operator

The operator (generally the laboratory manager) is responsible for the following aspects:

- The device must be correctly installed, commissioned, operated and serviced.
- Only suitably qualified staff who have completed the induction training on the Rotavapor may be assigned the task of performing the operations described in these operating instructions.
- The staff must comply with the locally applicable requirements and regulations for safe and hazard-conscious working practices.
- Safety-related incidents that occur while using the device should be reported to the manufacturer (quality@buchi.com).

BUCHI service technicians

Service technicians authorized by BUCHI have attended special training courses and are authorized by BÜCHI Labortechnik AG to carry out special servicing and repair measures.

2.4 Residual risks

The device has been developed and manufactured using the latest technological advances. Nevertheless, risks to persons, property or the environment can arise if the device is used incorrectly.

Appropriate warnings in this manual serve to alert the user to these residual dangers.

2.4.1 Dangerous vapors

Distillation can produce dangerous vapors that are capable of causing life-threatening toxic effects.

- ▶ Do not inhale any vapors produced during distillation.
- ▶ Ensure that vapors are removed by a suitable fume hood.
- ▶ Only use the device in well ventilated areas.
- ▶ If vapors escape from joints or connections, check the seals concerned and replace them if necessary.
- ▶ Do not distill any unknown fluids.
- ▶ Observe the safety data sheets for all fluids used.

2.4.2 High internal pressure

The evaporation of fluids can produce high pressures inside the flask or the condenser. If that pressure becomes too great, the glass components could explode.

- ▶ Make sure that the internal pressure inside the glass components is never greater than atmospheric pressure.
- ▶ When distilling without a vacuum, set the vacuum pump to atmospheric pressure so that excess pressure is automatically dissipated.
- ▶ If a vacuum pump is not used, leave the vacuum connection open.

2.4.3 Hot surfaces and liquids

The heating bath, evaporating flask and parts of the condenser can become very hot. If touched they can cause skin burns.

- ▶ Do not touch hot surfaces or liquids or else wear suitable protective gloves.

2.4.4 Rotating parts

The evaporating flask and the vapor duct are rotated by the rotary drive unit. Hair, clothing or jewelry can become caught up if allowed to come into contact with the rotating parts.

At high speeds, the heating fluid may be sprayed out by the rotation of the evaporating flask.

- ▶ Wear work overalls or protective clothing.
- ▶ Do not wear loose or baggy items of clothing such as scarves or neck-ties.
- ▶ Tie up long hair.
- ▶ Do not wear jewelry such as necklaces or bracelets.
- ▶ At high speeds and/or high temperatures, use the optional safety guard or a similar protective arrangement.

2.4.5 Faults during operation

If a device is damaged, sharp edges, moving parts or exposed electrical wires can cause injuries.

- ▶ Regularly check device for visible damage.
- ▶ If faults occur, switch off the device immediately, unplug the power cord and inform the operator.
- ▶ Do not continue to use devices that are damaged.

2.4.6 Glass breakage

Broken glass can cause severe cuts.

Damaged glass components may implode if subjected to a vacuum.

Minor damage to the ground joints impairs the sealing effect and may therefore diminish performance.

- ▶ Handle the flask and other glass components carefully and do not drop them.
- ▶ Always visually inspect glass components for damage every time they are to be used.
- ▶ Do not continue to use glass components that are damaged.
- ▶ Always wear protective gloves when disposing of broken glass.

2.5 Personal protective equipment

Depending on the application, hazards due to heat and/or corrosive chemicals may arise.

- ▶ Always wear appropriate personal protective equipment such as safety goggles, protective clothing and gloves.

- ▶ Make sure that the personal protective equipment meets the requirements of the safety data sheets for all chemicals used.

2.6 Modifications

Unauthorized modifications may impair safety and lead to accidents.

- ▶ Use only genuine BUCHI accessories, spare parts and consumables.
- ▶ Technical modifications to the device or accessories should only be carried out with the prior written approval of BÜCHI Labortechnik AG and only by authorized BUCHI technicians.

BUCHI accepts no liability whatsoever for damage arising as a result of unauthorized modifications.

3 Product description

3.1 Description of function

The Rotavapor® R-300 is a rotary evaporator with the aid of which single-stage distillation can be carried out quickly without unduly stressing the product. The basis of the process is the evaporation and condensing of solvents in a rotating evaporating flask under vacuum. Distillation under vacuum is more efficient and gentler on the product.

The product is heated in the evaporating flask by the heating bath. The rotary drive unit evenly rotates the evaporating flask. Rotation increases the surface area of the liquid which leads to an increased evaporation rate. This also constantly mixes the product which prevents localized overheating and delayed evaporation.

The vapor passes from the evaporating flask through the vapor duct into the cooling section (cooling condenser). There, the thermal energy of the vapor is transferred to the coolant fluid so that the vapor re-condenses. The resulting solvent is collected in the receiving flask and can then be reused or properly disposed of.

Distillation under vacuum

Distillation capacity depends on the following factors:

- Temperature of the heating bath
- Pressure in the evaporating flask
- Rotation speed of the evaporating flask
- Size of the evaporating flask

Pressure in the evaporating flask: a low pressure (below atmospheric) reduces the boiling point of the solvent. A lower boiling point means the solvent does not have to be heated as much. Distillation under vacuum is more efficient and gentler on the product.

Vacuum control: a stable vacuum adapted to the application prevents undesirable solvent emissions and bumping (boiling) of the product. Control of the vacuum is carried out by two means: the BUCHI VacuBox measures the current vacuum in the distillation system. The BUCHI VacuBox is connected to the BUCHI Interface I-300 or I-300 Pro. The BUCHI Interface is used to display the current readings and control the components of the distillation system. See also Chapter 5.17 "Assembling the BUCHI distillation system", page 47.

Heating bath temperature, coolant temperature and vapor temperature: to ensure optimum distillation, it is important to make sure that the temperature difference between the coolant and the heating bath is at least 40 °C. The temperature of the rising vapor should be mid-way between the heating bath temperature and the coolant temperature. See also Chapter 6.2.3 "Adjusting distillation conditions", page 65.

3.2 Options

There are two different heating bath sizes for the Rotavapor® R-300:

- The Heating Bath B-301 is suitable for evaporating flasks up to 1 L. See Heating Bath B-301.
- The Heating Bath B-305 is suitable for evaporating flasks up to 5 L. See Heating Bath B-305.

As an additional option, the Rotavapor® R-300 can be operated with the Interface I-300 or I-300 Pro. Connection of the interface unit to the Rotavapor® requires a VacuBox.

The Rotavapor® R-300 is available with either manual or motorized vertical adjustment of the rotary drive unit.

3.3 Configuration

3.3.1 Front view

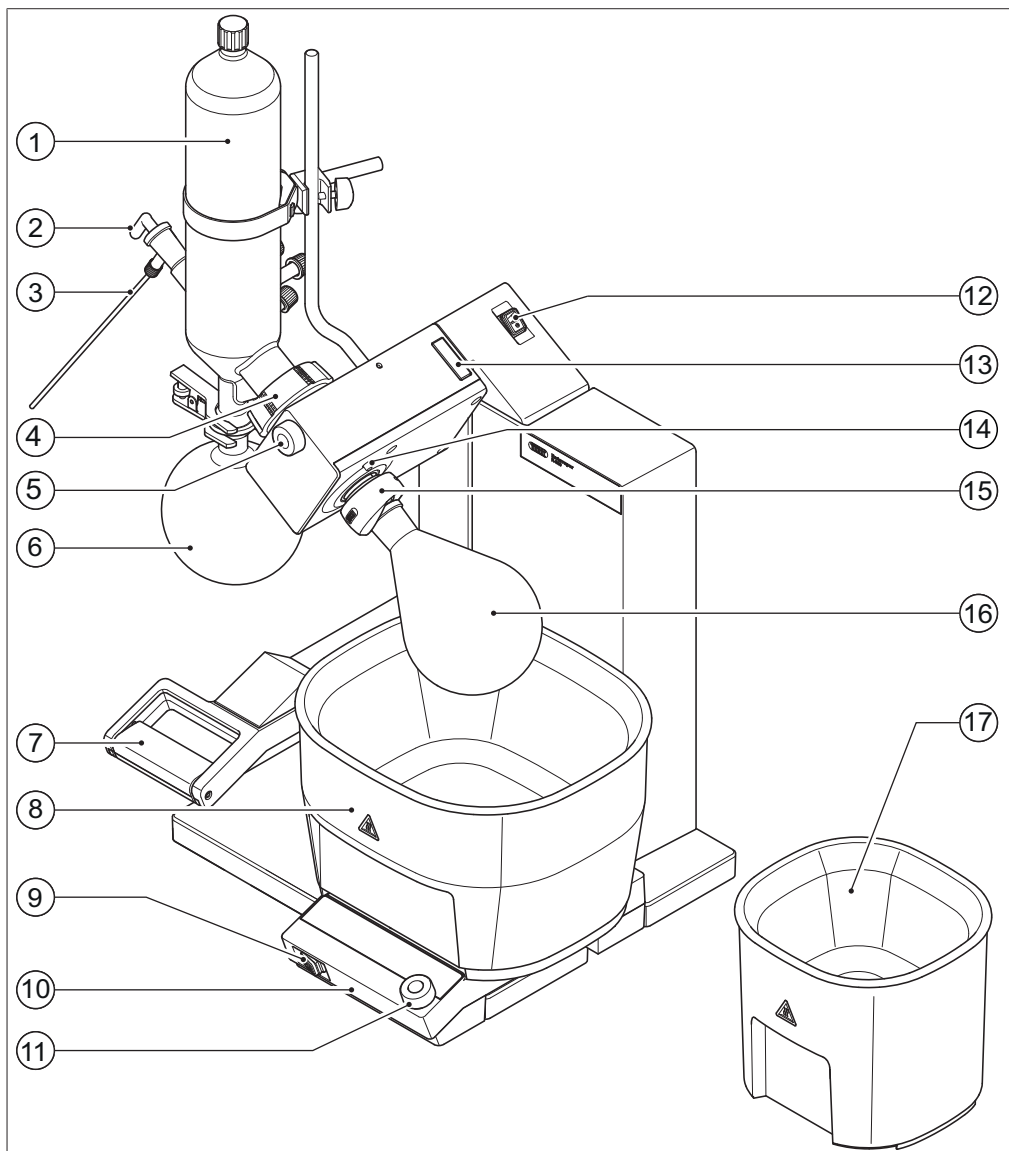


Fig. 1: Rotavapor R-300 configuration with Heating Bath B-305 and B-301 and Heating Bath B-300 Base

- | | |
|---|--|
| 1 Condenser | 10 Heating Bath B-300 Base |
| 2 Glass stopcock | 11 Control knob for heating bath temperature setting |
| 3 Solvent backfeed (tubing) | 12 On/Off master switch for Rotavapor |
| 4 Flange nut | 13 Button for angle adjustment |
| 5 Control knob for rotation speed | 14 Locking button for rotary drive unit |
| 6 Receiving flask | 15 Combi-clip |
| 7 Handle for height adjustment | 16 Evaporating flask |
| 8 Heating Bath B-305 | 17 Heating Bath B-301 |
| 9 On/Off master switch for heating bath | |

Depending on requirements, either the Heating Bath B-305 (for flasks up to 5 L max.) or the Heating Bath B-301 (for flasks up to 1 L max.) can be used.

3.3.2 Rear view

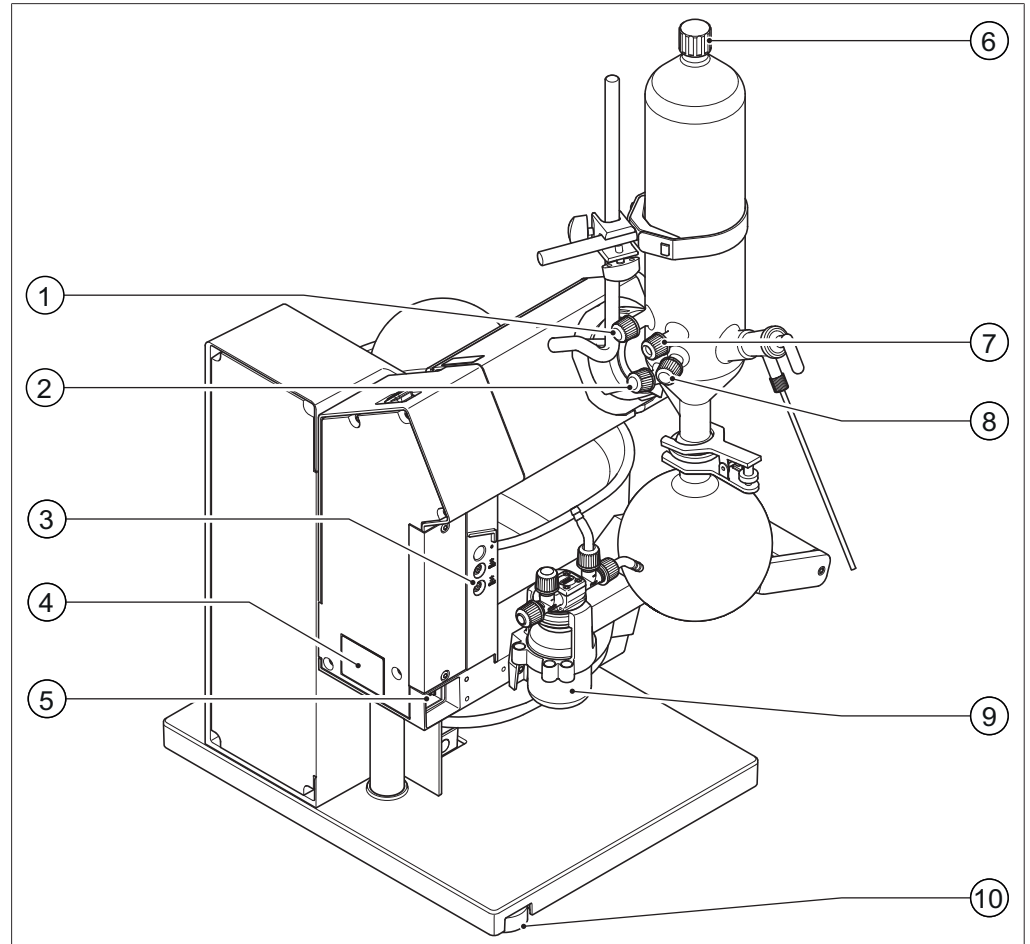


Fig. 2: Rear view of Rotavapor R-300

- | | |
|---------------------------------------|--|
| 1 Coolant inlet connection | 6 Cleaning hole |
| 2 Vapor temperature sensor connection | 7 Coolant outlet connection |
| 3 Communication cable connection | 8 Vacuum connection |
| 4 Type plate | 9 Wouff bottle |
| 5 Power supply connection | 10 Vertically adjustable foot for leveling |

3.3.3 Heating bath user interface

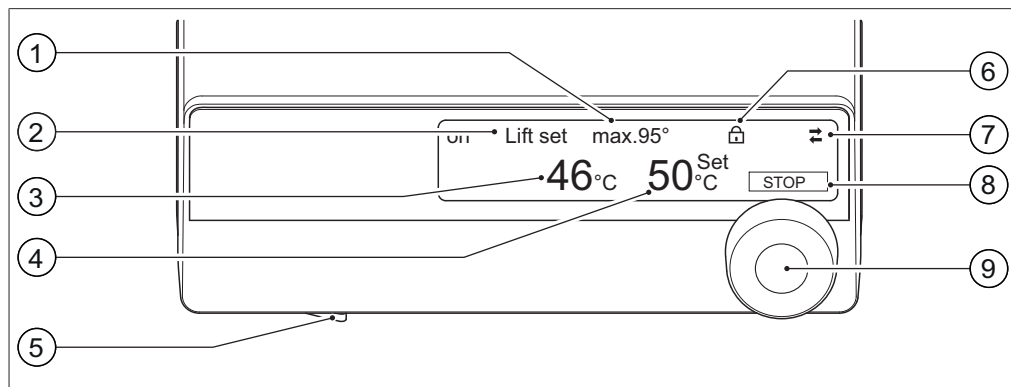


Fig. 3: User interface of Heating Bath B-300 Base

- | | |
|---|--|
| 1 Maximum temperature indication | 6 Set temperature locked indicator |
| 2 Indication of lift depth stop | 7 Connection symbol – device is being controlled via a BUCHI interface |
| 3 Actual temperature indication | 8 START/STOP function activated on pressing navigation control |
| 4 Set temperature indication | 9 Control knob for setting required temperature and heater START/STOP function |
| 5 On/Off master switch for heating bath and heating bath base | |

3.3.4 Type plate

The Rotavapor R-300 and the Heating Bath B-301/B-305 each have their own type plate on the rear. On the rear of the Heating Bath B-300 Base there is a fuse rating plate.

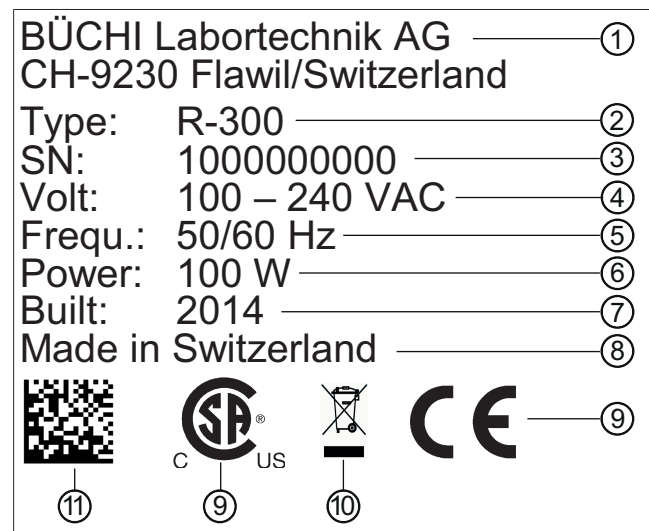
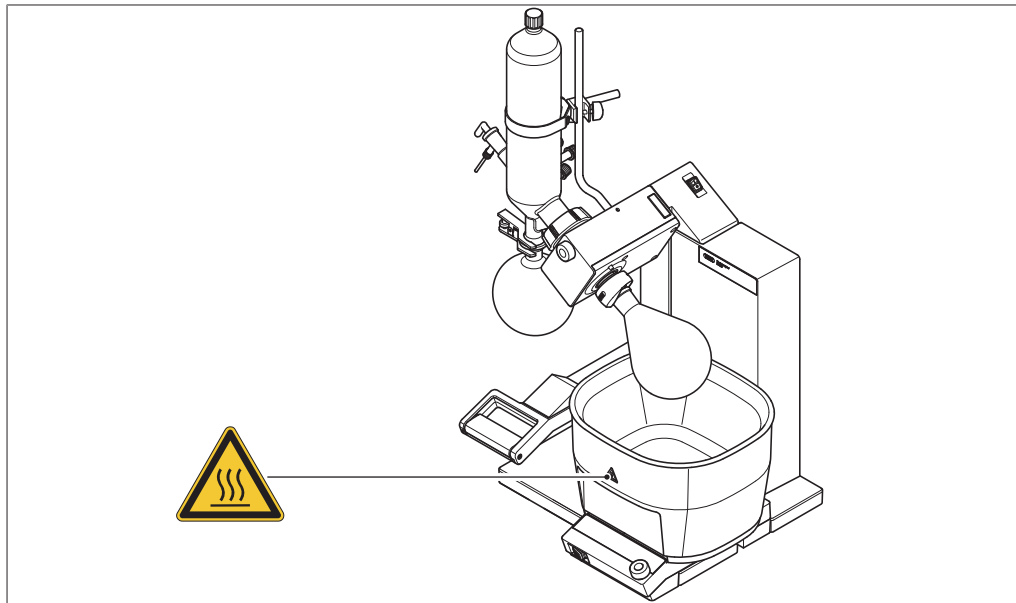


Fig. 4: Type plate (example)

- | | |
|----------------------------|--|
| 1 Company name and address | 7 Year of manufacture |
| 2 Device name | 8 Country of manufacture |
| 3 Serial number | 9 Approvals |
| 4 Input voltage | 10 Symbol for "Do not dispose of as household waste" |
| 5 Frequency | 11 Product code |
| 6 Maximum power rating | |

3.3.5 Warning symbols on the device

The heating bath and the bath cover carry the following warning symbol:



This symbol warns of the risk of skin burns from the hot surface of the heating bath.

3.3.6 Cover for Heating Bath B-305 (optional)

To save energy and to minimize water evaporation when not in use, a cover is available for the Heating Bath B-305.

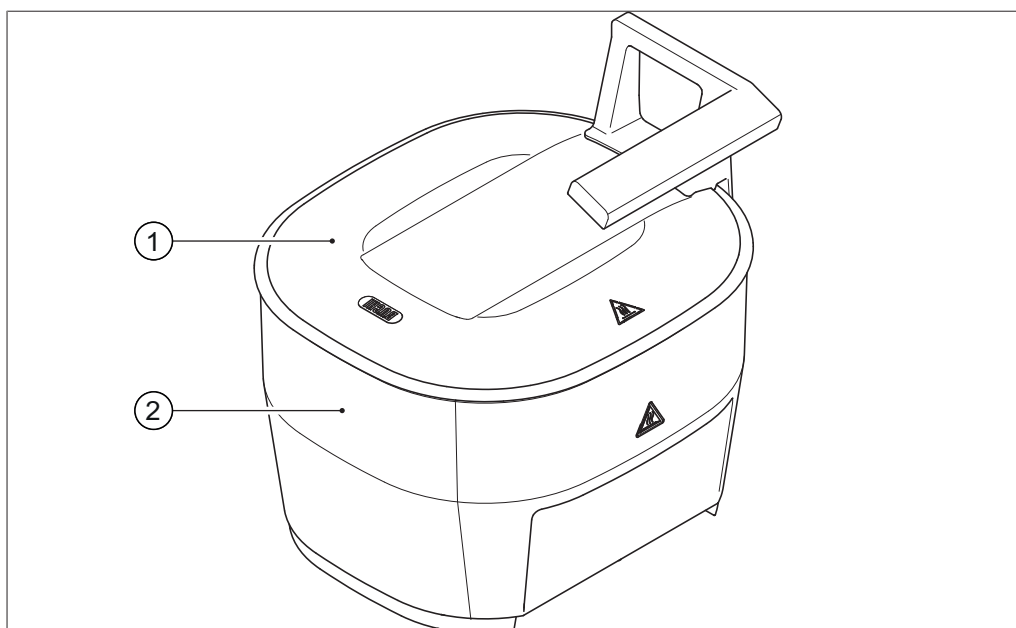


Fig. 5: Heating Bath B-305 with cover

1 Bath cover

2 Heating Bath B-305

3.4 Specifications supplied

	System with glassware	System without glassware
Rotavapor® R-300	1	1
Heating Bath B-301/B-305	1	1
Heating Bath B-300 Base	1	1
Cooling condenser (as per order number)	1	–
Vapor duct (with combi-clip)	1	–
Vacuum seal (WD26)	1	1
Evaporating flask (1 liter)	1	–
Receiving flask (1 liter)	1	–
Flyer 'List of Solvents'	1	1
Required coolant and vacuum tubing	1 set	–
Power cord	2	2

3.5 Technical data

3.5.1 Rotavapor® R-300

Specification	Value
Dimensions (W x H x D) with glass apparatus V	607 x 947 x 429 mm
Weight	13.5 kg (electric lift) 13.0 kg (manual lift)
Power supply	100 – 240 VAC ± 10%
Power consumption	100 W
Frequency	50/60 Hz
Ingress protection rating	IP21
Overvoltage category	II
Pollution degree	2
Immersion angle	10 – 50°
Vertical adjustment range	220 mm
Limit position detection adjustment range	170 mm (electric lift) 100 mm (manual lift)
Rotation speed range	10 – 280 rpm
Max. flask capacity	3 kg
Approval	CE/CSA

3.5.2 Heating bath base, B-300

Specification	Value
Dimensions (W x H x D)	183 x 82 x 286 mm
Weight	0.8 kg
Power supply	100 - 120 VAC ± 10% 220 - 240 VAC ± 10%
Frequency	50/60 Hz
Power consumption (with bath)	1500 W
Ingress protection rating	IP21
Approval	CE/CSA

3.5.3 Heating bath

Specification	Heating Bath B-301	Heating Bath B-305
Dimensions (W x H x D)	225 x 192 x 212 mm	307 x 202 x 275 mm
Weight	2.0 kg	4.2 kg
Power supply	100 - 120 VAC ± 10% 220 - 240 VAC ± 10%	100 - 120 VAC ± 10% 220 - 240 VAC ± 10%
Frequency	50/60 Hz	50/60 Hz
Power consumption	1250 W	1500 W

Specification	Heating Bath B-301	Heating Bath B-305
Ingress protection rating	IP21	IP21
Maximum bath capacity	2.3 l	5.5 l
Regulation precision	At 60 °C: ± 1 °C At 95 °C: ± 1 °C	At 60 °C: ± 1 °C At 95 °C: ± 1 °C At 180 °C: ± 3 °C At 220 °C: ± 4 °C
Heating fluid	Water	Water/Oil
Approval	CE/CSA	CE/CSA

3.5.4 Ambient conditions

Max. altitude above sea level	2000 m
Ambient temperature	5 - 40 °C
Maximum relative humidity	80 % for temperatures up to 31 °C decreasing linearly to 50 % at 40 °C

The laboratory apparatus described here may only be used indoors.

3.5.5 Materials

Component	Material
Rotavapor casing	Aluminum with powder coating
Heating bath casing	PBT, partially glass-fiber reinforced
Heating bath	Stainless steel 1.4404, glass-peened
Protection shield	PMMA
Protection shield handle	PBT
Rotary drive unit	Steel 1.4305
Flange connection to condenser	Aluminum, anodized
Seal	NBR, PTFE coated
Glass components	Borosilicate 3.3

3.6 Safety features

3.6.1 Overheat cut-out

To protect against overheating, the heating bath has a thermostatic bath temperature control.

In addition it is fitted with an electronic and a mechanical overheat cut-out.

The **electronic overheat cut-out** monitors the temperature limit, the heating rate and the function of the temperature sensor. If the electronic overheat cut-out trips, the device should be inspected by a BUCHI service technician.

The **mechanical overheat cut-out** consists of a bi-metallic thermostat that immediately cuts off the power supply if the temperature exceeds a certain level. The mechanical overheat cut-out has to be manually reset once the heating bath has cooled down (see Chapter 8.2.1 "Resetting overheat safety cut-out on heating bath", page 79).

3.6.2 Protection against electrical overload

The Heating Bath B-300 Base is fitted with a safety fuse.

The rotary drive unit has an electrical overload cut-out.

3.6.3 Clips and holders

- Combi-clip for fixing the evaporating flask and safe release of sticking ground-glass joints
- Ball joint clamps for securely fixing the receiving flask
- Laboratory stand and holder for fixing glass apparatus
- Cap nut for fixing the condenser

3.6.4 Glassware

- Inert borosilicate glass 3.3
- GL14 hose barbs for preventing glass breakage
- Optional feature: P+G plastic-coated glass

3.6.5 Optional accessories

- Safety guard to protect user against glass splinters, solvent splashes or hot heating fluid in the event of accidents or implosions
- Laboratory stand for providing additional fixing for condenser

For more information, see Spare parts and accessories.

3.6.6 Earthquake safety

- Lashing eyes for protecting the equipment against falling

For fitting, see Chapter 5.2 "Securing against earthquakes", page 24.

4 Transport and storage

4.1 Transport

IMPORTANT

Risk of breakage due to incorrect transportation

- ▶ Make sure that the device is fully dismantled and all parts of the device are safely packed in such a way as to prevent breakage, ideally in the original box.
- ▶ Avoid sharp movements during transit.

-
- ▶ After transportation, check the device and all glass components for damage.
 - ▶ Damage that has occurred in transit should be reported to the carrier.
 - ▶ Keep packing for future transportation.

4.2 Storage

- ▶ Make sure that the ambient conditions are complied with (see Chapter 3.5 "Technical data", page 20).
- ▶ Wherever possible, store the device in its original packaging.
- ▶ After storage, check the device, all glass components, seals and tubing for damage and replace if necessary.

5 Installation

5.1 Installation site

The installation site must meet the following requirements:



IMPORTANT

Risk of property damage due to overheating

- ▶ Do not run any cables under the heating bath.

- Firm and level surface
- Space requirements: at least 620 mm x 510 mm (W x D)
- Clear access to mains switch and power supply cable.
(Note: it must be possible to switch off the equipment involved in the distillation process and disconnect the electrical connections at any time.)
- If distilling under vacuum, there must be fume extraction apparatus available. Wherever possible, the Rotavapor® R-300 should be set up inside a fume hood. If that is not possible for reasons of space, it can also be set up outside if the safety guard (optional accessory) is fitted and the residual vapors are fed into the fume hood.

5.2 Securing against earthquakes

The Rotavapor R-300 has an earthquake fixing to protect the device against falling.

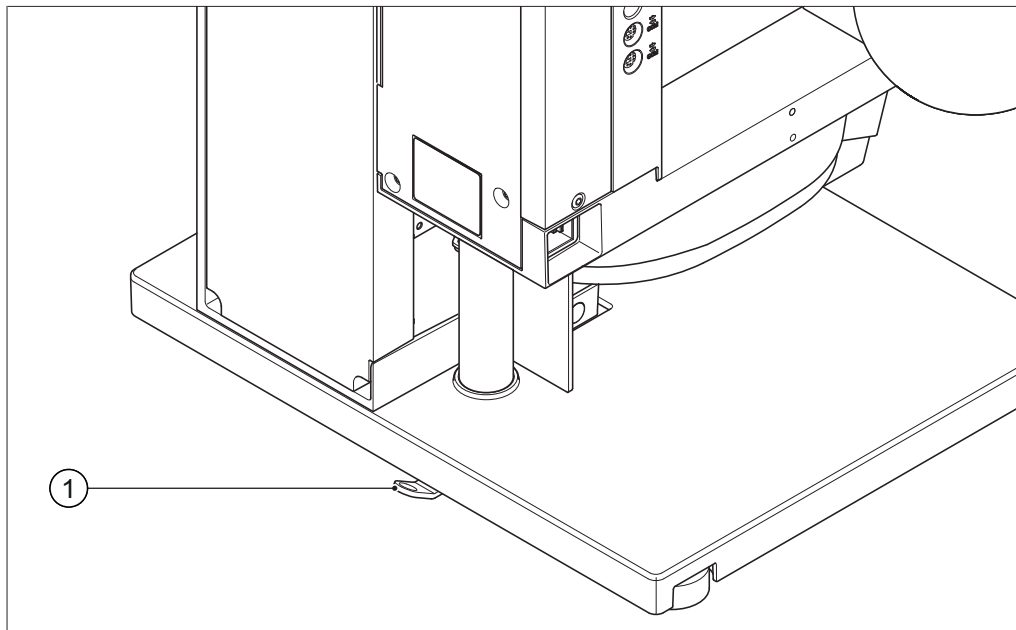


Fig. 6: Earthquake fixing

1 Lashing eye

- ▶ Lie the Rotavapor R-300 on its back.
- ▶ Fix the lashing eye (1) to the base of the R-300 from underneath using a screw. There is a threaded hole provided for the purpose.
- ▶ Tie the lashing eye to a fixed point using strong cord or a wire.

The Heating Bath B-300 Base can also be secured against earthquakes in similar fashion by fitting a lashing eye on the underneath.

