Operation Manual
Rotavapor® R II

093102 en

Table of contents

Read this manual carefully before installing and running your system and note the safety precautions in chapter 2 in particular. Store the manual in the immediate vicinity of the instrument, so that it can be consulted at any time.

No technical modifications may be made to the instrument without the prior written agreement of BUCHI. Unauthorized modifications may affect the system safety or result in accidents.

The English manual is the original language version and serves as basis for all translations into other languages. Other language versions can be downloaded at www.buchi.com.

1 About this manual

This manual describes the Rotavapor and provides all information required for its safe operation and to maintain it in good working order.
It is addressed in particular to laboratory personnel and operators.

NOTE
The symbols pertaining to safety (WARNINGS and ATTENTIONS) are explained in chapter 2.

1.1 Reference documents

For information on the Vacuum Controller V-850/V-855 and the Vacuum Pump V-700/V-710, please refer to the corresponding manuals available in English, German, French, Spanish and Italian:

- Vacuum Controller, Operating Manual numbers 093081–093085
- Vacuum Pump, Operating Manual numbers 093090–093094

1.2 Trademarks

The following product names and any registered and unregistered trademarks mentioned in this manual are used for identification purposes only and remain the exclusive property of their respective owners:

- Rotavapor® is a registered trademark of BÜCHI Labortechnik AG

1.3 Abbreviations

NBR: Butadiene-acrylonitrile rubber
P+G: PLASTIC + GLASS is a unique protective layer for glass components. It offers improved mechanical rupture resistance and increases protection against broken glass. It also makes sure that the sample is not lost in the receiving flask, if the flask is damaged.
PBT: Polybutylene Terephthalate
PTFE: Polytetrafluoroethylene
Rpm: Rotations per minute

2 Safety

This chapter points out the safety concept of the instrument and contains general rules of behavior and warnings from hazards concerning the use of the product.
The safety of users and personnel can only be ensured if these safety instructions and the safety-related warnings in the individual chapters are strictly observed and followed. Therefore, the manual must always be available to all persons performing the tasks described herein.

2.1 User qualification

The instrument may only be used by laboratory personnel and other persons who on account of training or professional experience have an overview of the dangers which can develop when operating the instrument.
Personnel without this training or persons who are currently being trained require careful instruction. The present Operation Manual serves as the basis for this.

2.2 Proper use

The instrument has been designed and built for laboratories. It serves for activities associated with evaporation of solvents.

It is used for:

- Distilling solvents
- Vaporizing of solvents
- Recrystallization
- Synthesis and cleaning of chemicals
- Soxhlet extractions
- Drying powders by means of the drying flask

The instrument can only be operated properly together with a heating bath.

2.3 Improper use

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

The following uses are expressly forbidden:

- Use of the instrument in rooms which require ex-protected instruments.
- Use as a calibrating instrument for other instruments
- Determination of samples, which can explode or inflame (example: explosives, etc.) due to shock, friction, heat or spark formation.
- Use in overpressure situations.
- Use of inappropriate water or oil baths, especially the use of heating sources with temperatures above 95 °C (e.g. a Bunsen burner, etc.).
- Processing of hard, brittle materials (e.g. stones, soil samples, etc.), which can lead to the destruction of the evaporating flask.
- Work with a sample weight of more than 3 kg within the evaporating flask.

2.4 Warning notices used in this manual

WARNING
Generally, the triangular warning symbol indicates the possibility of personal injury or even loss of life if the instructions are not followed.

WARNING
Hot surface.

WARNING
Electrical hazard.

WARNING
Biohazard.

ATTENTION
With the general "Read this" symbol, ATTENTION indicate the possibility of equipment damage, malfunctions or incorrect process results, if instructions are not followed.

NOTE
Useful tips for the easy operation of the instrument.

2.5 Product safety

The Rotavapor is designed and built in accordance with current state-of-the-art technology. Nevertheless, risks to users, property, and the environment can arise when the instrument is used carelessly or improperly.

The manufacturer has determined residual dangers emanating from the instrument

- if the instrument is operated by insufficiently trained personnel.
- if the instrument is not operated according to its proper use.

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

2.5.1 Instrument-related hazards

Pay attention to the following safety notices:

WARNING
Potentially hot surfaces during operation, especially at the water or oil bath (up to 95 °C).