5.3 Fitting the vapor duct, vacuum gasket and cooling condenser

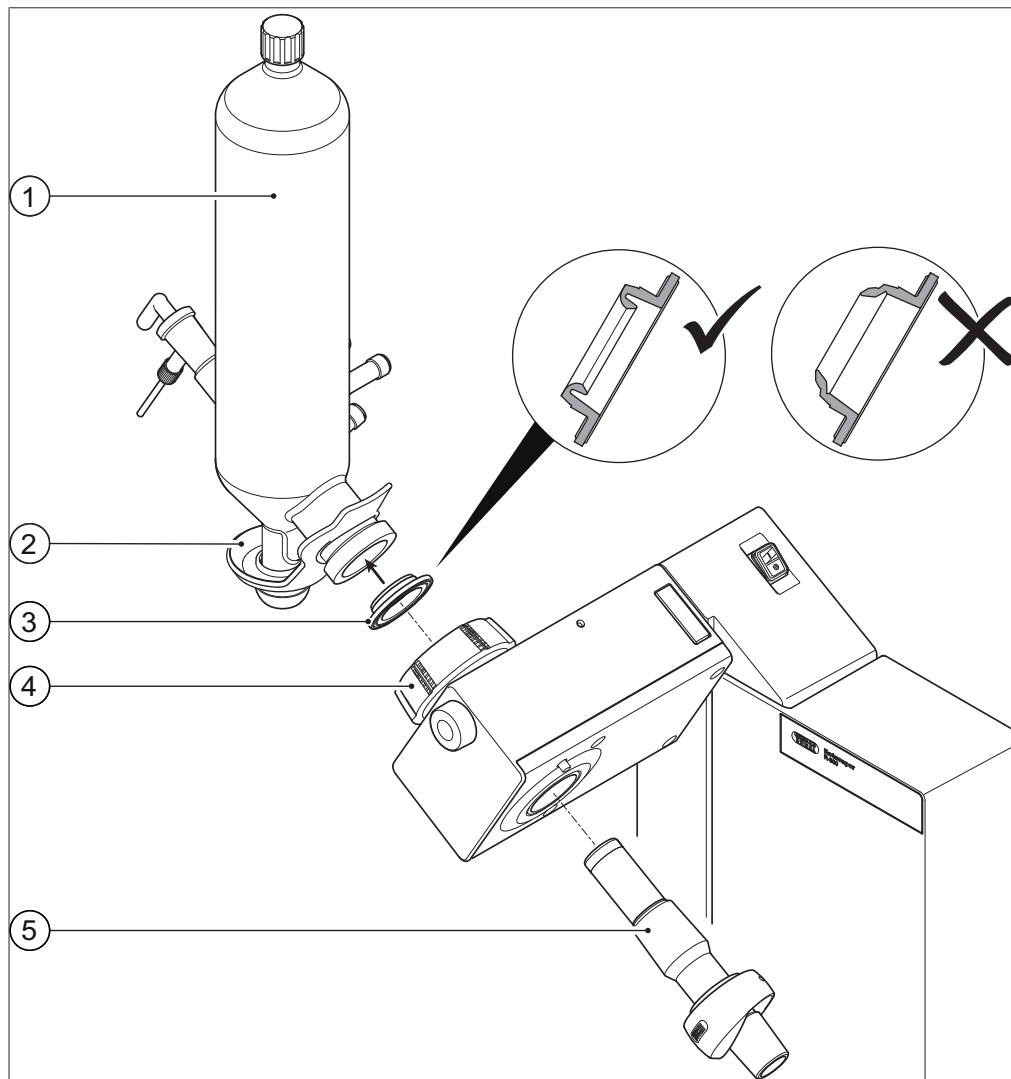


Fig. 7: Fitting vapor duct, cooling condenser and vacuum gasket

- | | |
|---------------------|--------------|
| 1 Cooling condenser | 4 Flange nut |
| 2 Condensate trap | 5 Vapor duct |
| 3 Seal | |



NOTE

If the air humidity in the laboratory is high, condensation may form on the outside of the cooling condenser. To catch that condensation, a condensate trap (2) is fitted on the cooling condenser.



NOTE

If at all possible, the ground glass joint of the vapor duct should not be greased.

- ▶ Insert vapor duct (5) into the rotary drive unit.
The vapor duct snaps into place with an audible click.
- ▶ **NOTICE! Risk of property damage due to vapor duct falling out if incorrectly fitted.** Pull on the vapor duct to check that it is properly engaged and cannot be pulled out without resistance.
- ▶ **NOTICE! Risk of seal damage if fitted incorrectly.** Insert vacuum gasket (3) into the flange of the cooling condenser (1) as shown.

- ▶ Fit cooling condenser (1) into the rotary drive unit, keeping it straight as you do so. When doing so, make sure that the inner lip of the vacuum gasket (3) does not fold over as the vacuum gasket would then be destroyed.
- ▶ Tighten the flange nut (4) to fix the cooling condenser in position. When doing so, make sure that the spring clip in the flange nut completely encircles the neck of the cooling condenser.
- ▶ If necessary, fit a tube to carry away the condensation from the condensate trap.



NOTE

For situations in which the equipment is regularly operated at high temperatures, there is a special "high temperature version" of the vapor duct available. Contact BUCHI Customer Service for further details.

5.4 Fitting the glass stopcock

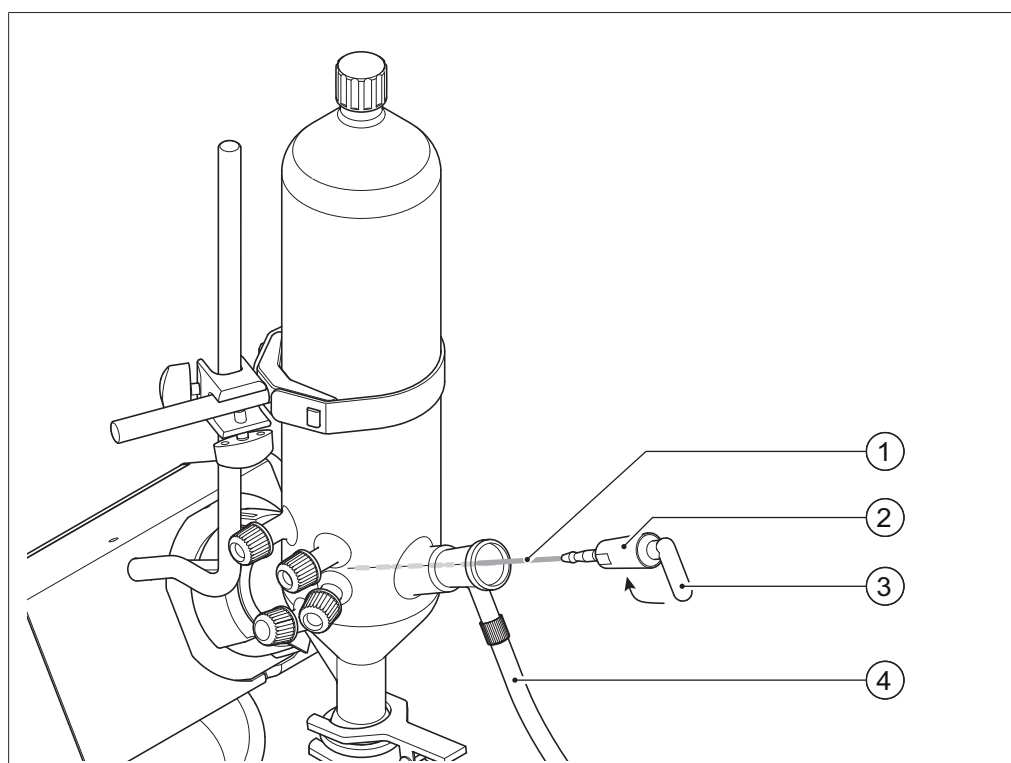


Fig. 8: Cooling condenser with glass stopcock and backfeed tube

- | | |
|-------------------------------|-----------------------------|
| 1 Glass stopcock | 3 Glass stopcock handle |
| 2 Flat face on glass stopcock | 4 Solvent backfeed (tubing) |

Materials required:

- Glisseal 40 red laboratory grease
- ▶ Feed the tube on the glass stopcock (1) through the vapor duct and into the evaporating flask.
- ▶ If necessary, connect the backfeed tube for solvent (4).
- ▶ Coat the ground joint of the glass stopcock with Glisseal 40 red laboratory grease.
- ▶ Insert glass stopcock into the cooling condenser and turn to the desired position.

The glass stopcock performs various functions depending on its position:

- Glass stopcock handle pointing right/forwards: the system is sealed. This is the standard position for distillation.
- Glass stopcock handle pointing left/rearwards: system is being vented.
- Glass stopcock handle pointing downwards: additional solvent can be fed into the evaporating flask via a connected backfeed tube.

5.5 Fitting PTFE stopcock (optional accessory)

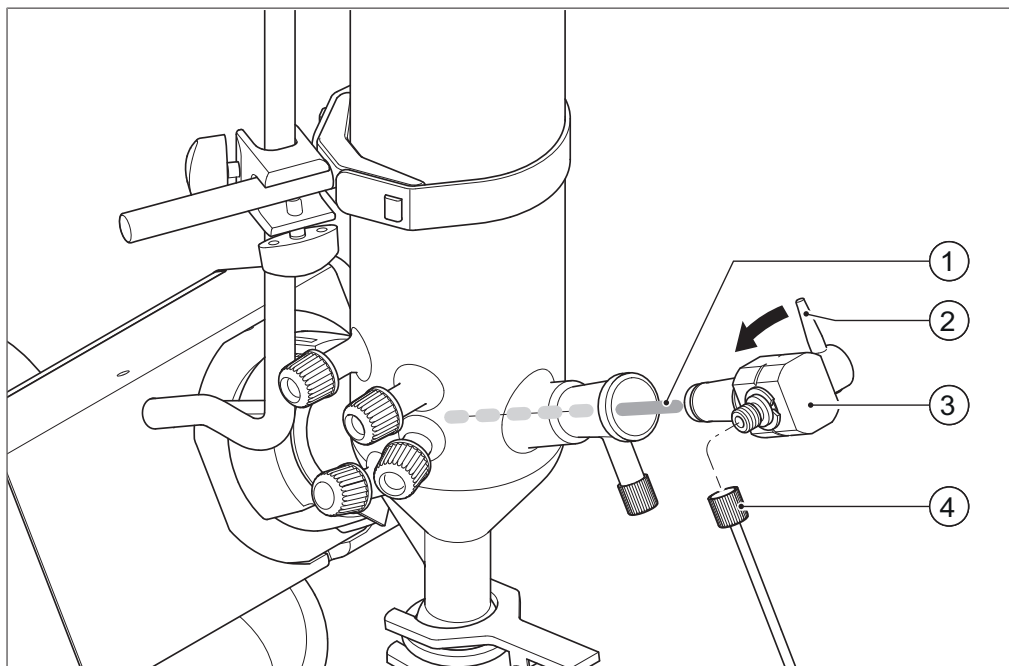


Fig. 9: Cooling condenser with PTFE stopcock and backfeed tube

- | | |
|---------------------------|-----------------------------|
| 1 Tube on PTFE stopcock | 3 Three-way tap |
| 2 Handle on three-way tap | 4 Solvent backfeed (tubing) |



NOTE

The PTFE stopcock does not have to be greased.

- ▶ Insert the tube (1) into the end of the PTFE stopcock and through the vapor duct into the evaporating flask.
- ▶ Carefully insert the PTFE stopcock into the cooling condenser. When doing so, hold the PTFE stopcock so that the three-way tap (3) is still facing forwards.
NOTICE! Take care not to damage the sealing lips on the PTFE stopcock.
- ▶ Rotate the PTFE stopcock 90° so that the three-way tap points upwards.
- ▶ Connect the backfeed tube (4) to the PTFE stopcock.
- ▶ Turn the handle on the three-way tap (2) to the desired position.

The PTFE stopcock performs various functions depending on its position:

- Three-way tap handle pointing forwards: additional solvent can be fed into the evaporating flask via a connected backfeed tube.
- Three-way tap handle pointing left: the system is sealed.
- Three-way tap handle pointing backwards: system is being vented.

5.6 Fitting the Interface I-300/I-300 Pro (optional accessory)

The I-300/I-300 Pro is designed for indicating, adjusting and controlling the complete distillation system. The Interface I-300 settings enable precise specification of the individual process parameters.

The interface unit can be mounted on the vertical adjustment handle.

Tools required:

- Torx keys Tx20 and Tx30

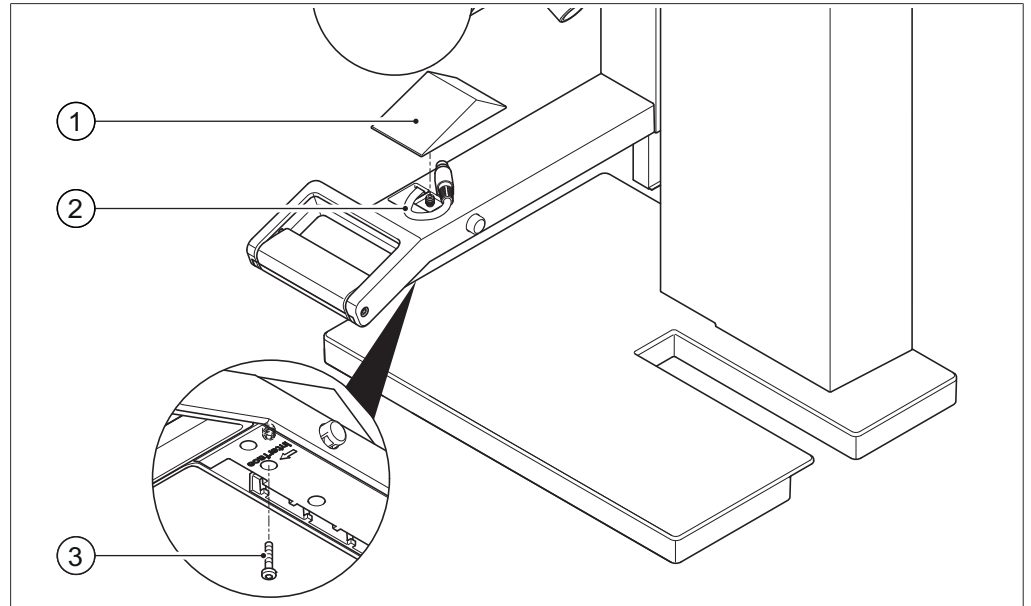


Fig. 10: Handle of Rotavapor R-300

1 Cover

3 Fixing screw for cover

2 Communication cable

- ▶ Undo the fixing screw (3) on the underneath of the handle and remove the cover (1) from the top.
- ▶ Pull the communication cable (2) out of the hole in the arm of the Rotavapor R-300.

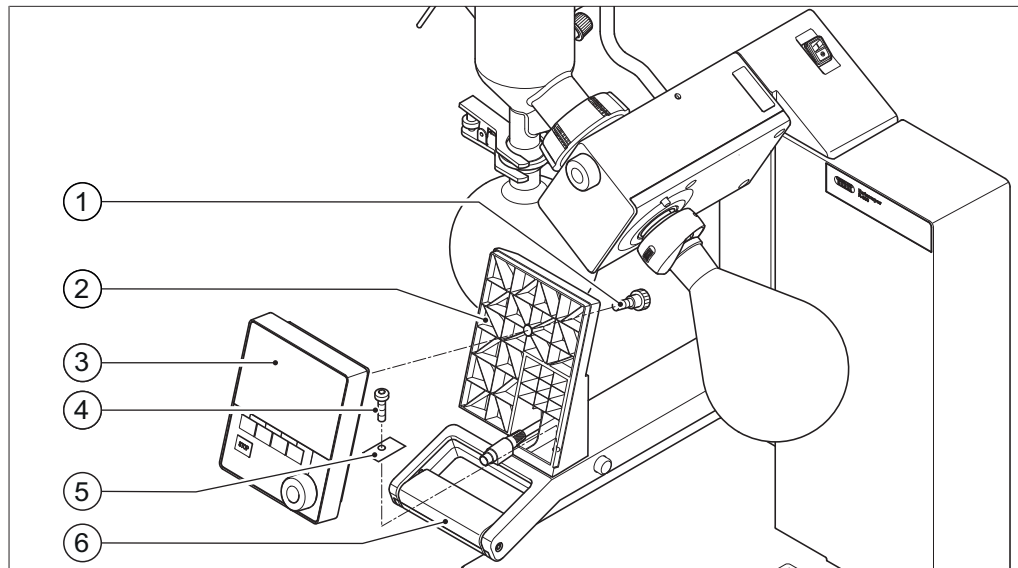


Fig. 11: Fitting the holder and interface unit on the handle

- | | |
|-----------------------------|----------------------------|
| 1 Knurled-head screw | 4 Fixing screw for holder |
| 2 Holder for interface unit | 5 Metal plate |
| 3 Interface I-300/I-300 Pro | 6 Rotavapor arm and handle |

- ▶ Position the holder (2) for the interface unit on the Rotavapor arm (6). At the same time, feed the communication cable through the bottom hole in the holder.
- ▶ Fix the holder to the Rotavapor arm with the screw (4) supplied. When doing so, pass the screw through the hole in the metal plate (5).
- ▶ Connect the communication cable to the COM port on the rear of the interface unit.
- ▶ Position the interface unit (3) on the holder. When doing so, make sure the lugs on the back of the interface unit engage in the holder.
- ▶ Fix the interface unit on the holder from behind using the knurled-head screw (1) supplied. When doing so, make sure that the communication cable is not trapped.

5.7 Mounting VacuBox on R-300 (optional accessory)

The VacuBox is required if the R-300 is to be operated with the Interface I-300 or I-300 Pro.

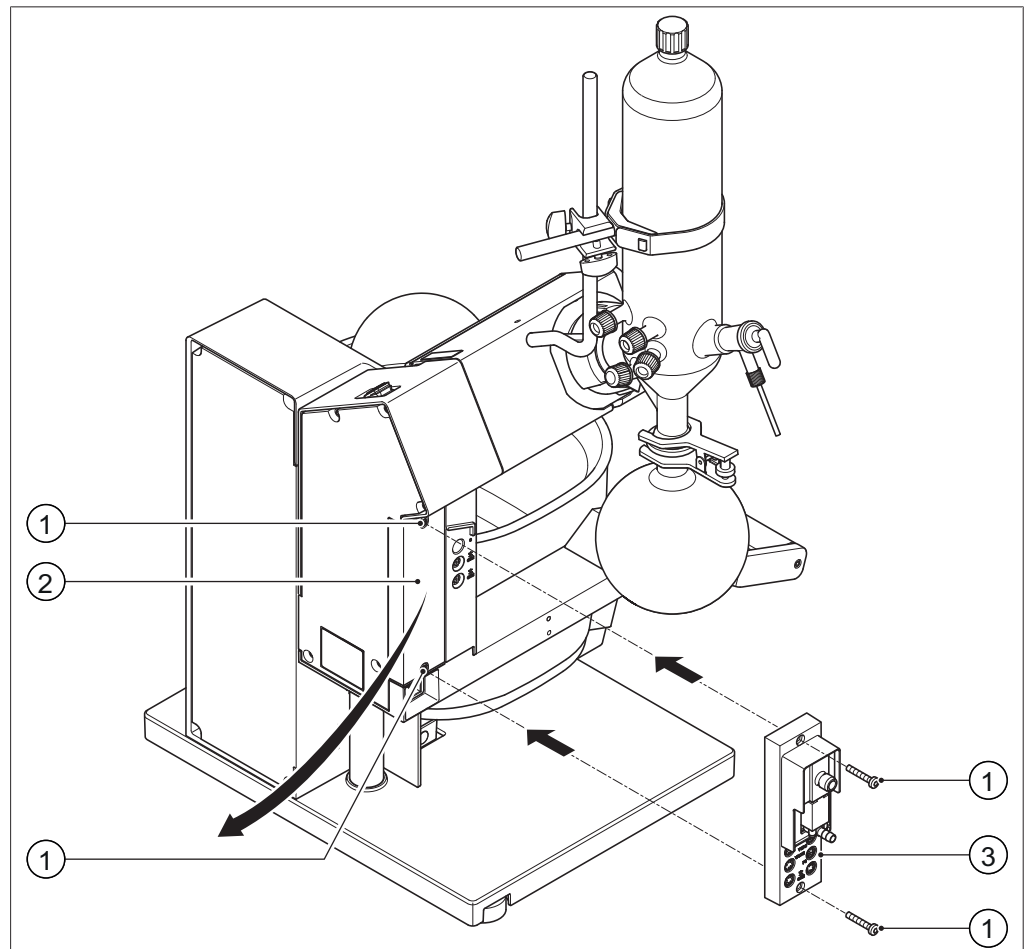


Fig. 12: Mounting the VacuBox on the Rotavapor

- 1 Fixing screw for cover and VacuBox 3 VacuBox
2 Cover

Tools required:

- Torx key Tx20

- ▶ Unscrew the two fixing screws (1) from the cover (2) and remove the cover.
- ▶ Fit the VacuBox (3) in place of the cover using the two cover fixing screws (1) previously removed.

5.8 Mounting LegacyBox on R-300 (optional accessory)

If legacy peripherals are to be used with the Interface I-300/I-300 Pro, a LegacyBox has to be fitted in addition to the VacuBox.

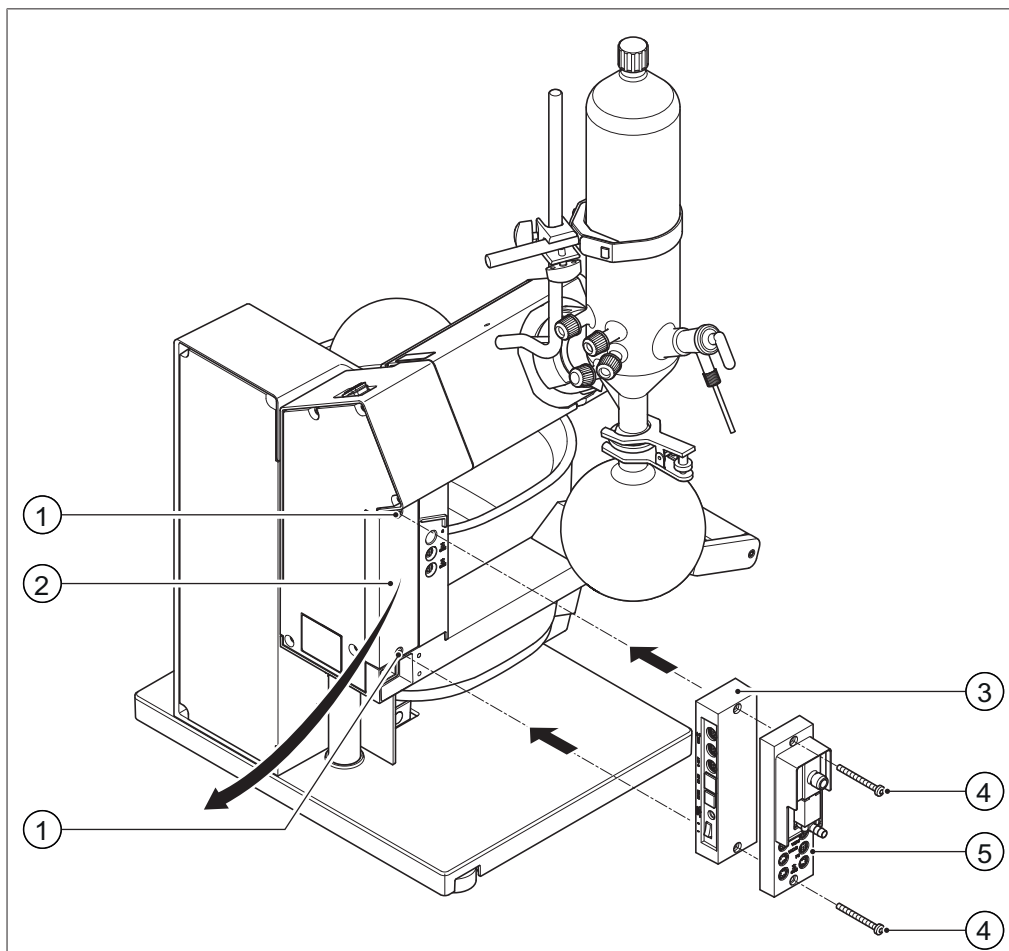


Fig. 13: Mounting LegacyBox and VacuBox on the Rotavapor

- | | |
|---------------------------|-----------------------------|
| 1 Fixing screws for cover | 3 LegacyBox |
| 2 Cover | 4 Fixing screws for VacuBox |
| | 5 VacuBox |

Tools required:

- Torx key Tx20
- ▶ Unscrew the fixing screws (1) from the cover (2) and remove the cover.
- ▶ Fit the LegacyBox (3) and VacuBox (5) together in place of the cover. To do so, use the fixing screws (4) supplied.

5.9 Fitting the Woulff bottle (optional accessory)

The Woulff bottle is used to separate out particles and droplets and to equalize pressure.

The Woulff bottle can be mounted either on the inlet (vacuum) of the Vacuum Pump V-300 (see vacuum pump manual) or on the Rotavapor® R-300.

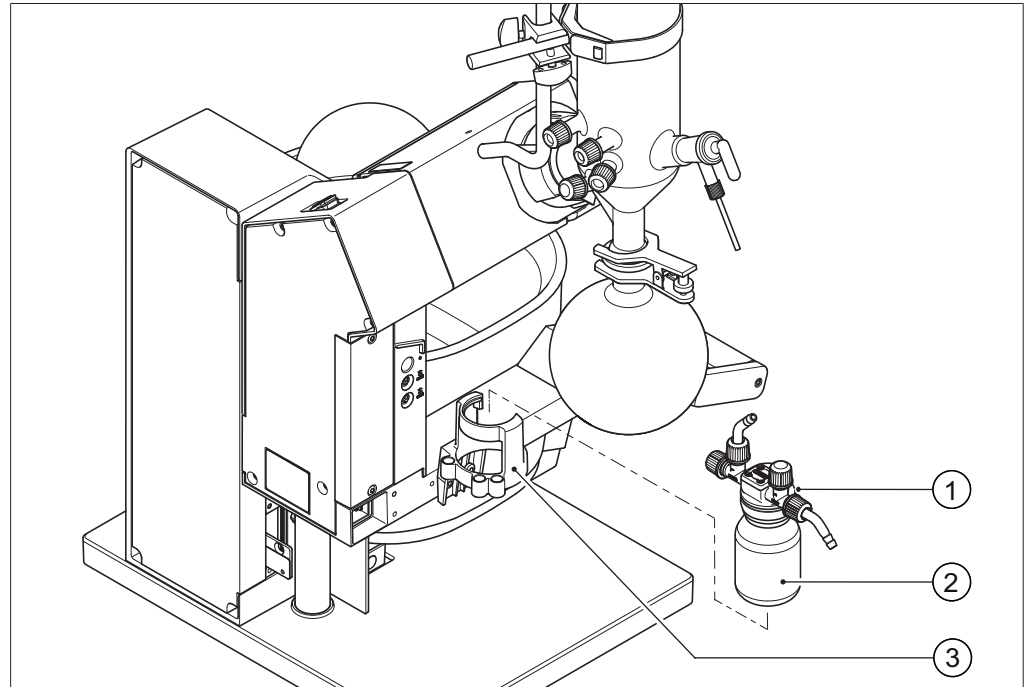


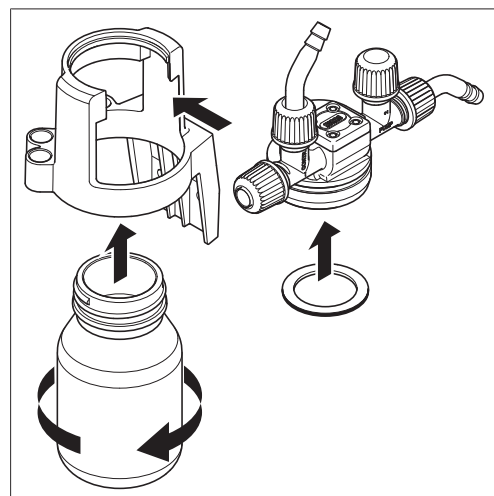
Fig. 14: Mounting the Woulff bottle on the Rotavapor

- | | |
|-------------------------------|----------|
| 1 Top part of Woulff bottle | 3 Holder |
| 2 Glass part of Woulff bottle | |

Precondition:

- The holder (3) for the Woulff bottle has already been fitted on the Rotavapor R-300.

- ▶ Unscrew the lower, glass part (2) of Woulff bottle.
- ▶ Press the top part of the Woulff bottle (1) into the holder so that it snaps into place.



- ▶ Screw the lower, glass part of the Woulff bottle into the top part again.

5.10 Fitting AutoDest sensor and vapor temperature sensor (optional accessory)

When using an Interface I-300/I-300 Pro there is the option of performing automatic distillation. Automatic distillation requires connection of an AutoDest sensor to the Rotavapor R-300. The AutoDest sensor is connected to the inlet and outlet of the cooling condenser and continuously measures the following temperatures:

- Temperature of the incoming coolant
- Temperature of the outgoing coolant
- Temperature of the vapor exiting the evaporating flask



NOTE

The AutoDest sensor has to be calibrated when first used and also when connected to a new VacuBox (see Operating Instructions I-300/I-300 Pro, Section 8.5 "Calibrating AutoDest sensor").

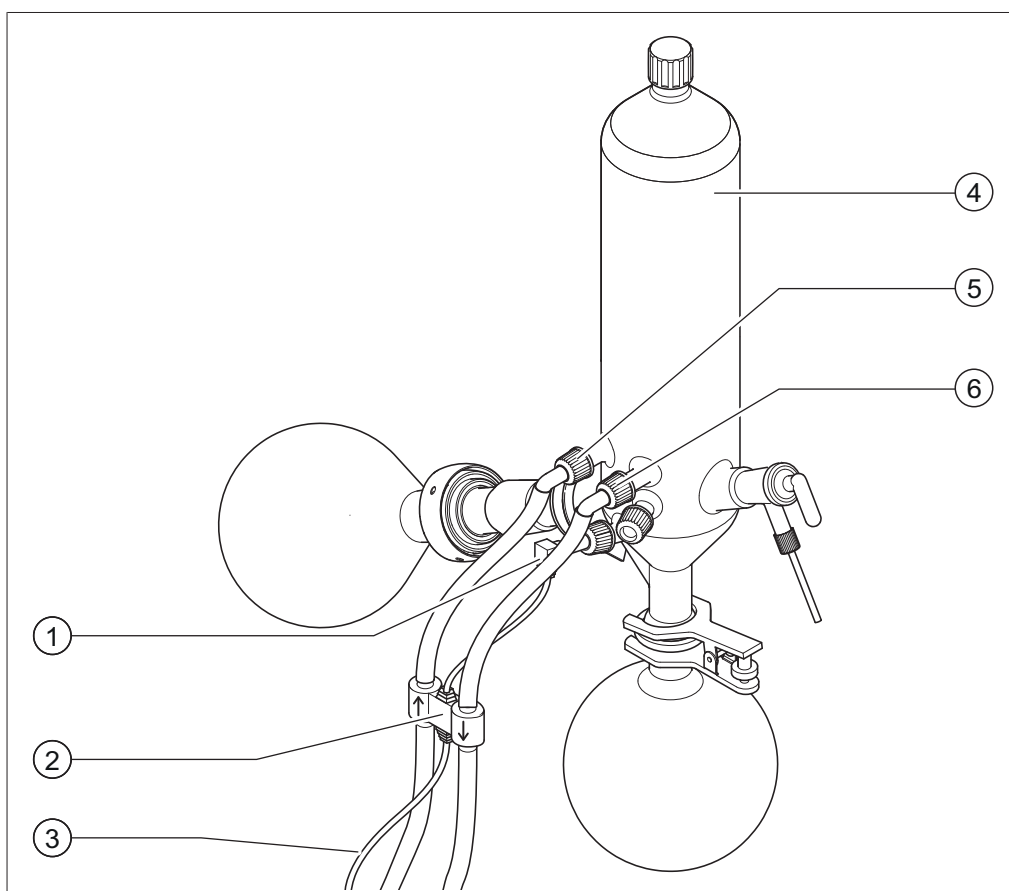


Fig. 15: AutoDest sensor, vapor temperature sensor and cooling condenser with evaporating flask of a Rotavapor R-300

- | | |
|--|-------------------------------|
| 1 Vapor temperature sensor | 4 Cooling condenser |
| 2 AutoDest sensor | 5 Coolant inlet on condenser |
| 3 Communication connection between AutoDest sensor and VacuBox | 6 Coolant outlet on condenser |



NOTE

There are two arrows stamped on the AutoDest sensor indicating the direction of flow for the coolant. The hoses for the coolant must be connected according to the direction of flow as the AutoDest sensor measures the difference between the incoming and outgoing coolant temperature and communicates the readings to the VacuBox and interface unit for the purposes of automatic control.

- ▶ Connect two tubes between the AutoDest sensor (2) and the cooling condenser (4). When doing so pay attention to the direction of flow of the coolant. The arrows on the AutoDest sensor indicate the direction of flow.

**NOTE**

The distance between the AutoDest sensor and the cooling condenser should not be more than 10 cm so as not to falsify the readings for the incoming and outgoing coolant temperatures in the distillation system.

- ▶ Connect a tube between the coolant inlet (5) on the AutoDest sensor and the outlet of the recirculating chiller.
- ▶ Connect a tube between the coolant outlet (6) on the AutoDest sensor and either the inlet of the recirculating chiller or another cooling condenser.
- ▶ Insert a vapor temperature sensor (1) in the Rotavapor R-300 and fix it in place.
- ▶ Connect the outgoing cable from the AutoDest sensor to the VacuBox. Use the connection marked "VT/AS" for this lead.

**NOTE**

There should be no air bubbles in the coolant as otherwise correct functioning of the AutoDest sensor is not guaranteed.

5.11 Fitting a foam sensor (optional accessory)

The foam sensor measures foam formation in the evaporating flask and emits a signal if the foam reaches the foam sensor. The foam is reduced by a short ventilation burst.

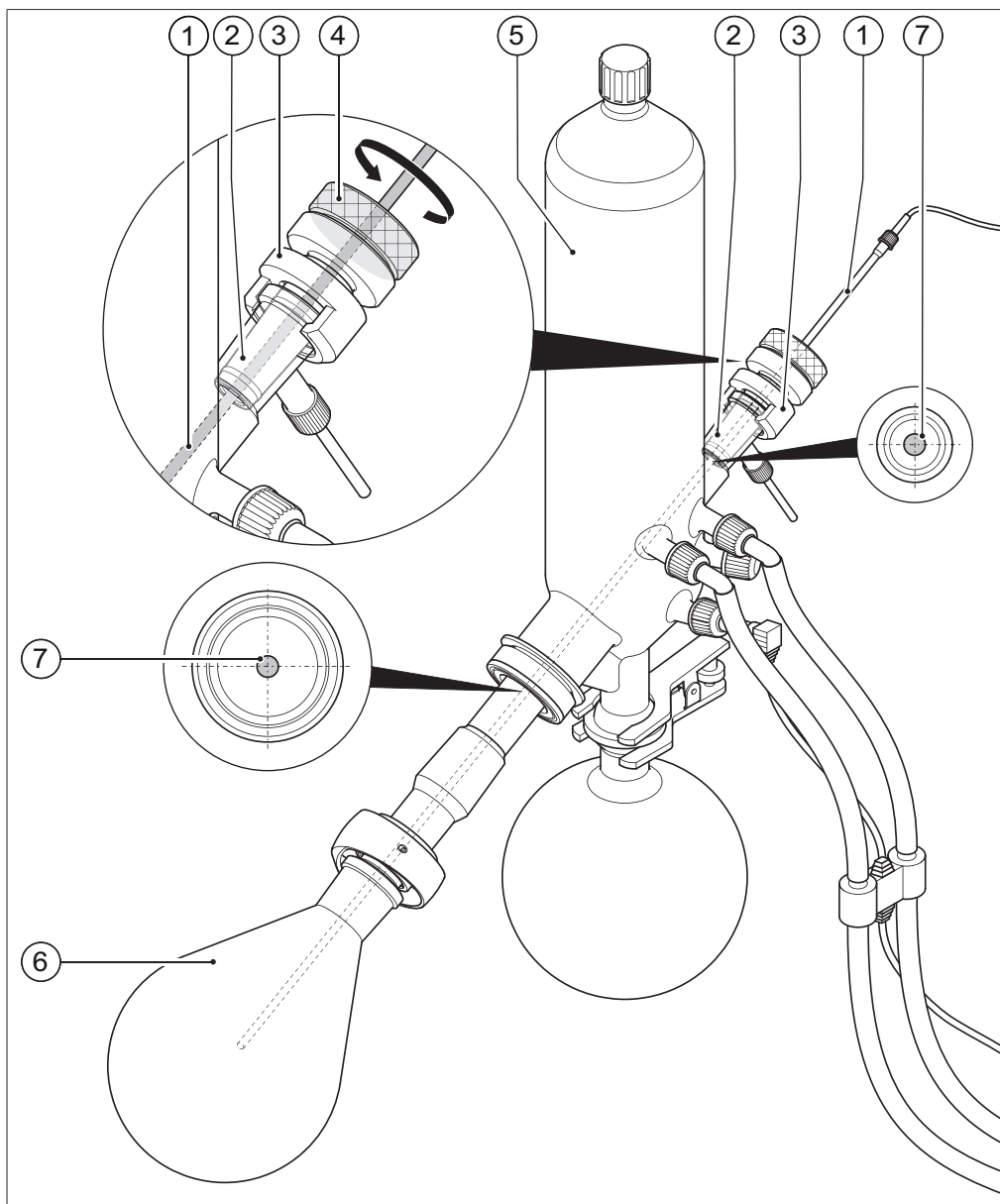


Fig. 16: Foam sensor in the evaporation unit of a Rotavapor R-300

- | | |
|------------------------------------|---------------------|
| 1 Foam sensor | 4 Clamp screw |
| 2 Holder for foam sensor | 5 Cooling condenser |
| 3 Securing nut | 6 Evaporating flask |
| 7 Foam sensor centrally positioned | |

IMPORTANT

Risk of damage to foam sensor from contact with glass components

- ▶ When inserting the foam sensor, make sure that the sensor rod passes centrally through the components without touching.
- ▶ Use a vapor duct with a standard ground glass joint that is as large as possible (e.g. SJ 29/32).

Precondition:

- The distillation system includes an Interface I-300/I-300 Pro and a VacuBox.
- ▶ Remove glass stopcock.
- ▶ Fit the tapered holder (2) over the upper end of the foam sensor (1).
- ▶ Slide the clamp nut (3) onto the opening for the glass stopcock.
- ▶ Feed the foam sensor into the opening for the glass stopcock and through the vapor duct into the evaporating flask (6) of the Rotavapor R-300 and fix in place with the clamp nut (3). The tip of the foam sensor should be positioned approx. 4 to 5 cm below the ground neck of the evaporating flask.
- ▶ Align foam sensor centrally and fix in place with the clamp screw (4).
- ▶ Connect the communication cable from the foam sensor to the VacuBox. Plug the connector into the socket marked "FS".

5.12 Connecting vacuum and coolant tubing

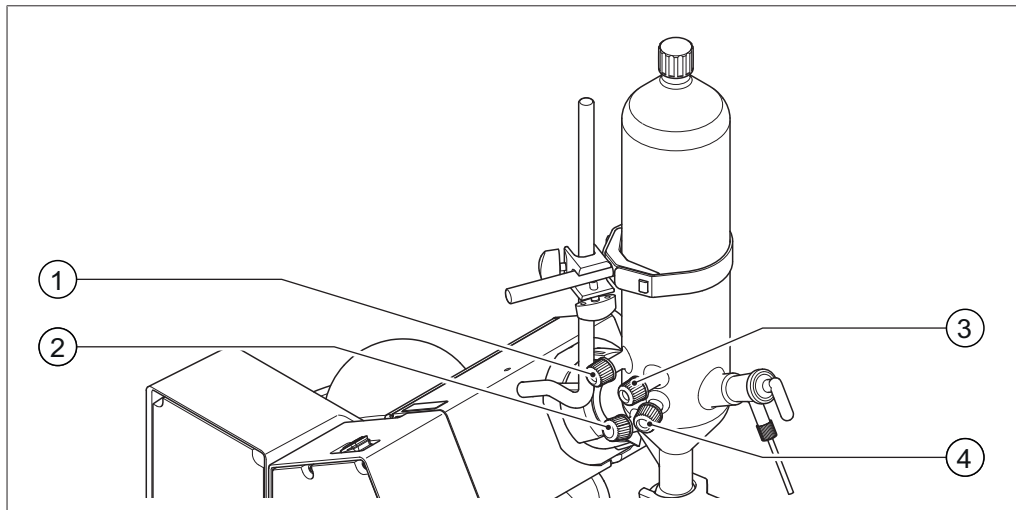


Fig. 17: Vacuum and coolant tubing connections on the cooling condenser of the R-300

- | | |
|---|----------------------------|
| 1 Cooling condenser inlet | 3 Cooling condenser outlet |
| 2 Connection for vapor temperature sensor | 4 Vacuum connection |

- ▶ Connect coolant tubes to the two coolant connections (1) and (3) using GL14 cap nuts.
- ▶ Connect the vacuum tubing to the vacuum connection (4) using a GL14 cap nut.
- ▶ Option 1: connect the vapor temperature sensor to connection (2) using a GL14 cap nut.
- ▶ Option 2: connect the vapor temperature sensor of the AutoDest sensor to connection (2) using a GL14 cap nut. See Chapter 5.10 "Fitting AutoDest sensor and vapor temperature sensor (optional accessory)", page 34.

5.12.1 Overview: vacuum and coolant tubing

The following illustration provides an overall view of all vacuum and coolant tubing connections in the complete distillation system:

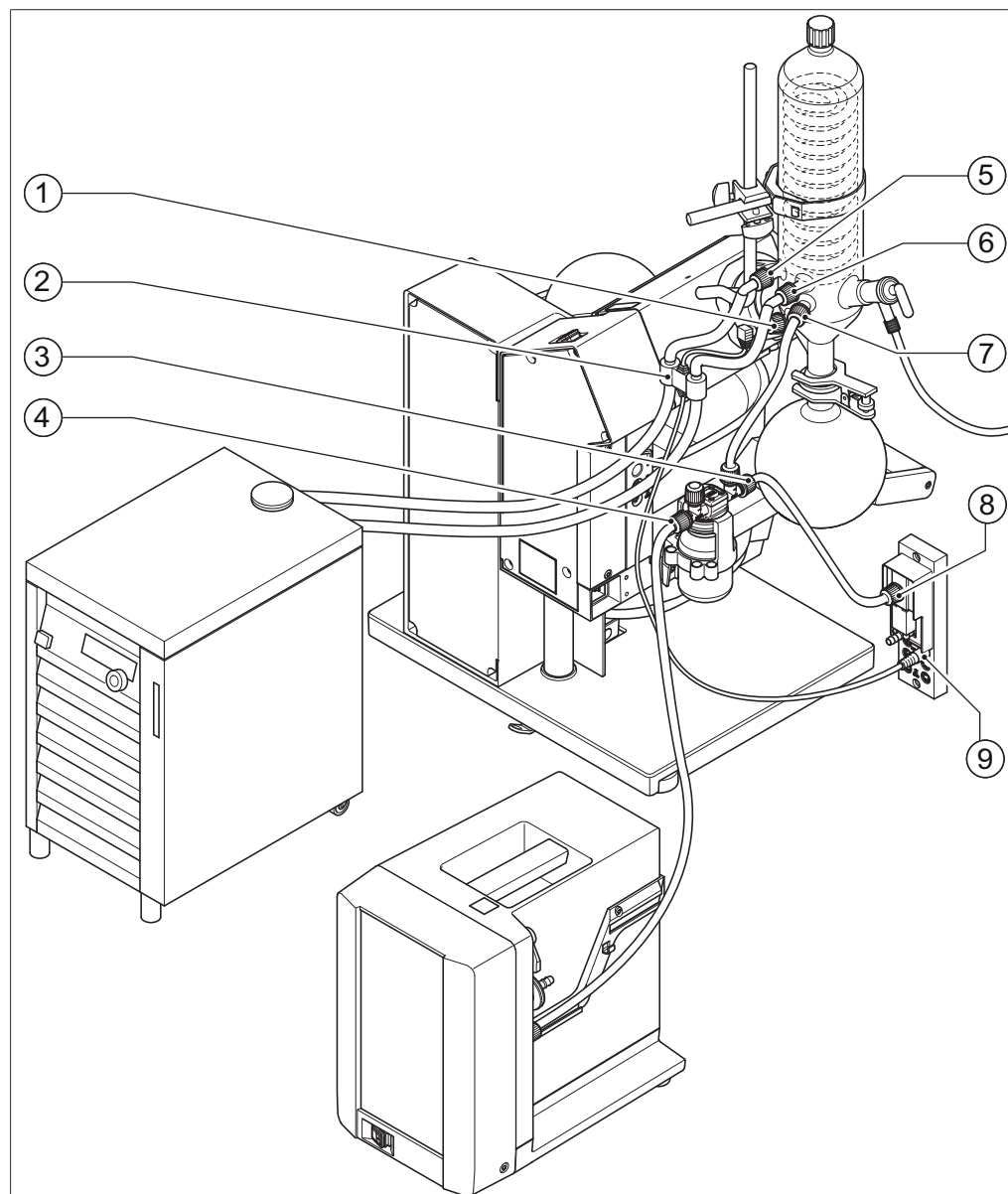


Fig. 18: Overview of tubing connections on Rotavapor R-300, Recirculating Chiller F-3xx, Vacuum Pump V-300 and VacuBox

- | | |
|---|----------------------------------|
| 1 Connection for vapor temperature sensor | 5 Coolant inlet on condenser |
| 2 AutoDest sensor | 6 Coolant outlet on condenser |
| 3 Outlet for VacuBox connection | 7 Vacuum connection on Rotavapor |
| 4 Woulff bottle outlet | 8 Vacuum connection on VacuBox |
| | 9 Connection for AutoDest sensor |

5.13 Setting up the heating bath

There are two different heating bath sizes for the Rotavapor R-300:

- Heating Bath B-301 for flasks up to 1 L capacity, only suitable for the use of water as heating fluid
- Heating Bath B-305 for flasks up to 5 L capacity, suitable for the use of water and oil as heating medium

Whichever size of heating bath is used, it is placed on the Heating Bath B-300 Base. Depending on which size of heating bath is used, the heating bath base has to be pushed in a different amount on the Rotavapor rail. With the smaller heating bath, the B-301, the base is pushed in as far as it will go. With the larger heating bath, the B-305, the heating bath base must not be pushed all the way in as otherwise the Rotavapor lift will not be able to lower. A mechanical catch on the Heating Bath B-305 makes sure that the heating bath base is not pushed in too far.

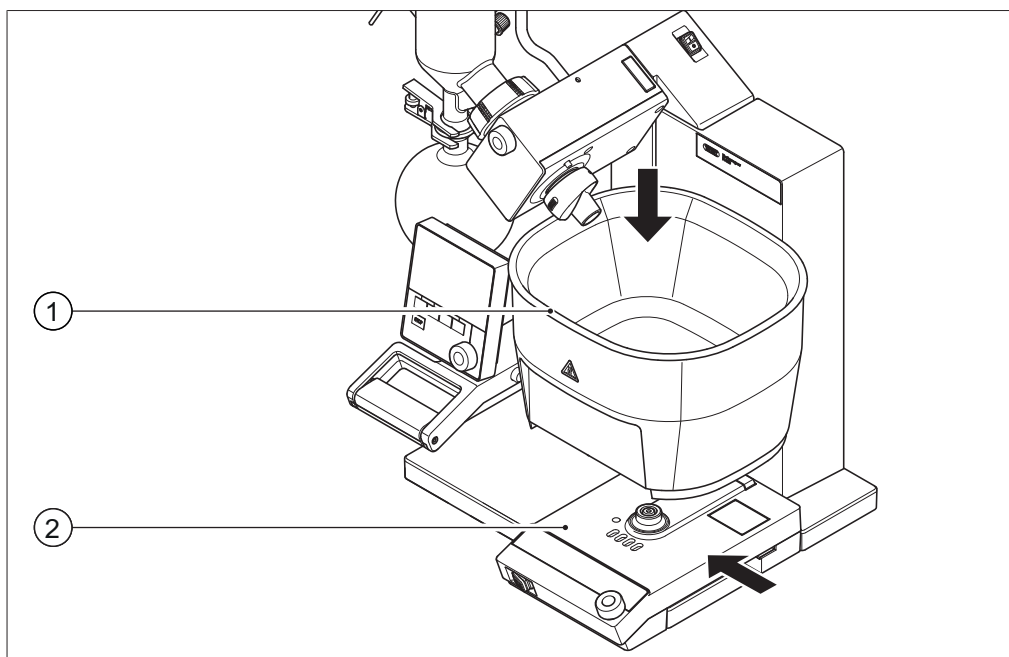


Fig. 19: Heating Bath B-305 and Heating Bath B-300 Base

1 Heating Bath B-305

2 Heating Bath B-300 Base



WARNING

Risk of burns if Heating Bath B-301 is used incorrectly

- ▶ Do not use oil as heating fluid in the Heating Bath B-301.

IMPORTANT

Risk of heating bath corrosion due to use of unsuitable heating fluid

- ▶ If pure distilled or de-ionised water is used, add approx. 1 g of Borax ($\text{Na}_2\text{B}_4\text{O}_7 \times 10 \text{ H}_2\text{O}$) per liter of water.

The recommended fluid for use in the heating bath is water. Normal tap water may be mixed with distilled water with a mixing ratio of up to 1:1 according to the water hardness.

- ▶ Slide the Heating Bath B-300 Base (2) onto the base of the Rotavapor R-300.
- ▶ Make sure that there are no objects in the Rotavapor base recess as this is where the data is transferred from the heating bath base to the Rotavapor by infra-red signals.
- ▶ Place the heating bath (1) centrally on the base.
- ▶ Fill the heating bath with suitable fluid.

5.14 Fitting the protection shield (optional)

The protection shield protects against solvent splashes, hot heating fluid splashes and glass splinters in the event of implosions.



NOTE

The protection shield only protects against splashes to the front. Protection against splashes in other directions must be provided by the user.

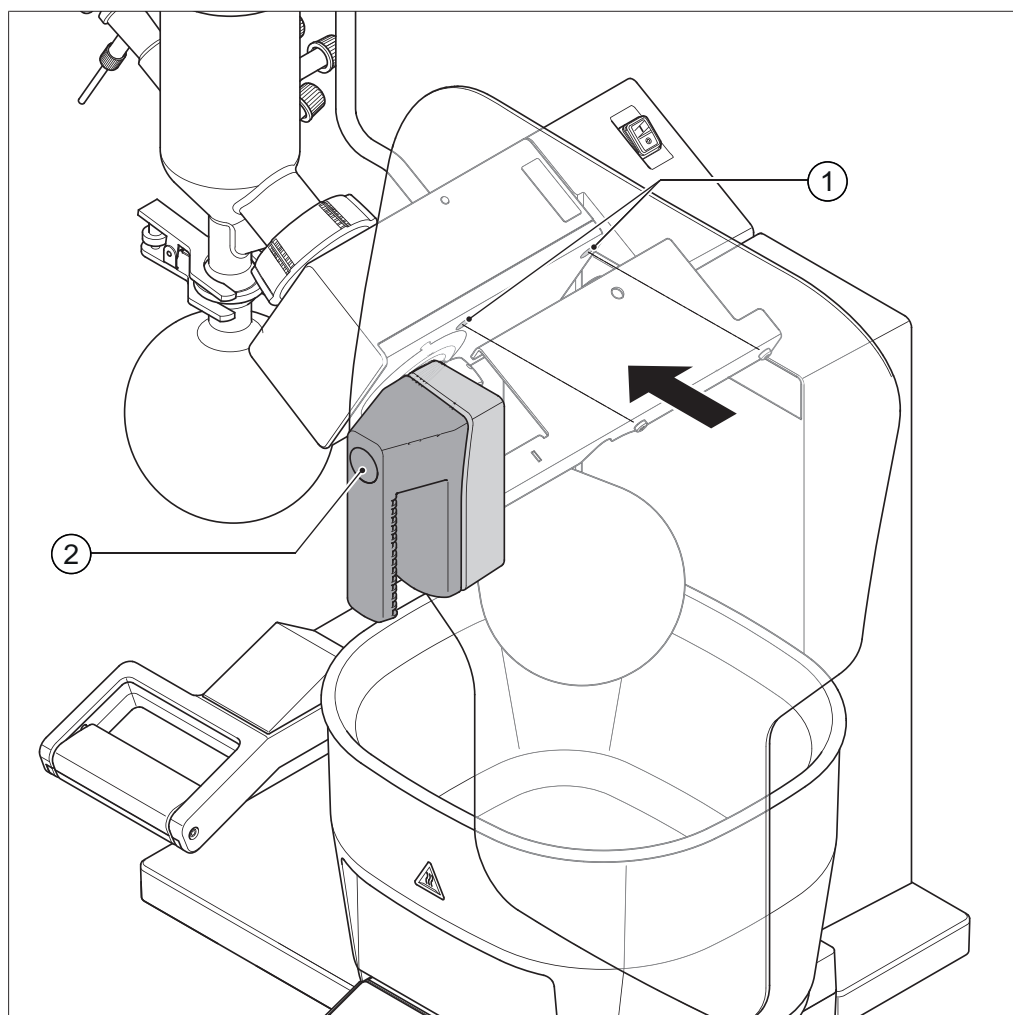
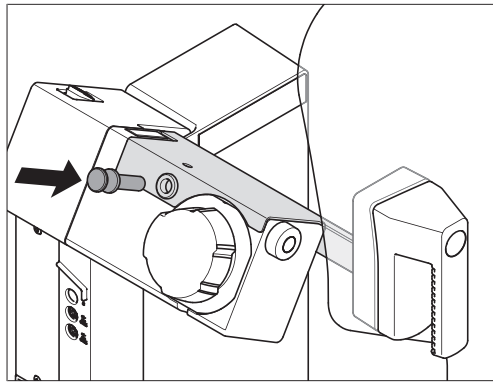


Fig. 20: Fitting the protection shield on the Rotavapor

1 Screw holes

2 Button on handle

- ▶ Insert the studs on the protection shield mounting bracket into the screw holes (1) on the Rotavapor drive unit.



- ▶ Secure the protection shield by inserting the pin supplied in the hole for the mounting bracket.
- ▶ Adjust the position of the protection shield to the desired angle by pressing the button on the handle (2).

5.15 Fit the splash guard (optional accessory)

When closed, the splash guard protects against splashes of heating fluid.



NOTE

Use the splash guard with the heating bath B-305.



NOTE

Only suitable for heating bath temperatures up to 160°C.



NOTE

All tools and screws are included in the splash guard specifications supplied.

- ▶ Switch the Rotavapor **On/Off** master switch to Off.
- ▶ Switch the heating bath **On/Off** master switch to Off.

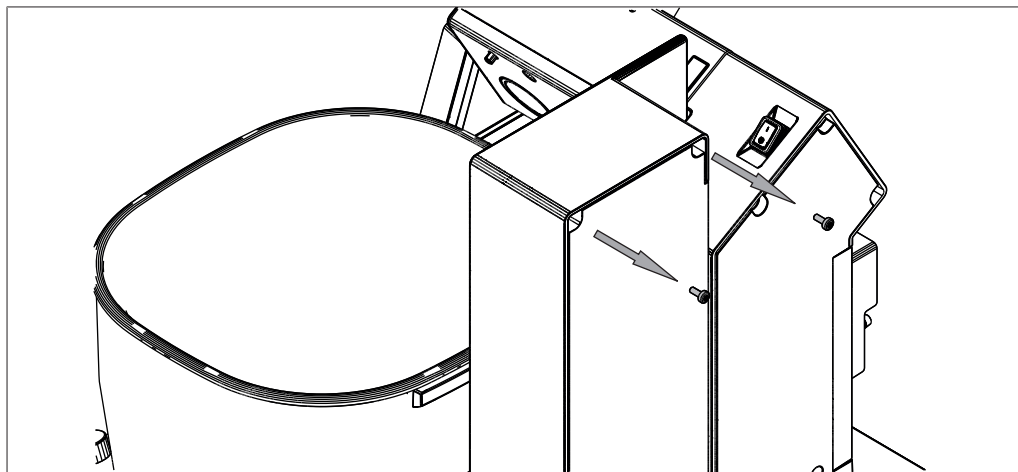


Fig. 21: Removing the screws on the rear panel

- ▶ Remove the screws on the rear panel of the Rotavapor.

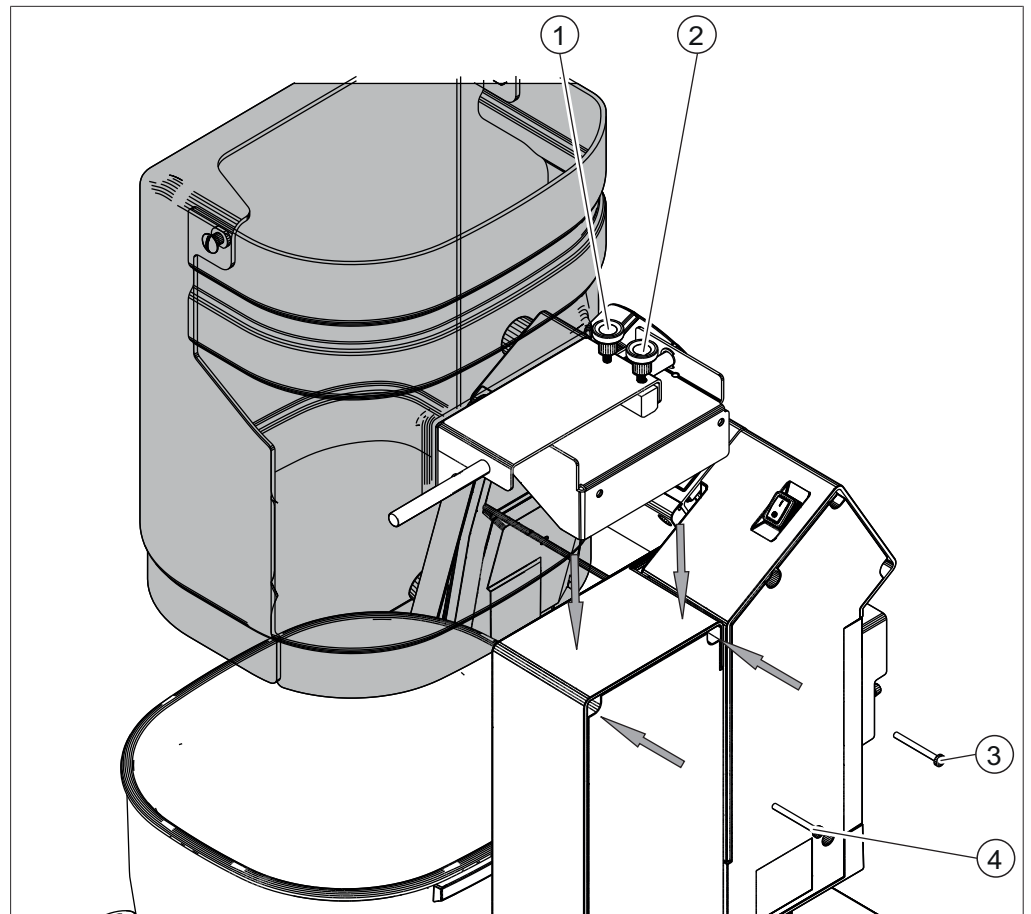


Fig. 22: Fitting the splash guard on the Rotavapor

- | | |
|-------------------------|---------------------------|
| 1 Vertical fixing screw | 2 Horizontal fixing screw |
| 3 Fixing screw | 4 Fixing screw |

- ▶ Place the splash guard on the Rotavapor.
- ▶ Fix the splash guard using the screws supplied.
- ▶ Loosen the horizontal fixing screw.
- ▶ Loosen the vertical fixing screw.

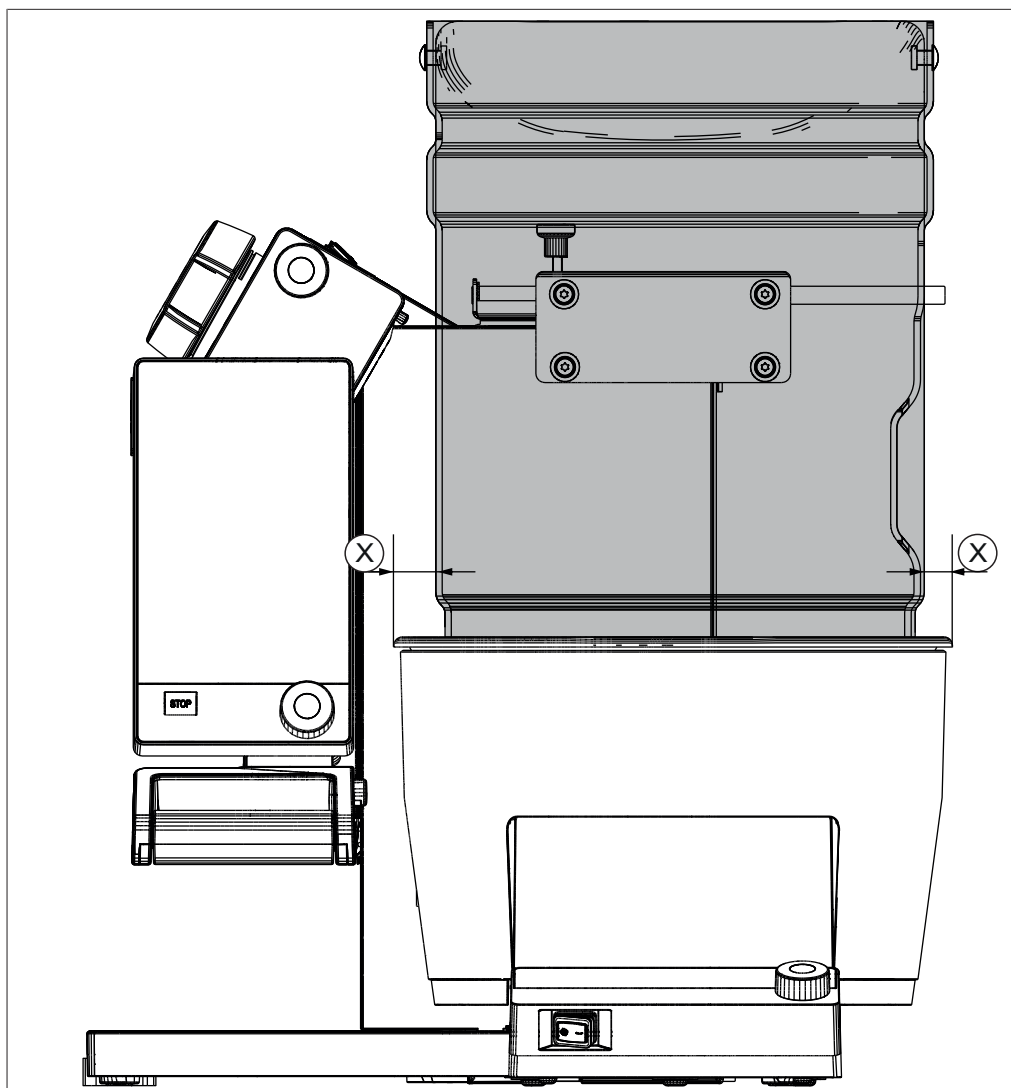


Fig. 23: Aligning the splash guard

- ▶ Line up the splash guard and bath with one another.
- ▶ Make sure that the distance X is equal on both sides.
- ▶ Make sure that the lid can be opened.
- ▶ Tighten the horizontal fixing screw.
- ▶ Tighten the vertical fixing screw.

5.16 Connecting the Rotavapor to the power supply

The Rotavapor and the heating bath each have their own separate power supply connection.