- *Always be aware of the risk of being burned.*
- *When using an oil bath, make sure that no water gets into the bath otherwise there is a serious risk of being splashed by hot oil.*

WARNING
Potential implosion risk if used with damaged glassware.
Risk of electrostatic discharge when the rotary evaporator is filled with solvents, e.g. via the feeding tube, or when drying powders are used.

- *Beware of damaged or cracked glass parts.*
- *Beware of the fire hazard.*

WARNING

Potential explosion risk if solvent vapors accumulate within the instrument housing.

- *Always use the instrument in a well ventilated area.*
- *Beware of damaged or cracked glass parts.*
- *Beware of the fire hazard.*

2.5.2 Other hazards

WARNING

Certain solvents in or in the vicinity of the Rotavapor can form peroxides and/or are highly inflammable.

- *Always be aware of the explosion risk when working with hazardous substances or with substances of unknown composition.*
- *Always provide a good ventilation within or in the vicinity of the system.*

2.5.3 Safety measures

Always wear personal protective equipment such as protective eye goggles, protective clothing and gloves when working with the instrument.

2.5.4 Safety elements

Electronics

- The heating bath is equipped with a mechanical over-temperature protection.
  The mechanical over-temperature protection consists of a bimetal thermostat that, in case of over-temperature (over 260 °C), directly interrupts the power supply. It has to be set back manually after the bath has cooled down (see also chapter 8).
  The electronic over-temperature protection controls the temperature limit (actual bath temperature may not exceed the given temperature by 2 °C for more than 2 minutes), the heating rate (actual temperature may not rise by more than 5 °C during 5 seconds) and the function of the temperature sensor.
- The heating bath is equipped with safety fuses.
- The heating bath is equipped with a thermostatic control of the bath temperature - to prevent the product from overheating

Parts in direct contact with the instrument

- Combi-Clips for fixing the evaporating flask and for safe removal of fixed ground-glass joints.
- Ball joint clip for safe fixing of the receiving flask.
- Rods and holders for fixing the glass assemblies.
- Electronic over-current protection at the drive unit.
- Safety spring preventing the vapor duct from dropping out.

Glass

- Use of high quality, inert 3.3 borosilicate glass.
- Use of tube connections GL 14 for preventing glass breakage.

Optional

- P+G is a unique protective layer for glass components. It offers improved mechanical damage resistance and increases protection against broken glass. It also makes sure that the solvent in the receiving flask is not spilling, if the flask is damaged.
- The protective shield (optional accessory) protects operators from broken glass, solvent splashes and hot heating medium in case of accidents or an implosion.
- With the support rod the condenser can additionally be clamped.

2.6 General safety rules

Responsibility of the operator

The head of laboratory is responsible for training his personnel.
The operator shall inform the manufacturer without delay of any safety-related incidents which might occur during operation of the instrument. Legal regulations, such as local, state and federal laws applying to the instrument must be strictly followed.

Duty of maintenance and care

The operator is responsible for ensuring that the instrument is operated in proper condition only, and that maintenance, service, and repair jobs are performed with care and on schedule, and by authorized personnel only.

Spare parts to be used

Use only genuine consumables and genuine spare parts for maintenance to assure good system performance and reliability. Any modifications to the spare parts used are only allowed with the prior written permission of the manufacturer.

Modifications

Modifications to the instrument are only permitted after prior consultation with and with the written approval of the manufacturer. Modifications and upgrades shall only be carried out by an authorized BUCHI technical engineer. The manufacturer will decline any claim resulting from unauthorized modifications.

3 Technical data

This chapter introduces the reader to the instrument specifications. It contains the scope of delivery, technical data, requirements and performance data.

3.1 Scope of delivery

Check the scope of delivery according to the order number.

NOTE

For detailed information on the listed products, see www.buchi.com or contact your local dealer.