Rotavapor

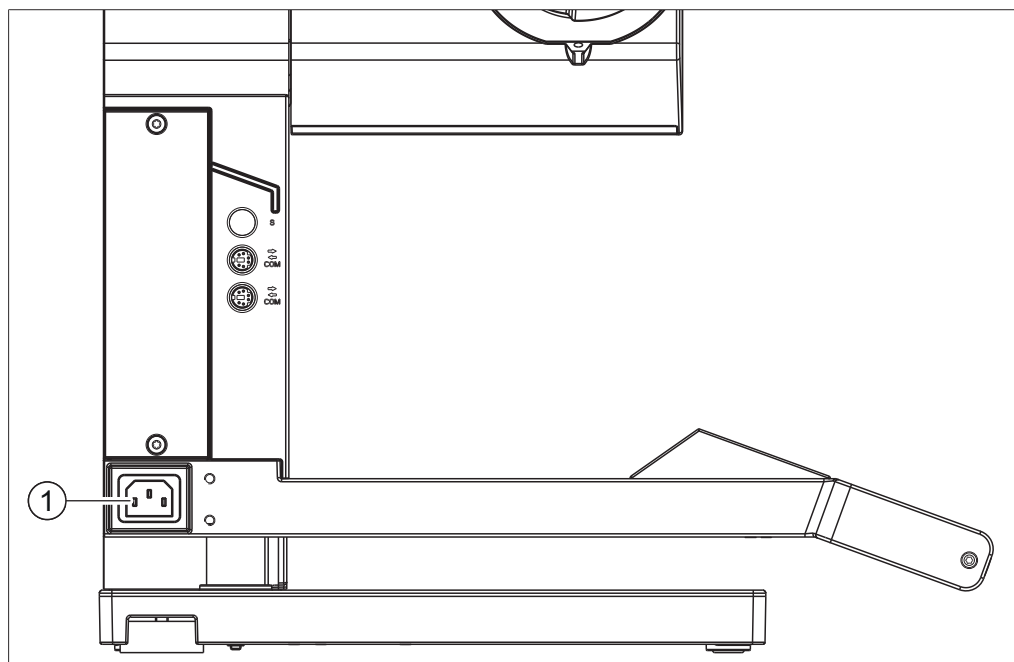


Fig. 24: Power supply connection on Rotavapor R-300

1 Power supply connection



NOTE

When connecting the Rotavapor and the heating bath to the power supply, it is important to ensure that they are grounded. The use of 3-core power cables and 3-pin plugs will ensure that is the case.

- ▶ Make sure that the available power supply matches the rating indicated on the type plate.
- ▶ Plug the power cord into the socket (1) on the Rotavapor and then into a mains power socket.
- ▶ If an extension lead is required, make sure that it is grounded and has a suitable power rating.

Heating bath base

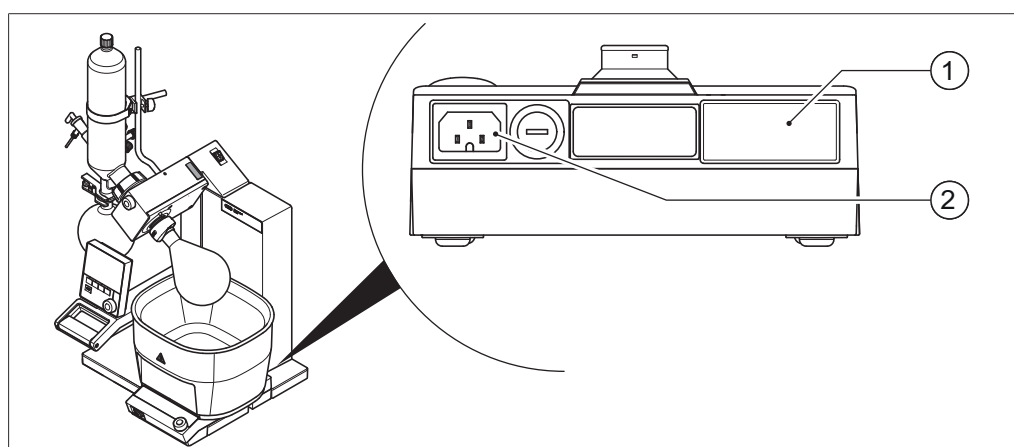


Fig. 25: Power supply connection on heating bath base

1 Fuse rating plate

2 Power supply connection

- ▶ Plug a separate power cord into the socket (2) on the heating bath base and then into a mains power socket.

5.17 Assembling the BUCHI distillation system

In order to use the Rotavapor® R-300 to best effect, we recommend that it is used together with the following equipment:

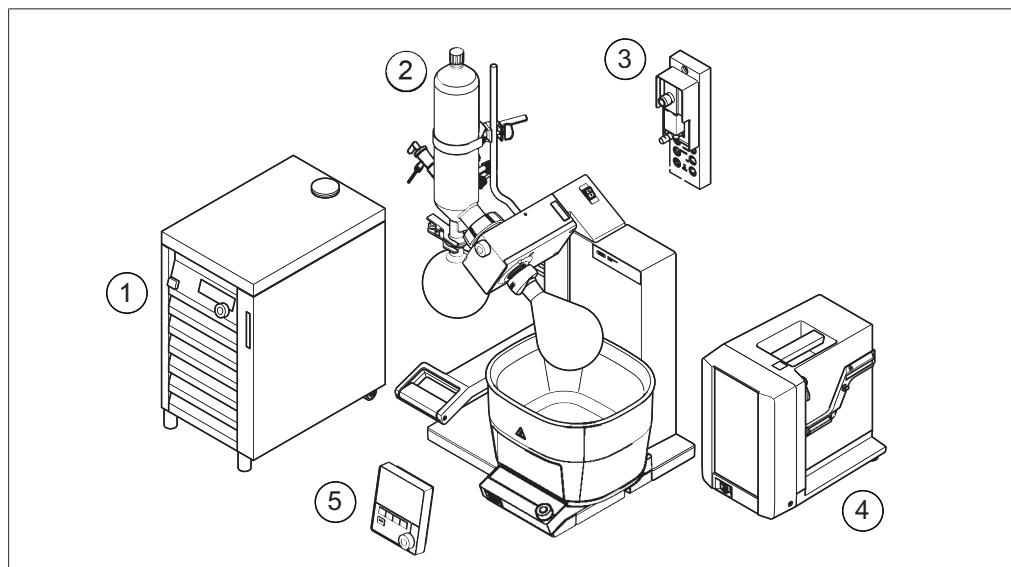


Fig. 26: Interface unit, VacuBox, Rotavapor, vacuum pump and recirculating chiller

- | | |
|-------------------------------------|-----------------------------------|
| 1 Recirculating Chiller F-3xx | 4 Vacuum Pump V-300 |
| 2 Rotavapor R-300 with heating bath | 5 Interface I-300/I-300 Pro B-305 |
| 3 VacuBox | |

The F-3xx is a recirculating chiller with a sealed circulation system. It is available in various capacity ratings.

The Interface I-300/I-300 Pro together with the VacuBox can be used to control and monitor the vacuum. It can control the Rotavapor, the Vacuum Pump V-300 and the Recirculating Chiller F-3xx and maintain a set constant pressure.

The Vacuum Pump V-300 is a diaphragm pump designed for evacuating laboratory apparatus. It can be operated either as a standalone device or combined with optional accessories such as an interface unit and a secondary cold trap to form a complete vacuum system. The laboratory equipment to be evacuated is connected to the vacuum pump and the VacuBox by means of vacuum tubing. See Overview: setting up vacuum tubing connections

Data communication between the laboratory equipment takes place via the communication ports. See Chapter 5.17.2 "Connecting communication cables to the Rotavapor", page 49.

The coolant circulates around the distillation system through a separate circulation system. See Overview: setting up coolant tubing connections.

5.17.1 Overview: setting up communication connections

The laboratory apparatus can be connected in any order. **Important:** as well as the Interface I-300/I-300 Pro, a VacuBox also has to be connected.

Below is an example of the connections between the laboratory apparatus.

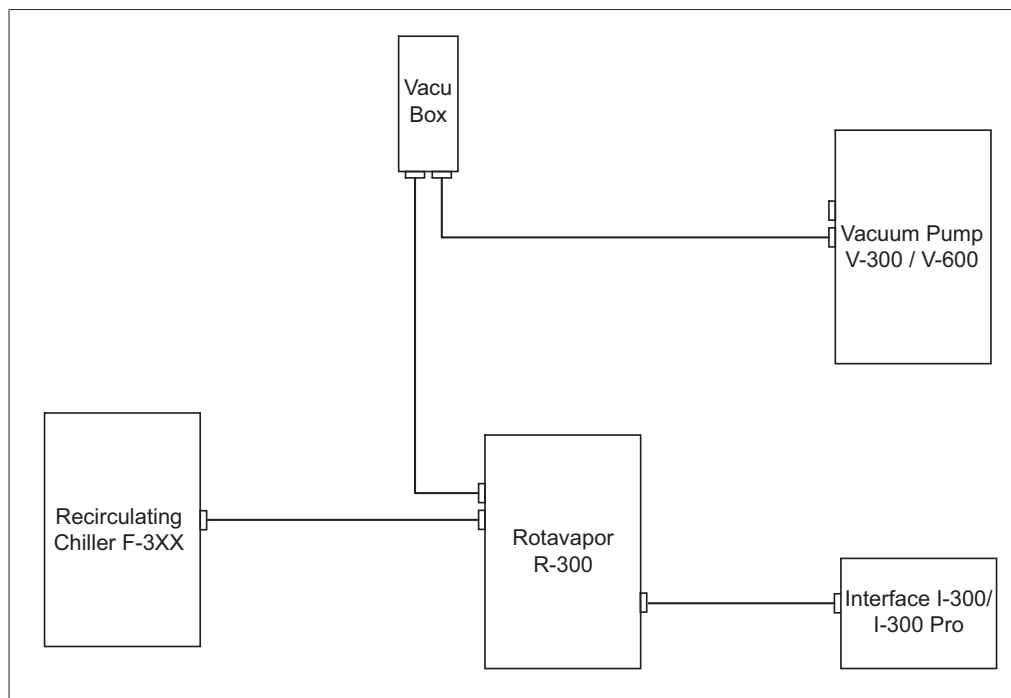


Fig. 27: Schematic diagram of communication connections between the BUCHI laboratory equipment (example)

- ▶ Connect the Recirculating Chiller F-3xx to the Rotavapor R-300.
- ▶ Connect the Rotavapor R-300 to the VacuBox.
- ▶ Connect the VacuBox to the Vacuum Pump V-300/V-600.
- ▶ Connect Rotavapor to the Interface I-300/I-300 Pro.



NOTE

Connections on R-220 Pro:

Information on the connection of communication cables, coolant and vacuum tubing with the Rotavapor R-220 Pro can be found in the operating instructions for the Rotavapor R-220 Pro.

5.17.2 Connecting communication cables to the Rotavapor

The connections between the BUCHI laboratory apparatus are established by means of a standard BUCHI communication cable (COM) in each case.

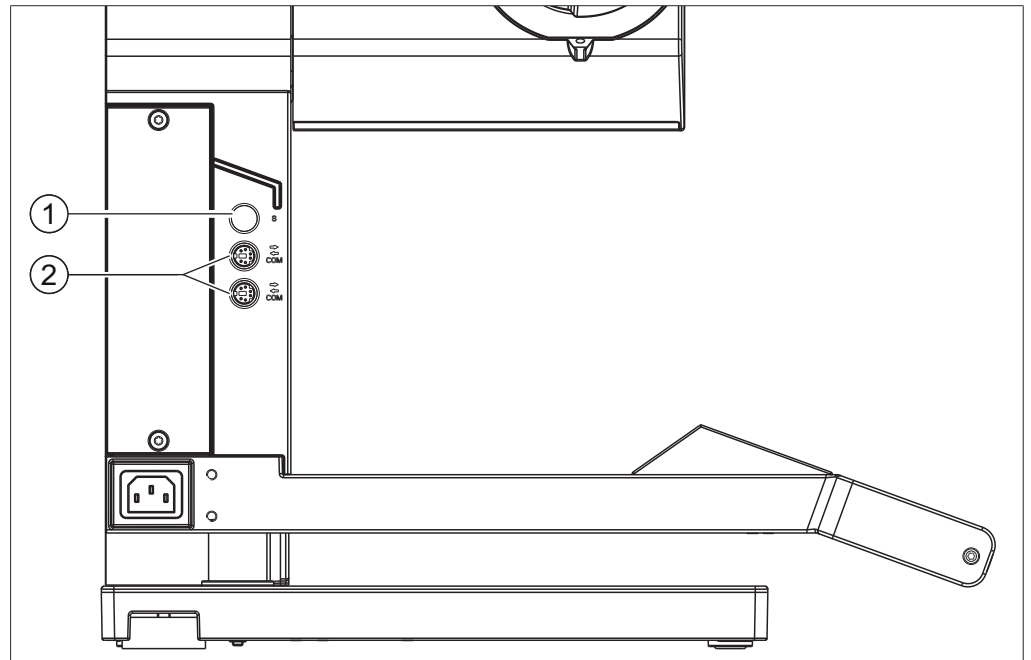


Fig. 28: Communication cable connections on Rotavapor

- | | | | |
|---|-----------------------------|---|--|
| 1 | Sensor connection, not used | 2 | Standard BUCHI communication ports (COM) |
|---|-----------------------------|---|--|
- ▶ Plug the communication cable for connection to other BUCHI laboratory equipment into one of the standard BUCHI communication ports (2).
 - ▶ Plug the communication cable into the green communication port on the other item of laboratory equipment.

5.17.3 Overview: setting up coolant tubing connections

The tubing connections between the various items of BUCHI laboratory equipment form a sealed circulation system. The starting and finishing point is always the recirculating chiller (F-3xx).

Below is an example of the tubing connections between the laboratory apparatus.

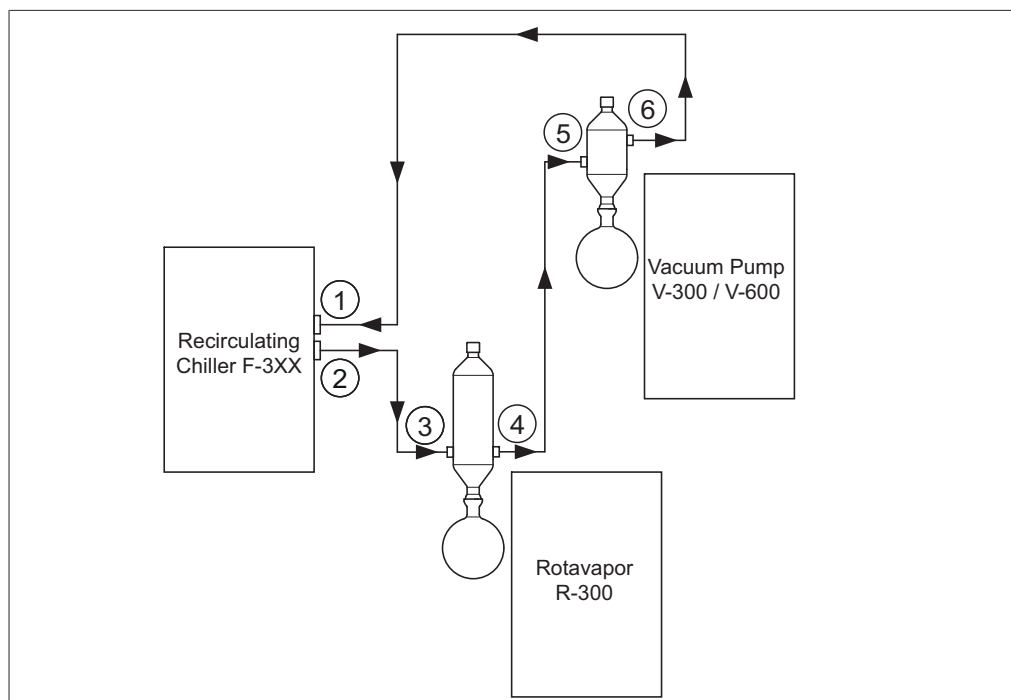


Fig. 29: Coolant tubing connections in a BUCHI distillation system (example)

- | | |
|---|---|
| 1 Inlet on Recirculating Chiller F-3xx | 4 Condenser outlet on Rotavapor R-300 |
| 2 Outlet on Recirculating Chiller F-3xx | 5 secondary cold trap inlet on Vacuum Pump V-300 |
| 3 Condenser inlet on Rotavapor R-300 | 6 Secondary cold trap outlet on Vacuum Pump V-300 |

- ▶ Connect a tube between the outlet of the recirculating chiller (2) and the inlet of the condenser on the Rotavapor R-300 (3).
- ▶ Connect a tube between the outlet of the condenser on the Rotavapor R-300 (4) and the inlet of the secondary cold trap on the Vacuum Pump V-300 (5).
- ▶ Connect a tube between the outlet of the secondary cold trap on the Vacuum Pump V-300 (6) and the inlet of the recirculating chiller (1).



NOTE

Use GL14 hose barbs for the tubing connections.

Secure tubes with spring clips where necessary.



NOTE

The R-300 is also suitable for use with water coolant.

5.17.4 Overview: setting up vacuum tubing connections

The vacuum tubing connections in a typical BUCHI distillation system lead from the Rotavapor R-300 via a Woulff bottle to the Vacuum Pump V-300. The vacuum is measured by means of the VacuBox, which is also connected to the Woulff bottle.

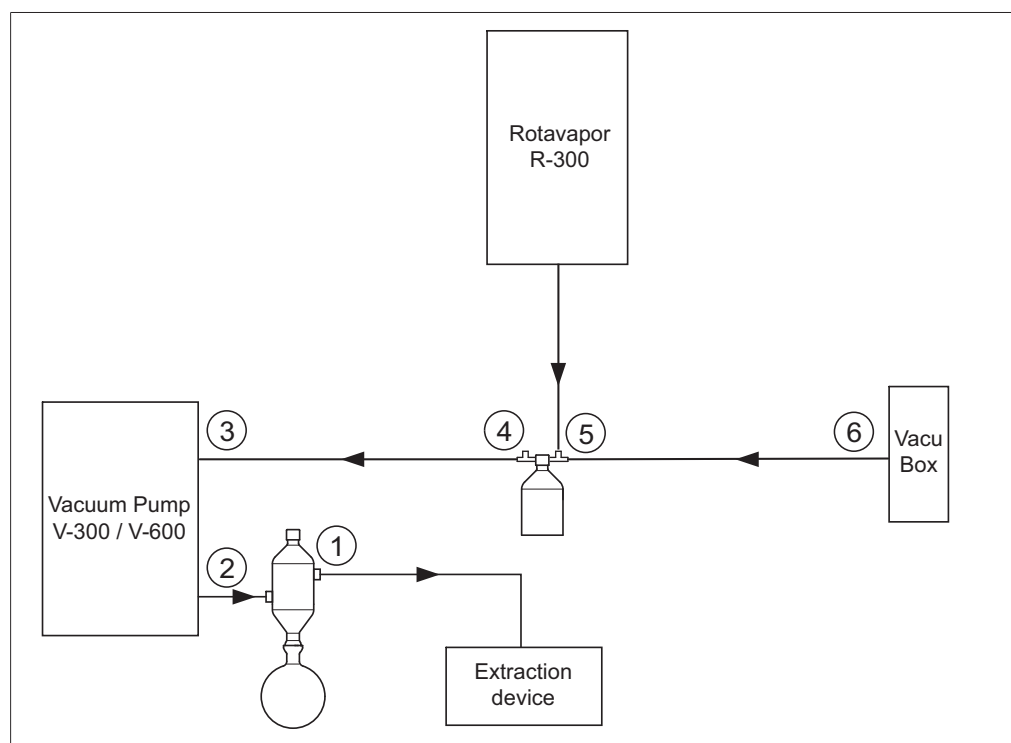


Fig. 30: Coolant tubing connections in a BUCHI distillation system

- | | |
|------------------------------|-------------------------------|
| 1 Secondary cold trap outlet | 4 Woulff bottle outlet (PUMP) |
| 2 Vacuum pump outlet | 5 Woulff bottle inlet (CONTR) |
| 3 Vacuum pump inlet | 6 VacuBox valve connection |
- ▶ Connect a tube between the Rotavapor R-300 and the top inlet of the Woulff bottle.
 - ▶ Connect a tube between the outlet of the Woulff bottle marked PUMP (4) and the pump inlet (3).
 - ▶ Connect the secondary cold trap to the pump outlet (2).
 - ▶ For measuring and controlling the vacuum, connect a tube between the inlet of the Woulff bottle marked CONTR (5) and the VacuBox (6).

The pressure is measured in the VacuBox. The current working pressure can be indicated and controlled by means of the Interface I-300/I-300 Pro.



NOTE

The VacuBox and Woulff bottle can be mounted either on the Rotavapor R-300 or the Vacuum Pump V-300. What is important is that the VacuBox and Woulff bottle are as close as possible to each other (on the same device) as otherwise there is a vacuum control lag.

5.18 Basic settings

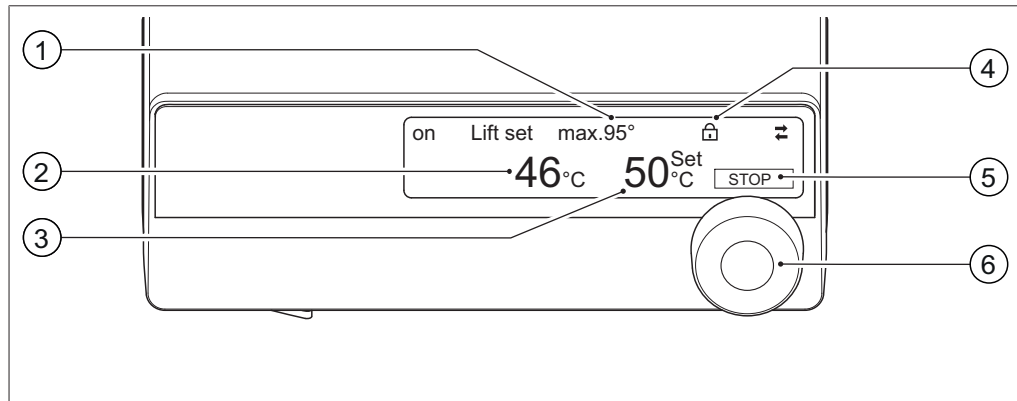


Fig. 31: Heating bath basic settings

- | | |
|-----------------------|---|
| 1 Maximum temperature | 4 Set temperature locked |
| 2 Actual temperature | 5 START/STOP function activated on pressing navigation control |
| 3 Set temperature | 6 Control knob for setting the required temperature and starting/stopping the heating process |

Setting the maximum temperature



NOTE

Maximum possible temperature settings (1) are defined for the heating bath: The Heating Bath B-305 can be set to a maximum temperature of 95 °C, 180 °C or 220 °C, depending on which fluid is in the bath. The Heating Bath B-301 can be set to a maximum temperature of 95 °C. For safety reasons, the lowest possible maximum temperature should be chosen.

- ▶ To set the maximum temperature, press and hold the control knob (6). The Settings menu appears, identifiable by the gear symbol on the display.
- ▶ Turn the control knob to select the desired maximum temperature, and press it briefly to confirm the selection.

Locking the set temperature

The heating bath has a locking function that prevents the set temperature being inadvertently altered.

- ▶ To lock the set temperature, press and hold the control knob (6) until the padlock symbol (4) appears on the display.
- ▶ Press the control knob again to confirm. The Settings menu appears, identifiable by the gear symbol on the display.
- ▶ To cancel the lock function, press and hold the control knob again until the padlock symbol disappears.

5.19 Quick check

- ▶ To complete the installation process, switch on the device at the master switch and check the following points:
- ▶ Switch on the rotary drive unit, change the rotation speed and check that the evaporating flask rotates at a different speed.
- ▶ **CAUTION! Risk of skin burns!** Make sure that the heating bath is filled, switch on the heating bath and check that the heating fluid heats up. See Chapter 6.1.1 "Preparing the heating bath", page 54.
- ▶ Check that the height of the rotary drive unit can be adjusted. See Chapter 6.1.5 "Raising and lowering rotary drive unit", page 58.
- ▶ Check system for leaks, see Chapter 7.2 "Checking the system for leaks", page 71.

6 Operation

6.1 Preparations

6.1.1 Preparing the heating bath

⚠ CAUTION

Risk of skin burns from hot fluids and surfaces

- ▶ Do not put your hands in the hot fluid.
- ▶ Do not carry, shift, tip or otherwise move the heating bath when it is filled with hot fluid.
- ▶ Do not fill the heating bath right to the very top. Allow for the expansion of the fluid when heated.
- ▶ Do not switch on the heating bath when it is empty.

⚠ CAUTION

Risk of skin burns from oil splashes

- ▶ Never pour water into hot oil.
- ▶ Make sure that the oil used is suitable for these purposes and the desired temperatures. (The oil used must have a flashpoint of > 175 °C.)

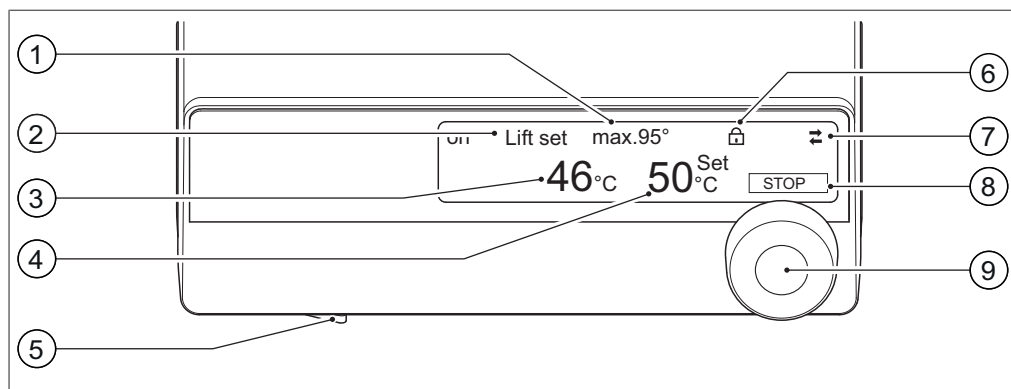


Fig. 32: Heating bath display

- | | |
|--|---|
| 1 Maximum temperature | 6 Set temperature locked |
| 2 "Lift set" indicates that a lower limit has been set for the Rotavapor lift. | 7 Connection symbol – heating bath is being controlled by an Interface I-300/ I-300 Pro |
| 3 Actual temperature | 8 START/STOP function activated on pressing navigation control |
| 4 Set temperature | 9 Control knob for setting the required temperature and starting/stopping the heating process |
| 5 ON/OFF master switch | |

- ▶ Switch on the device at the master switch (5).
The heating bath temperature (4) last set is displayed.
- ▶ Set the maximum temperature (1), see Chapter 5.18 "Basic settings", page 52.

- ▶ Set the desired temperature using the control knob (9).
The current actual temperature (3) and the specified temperature (4) are shown on the display.
- ▶ Lock the set temperature, see Chapter 5.18 "Basic settings", page 52.

6.1.2 Fitting the evaporating flask

IMPORTANT

Risk of evaporating flask damage if fitted incorrectly

- ▶ When fitting the evaporating flask make sure that the edge of the glass does not strike the vapor duct.
- ▶ Tighten combi-clip no more than hand-tight.

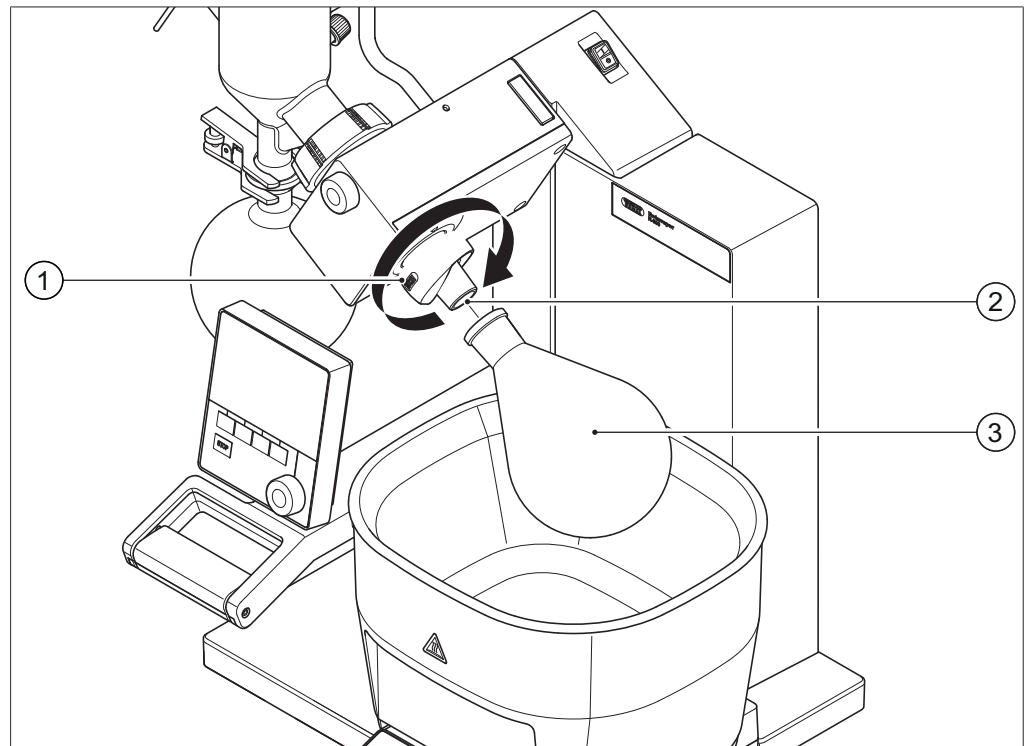


Fig. 33: Fitting the evaporating flask

- 1 Combi-clip
- 2 Vapor duct

3 Evaporating flask

- ▶ Carefully fit evaporating flask (3) onto the vapor duct (2).
- ▶ Screw combi-clip (1) clockwise until hand-tight.

6.1.3 Adjusting immersion angle of evaporating flask

The immersion angle of the evaporating flask has to be adjusted according to the size and capacity of the heating bath (B-301 or B-305) and the evaporating flask.

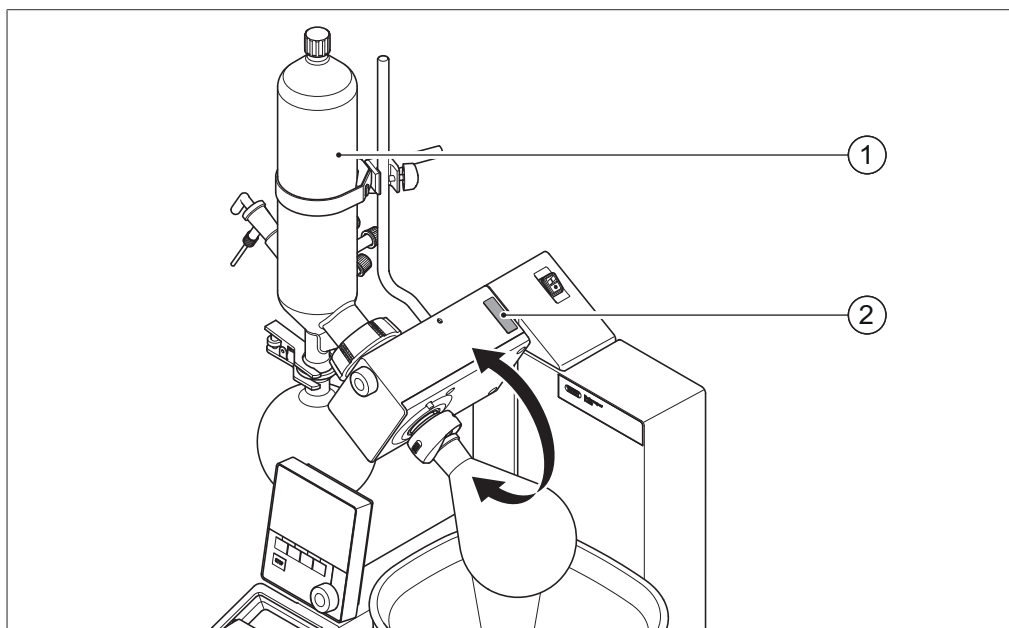


Fig. 34: Adjusting the immersion angle

1 Cooling condenser

2 Adjuster button for immersion angle

Precondition:

Rotavapor is not in operation.

- ▶ Hold the cooling condenser (1) firmly with one hand and press and hold the adjuster button (2) with the other hand.
- ▶ Adjust the immersion angle.



NOTE

When the Rotavapor lift is in its lowered position, there must be at least 10 mm clearance between the edge of the heating bath and the evaporating flask.

- ▶ Release the adjuster button to lock the rotary drive unit in position again.
- ▶ Check the vertical travel limit for the lift and, if necessary, readjust the immersion angle or the end stop, see Chapter 6.1.5 "Raising and lowering rotary drive unit", page 58.

6.1.4 Fitting the receiving flask

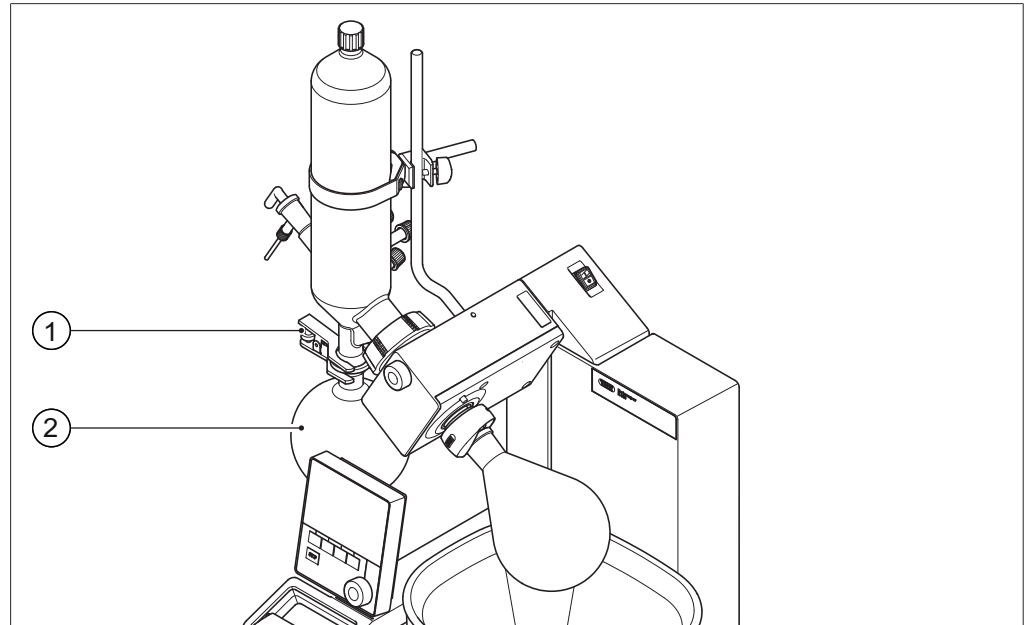


Fig. 35: Fitting the receiving flask

1 Ball joint clamp

2 Receiving flask

- ▶ Fit the receiving flask (2) onto the condenser from below, hold it firmly in place and secure it with the ball joint clamp (1).
- ▶ If the connection is not sufficiently airtight, apply a thin coat of Glisseal 40 red laboratory grease to the ground glass joint.

6.1.5 Raising and lowering rotary drive unit

The rotary drive unit together with the glass components can be raised or lowered either manually or by motor power, depending on the version of the R-300. To prevent the evaporating flask fouling on the heating bath, a minimum depth stop can be set.

CAUTION

Risk of scalding if heating bath overflows

- ▶ When immersing the evaporating flask, make sure that the fluid does not overflow due to the displacement.
- ▶ When the evaporating flask is rotating look out for splashing fluid.



CAUTION

Risk of burns from splashing heating fluid

- ▶ When the evaporating flask is rotating look out for splashing fluid.
- ▶ Use the protection shield and wear protective clothing.



CAUTION

Risk of injury when adjusting apparatus height

- ▶ Make sure that your fingers are not trapped when adjusting the apparatus height, especially when using the safety guard.
- ▶ Make sure that all tubing is long enough and is not under strain after making the adjustment.

IMPORTANT

Risk of evaporating flask damage due to collision with edge of heating bath

- ▶ Make sure that there is at least 10 mm clearance between the evaporating flask and the edge and/or bottom of the heating bath.

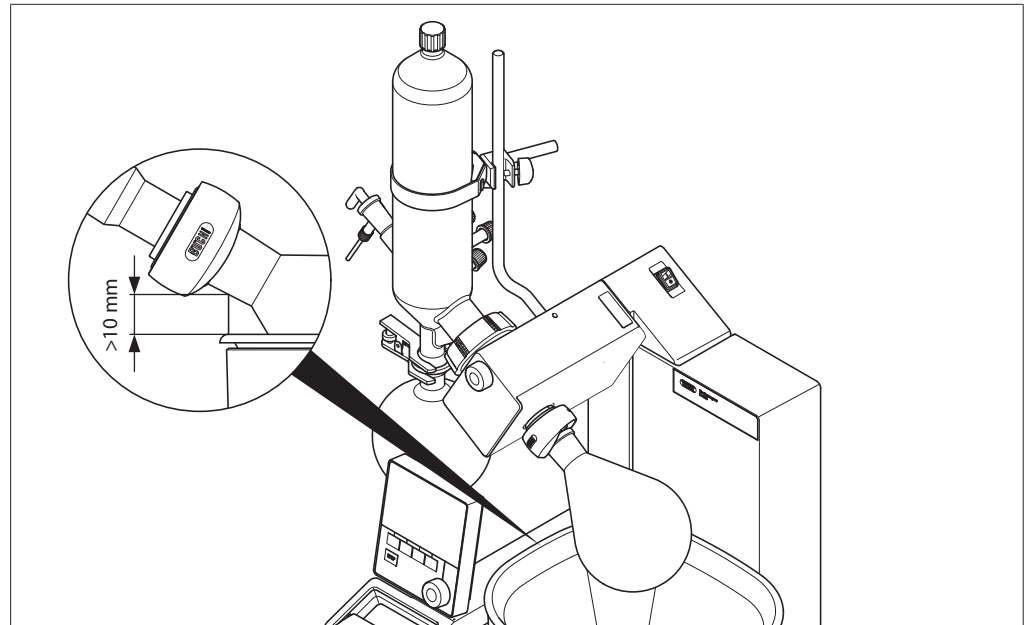


Fig. 36: Clearance between evaporating flask and edge of heating bath

Electrical height adjustment

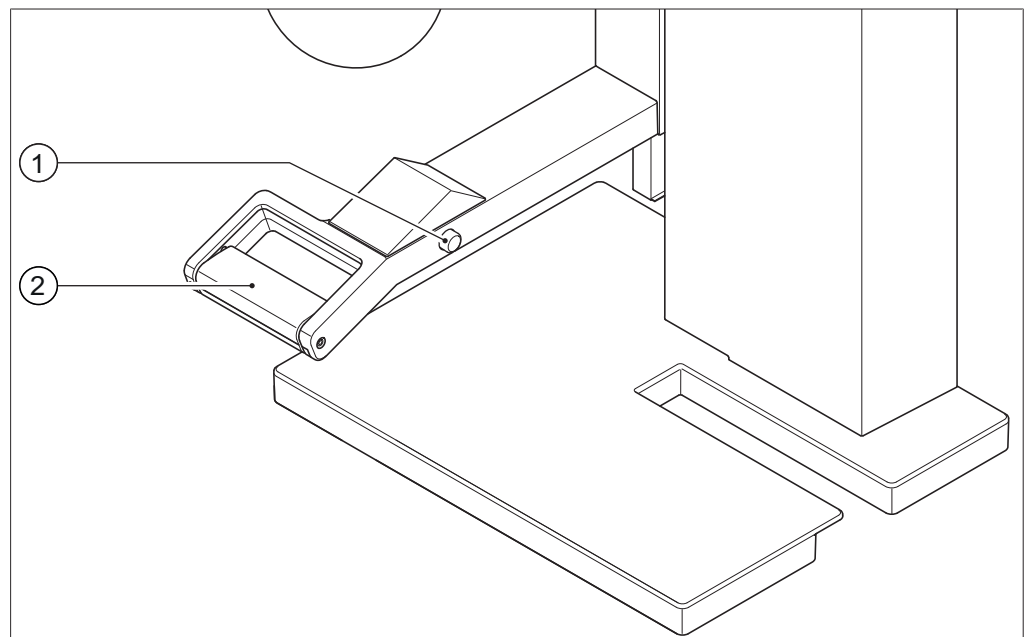


Fig. 37: Rotavapor arm

- | | |
|--|----------------------------------|
| <p>1 Set button for adjusting the depth stop</p> | <p>2 Handle on Rotavapor arm</p> |
|--|----------------------------------|

- ▶ To raise or lower the rotary drive unit, tip the handle (2) up or down to obtain the desired position.
- ▶ To set a depth stop, move the drive unit to the desired height and press and hold the Set button (1) for approx. 2 seconds.

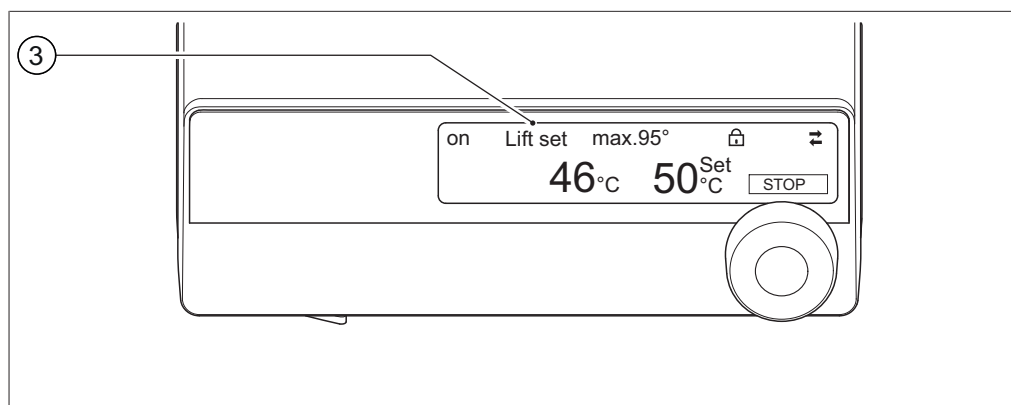


Fig. 38: Heating bath display

3 "Lift set" indication for depth stop

The display of the heating bath base shows "Lift set" (3).

- To delete a depth stop, press and hold the Set button (1) for at least three seconds until "Lift set" disappears from the display.

The position of the rotary drive unit is indicated on the display of the Heating Bath B-300 Base and the Interface I-300/I-300 Pro as follows:

- If no depth stop has been set, the distance of the lift from the top end is indicated, starting from 0 mm as the highest position. Any position below that is indicated accordingly by a negative figure.
- If a depth stop has been set, the distance of the lift from the bottom end is indicated, starting from 0 mm as the lowest position. Any position above that is indicated accordingly by a positive figure.



NOTE

2 different speeds: the lift moves down quickly until it is 2 cm from the depth stop; it then moves slowly over the last 2 cm to the depth stop.

Manual height adjustment

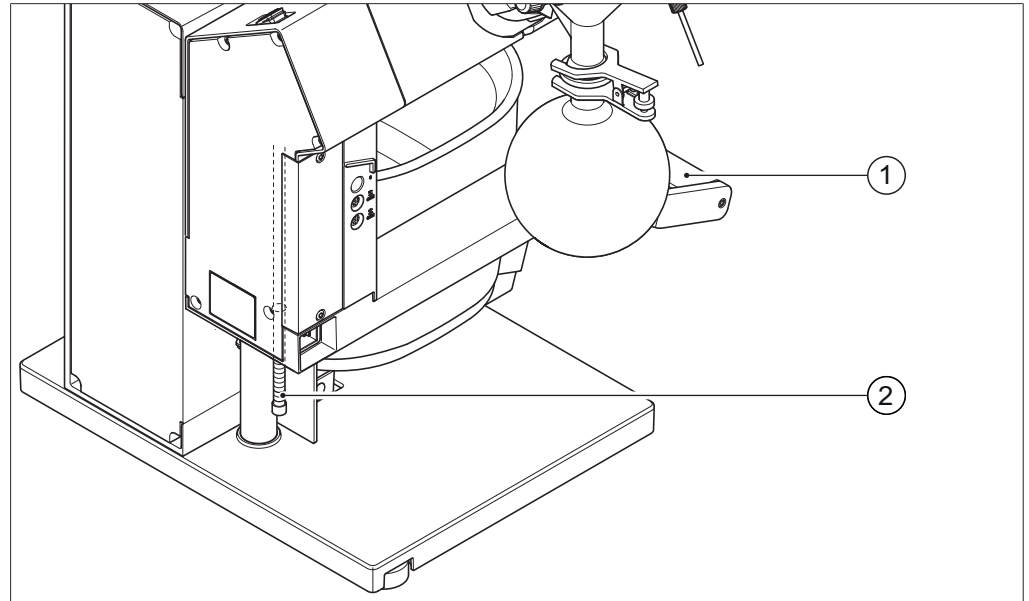


Fig. 39: Rear view of Rotavapor

1 Handle on Rotavapor arm

2 Stop screw

- ▶ To raise or lower the rotary drive unit, tip the handle (1) up or down and move the rotary drive unit to the desired position.
- ▶ To set a depth stop, press the Set button.
- The stop screw (2) drops down onto the base of the Rotavapor. That is the mechanical depth stop.

6.2 Performing distillation



DANGER

Risk of poisoning from inhalation of hazardous vapors

- ▶ Do not inhale any vapors produced during distillation.
- ▶ Ensure that vapors are removed immediately by a suitable fume hood.
- ▶ Only use the device in well ventilated areas.
- ▶ If vapors escape from joints or connections, check the seals concerned and replace them if necessary.
- ▶ Do not distil any unknown fluids.
- ▶ Observe the safety data sheets for all fluids used.



DANGER

Explosion risk from distillation of hazardous materials

- ▶ Do not distil solvents that produce explosive mixtures of gases.
- ▶ Make sure that there is always a sluggishly reactive atmosphere inside the system.
- ▶ Discharge any electrostatic charge by suitable grounding arrangements.
- ▶ Keep sources of ignition away from the apparatus.
- ▶ Use the protection shield and fume extractor, and wear protective clothing.



WARNING

Risk of explosion from excessive internal pressure

The evaporating flask and/or the condenser could explode if the internal pressure produced by evaporation becomes too great.

- ▶ Make sure that the pressure in the system is never greater than atmospheric pressure.



CAUTION

Risk of skin burns from hot components

- ▶ Do not touch hot components unless wearing suitable protective gloves.



CAUTION

Risk of injury from solvent splashes and hot heating fluid splashes

- ▶ Use the protection shield.
- ▶ Make sure that protection against splashes in all directions is provided.
- ▶ When the evaporating flask is rotating look out for splashing fluid.

6.2.1 Operating the Rotavapor without control system (interface)

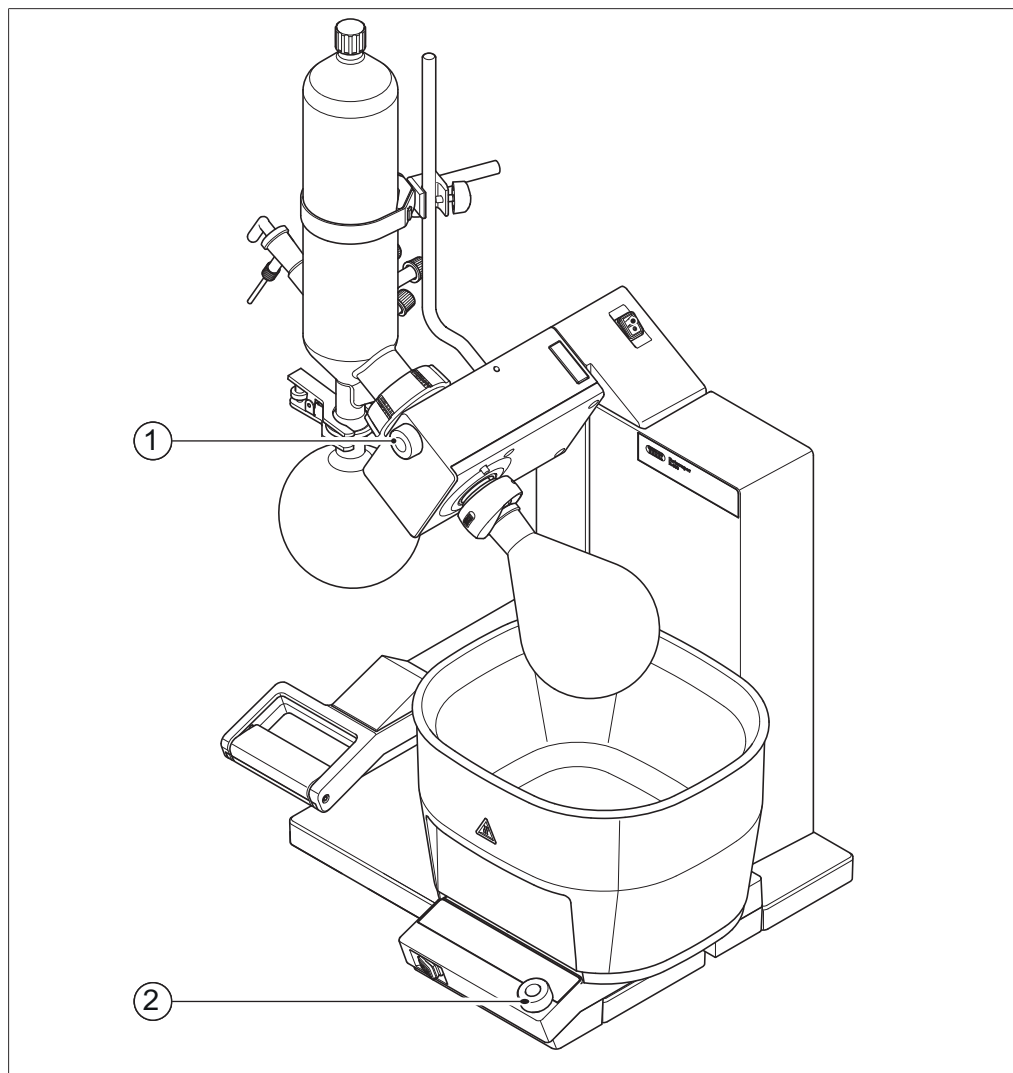


Fig. 40: Components for manual control of Rotavapor R-300

- 1 Control knob on rotary drive unit 2 Control knob on heating bath



NOTE

When controlling the Rotavapor R-300 manually, it is important to adjust and switch on the laboratory equipment involved in the correct order.

To achieve optimum distillation results, the following procedure is recommended:

- ▶ Prepare the heating bath, see Chapter 6.1.1 "Preparing the heating bath", page 54, and start the heating process by briefly pressing the control knob on the heating bath (2).
- ▶ Switch on the cooling system. Set the coolant temperature (max. 20 °C) or the flow rate (at least 40 L/h).
- ▶ Switch on the Rotavapor at the master switch.
- ▶ Fit the filled evaporating flask and the receiving flask.
- ▶ Close the glass stopcock.
- ▶ Press the control knob on the rotary drive unit (1) and start rotation at a slow speed. The rotation speed can be adjusted by means of the control knob.
- ▶ Switch on the vacuum pump and, if necessary, set the required pressure. The boiling point of the solvent must be 20 °C below the temperature of the heating bath.

- ▶ Lower the rotating evaporating flask into the heating bath. **CAUTION! Risk of pinching injuries!** If using the protection shield, make sure that your fingers or other parts of the body are not trapped.
- ▶ Immerse the evaporating flask in the heating bath.
- ▶ Increase rotation to the desired speed.
- ▶ Wait 1 – 2 minutes to make sure distillation starts.
- ▶ If necessary, adjust the vacuum and/or the heater temperature see Chapter 6.2.4 "Optimization distillation", page 65.

6.2.2 Operating Rotavapor with Interface I-300/I-300 Pro

The Rotavapor and the entire distillation system can be fully controlled by an Interface I-300/I-300 Pro. The Interface I-300/I-300 Pro settings enable precise specification of the individual process parameters. For example:

- Rotation speed of the evaporating flask
- Specified temperature of the heating bath
- Specified temperature of the coolant
- Vacuum level
- Duration of the distillation process

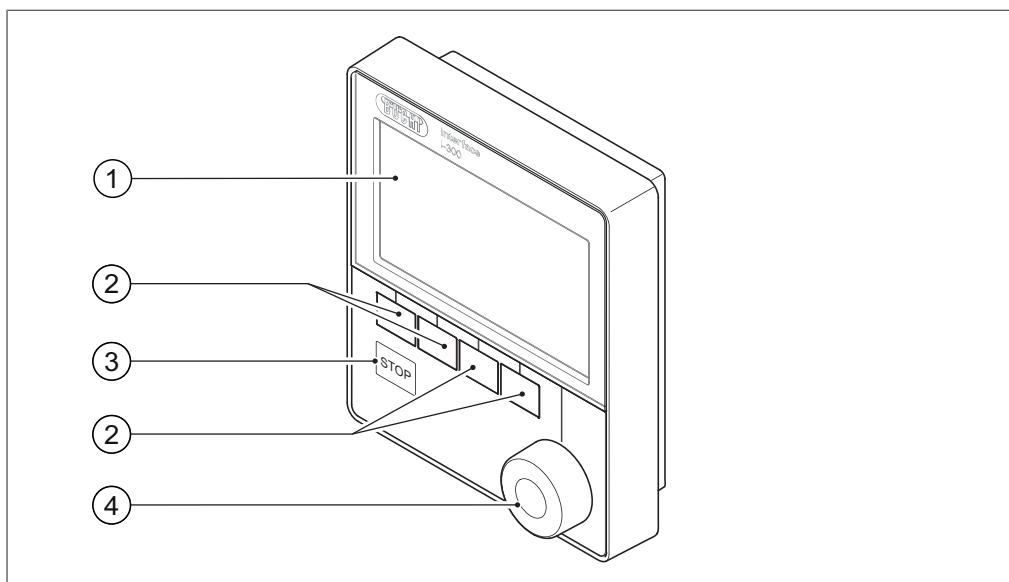


Fig. 41: Front view of Interface I-300 showing controls

- | | |
|--------------------|--------------------------------|
| 1 Display | 3 STOP button (emergency stop) |
| 2 Function buttons | 4 Navigation control |

- ▶ Connect the Interface I-300/I-300 Pro and the VacuBox, see Chapter 5.17.1 "Overview: setting up communication connections", page 48 and the relevant chapters in the operating instructions of the I-300/I-300 Pro.



NOTE

To save energy, the Interface I-300/I-300 Pro offers an "eco mode" option which can be activated if the distillation system is inactive. In eco mode, the distillation system shuts down the activity of the heating bath after a defined delay period. The heating bath does not reheat until the heating bath temperature has dropped to a defined minimum temperature. For details, refer to the operating instructions of the Interface I-300/I-300 Pro.

6.2.3 Adjusting distillation conditions

To obtain optimum distillation conditions, the energy absorbed by the solvent from the heating bath must be removed again in the condenser. To achieve that, the following settings are recommended:

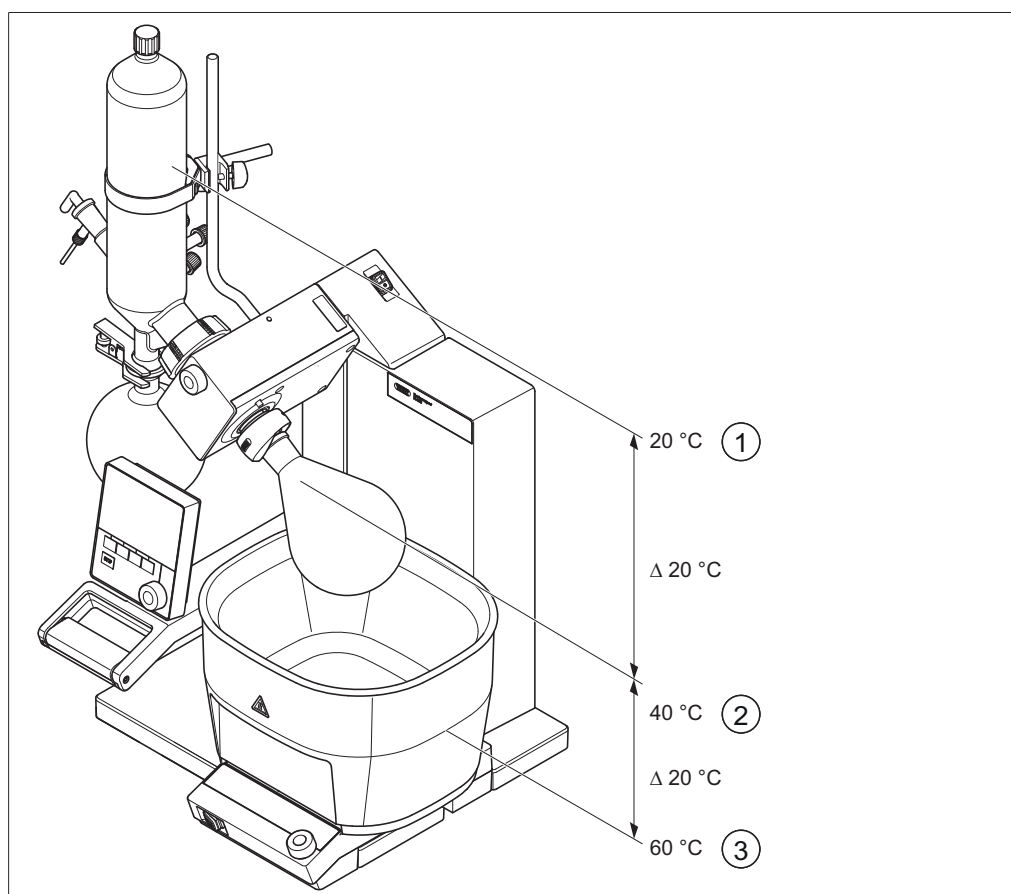


Fig. 42: Distillation conditions

- 1 Coolant temperature: 20 °C
- 2 Vapor temperature: 40 °C
- 3 Heating bath temperature: 60 °C

The temperature difference between heating bath and evaporating flask and between evaporating flask and cooling condenser should be 20 °C in each case.

The pressure in the evaporating flask should be set so that the boiling point of the solvent is around 40 °C. See Chapter 10.1 "Solvent table", page 82.

The flow rate of the coolant depends on the type of coolant used and the pump capacity of the cooler but should be at least 40 to 50 L/h.

Those settings offer the following advantages:

- The evaporating flask can be replaced without the risk of skin burns.
- The evaporation rate of the water in the heating bath is low.
- The energy of the heating bath is efficiently utilized.

6.2.4 Optimization distillation

Depending on the solvent involved, it may also be possible to further optimize the distillation process. The distillation should always be set up so that the condensate does not cover more than three quarters of the coil in the cooling condenser. There should be no condensate visible in the top quarter.

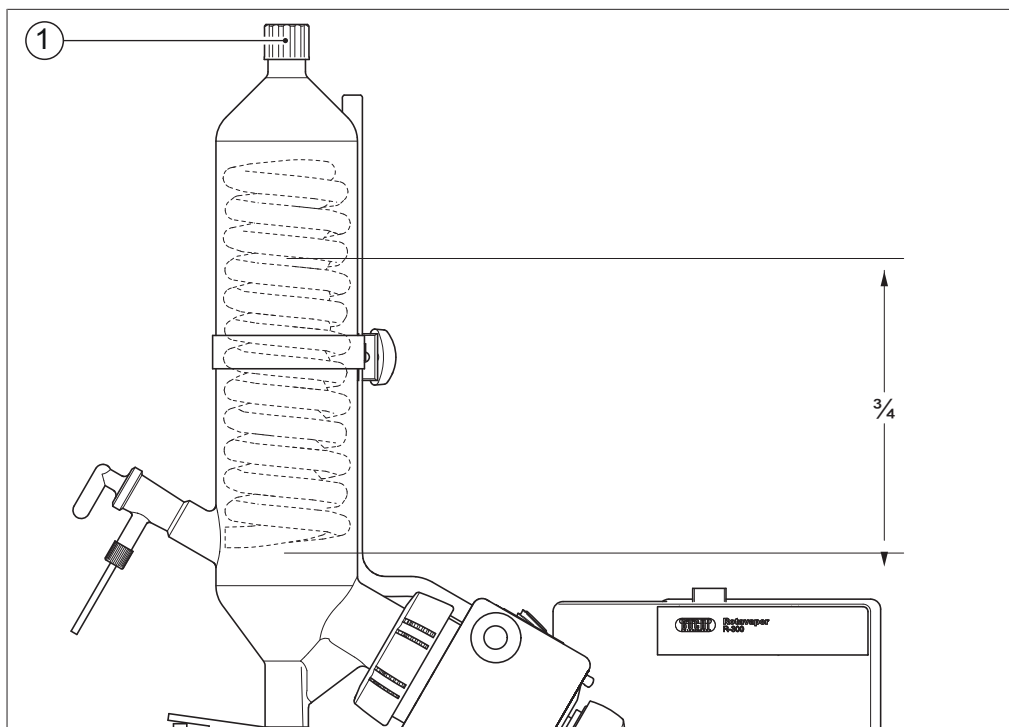


Fig. 43: Cooling condenser

1 Cleaning hole

**WARNING****Risk of explosion from excessive internal pressure**

The evaporating flask and/or the condenser could explode if the internal pressure produced by evaporation becomes too great.

- ▶ Make sure that the pressure in the system is never greater than atmospheric pressure.

**NOTE**

The stopcock should only be inserted in the cooling condenser, not secured. If an abrupt rise in pressure occurs during distillation, the stopcock will then be able to pop out, which is intended. That guarantees that the system pressure is never greater than atmospheric pressure.

**NOTE**

If a distillation process is to be carried out at normal pressure, the glass components – for example the cleaning hole (1) on the cooling condenser – should be opened to prevent pressure build-up.

If the condensation is below 3/4 of the condenser:

- ▶ Increase the vacuum.
That will lower the boiling point and more vapor will enter the condenser.
- ▶ In applications where no vacuum is applied, raise the temperature of the heating bath if necessary.
That will cause more solvent to evaporate.

If the condensation is above 3/4 of the condenser:

- ▶ Decrease the vacuum.
That will raise the boiling point and less vapor will enter the condenser.
- ▶ In applications where no vacuum is applied, lower the temperature of the heating bath.
That will cause less solvent to evaporate.

6.2.5 Adding solvent during distillation

Precondition:

- ☑ A vacuum pump is connected and running.
- ☑ A backfeed tube leading from the glass stopcock to the evaporating flask is fitted.

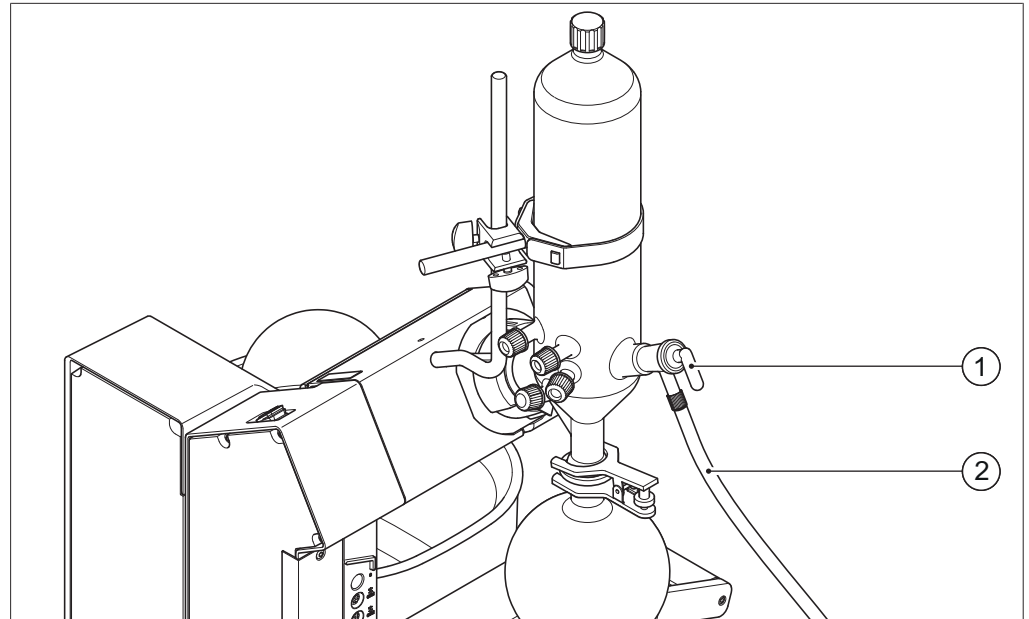


Fig. 44: Cooling condenser with glass stopcock and backfeed tube

1 Glass stopcock

2 Backfeed tube

- ▶ Connect a backfeed tube (2) for the solvent to the glass stopcock (1) and hold it in the solvent.
- ▶ Turn the glass stopcock until the handle is pointing downwards.
Solvent is drawn into the evaporating flask by the vacuum.
- ▶ Make sure that there is not more than 3 kg of solvent in the evaporating flask and that the evaporating flask is not overfilled.
- ▶ Make sure that there is sufficient space for the condensate in the receiving flask.
- ▶ Close the glass stopcock.

6.3 Finishing distillation

- ▶ Slow down the rotation speed or reduce it to a minimum.
- ▶ Raise the rotary drive unit (see Chapter 6.1.5 "Raising and lowering rotary drive unit", page 58). **CAUTION! Risk of burns from hot heating fluid splashes.** When the evaporating flask is rotating look out for splashing fluid.
- ▶ Vent the Rotavapor.
- ▶ Turn off the rotary drive unit (set the rotation speed to 0 rpm).
- ▶ Switch off the heating bath.
- ▶ **CAUTION! Risk of skin burns from hot evaporating flask.** Check the temperature of the evaporating flask and, if necessary, allow it to cool down or else wear suitable protective gloves.
- ▶ Remove the evaporating flask, see Chapter 6.3.1 "Removing the evaporating flask", page 68.
- ▶ Turn off the coolant supply.
- ▶ Remove the receiving flask, see Chapter 6.3.2 "Removing the receiving flask", page 69.
- ▶ Dry the Rotavapor, see Chapter 7.9 "Removing solvent accumulations", page 76.
- ▶ Clean the Rotavapor and all glass components, see Chapter 7 "Cleaning and servicing", page 70.

6.3.1 Removing the evaporating flask

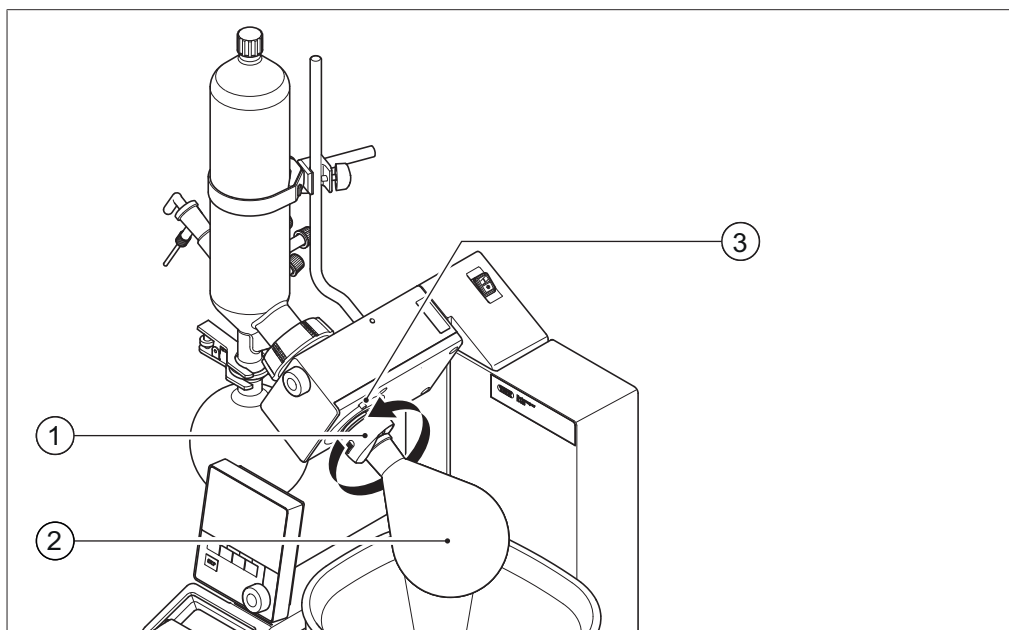


Fig. 45: Evaporating flask on Rotavapor R-300

- | | |
|---------------------|------------------|
| 1 Combi-clip | 3 Locking button |
| 2 Evaporating flask | |

- ▶ Slow down the rotation speed or reduce it to a minimum.
- ▶ Raise the rotary drive unit (see Chapter 6.1.5 "Raising and lowering rotary drive unit", page 58).
- ▶ Vent the Rotavapor.
- ▶ Turn off the rotary drive unit (set the rotation speed to 0 rpm).
- ▶ **CAUTION! Risk of skin burns from hot evaporating flask.** Check the temperature of the evaporating flask and, if necessary, allow it to cool down or else wear suitable protective gloves.
- ▶ Firmly hold the evaporating flask (2) and release the combi-clip (1) by screwing it counter-clockwise.
- ▶ Detach the evaporating flask.

- ▶ If the evaporating flask sticks because of chemical residues, press the lock release button (3) and twist the combi-clip counter-clockwise to allow the flask to be removed.

6.3.2 Removing the receiving flask

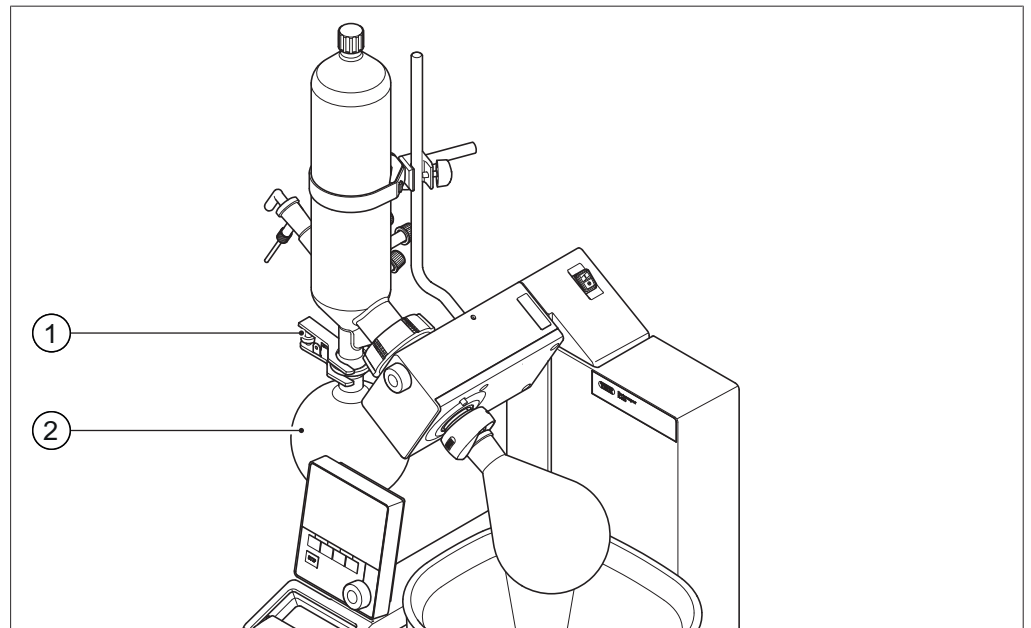


Fig. 46: Receiving flask on Rotavapor R-300

1 Ball joint clamp

2 Receiving flask

- ▶ Slow down the rotation speed or reduce it to a minimum.
- ▶ Raise the rotary drive unit (see Chapter 6.1.5 "Raising and lowering rotary drive unit", page 58).
- ▶ Vent the Rotavapor.
- ▶ Turn off the rotary drive unit (set the rotation speed to 0 rpm).
- ▶ Firmly hold the receiving flask (2), remove the ball joint clamp (1) and remove the receiving flask.
- ▶ Make sure that any dripping condensate cannot cause any damage.

7 Cleaning and servicing



NOTE

Users may only carry out the servicing and cleaning operations described in this section.

Any servicing and repair work which involves opening up the housing may only be carried out by BUCHI service technicians.

- ▶ Use only genuine BUCHI consumables and spare parts in order to ensure correct operation of the device and preserve the warranty.
- ▶ Before carrying out any servicing work, empty the heating bath and all glass components.

7.1 Inspecting and cleaning the vapor duct

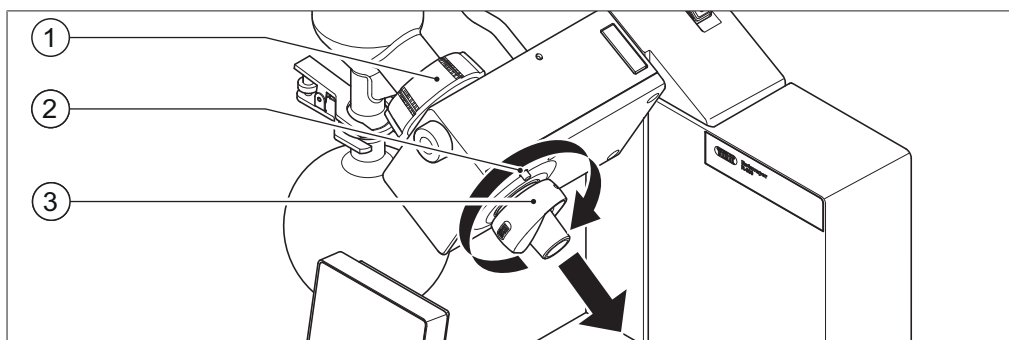


Fig. 47: Vapor duct on Rotavapor R-300

- | | |
|------------------|--------------|
| 1 Flange nut | 3 Combi-clip |
| 2 Locking button | |

- ▶ Switch off the device.
- ▶ Remove the evaporating flask, see Chapter 6.3.1 "Removing the evaporating flask", page 68.
- ▶ Remove the receiving flask, see Chapter 6.3.2 "Removing the receiving flask", page 69.
- ▶ Remove the cooling condenser from the rotary drive unit. To do so, hold the cooling condenser firmly with one hand and unscrew the flange nut (1) with the other hand.
- ▶ Press and hold the lock release button (2) on the front of the rotary drive unit.
- ▶ Turn the combi-clip (3) clockwise until the vapor duct is released.
- ▶ Remove the vapor duct and visually inspect it for damage, wear marks and residues.
- ▶ Clean the vapor duct with a paper towel and water or ethanol.
- ▶ Refit the vapor duct and cooling condenser, see Chapter 5.3 "Fitting the vapor duct, vacuum gasket and cooling condenser", page 26.

7.2 Checking the system for leaks

Recommendation:

When using an Interface I-300/I-300 Pro there is the option of performing a leak test to check the system for leaks. For details, refer to the operating instructions of the Interface I-300/I-300 Pro.

Precondition:

- A vacuum pump with a pressure gauge is connected.
- The system is dry.
- ▶ Make sure that the system is dry. Remove any solvent accumulations if necessary.
- ▶ Make sure that all flasks are fitted and the glass stopcock is closed.
- ▶ Connect the vacuum pump and evacuate the R-300 to a pressure of 50 mbar.
- ▶ Switch off the vacuum pump. If necessary, disconnect the vacuum tubing so as to exclude the vacuum pump as a possible source of a leak.
- ▶ Check the pressure after one minute.
- If the pressure has risen by less than 5 mbar after one minute, the system is air-tight.

If the system is not air-tight:

- ▶ Check all seals, see Chapter 7.5 "Checking seals", page 73.
- ▶ Examine all tubing and replace if they are brittle or cracked.
- ▶ Grease ground glass joints if necessary.



NOTE

Damaged ground glass joints can also lead to leaks in the system.

7.3 Cleaning the splash guard (optional accessory)

- ▶ Wipe down the splash guard with a damp cloth.
- ▶ If heavily soiled, use ethanol or a mild detergent.

7.4 Fitting GL14 cap nut with tube seal

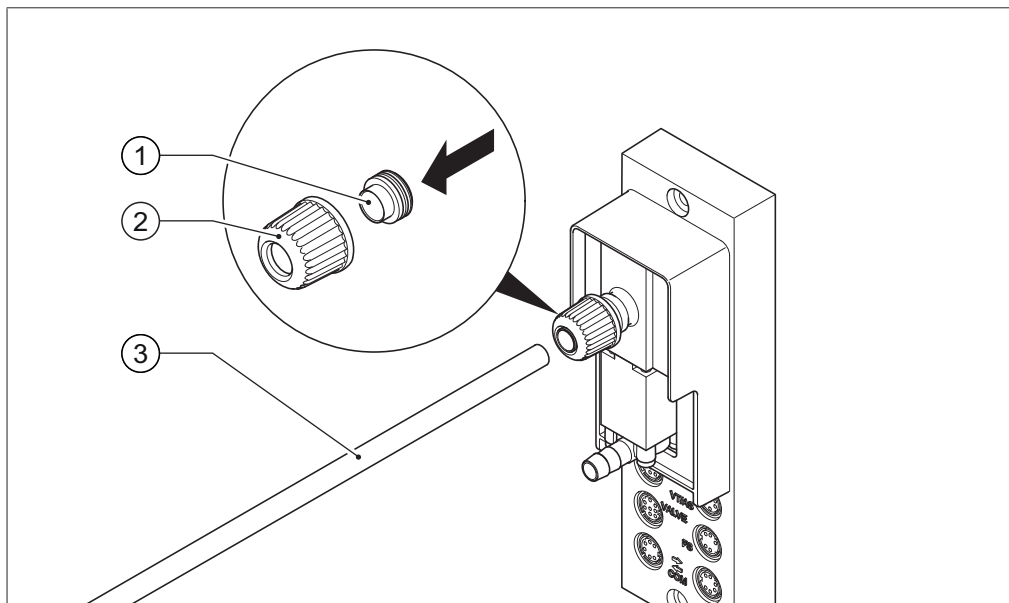


Fig. 48: Fitting GL14 cap nut with tube seal (example shows VacuBox)

1 Tube seal

3 Tubing

2 GL14 cap nut

- ▶ Insert the tube seal (1) in the GL14 cap nut (2) ensuring it is straight.
NOTICE! Risk of damaging tube seal. Make sure that the tube seal does not twist or jam in the GL14 cap nut.
- ▶ Loosely screw the GL14 cap nut together with tube seal onto the device concerned (example shows VacuBox) or the Woulff bottle.
- ▶ Carefully insert the end of the tube (3) into the GL14 cap nut and tube seal.
- ▶ Tighten the GL14 cap nut and tube seal.

7.5 Checking seals



NOTE

The life of a seal depends on how much it is used and how well it is looked after.

Clean the seals if

- boiling delays occur during distillation.
- crystalline products are distilled.
- solvents remain in the condenser.
- after using corrosive solvents.

Replace the seals if

- the seals swell up.
- the vacuum is not achieved.
- the sealing lip is damaged.
- there is a risk of sample contamination.

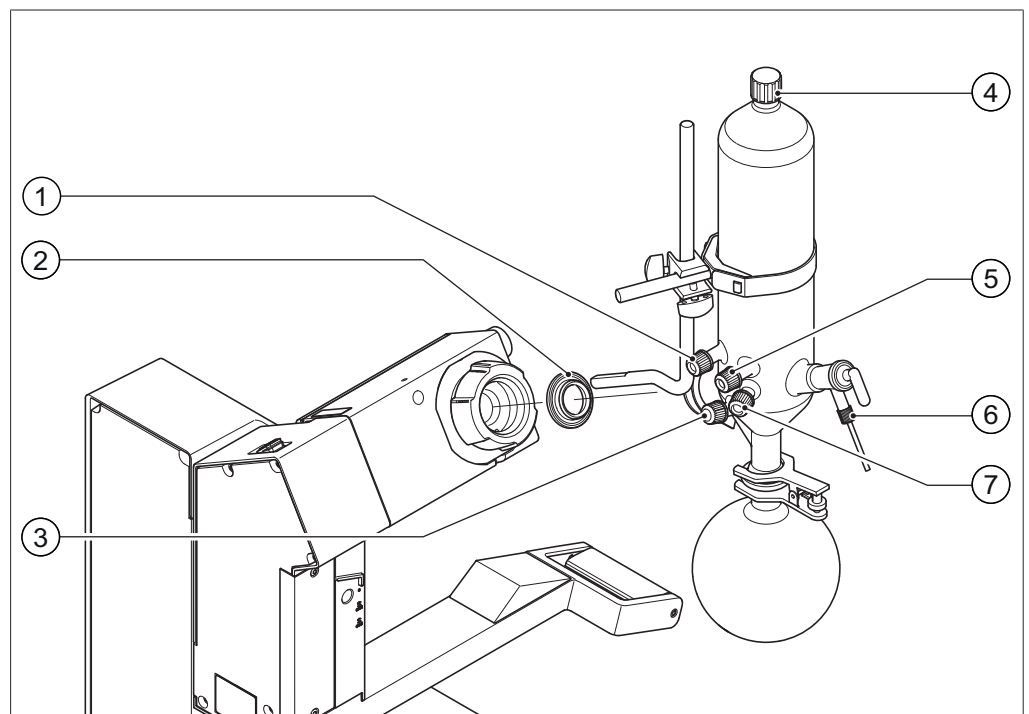


Fig. 49: Seals on Rotavapor and cooling condenser

- | | |
|----------------|--------------------------|
| 1 Coolant seal | 4 Cleaning hole seal |
| 2 Vacuum seal | 5 Coolant seal |
| 3 Sensor seal | 6 Feed tubing seal |
| | 7 Vacuum connection seal |

Precondition:

The system leak test result was negative. See Chapter 7.2 "Checking the system for leaks", page 71

- ▶ Remove seals and inspect for damage and cracks.
- ▶ Rinse intact seals in water or ethanol and dry with a soft cloth.

- ▶ Replace damaged seals and check the corresponding glass contact faces for damage (e.g. wear marks).

**NOTE**

New seals require approx. 10 hours to achieve an optimum seal.

7.6 Cleaning the glassware

IMPORTANT

Clean glass components by hand in order to avoid damage.



NOTE

Inserting a thin copper wire into the coil of the secondary condenser reduces algae growth in the coil.

- ▶ Using a wash bottle, squirt ethanol into the cleaning hole of the cooling condenser and rinse it out.
- ▶ After rinsing allow the ethanol to drain out.
- ▶ Remove the ethanol from the receiving flask.
- ▶ Use an alkaline cleaning agent to remove stubborn dirt (e.g. algae in the condenser coil).
- ▶ Remove grease from joints.
- ▶ Carry out a distillation process in order to dry the glassware.
- ▶ Make sure that there is no fluid in the system.
The glassware must be dry.
- ▶ Check the glassware for cracks.
- ▶ Dispose of damaged glassware.

7.7 Cleaning the heating bath

IMPORTANT

Risk of short circuit from fluid penetration into device

- ▶ Do not immerse heating bath or rotary drive unit in water or pour water over them.
- ▶ Only wipe down the casing with a damp cloth.

Clean the heating bath bowl if

- the water in the heating bath is contaminated.
- limescale deposits are starting to form.
- the steel surface of the heating bath is starting to rust.
- the oil in the oil bath has changed (colour, viscosity, etc.).
- ▶ Disconnect the power supply for the heating bath.
- ▶ Disconnect the power supply for the rotary drive unit.
- ▶ Allow the heating bath to cool down.
- ▶ Empty the heating bath.
- ▶ Remove small amounts of limescale in the bowl of the heating bath using non-abrasive cleaners (e.g. household cleaner and washing-up sponge).
- ▶ Use acetic acid to dissolve stubborn limescale deposits.
- ▶ Use an abrasive cloth/pad to remove rust.
- ▶ Rinse out the heating bath.

7.8 Cleaning the Woulff bottle

- ▶ Unscrew the glass part of the Woulff bottle from the holder.
- ▶ Clean the glass part with ethanol to remove residues.
- ▶ Screw the glass part back into the holder.

7.9 Removing solvent accumulations

Before any extended period in which the device is not used (e.g. overnight) all fluids must be removed from the device and the system dried.

- ▶ Fit a clean and dry evaporating flask and receiving flask. See Chapter 6.1.2 "Fitting the evaporating flask", page 55 and Chapter 6.1.4 "Fitting the receiving flask", page 57.
- ▶ Make sure that the glass stopcock is closed.
- ▶ Connect the vacuum pump and evacuate the Rotavapor as much as possible.
- ▶ Allow the vacuum pump to run for at least 2 to 3 minutes.
- ▶ Vent the Rotavapor.
- ▶ Check that all solvent accumulations have been removed.

8 Help with faults

8.1 Faults, possible causes and remedies

Fault	Possible cause	Remedy
Device does not work	Device is not connected to power supply	▶ Check power supply (see Chapter 5.16 "Connecting the Rotavapor to the power supply", page 44).
	Fuse blown	▶ Replace fuse (see Chapter 8.2.2 "Replacing fuse in heating bath base", page 80). ▶ If fault recurs, contact BUCHI Customer Service.
Heating bath fails to heat up	Device is not connected to power supply	▶ Check power supply (see Chapter 5.16 "Connecting the Rotavapor to the power supply", page 44).
	High temperature cut-out has tripped	▶ Reset the overheat safety cut-out (see Chapter 8.2.1 "Resetting overheat safety cut-out on heating bath", page 79).
	Fuse blown	▶ Replace fuse (see Chapter 8.2.2 "Replacing fuse in heating bath base", page 80). ▶ If fault recurs, contact BUCHI Customer Service.
System leaking	Ground glass joints not greased	▶ Grease ground glass joints.
	Tubing leaking	▶ Replace tubing (see Chapter 5.12 "Connecting vacuum and coolant tubing", page 38).
	Seal defective	▶ Replace seal (see Chapter 7.5 "Checking seals", page 73).
Electric lift does not operate	Heating Bath B-300 Base and heating bath positioned too far to the left.	▶ Move Heating Bath B-300 Base to the right until it snaps into position.

Fault	Possible cause	Remedy
Vacuum is not achieved	Back-evaporation from the receiving flask	▶ Empty the receiving flask (see Chapter 6.3.2 "Removing the receiving flask", page 69).
	Temperature difference between vapor and coolant less than 20 °C	▶ Increase cooling (see Chapter 6.2.3 "Adjusting distillation conditions", page 65).
	System leaking	▶ Check system for leaks (see Chapter 7.2 "Checking the system for leaks", page 71).
	If using a glass filter pump: water pressure of glass filter pump too low	▶ Increase water flow (see pump operating instructions).
	Vacuum pump too weak	▶ Use suitably dimensioned vacuum pump.
Optimum distillation not achieved	Too much back-evaporation from the receiving flask (especially with solvent mixtures)	▶ Empty receiving flask and restart distillation (see Chapter 6.3.2 "Removing the receiving flask", page 69, Chapter 6.1.4 "Fitting the receiving flask", page 57 and Chapter 6.2 "Performing distillation", page 62).
	Other faults in distillation process (e.g. sudden cooling, too little heat flow, etc.)	<ul style="list-style-type: none"> ▶ Check temperatures of heating bath and coolant and adjust as necessary (see Chapter 6.1.1 "Preparing the heating bath", page 54 and/or cooler operating instructions). ▶ Lower pressure until distillation resumes (see vacuum pump operating instructions).

8.2 Resetting safety functions

8.2.1 Resetting overheat safety cut-out on heating bath

The overheat safety cut-out trips if oil is used in the Heating Bath B-301 or the temperature control fails. In that case, the power supply for the heating bath is switched off. If the wrong heating fluid has been used for the Heating Bath B-301, the overheat safety cut-out can be reset.

The overheat safety cut-out is on the underneath of the heating bath.



CAUTION

Risk of skin burns from hot components

- ▶ Do not touch hot components unless wearing suitable protective gloves.

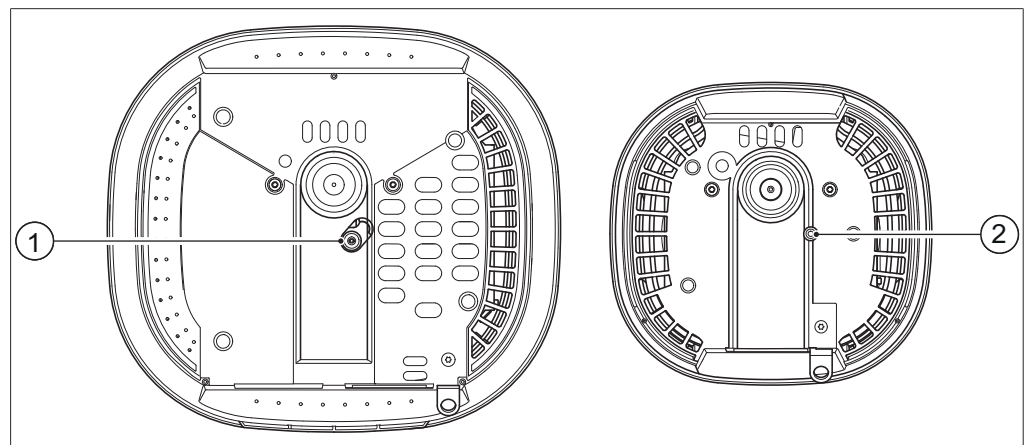


Fig. 50: Undersides of Heating Baths B-301 and B-305

- 1 Overheat safety cut-out on B-305 2 Overheat safety cut-out on B-301

- ▶ Switch off the device.
 - ▶ Unplug the power supply for the heating bath and rotary drive unit.
 - ▶ Allow the heating bath to cool down then empty it.
 - ▶ Using a narrow object or screwdriver, press the red pin (1)/(2) on the underside of the heating bath.
- The overheat safety cut-out is reset.

8.2.2 Replacing fuse in heating bath base

The fuse is on the rear of the heating bath base.

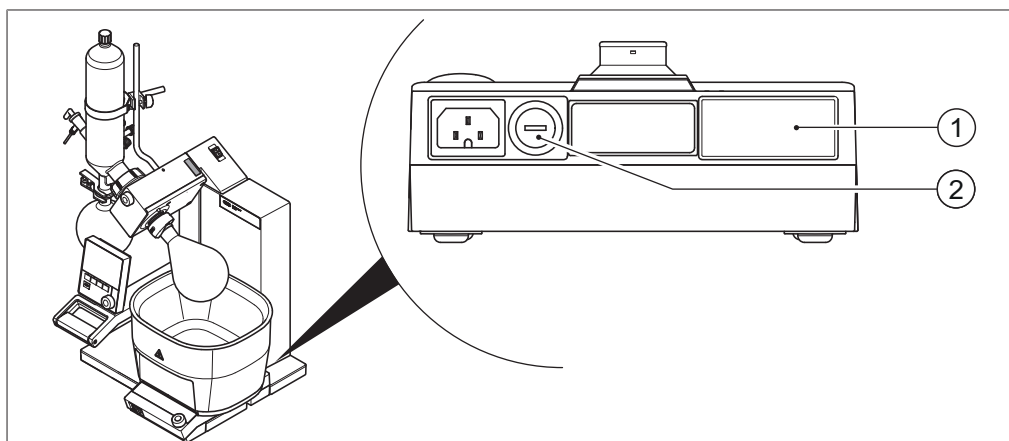


Fig. 51: Fuse in heating bath base

1 Fuse rating plate

2 Fuse holder

- ▶ Allow the heating bath to cool down then lift it carefully off the base.
- ▶ Slide the base to the right off the base of the Rotavapor.
- ▶ Disconnect the power cord.
- ▶ Open the fuse holder (2) with a large screwdriver.
- ▶ Replace the blown fuse with an intact one of the same rating.
- ▶ Screw the fuse holder (2) back in.
- ▶ Reconnect the power cord.
- ▶ Slide the base back onto the Rotavapor® base from the right.



NOTE

The fuse must match the specifications on the fuse rating plate.

9 Taking out of service and disposal

9.1 Taking out of service

- ▶ Remove all fluids from the glass components (see Chapter 7.9 "Removing solvent accumulations", page 76).
- ▶ Switch off the device.
- ▶ Unplug the power supply for the heating bath and rotary drive unit.
- ▶ Remove all glass components.

9.2 Disposal

The operator is responsible for proper disposal of the Rotavapor®.

- ▶ When disposing of equipment observe the local regulations and statutory requirements regarding waste disposal.

10 Appendix

10.1 Solvent table

Solvent	Formula	Molar mass in g/mol	Evaporation energy in J/g	Boiling point in °C at 1013 mbar	Density in g/cm ³	Vacuum in mbar for 40 °C boiling point
Acetone	CH ₃ H ₆ O	58.1	553	56	0.790	556
<i>n</i> -pentanol	C ₅ H ₁₂ O	88.1	595	137	0.814	11
Benzene	C ₆ H ₆	78.1	548	80	0.877	236
<i>n</i> -butanol	C ₄ H ₁₀ O	74.1	620	118	0.810	25
<i>tert</i> -butanol	C ₄ H ₁₀ O	74.1	590	82	0.789	130
Chlorobenzene	C ₆ H ₅ Cl	112.6	377	132	1.106	36
Chloroform	CHCl ₃	119.4	264	62	1.483	474
Cyclohexane	C ₆ H ₁₂	84.0	389	81	0.779	235
Diethyl ether	C ₄ H ₁₀ O	74.0	389	35	0.714	850
1,2-dichloroethane	C ₂ H ₄ Cl ₂	99.0	335	84	1.235	210
<i>cis</i> -1,2-dichloroethene	C ₂ H ₂ Cl ₂	97.0	322	60	1.284	479
<i>trans</i> -1,2-dichloroethene	C ₂ H ₂ Cl ₂	97.0	314	48	1.257	751
Di-isopropyl ether	C ₆ H ₁₄ O	102.0	318	68	0.724	375
Dioxane	C ₄ H ₈ O ₂	88.1	406	101	1.034	107
DMF (dimethylformamide)	C ₃ H ₇ NO	73.1	–	153	0.949	11
Acetic acid	C ₂ H ₄ O ₂	60.0	695	118	1.049	44
Ethanol	C ₂ H ₆ O	46.0	879	79	0.789	175
Ethylacetate	C ₄ H ₈ O ₂	88.1	394	77	0.900	240
Heptane	C ₇ H ₁₆	100.2	373	98	0.684	120
Hexane	C ₆ H ₁₄	86.2	368	69	0.660	360
Isopropanol	C ₃ H ₈ O	60.1	699	82	0.786	137
Isopentanol	C ₅ H ₁₂ O	88.1	595	129	0.809	14
Methylethylketone	C ₄ H ₈ O	72.1	473	80	0.805	243
Methanol	CH ₄ O	32.0	1227	65	0.791	337
Dichlormethane	CH ₂ Cl ₂	84.9	373	40	1.327	850
Pentane	C ₅ H ₁₂	72.1	381	36	0.626	850
<i>n</i> -propanol	C ₃ H ₈ O	60.1	787	97	0.804	67
Pentachloroethane	C ₂ HCl ₅	202.3	201	162	1.680	13
1,1,2,2-tetrachloroethane	C ₂ H ₂ Cl ₄	167.9	247	146	1.595	20
Tetrachloromethane	CCl ₄	153.8	226	77	1.594	271

Solvent	Formula	Molar mass in g/mol	Evaporation energy in J/g	Boiling point in °C at 1013 mbar	Density in g/cm ³	Vacuum in mbar for 40 °C boiling point
1,1,1-trichloroethane	C ₂ H ₃ Cl ₃	133.4	251	74	1.339	300
Tetrachloroethene	C ₂ Cl ₄	165.8	234	121	1.623	53
THF (tetrahydrofuran)	C ₄ H ₈ O	72.1	–	67	0.889	374
Toluene	C ₇ H ₈	92.2	427	111	0.867	77
Trichloroethene	C ₂ HCl ₃	131.3	264	87	1.464	183
Water	H ₂ O	18.0	2261	100	1.000	72
Xylene (mixture)	C ₈ H ₁₀	106.2	389	–	–	25
<i>o</i> -xylene	C ₈ H ₁₀	106.2	–	144	0.880	–
<i>m</i> -xylene	C ₈ H ₁₀	106.2	–	139	0.864	–
<i>p</i> -xylene	C ₈ H ₁₀	106.2	–	138	0.861	–

10.2 Spare parts and accessories

Use only genuine BUCHI consumables and spare parts in order to ensure correct, safe and reliable operation of the system.



NOTE

Any modifications of spare parts or assemblies are only allowed with the prior written permission of BUCHI.

10.2.1 Glass assembly A

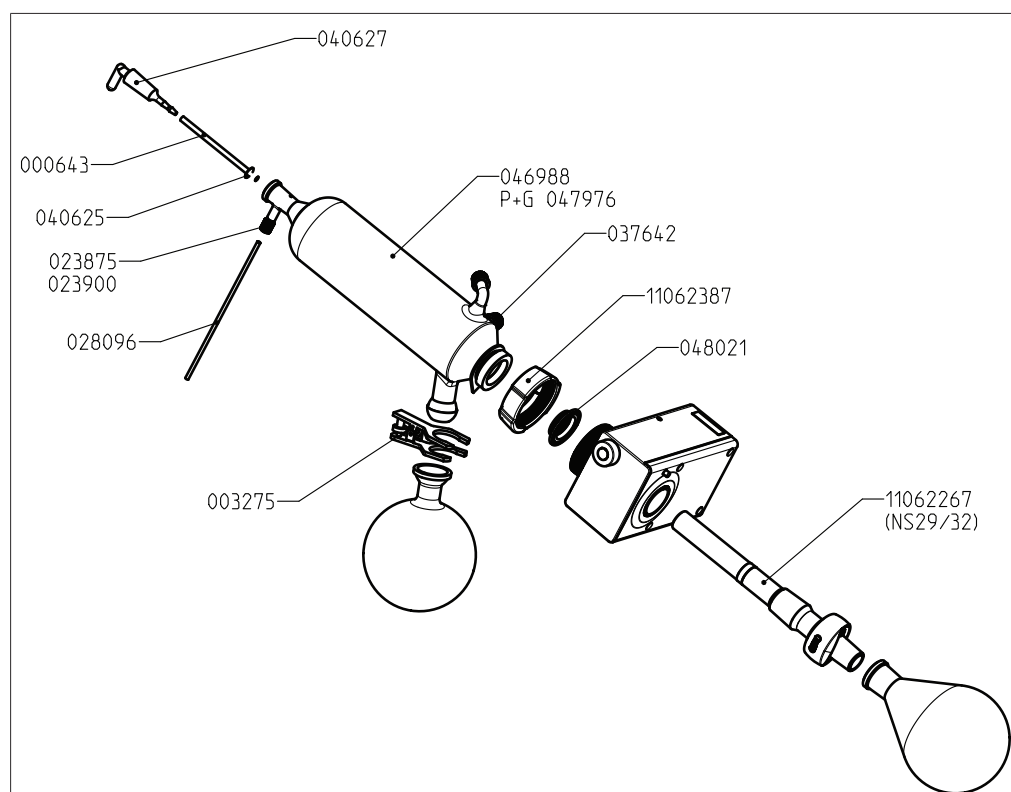


Fig. 52: Glass assembly A

10.2.2 Glass assembly V

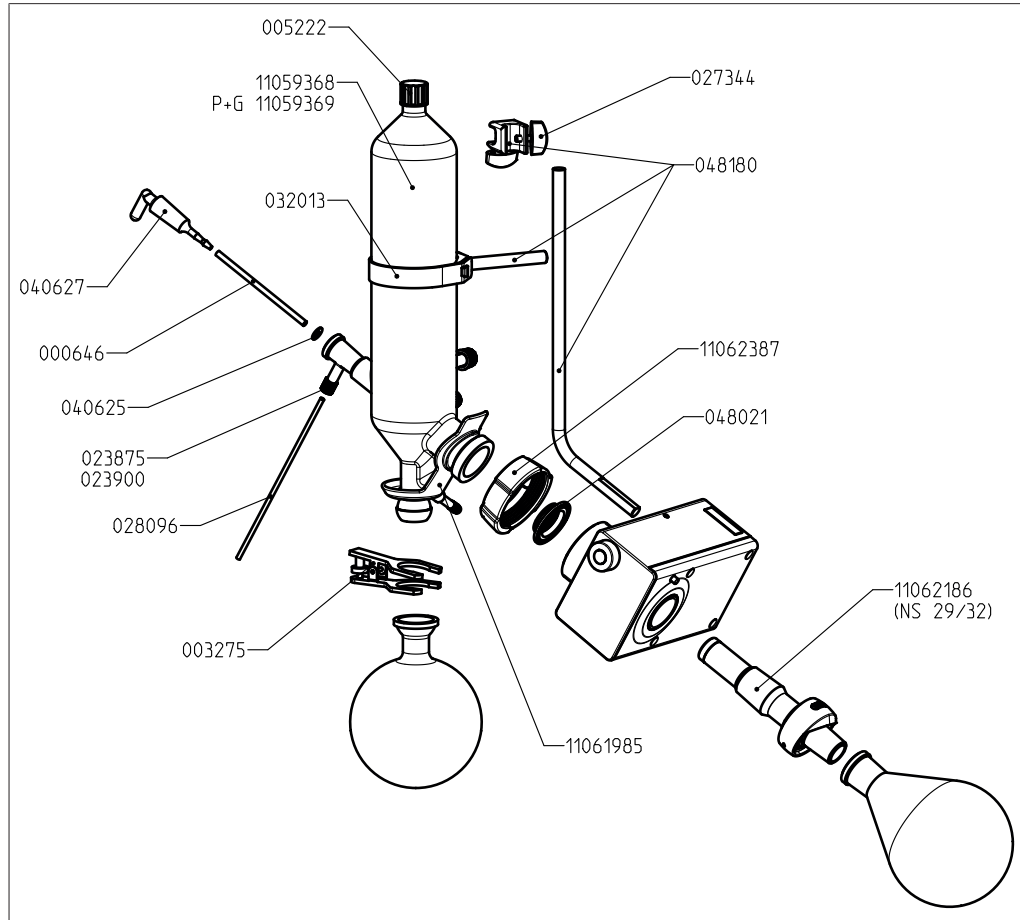


Fig. 53: Glass assembly V

10.2.3 Glass assembly C

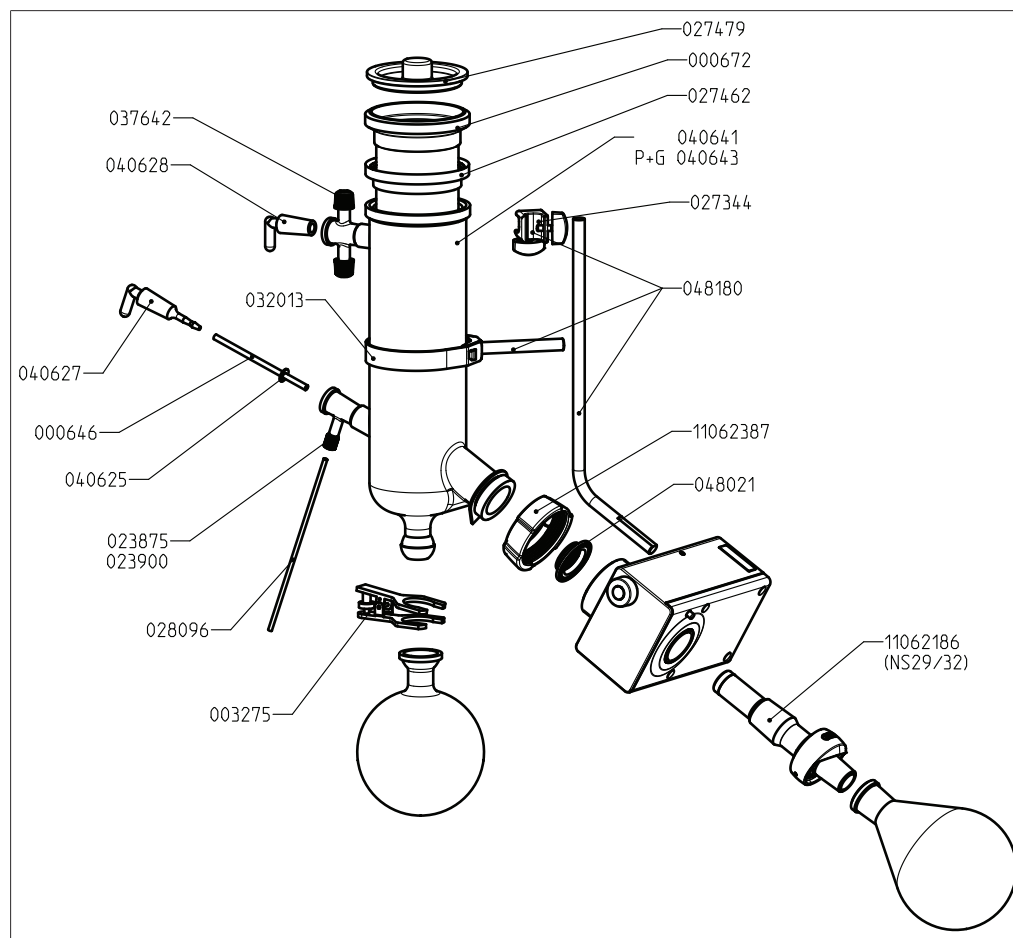


Fig. 54: Glass assembly C

10.2.4 Glass assembly S

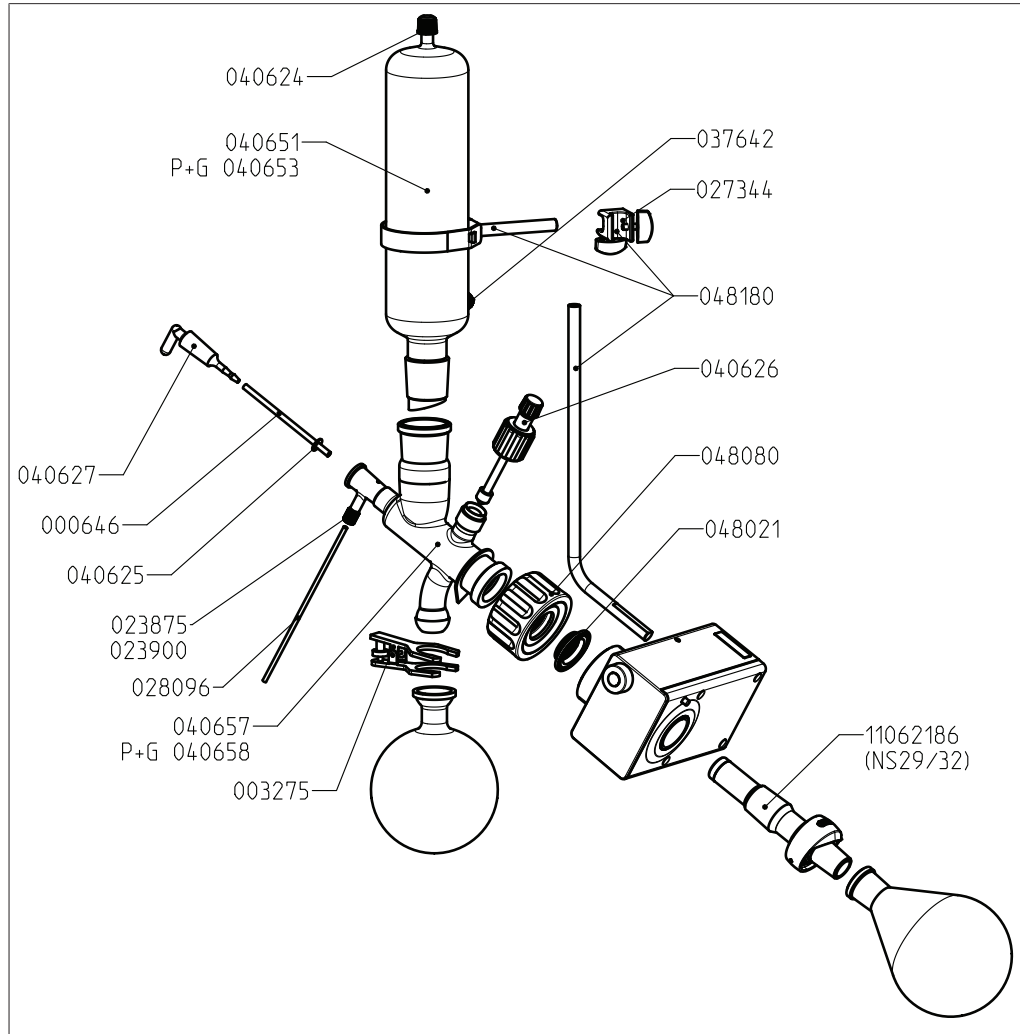


Fig. 55: Glass assembly S

10.2.5 Glass assembly CR

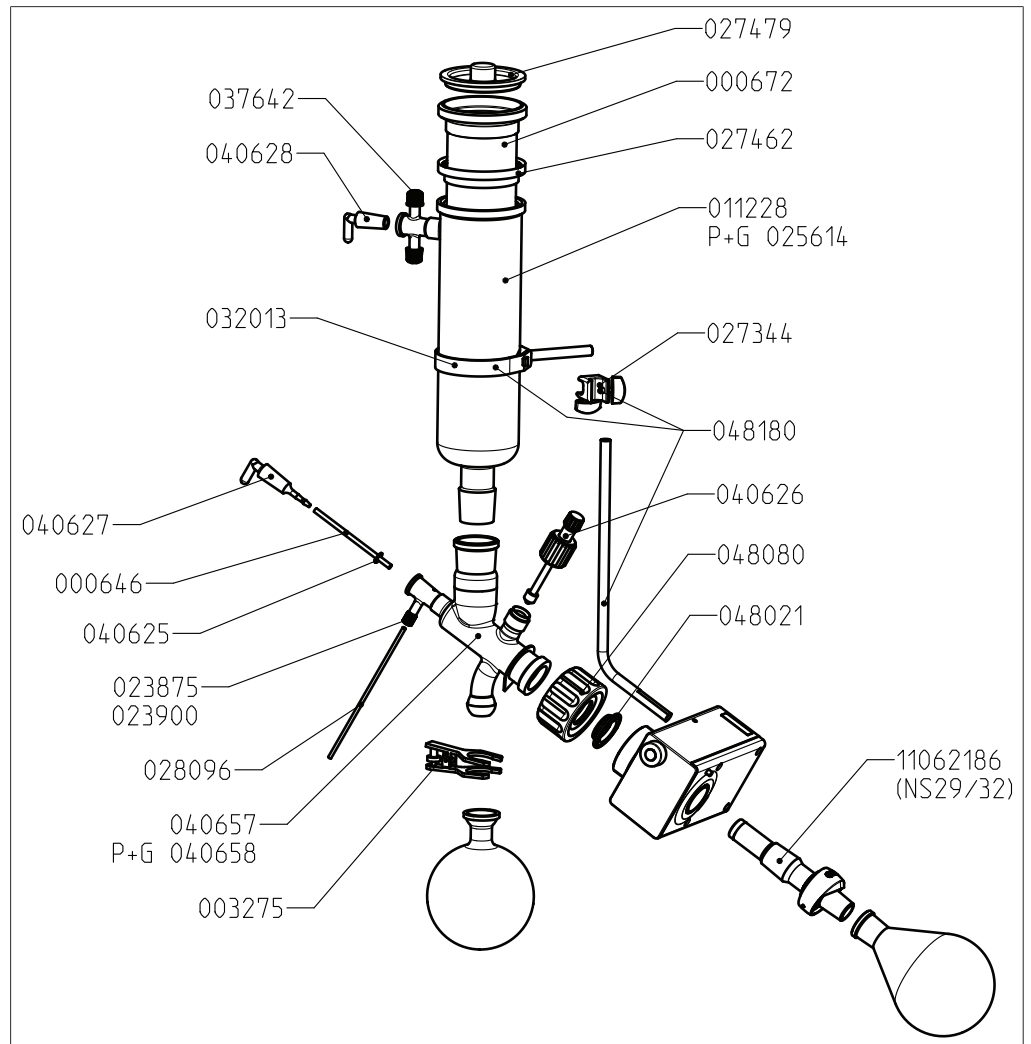


Fig. 56: Glass assembly CR

10.2.6 Glass assembly E

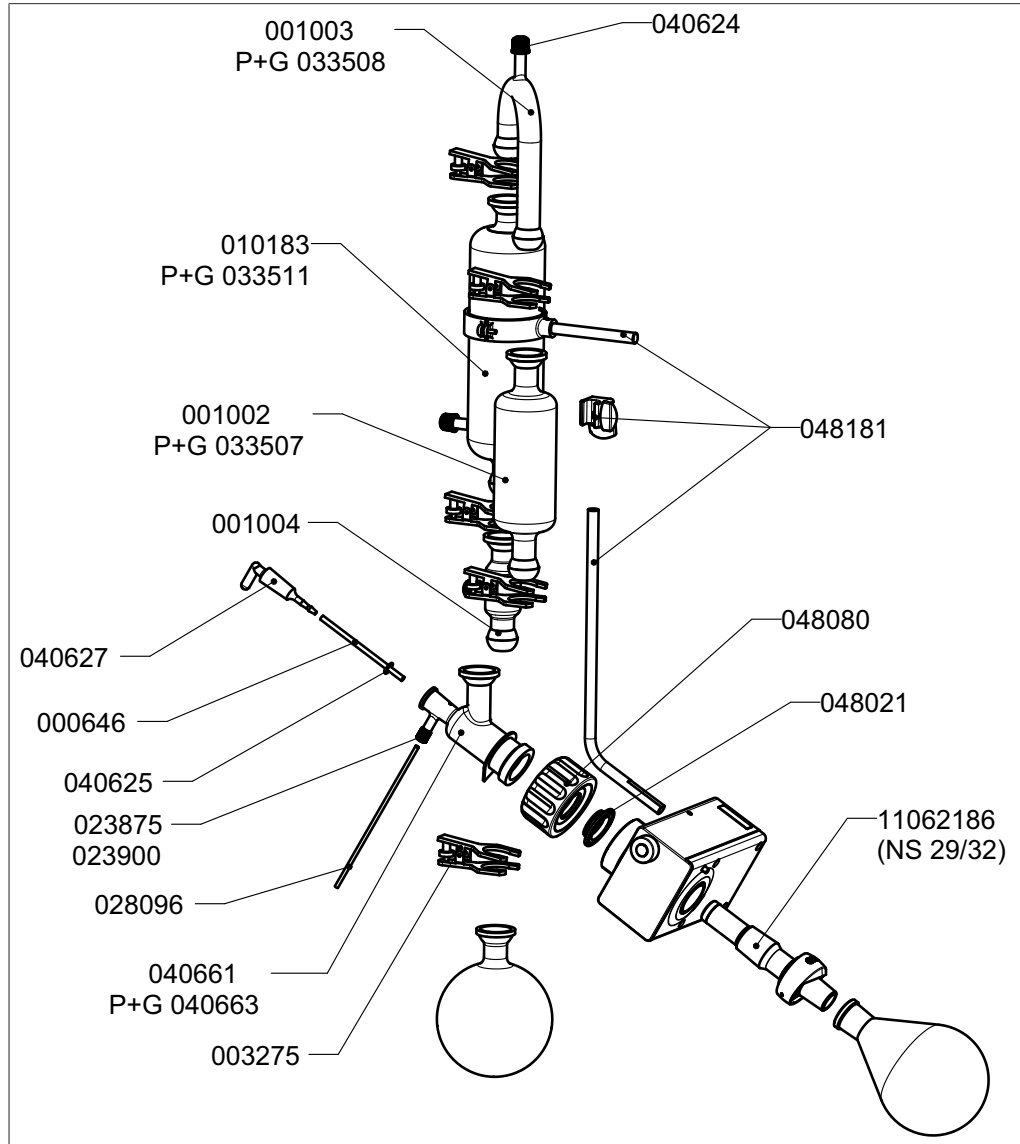


Fig. 57: Glass assembly E

10.2.7 Glass assembly BY

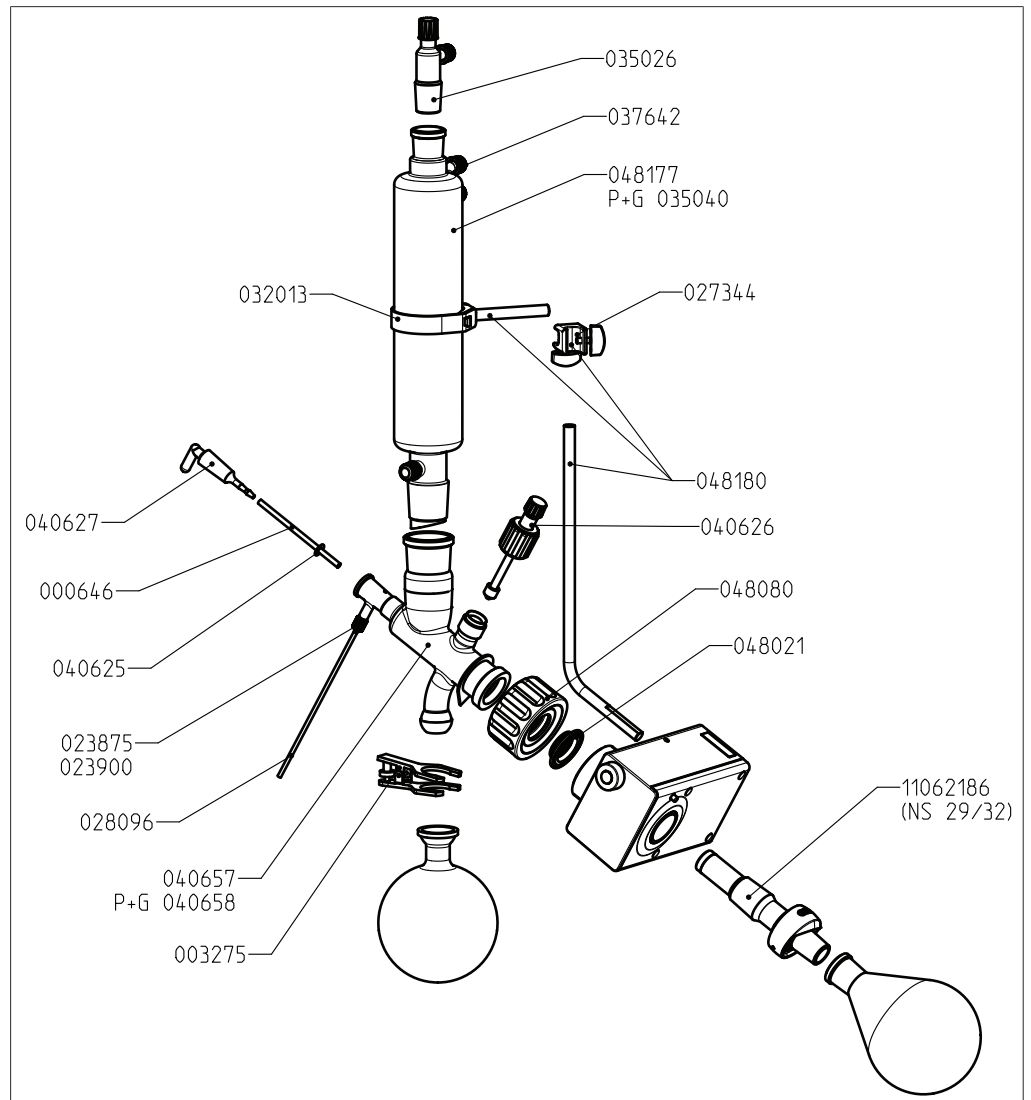


Fig. 58: Glass assembly BY

10.2.8 Accessories

Heating baths

	Order no.
Heating Bath B-301, 110V, not incl. Base B-300 For up to 1 Liter evaporating flasks. For temperatures up to 95°C. Meant to be used with water as heating media.	11B301002
Heating Bath B-301, 230V, not incl. Base B-300 For up to 1 Liter evaporating flasks. For temperatures up to 95 °C. Meant to be used with water as heating media.	11B301001
Heating Bath B-301, 110V, incl. Base B-300 For up to 1 Liter evaporating flasks. For temperatures up to 95 °C. Meant to be used with water as heating media.	11B301102

	Order no.
Heating Bath B-301, 230V, incl. Base B-300 For up to 1 Liter evaporating flasks. For temperatures up to 95 °C. Meant to be used with water as heating media.	11B301101
Heating Bath B-305, 110V, not incl. Base B-300, 110V For up to 5 Liter evaporating flasks. For temperatures up to 220 °C. Meant to be used with water or oil as heating media.	11B305002
Heating Bath B-305, 230V, not incl. Base B-300 For up to 5 Liter evaporating flasks. For temperatures up to 220 °C. Meant to be used with water or oil as heating media.	11B305001
Heating Bath B-305, 110V, incl. Base B-300 For up to 5 Liter evaporating flasks. For temperatures up to 220 °C. Meant to be used with water or oil as heating media.	11B305102
Heating Bath B-305, 230V, incl. Base B-300 For up to 5 Liter evaporating flasks. For temperatures up to 220 °C. Meant to be used with water or oil as heating media.	11B305101
Heating Bath B-305, 110V, for R-21x, incl. Base For up to 5 Liter evaporating flasks. For temperatures up to 220 °C. Meant to be used with water or oil as heating media. Included: Adapter to Rotavapor R-21x.	11B305112
Heating Bath B-305, 230V, for R-21x, incl. Base For up to 5 Liter evaporating flasks. For temperatures up to 220 °C. Meant to be used with water or oil as heating media. Included: Adapter to Rotavapor R-21x.	11B305111
Adapter B-300. For Heating Bath B-305 Required when Heating Bath B-305 is used with a Rotavapor R-210, R-215 or R II. Not compatible with Heating Bath B-301.	11061317

Heating bath accessories

	Order no.
Heating bath balls. 450pcs, PP, Ø10 mm To reduce energy consumption of heating bath and for less evaporation of the heating medium. For temperatures up to 100 °C.	036405
Lid. For Heating Bath B-305 To save energy and to minimize loss of water when heating bath is not in use.	11059500
Protection shield. Operator protection for heating bath For Heating Bath B-301 and B-305.	11061402
Splash shield. Operator protection against splashes. With opening on the front side for easy handling. Material: 6 mm thick polycarbonate.	11064768
Protective cover. For Heating Bath B-300 base Used for protection of the heating bath display.	11064111

Tubing

	Order no.
Tubing. FEP, Ø6/8 mm, transparent, per m Use: Vacuum, cooling media.	027900
Insulation tubing. Synthetic rubber, Ø10/23 mm, black, per m For insulation of cooling media. Meant to be used with silicone tubing (004134).	028696
Tubing. Natural rubber, Ø6/16 mm, red, per m Use: Vacuum.	017622
Tubing. Nylflex, PVC-P, Ø8/14 mm, transparent, per m Use: Vacuum, cooling media, feeding (industrial Rotavapor®).	004113
Tubing. PTFE, Ø4.7/5.5 mm, transparent, 330 mm Use: To introduce solvent into evaporating flask during distillation.	000646
Tubing. PTFE, Ø4.7/5.5 mm, transparent, 460 mm Use: To introduce solvent into evaporating flask during distillation.	000643
Tubing. PTFE, Ø8/10 mm, white, per m Use: Vacuum, feeding (industrial Rotavapor®).	027277
Tubing. Silicone, Ø6/9 mm, transparent, per m Use: Cooling media.	004133
Tubing. Synthetic rubber, Ø6/13 mm, black, per m Use: Vacuum.	11063244

Further accessories

	Order no.
AutoDest sensor. Incl. cap nut, seal GL14 For automatic distillation. Measures temperature of cooling media and the vapor temperature. Vacuum is adjusted according to cooling capacity of condenser. Meant to be used with the Interface I-300/I-300 Pro and glass assembly V or S.	11059225
Combi-Clip, set. 50 pcs, not incl. vapor duct Patented Combi-Clip with snap lock mechanism to fasten evaporating flask on vapor duct.	11063308
Condensate trap. Grey, TPE, for condenser V, hose connector Ø8 mm Collects and drains condensate which may accumulate at the condenser.	11062955
Condensate trap. Green, TPE, for condenser V, hose connector Ø8 mm Collects and drains condensate which may accumulate at the condenser.	11061985
Cooling water valve. 24VAC Valve opens cooling water feed during distillation. Meant to be used with a vacuum controller/interface.	031356
Extraction thimbles, set. 25 pcs, 200 mL, cellulose For Soxhlet extraction unit.	018106

	Order no.
Flask holder. EPDM, slip free Holder for round-bottom flasks (50-5000 mL).	048618
Flask holders, set. 5pcs., EPDM, slip free Holder for round-bottom flasks (50-5000 mL).	11059916
Foam sensor. Incl. holder Prevents sample from foaming into the condenser by aeration of system temporarily. Meant to be used with the Interface I-300 / I-300 Pro.	11061167
Holder. For extraction unit, steel, 750 mm, Ø12 mm	011904
IQ/OQ. R-300 en Official BUCHI documents.	11063608
Lab grease. Glisseal 40 (60 g) To grease joints in order to increase tightness of system.	048197
Level sensor. Incl. O-ring, cable, rubber band Prevents an overflow in the receiving flask of condenser/secondary condenser. Placed on receiving flask. Meant to be used with the Interface I-300 / I-300 Pro.	11060954
Repeating OQ. R-300 en Official BUCHI documents.	11063609
Power plug fixation. For R-300 Used to fixate the power plug into Rotavapor.	11063710
Set earthquake fastener. Lug for backside To fasten device on lab bench.	11062386
Thread adapter. For vacuum connection, SVL22/GL14 Use: To switch vacuum connection from a Rotavapor® to Syncore® vacuum distributor (037686).	040871
Vacuum connection. Incl. drain valve, hose barb Ø8mm, BJ35/20 Connection piece for aeration of the system, placed between condenser and receiving flask.	001006
Vacuum valve. Magnetic valve, 24V/4W, Mini-DIN, 1.5 m Flow valve without flask, meant to be used with a centralized vacuum source or an unregulated vacuum pump. Meant to be used with the Interface I-300 / I-300 Pro.	11060706
Vapor temperature sensor. Incl. cap nut, seal GL14 Measures the vapor temperature inside the system. Meant to be used with the Interface I-300 / I-300 Pro.	11060707
Water jet pump. Plastic Used when tap water is used to generate vacuum.	002913
Water jet pump, B-767: Magnetic valve (2pcs), FFKM, 24V Used when tap water is used to generate vacuum. Inclusive: Cooling water valve. Meant to be used with a vacuum controller/interface.	031357
Water regulation nozzle. Flow regulator, incl. hose clamp, sieve Used when tap water is used to generate vacuum. Reduces water consumption.	011606

	Order no.
Woulff bottle. 125 mL, P+G, incl. holder For trapping particles and droplets and for pressure equalization.	11059905
Woulff bottle. 3-neck, 800 mL, P+G. For trapping particles and droplets and for pressure equalization.	025519
Manometer with needle valve. Incl. vacuum gauge, not incl. holder	047391

Glassware

Glass assemblies

	Order no.
Glass assembly A. Diagonal condenser, 1500 cm ² For standard distillations, used with recirculating chiller or tap water. Features: Cleaning hole on top. Content: 1 L receiving flask, required tubings, ball joint clamp, stopcock, feeding tubing. Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.	048168
Glass assembly A. Diagonal condenser, 1500 cm ² , P+G For standard distillations, used with recirculating chiller or tap water. Features: Cleaning hole on top. Content: 1 L receiving flask (P+G), required tubings, ball joint clamp, stopcock, feeding tubing. Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.	048169
Glass assembly BY. Vertical intensive condenser, reflux, 1300cm ² For particularly efficient condensation with double jacket condenser as well as for reflux distillations with distributor and shut-off valve. Used with recirculating chiller or tap water. Features: Double jacket condenser. Additional joint on top of the condenser for flexible expansion (SJ29/32). Connection for vapor temperature sensor. Content: 1 L receiving flask, required tubings, ball joint clamp, stopcock, feeding tubing, distributor. Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.	048176
Glass assembly BY. Vertical intensive condenser, reflux, 1300 cm ² , P+G For particularly efficient condensation with double jacket condenser as well as for reflux distillations with distributor and shut-off valve. Used with recirculating chiller or tap water. Features: Double jacket condenser. Additional joint on top of the condenser for flexible expansion (SJ29/32). Connection for vapor temperature sensor. Content: 1 L receiving flask (P+G), required tubings, ball joint clamp, stopcock, feeding tubing, distributor. Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.	048297
Glass assembly C. Cold trap, 500 cm ² For distillations of low-boiling point solvents. No need of cooling liquid, but e.g. dry ice. Content: 1 L receiving flask, ball joint clamp, stopcock, feeding tubing. Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.	040640

	Order no.
<p>Glass assembly C. Cold trap, 500 cm², P+G-LT</p> <p>For distillations of low-boiling point solvents. No need of cooling liquid, but e.g. dry ice. Application temperature: -70 to 40 °C. Content: 1 L receiving flask (P+G-LT), ball joint clamp, stopcock, feeding tubing.</p> <p>Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.</p>	040642
<p>Glass assembly CR. Cold trap reflux, 500 cm²</p> <p>For reflux distillations with distributor and shut-off valve as well as for distillation of low-boiling point solvents. No need of cooling liquid, but e.g. dry ice. Content: 1 L receiving flask, ball joint clamp, stopcock, feeding tubing, distributor.</p> <p>Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.</p>	048292
<p>Glass assembly CR. Cold trap reflux condenser, 500 cm², P+G-LT</p> <p>For reflux distillations with distributor and shut-off valve as well as for distillation of low-boiling point solvents. No need of cooling liquid, but e.g. dry ice. Application temperature: -70 to 40 °C. Content: 1 L receiving flask, ball joint clamp, stopcock, feeding tubing, distributor.</p> <p>Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.</p>	048293
<p>Glass assembly E. Expansion condenser, 1500 cm²</p> <p>Optimised for distillations of foaming substances and bumping sample solutions. Used with recirculating chiller or tap water.</p> <p>Features: Descending condenser with expansion vessel. Cleaning hole on top. Connection for vapor temperature sensor. Content: 1 L receiving flask, required tubings, ball joint clamp, stopcock, feeding tubing, holder.</p> <p>Not inclusive: Evaporating flask, vapor duct, vacuum gasket.</p>	11061112
<p>Glass assembly E. Expansion condenser, 1500 cm², P+G</p> <p>Optimised for distillations of foaming substances and bumping sample solutions. Used with recirculating chiller or tap water.</p> <p>Features: Descending condenser with expansion vessel. Cleaning hole on top. Connection for vapor temperature sensor. Content: 1 L receiving flask (P+G), required tubings, ball joint clamp, stopcock, feeding tubing, holder.</p> <p>Not inclusive: Evaporating flask, vapor duct, vacuum gasket.</p>	11061113
<p>Glass assembly S. Vertical condenser reflux, 1500 cm²</p> <p>For reflux distillations with distributor and shut-off valve. Used with recirculating chiller or tap water.</p> <p>Features: Cleaning hole on top. Connection for vapor temperature sensor. Inner glass tube. Content: 1 L receiving flask, required tubings, ball joint clamp, stopcock, feeding tubing, distributor.</p> <p>Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.</p>	048290
<p>Glass assembly S. Vertical condenser reflux, 1500 cm², P+G</p> <p>For reflux distillations with distributor and shut-off valve. Used with recirculating chiller or tap water.</p> <p>Features: Cleaning hole on top. Connection for vapor temperature sensor. Inner glass tube. Content: 1 L receiving flask (P+G), required tubings, ball joint clamp, stopcock, feeding tubing, distributor.</p> <p>Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.</p>	048291

	Order no.
<p>Glass assembly V. Vertical condenser, 1500 cm² For standard distillations, used with recirculating chiller or tap water. Features: Large cleaning hole on top (SVL22). Connection for vapor temperature sensor. Inner glass tube. Inner glass plate. Content: 1 L receiving flask, required tubings, ball joint clamp, stopcock, feeding tubing. Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.</p>	11062432
<p>Glass assembly V. Vertical condenser, 1500 cm², P+G For standard distillations, used with recirculating chiller or tap water. Features: Large cleaning hole on top (SVL22). Connection for vapor temperature sensor. Inner glass tube. Inner glass plate. Content: 1 L receiving flask (P+G), required tubings, ball joint clamp, stopcock, feeding tubing. Not inclusive: Evaporating flask, vapor duct, vacuum gasket, holder.</p>	11062433

Accessories for glass assemblies

	Order no.
<p>Condenser holder. For Glass assembly V/C/S/CR/BY Content: Holding rod, rubber band, cross sleeve.</p>	048180
<p>Condenser holder. For Glass assembly E Content: Holding rod, bride, cross sleeve.</p>	048181
<p>Extraction unit Soxhlet. 200 mL, incl. extraction part, reduction part For Soxhlet extraction applications. Meant to be used with glass assembly S.</p>	011744
<p>Extraction unit Soxhlet. 500 mL, incl. extraction part, reduction part For Soxhlet extraction applications. Meant to be used with glass assembly S.</p>	011745

Bump trap adapters

	Order no.
Glass, SJ24/40, 175 mm	11056919
Glass, SJ29/32, 160 mm	11056920
Glass, Reitmeyer, SJ24/40, 150 mm	036577
Glass, Reitmeyer, SJ29/32, 135 mm	036576

Evaporating flask

	Order no.
Glass, SJ24/29, 50 mL	000472
Glass, SJ24/40, 50 mL	008750
Glass, SJ29/32, 50 mL	000431
Glass, SJ29/32, 50 mL, P+G	033405
Glass, SJ29/42, 50 mL	008736
Glass, SJ24/29, 100 mL	000473
Glass, SJ24/40, 100 mL	008751

	Order no.
Glass, SJ29/32, 100 mL	000432
Glass, SJ29/32, 100 mL, P+G	033404
Glass, SJ29/42, 100 mL	008737
Glass, SJ24/29, 250 mL	008753
Glass, SJ24/40, 250 mL	008754
Glass, SJ29/32, 250 mL	000433
Glass, SJ29/32, 250 mL, P+G	025520
Glass, SJ29/42, 250 mL	008738
Glass, SJ24/40, 500 mL	008758
Glass, SJ24/40, 500 mL, P+G	025261
Glass, SJ29/32, 500 mL	000434
Glass, SJ29/32, 500 mL, P+G	025322
Glass, SJ29/42, 500 mL	008739
Glass, SJ24/29, 1000 mL	008761
Glass, SJ24/40, 1000 mL	000440
Glass, SJ24/40, 1000 mL, P+G	020730
Glass, SJ29/32, 1000 mL	000435
Glass, SJ29/32, 1000 mL, P+G	020729
Glass, SJ29/42, 1000 mL	008762
Glass, SJ29/42, 1000 mL, P+G	025517
Glass, SJ24/29, 2000 mL	008764
Glass, SJ24/40, 2000 mL	008765
Glass, SJ24/40, 2000 mL, P+G	025262
Glass, SJ29/32, 2000 mL	000436
Glass, SJ29/32, 2000 mL, P+G	025323
Glass, SJ29/42, 2000 mL	008769
Glass, SJ24/40, 3000 mL	008767
Glass, SJ24/40, 3000 mL, P+G	025263
Glass, SJ29/32, 3000 mL	000437
Glass, SJ29/32, 3000 mL, P+G	025324
Glass, SJ29/42, 3000 mL	008770
Glass, SJ29/42, 3000 mL, P+G	027346
Glass, SJ24/40, 4000 mL	047990
Glass, SJ24/40, 4000 mL, P+G	047992
Glass, SJ29/32, 4000 mL, P+G	047993
Glass, SJ29/32, 4000 mL	047991
Glass, SJ24/40, 5000 mL, P+G	046596
Glass, SJ24/40, 5000 mL	046586
Glass, SJ29/32, 5000 mL	046573

	Order no.
Glass, SJ29/32, 5000 mL, P+G	046583
Drying flasks	
	Order no.
Glass, SJ24/40, 500 mL With 4 indents for better mixing/drying.	011579
Glass, SJ29/32, 500 mL With 4 indents for better mixing/drying.	000452
Glass, SJ24/40, 1000 mL With 4 indents for better mixing/drying.	000420
Glass, SJ29/32, 1000 mL With 4 indents for better mixing/drying.	000453
Glass, SJ24/40, 2000 mL With 4 indents for better mixing/drying.	011580
Glass, SJ29/32, 2000 mL With 4 indents for better mixing/drying.	000454
Beaker flasks	
	Order no.
Beaker flask, Drying, bayonet type, flat bottom, SJ24/40, 500 mL Bayonet mount type Ø75 mm. With 4 indents for better mixing/drying. Working volume 150 mL. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063159
Beaker flask, Drying, bayonet type, flat bottom, SJ24/40, 1500 mL Bayonet mount type Ø110 mm. With 4 indents for better mixing/drying. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063161
Beaker flask, Drying, bayonet type, flat bottom, SJ29/32, 500 mL Bayonet mount type Ø75 mm. With 4 indents for better mixing/drying. Working volume 150 mL. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063158
Beaker flask, Drying, bayonet type, flat bottom, SJ29/32, 1500 mL Bayonet mount type Ø110 mm. With 4 indents for better mixing/drying. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063160
Beaker flask, Evap., bayonet type, flat bottom, SJ24/40, 500 mL Bayonet mount type Ø75 mm. Working volume 150 mL. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063155
Beaker flask, Evap., bayonet type, flat bottom, SJ24/40 1500 mL Bayonet mount type Ø110 mm. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063157
Beaker flask, Evap., bayonet type, flat bottom, SJ29/32, 500 mL Bayonet mount type Ø75 mm. Working volume 150 mL. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063154

	Order no.
Beaker flask, Evap., bayonet type, flat bottom, SJ29/32 1500 mL Bayonet mount type Ø110 mm. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11063156
Beaker flask, Evap., bayonet type, round bottom, SJ24/40, 1500 mL Bayonet mount type Ø110 mm. Use: Easy cleaning and collection of solid residue. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11065719
Beaker flask, Evap., bayonet type, round bottom, SJ29/32, 1500 mL Bayonet mount type Ø110 mm. Use: Easy cleaning and collection of solid residue. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11065718
Beaker flask, Evap., bayonet type, pear shape, SJ24/40, 4000 mL Bayonet mount type Ø110 mm. Appropriate for natural product applications. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11065691
Beaker flask, Evap., bayonet type, pear shape, SJ29/32, 4000 mL Bayonet mount type Ø110 mm. Appropriate for natural product applications. Content: 1 coupling piece, 1 seal, 1 flask and 1 beaker fastener.	11065690

Receiving flask

	Order no.
Glass, BJ35/20, 50 mL	000421
Glass, BJ35/20, 100 mL	000422
Glass, BJ35/20, 250 mL	000423
Glass, BJ35/20, 250 mL, P+G	11060907
Glass, BJ35/20, 250 mL, P+G-LT Application temperature: -70 to 40 °C.	11060908
Glass, BJ35/20, 500 mL	000424
Glass, BJ35/20, 500 mL, P+G	025264
Glass, BJ35/20, 500 mL, P+G-LT Application temperature: -70 to 40 °C.	040774
Glass, BJ35/20, 1000 mL, P+G	020728
Glass, BJ35/20, 1000 mL, P+G-LT Application temperature: -70 to 40 °C.	040775
Glass, BJ35/20, 2000 mL	000426
Glass, BJ35/20, 2000 mL, P+G	025265
Glass, BJ35/20, 2000 mL, P+G-LT Application temperature: -70 to 40 °C.	040776
Glass, BJ35/20, 3000 mL	000427
Glass, BJ35/20, 3000 mL, P+G	025266
Glass, BJ35/20, 3000 mL, P+G-LT Application temperature: -70 to 40 °C.	040777

	Order no.
Receiving flask with drain valve. Glas, BJ35/20, 1000 mL, P+G, PTFE	036919
Vapor ducts	
	Order no.
Ø26 mm, SJ24/40, incl. Combi-Clip For Glass assembly A.	11062268
Ø26 mm, SJ24/40, incl. Combi-Clip Analytical, long. For glass assembly V, C, S, E, BY and CR.	11062466
Ø26 mm, SJ24/40, incl. Combi-Clip For Glass assembly V, C, S, E, BY and CR.	11062187
Ø26 mm, SJ29/32, incl. Combi-Clip For Glass assembly V, C, S, E, BY and CR.	11062186
Ø26mm, SJ29/32, incl. Combi-Clip For Glass assembly A.	11062267
Ø22 mm, SJ29/32, incl. Combi-Clip Meant to be used with KD22. For glass assembly V, C, S, E, BY and CR.	11062910
Ø26 mm, SJ29/32, incl. Combi-Clip Analytical, long. For glass assembly V, C, S, E, BY and CR.	11062465
Ø26 mm, SJ29/42, incl. Combi-Clip For Glass assembly A.	11062269
Ø26 mm, SJ29/42, incl. Combi-Clip For Glass assembly V, C, S, E, BY and CR.	11062464
Ø26 mm, SJ29/42, incl. Combi-Clip Analytical, long. For glass assembly V, C, S, E, BY and CR.	11062467
Ø26 mm, SJ24/29, incl. Combi-Clip For Glass assembly V, C, S, E, BY and CR.	11062909
Ø26 mm, SJ34/35, incl. Combi-Clip For condenser A. For Glass assembly V, C, S, E, BY and CR.	048167
Vapor duct with frit. Ø26mm, SJ29/32, incl. Combi-Clip For powder drying. To prevent powder from getting into the condenser. For glass assembly V, C, S, E, BY and CR.	11057297
For high temperatures, 29/32, short For Glass assembly V, C, S, E, BY and CR.	11061837
Stopcocks	
	Order no.
For condenser C/CR, glass, SJ18.8/38 For aeration of the system. For cold trap outer part.	040628
Professional, glass, SJ18.8/38 For aeration of the system. Less cross-contamination compared to standard-stopcock (040627).	000637

	Order no.
PTFE, incl. 3-way valve For feeding of solvents and aeration of the system. For applications when grease should be avoided. Used instead of standard-stopcock (040627). Content: Inlet tubing 300mm, backfeed tubing 600mm, cap nut GL10.	11058814
Standard, glass, SJ18.8/38 For aeration of the system.	040627

Distillation spiders

	Order no.
Glass, SJ24/40, incl. 100 mL flask (5pcs)	011575
Glass, SJ24/40, incl. 50 mL flask (5pcs)	011574
Glass, SJ29/32, incl. 100 mL flask (5pcs)	001333
Glass, SJ29/32, incl. 20 mL cyl. flask (12pcs)	001335
Glass, SJ29/32, incl. 20 mL cyl. flask (20pcs)	001336
Glass, SJ29/32, incl. 20 mL cyl. flask (6pcs)	001334
Glass, SJ29/32, incl. 50 mL flask (5pcs)	001332
Evaporating flask, For distillation spider, cylindric, SJ14/23, 20 mL	000477

Adaptor

	Order no.
Intermediate piece with valve, Incl. drain valve, hose connection Ø8 mm, BJ35/20 Connection piece with 3-way valve, for aeration of the system. Placed between condenser and receiving flask. Allows to remove and empty the receiving flask during the evaporating process.	11063430
Set Rotavapor connection Combining the Multivapor with the Rotavapor requires a T-shaped glass connector for the condenser of the rotary evaporator. The T-piece consist of two spherical joints for the condenser assembly and a SVL 22 joint for the vacuum tube. The length of the tube is 400 mm.	048740

10.2.9 Wearing parts

Vacuum seal

	Order no.
Vacuum gasket. WD26, PTFE, FDA-compliant	048021

Seals

	Order no.
For cap nut GL14 to FEP, EPDM	038225
Set. 10pcs, for hose barbs GL14, EPDM, black	040029
Set. 10pcs, for hose barbs GL14, FPM, green	040040
Set. 20pcs, for hose barbs GL14, silicone, red	040023

Hose barbs

	Order no.
Bent, GL14, incl. silicone seal	018916
Set. 2pcs, bent (1), straight (1), GL14, silicone seal Content: Hose barbs, cap nuts, seals.	041939
Set. 3pcs, bent, GL14, silicone seal Content: Hose barbs, seals.	041987
Set. 4pcs, bent GL14, silicone seal Content: Hose barbs, cap nuts, seals.	037287
Set. 4pcs, bent, GL14, EPDM seal Content: Hose barbs, cap nuts, seals.	043129
Set. 4pcs, bent, GL14, FPM seal Content: Hose barbs, cap nuts, seals.	040295
Set. 4pcs, straight, GL14, EPDM seal Content: Hose barbs, cap nuts, seals.	043128
Set. 4pcs, straight, GL14, FPM seal Content: Hose barbs, cap nuts, seals.	040296
Set. 4pcs, straight, GL14, silicone seal Content: Hose barbs, seals.	037642
Set. 6pcs, bent (4), straight (2), GL14, silicone seal Content: Hose barbs, cap nuts, seals.	038000

Miscellaneous wearing parts

	Order no.
Cap nut. Screw cap with hole GL10	023875
Cap nuts, set. 10pcs, screw cap with hole GL14, seal EPDM Content: Hose barbs, cap nuts, seals.	041999
Cap nuts, set. 10pcs screw cap with hole GL14	041956
Hose, set, Incl. GL14 set, FEP tube 11061756 Used to connect VacuBox and Valve unit/Woulff bottle when both are fixed on the Rotavapor R-300	11065373
O-ring. FKM, 40.9/2.6 mm, for reflux insert	048078
O-ring. FPM, for cap nut GL10, Ø3.00/2.70 mm	023900
Screw caps, set. 5pcs, GL14	040624
Set screwings. Hose barbs and seals GL14, set Content: Hose barbs bent 4pcs, hose barbs straight 1pc, cap nuts 4pcs, screw caps 2pcs, seals EPDM 3pcs.	11061921

10.2.10 Spare parts**Glassware**

	Order no.
Beaker flask, Drying, screw joint, flat bottom, glass, 500 mL With 4 indents for better mixing/drying. Compatible with a beaker fastener (034771) Ø75 mm.	034770

	Order no.
Beaker flask, Drying, screw joint, flat bottom, glass, 1500 mL With 4 indents for better mixing/drying. Compatible with a beaker fastener (034139) Ø110 mm.	034267
Beaker flask, Evap., screw joint, flat bottom, glass, 500 mL Compatible with a beaker fastener (034771) Ø75 mm.	034769
Beaker flask, Evap., screw joint, flat bottom, glass, 1500 mL Compatible with a beaker fastener (034139) Ø110 mm.	034140
Beaker flask, Drying, bayonet type, flat bottom, glass, 500 mL With 4 indents for better mixing/drying. Working volume 150 mL. Compatible with a beaker fastener (11059810) Ø75 mm.	11059268
Beaker flask, Drying, bayonet mount, flat bottom, glass, 1500 mL With 4 indents for better mixing/drying. Compatible with a beaker fastener (11059851) Ø110 mm.	11059269
Beaker flask, Evap., bayonet type, flat bottom, glass, 500 mL Working volume 150 mL. Compatible with a beaker fastener (11059810) Ø75 mm.	11059185
Beaker flask, Evap., bayonet type, round bottom, glass, 1500 mL Compatible with a beaker fastener (11059851) Ø110 mm.	11065716
Beaker flask, Evap., bayonet type, flat bottom, glass, 1500 mL Compatible with a beaker fastener (11059851) Ø110 mm.	11059186
Beaker flask, Evap., bayonet type, pear shape, glass, 4000 mL Compatible with a beaker fastener (11059851) Ø110 mm.	11065689
Coupling piece, Bayonet mount type, glass, SJ 24/40, Ø75 mm For 500 mL beaker flasks.	11059362
Coupling piece, Bayonet mount type, glass, SJ29/32, Ø75 mm For 500 mL beaker flasks.	11059043
Coupling piece, Bayonet mount type, glass, SJ 24/40, Ø110 mm For 1500 mL round and flat bottom and for 4000 mL pear shape beaker flasks.	11059363
Coupling piece, Bayonet mount type, glass, SJ29/32, Ø110 mm For 1500 mL round and flat bottom and for 4000 mL pear shape beaker flasks.	11059187
Distillation spider. Glass, SJ29/32 (for 20 flasks), not incl. flasks	000476
Distillation spider. Glass, SJ24/40 (for 5 flasks), not incl. flasks	000466
Distillation spider. Glass, SJ29/32 (for 12 flasks), not incl. flasks	000475
Distillation spider. Glass, SJ29/32 (for 5 flasks), not incl. flasks	000471
Distillation spider. Glass, SJ29/32 (for 6 flasks), not incl. flasks	000474
Distribution head. For assembly S/CR/BY, P+G, incl. cap nut GL10	040658
Distribution head. For glass assembly E, incl. cap nut GL10	040661
Distribution head. For glass assembly E, P+G, incl. cap nut GL10	040663
Distribution head. For glass assembly S/CR/BY, incl. cap nut GL10	040657
Expansion vessel. For Apparatus E, glass, P+G, inc. GL14 union nut	033507
Expansion vessel. For Glass assembly E, glass, incl. screw cap GL14	001002

	Order no.
Glass tube, Spare glass part for foam sensor (11059245)	11058922
U-tube. For assembly E, Glass, incl. screw cap GL14	001003
U-tube. For Apparatus E, glass, P+G, inc. GL14 union nut	033508

Seals

	Order no.
Gasket, For 1.5 L and 4 L beaker flask, Ø100 mm, incl. O-ring PTFE coated gasket is used to seal the beaker flask.	034152
For beaker flask 500 mL, Ø68 mm, incl. O-ring PTFE coated seal for beaker flask.	034772
Set. For condenser C/CR, O-ring EPDM/PTFE Seal between cold trap outer part and cold finger.	027462
Set. For Woulff bottle/valve unit Content: O-ring (048406, 5pcs), O-ring (047169, 5pcs).	045544
Set. For Woulff bottle/valve unit Content: O-ring (048406, 5pcs), O-ring (047169, 5pcs), spare parts for valve unit (047258), seal (047165).	045545
Seal, SVL sealing for foam sensor	11058958

Condenser(s)

	Order no.
Condenser A. Diagonal condenser, 1500 cm ²	046988
Condenser A. Diagonal condenser, 1500 cm ² , P+G	047976
Condenser BY. Double jacket, 1300 cm ² , P+G	035040
Condenser BY. Double jacket, 1300 cm ²	048177
Condenser C. Cold trap, 500 cm ²	040645
Condenser C. Cold trap, 500 cm ² .P+G-LT Application temperature: -70 to 40 °C.	040646
Condenser CR. Cold trap reflux, outer part	011228
Condenser CR. Cold trap reflux, outer part, P+G-LT Application temperature: -70 to 40 °C.	025614
Condenser CR. Cold trap reflux, 500 cm ²	011511
Condenser CR. Cold trap reflux, 500 cm ² , P+G-LT Application temperature: -70 to 40 °C.	033478
Condenser E. Expansion, 1500 cm ²	010183
Condenser E. Expansion, 1500 cm ² , P+G	033511
Condenser S. Vertical condenser reflux, 1500 cm ²	040651
Condenser S. Vertical condenser reflux, 1500 cm ² , P+G	040653
Condenser V. Vertical condenser, 1500 cm ²	11059368
Condenser V. Vertical condenser, 1500 cm ² , P+G	11059369

Further spare parts

	Order no.
Ball joint clamp. For BJ25/20 Not inclusive: Rubber band (032013).	003275
Beaker fastener, Connection with bayonet mount, for 1.5 and 4 L For 1500 mL round and flat bottom and for 4000 mL pear shape beaker flasks.	11059851
Beaker fastener, Connection with bayonet mount, for 500 mL For beaker flask 500 mL.	11059810
Capacitive switch, For level sensor	11055914
Cold finger. For condenser C/CR	000672
Cold trap mantle. For condenser C	040641
Cold trap mantle. For condenser C, P+G-LT Application temperature: -70 to 40 °C.	040643
Combi-Clip, Not incl. vapor duct Patented Combi-Clip with snap lock mechanism to fasten evaporating flask on vapor duct.	11059770
Cross sleeve. To fasten condenser clamp Not inclusive: Rubber band (032013)	027344
Deflector rings, set. Drain sleeve, EPDM, black, Ø41/55 mm Drains off condensate which may accumulate at the condenser.	040822
Drain disc. PTFE, Ø5.1/14 mm	040625
Flange screwed connection. For Glass assembly V/C/A Content: Flange nut, pressure spring.	11062387
Flange screwed connection-reflux. For Glass assembly E/S/BY/CR Content: Flange nut, reflux part, pressure spring, O-ring FKM.	048080
Fuses, set. 10pcs, 6.3AT, 20 mm, Ø5 mm	022561
Fuses, set. 10pcs, 12.5AT, 20 mm, Ø5 mm	047939
Handle, For top cover heating bath (B-305, 11059500) Handle with top cover is used for covering the heating bath after the experiment is over.	11059502
Heating Bath B-300 Base. For Heating Bath B-301 and B-305, 110 V	11B300102
Heating Bath B-300 Base. For Heating Bath B-301 and B-305, 230 V	11B300101
Holder. Clamp for glass assembly E	048125
Holder, set, For fixing the Woulff bottle onto R-300 Content: Holder Woulff bottle and 2 M4x8 screws.	11065756
Navigation knob. Ø30mm, green/grey, incl. knob case, cover For Rotavapor R-300, Heating Bath B-300 Base, Interface I-300/I-300 Pro and Recirculating Chiller F-305/F-308/F-314.	11059157
Receiving vessel. For Woulff bottle, GL40, 125 mL, P+G	047233
Rubber band. To fasten condenser on holder	032013
Sieve. For water control valve (011606), Ø18mm	011514
Shut-off valve. For distribution head of glass assembly S/CR/BY For reflux reactions, for interruption of condensation.	040626

	Order no.
Support foam sensor, Incl. clamping nut, support ring To fasten foam sensor on glass assembly	11059024
T-piece. Incl. cap nut (3Stk) GL14	038190
Tubing. PTFE, Ø3/4 mm, white, 600 mm Use: Feeding.	028096
Vacuum connection. For glass assembly BY, vacuum piece To close the top hole (NS29/32) of the condenser if no expansion is used. Openings with screw cap SVL15 (on top) and with cap nut GL14 (sideward).	035026
Vacuum connector. For glass assembly E, incl. hose barb GL14	001004

10.3 List of abbreviations

Abbreviation	Meaning
ADR	Accord européen relatif au transport international des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
DKD	Deutscher Kalibrierdienst (German Calibration Service)
EPDM	Ethylene propylene diene monomer
FEP	Fluorinated ethylene propylene
FFKM	Perfluoro-elastomer
FPM	Fluorinated propylene monomer
GGVE	Gefahrgutverordnung Eisenbahn (German Hazardous Goods Regulations for Railways)
GGVS	Gefahrgutverordnung Strasse (German Hazardous Goods Regulations for Road Transport)
NBR	Nitrile butadiene rubber
PBT	Polybutylene terephthalate
PETP	Polyethylene terephthalate
PTFE	Polytetrafluoroethylene
RID	Règlement concernant le transport international ferroviaire de marchandises dangereuses (Regulations concerning the International Carriage of Dangerous Goods by Rail)

10.4 Health and safety approval

To guarantee the health and safety of our staff and to comply with the law and the regulations for handling hazardous materials, for the purposes of health and safety at work and safe disposal of waste, no products may be sent back to BÜCHI Labortechnik AG or repaired unless we have received the declaration below, completed and signed.

Products sent to us will not be accepted for repair until we have received this declaration.

► Copy the form overleaf and complete it.

- ▶ Make sure that you know the full details of the substances with which the device has been in contact and that all questions have been answered fully and correctly.
- ▶ Send the completed form to us in advance by post or fax. The declaration must reach us before the device.
- ▶ Enclose a copy of the declaration with the device.
- ▶ If the product is contaminated, inform the carrier (in accordance with GGVE/GGVS/RID/ADR).

If the declaration is missing or the procedure described is not followed, the repairs will be delayed. We ask for your understanding and cooperation with regard to these measures.

10.5 Health and safety

Declaration regarding the safety, hazards and safe disposal of waste

To guarantee the health and safety of our staff and to comply with the law and the regulations for handling hazardous materials, regarding health and safety at work, and to comply with safety regulations, health and safety requirements and requirements for safe disposal of waste such as chemical waste, chemical residues or solvents, the form below must be fully completed and signed whenever devices or faulty components are to be sent back to our factory.

Products or components will not be accepted if this declaration has not been provided.

	Device	Model:	Part/Device no.:
Declaration for non-hazardous materials	We hereby assure that the products returned <input type="checkbox"/> have not been used in the laboratory and are new. <input type="checkbox"/> have not been in contact with toxic, corrosive, biologically active, explosive, radioactive or other hazardous materials. <input type="checkbox"/> are not contaminated. The solvents or residues of the substances pumped have been removed.		
Declaration for hazardous materials	In respect of the products returned, we hereby assure that <input type="checkbox"/> all substances (toxic, corrosive, biologically active, explosive, radioactive or otherwise hazardous) that have been pumped by the products or have otherwise been in contact with the products are listed below. <input type="checkbox"/> the products have been cleaned, decontaminated, sterilised inside and outside and all inlets and outlets are sealed.		
	List of hazardous materials that have been in contact with the products:		
	Chemical, material	Hazard category	
Final declaration	We hereby declare that <ul style="list-style-type: none"> • we are fully conversant with the substances that have been in contact with the products and have answered all questions correctly. • we have taken all measures necessary to prevent potential hazards in respect of the products returned. 		

Company name or stamp:

Place, date:

Name (block letters), position
(block letters):

Signature:

10.6 Rotavapor® induction training

Introduction training Rotavapor®



Introduction Training

Educating Rotavapor® Users

The following topics shall be trained as part of the “Introduction Training” after the installation:

1. Theoretical basis

- Reviewing fundamental principles of distillation under vacuum
- Explanation of the Rotavapor® working principle
- Understanding the impact of the $\Delta 20$ rule, pressure adjustment, condenser loading, rotation speed and flask size

2. Rotavapor® R-300

- Setting the heating bath temperature, condenser angle and rotation without the interface
- Locking the heating bath and chiller temperature
- Setting and deleting a depth stop
- Proper Combi-clip use (mounting and removing the evaporating flask, removing the vapor-duct)
- Correctly starting and stopping the distillation process
- Adding solvents during distillation

3. Interface I-300 / I-300 Pro

- Setting the pressure, rotation, lift height and heating and cooling temperatures
- Implementing operating modes (i.e. Manual, Timer, Continuous, AutoDest, Drying and Methods)
- Utilizing the solvent library and favorites feature
- Remote monitoring using the Rotavapor® App
- Adjusting the hysteresis and maximum pump output

4. Safety features

- Reviewing prohibited uses and potential dangers as described in the operation manual
- Familiarization with P+G coating, protection and splash shield, safety stop in case of power failure, temperature limit setting, overpressure prevention, heating bath overheat protection

5. Maintenance and cleaning

- Cleaning the heating bath and the vacuum pump
- Cleaning the condenser, vapor duct, Woufff bottle, receiving and evaporating flask
- Preventive maintenance
- Using the leak test, finding and removing a leak

6. Convenient additional functions

- Automatic foam removal (foam sensor), automatic vacuum regulation/control (AutoDest)
- Additional safety add-ons (e.g. level sensor)

Account Details

Account Name:

Account Address:

Location (e.g. Building, Department, Lab):

Optional: Account Number (CRM):

Attendees

The people listed below have attended the "Introduction Training" for Rotavapor® users.

No.	Surname	Name	Signature	Rating*
1				① ② ③ ④ ⑤
2				① ② ③ ④ ⑤
3				① ② ③ ④ ⑤
4				① ② ③ ④ ⑤
5				① ② ③ ④ ⑤
6				① ② ③ ④ ⑤
7				① ② ③ ④ ⑤
8				① ② ③ ④ ⑤
9				① ② ③ ④ ⑤
10				① ② ③ ④ ⑤

*Rate your satisfaction with the provided training. (①: very unsatisfied; ⑤: very satisfied)

Trainer

The following person confirms that he is qualified to perform the "Introduction Training" (certificate is available upon request) and covered all applicable topics mentioned on the front page.

Trainer Company Name:

Full Name of Trainer:

Date of Training:

Optional: Case Number (CRM):

Signature of Trainer:

Advice to trainer:

Hand over the original document to the customer and email a picture of this page to InstallFeedback@buchi.com. Please use the Rotavapor® R-300 serial number as the subject line.

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