3.1.1 Basic instrument

Order number:

2	4	**1**	x	x	x

Rotavapor R II 230 V 50/60 Hz

Order number:

2	4	**2**	x	x	x

Rotavapor R II 100–120 V 50/60 Hz

Order number:

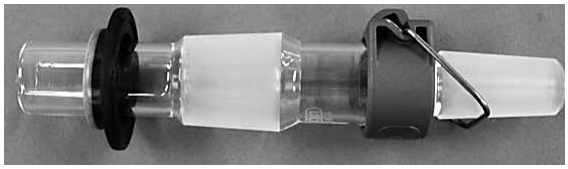
2	4	x	**1**	x	x

Vapor duct SJ 29/32

Order number:

2	4	x	**2**	x	x

Vapor duct SJ 24/40



Order number:

2	4	x	x	**A**	x

Glass assembly A

- Diagonal condenser
- Can be used where height is limited
- For standard distillations
- With optional tap for continuous feeding

Order number:

2	4	x	x	**V**	x

Glass assembly V

- Vertical condenser
- Minimum space requirement
- For standard distillations
- With optional tap for continuous feeding

Order number:

2	4	x	x	**C**	x

Glass assembly C

- Dry ice condenser
- For distillation of solvents with low boiling points
- With optional tap for continuous feeding
- No cooling water necessary

NOTE

The condenser mounting (040607 and 040608) in combination with glass assembly A is not included in the basic instrument.

Order number:

2	4	x	x	x	**1**

P+G coating

NOTE

The broken flask shown on the picture on the left demonstrates the function of the P+G coating in case of glass breakage.

3.1.2 Standard accessories

Table 3-1: Standard accessories

Product	Order number
Cooling water tube silicone 9/6 mm	004133
2 power cords	–
Type CH plug type 12 or PNE, 2.5 m	010010
Type Schuko	010016
Type GB	017835
Type AUS	017836
Type USA	010020
4 cable binders	–
Operation Manual:	
English	093102
German	093103
French	093104
Italian	093105
Spanish	093106

3.1.3 Optional accessories

Table 3-2: Optional accessories

Product	Order number
Vacuum pump V-700 (100–230 V 50/60 Hz)	071000
Vacuum pump V-700 (100–230 V 50/60 Hz) with secondary condenser and 500 mL receiving flask	071001

Table 3-2: Optional accessories (cont.)

Product	Order number
Water jet pump (plastic)	002913
Woulff bottle complete including holder	047170
Woulff bottle glass part, P+G coated	047233
Holder for Woulff bottle	047164
Manometer with needle valve complete (for manual vacuum control) including support for R-210/R-215, V-700/V-710 and V-850/V-855	047291
BÜCHI Recirculating Chiller F-1XX 230 V	
F-100 Model 500 Watt fix at 10 °C	11056460
F-105 Model 500 Watt controlled	11056462
F-108 Model 800 Watt controlled	11056464
F-114 Model 1400 Watt controlled	11056466
BÜCHI Recirculating Chiller F-1XX 115 V	
F-100 Model 500 Watt fix at 10 °C	11056461
F-105 Model 500 Watt controlled	11056463
F-108 Model 800 Watt controlled	11056465
F-114 Model 1400 Watt controlled	11056467

Table 3-2: Optional accessories (cont.)

Product	Order number
Heating bath R II complete 230 V 50/60 Hz	048199
Heating bath R II complete 100–120 V 50/60 Hz	048198
Protective shield complete for B-491	048052

3.2 Technical data overview

Table 3-3: Technical data

	R II	R II Heating bath
Glass assemblies	A, V, C	
Dimensions (W x H x D)	550×575×415 mm	285×240×300 mm
Weight	16–18 kg (depending on the glass assembly)	4 kg
Connection voltage	100–240 V ±10 %	100–120 V or 220–240 V ±10 %
Mains connection	3-pole (P, N, E) via power cord	3-pole (P, N, E) via power cord
Frequency	50/60 Hz	50/60 Hz
Power consumption	60 W	1700 W
Installation category	II	II
Degree of protection	IP21	IP21
Pollution degree	2	2
Rotation speed range	20–280 rpm	–
Flask size	50–4000 mL	up to 4000 mL
Max. flask content	3 kg	
Temperature control range		20 °C–95 °C
Display	Scale 0–10	Scale 0–100 °C, heating on/off
Temperature accuracy		±5 °C
Environmental conditions Temperature Altitude Humidity	for indoor use only 5 – 40 °C up to 2000 m maximum relative humidity 80 % for temperatures up to 31 °C, and then linearly decreasing to 50 % at 40 °C	
Bath content		4 L
Heating medium		Water, distilled water (we recommend to add borax in a concentration of 0.5 g/l when using deionized water), heat transfer oil
Vacuum tightness of system	5 mbar per 3 minutes at a pressure of < 10 mbar	–
Temperature resistance P+G	ca. -70 °C – 60 °C	–
Temperature resistance P+G low temperature	-80 °C – 50 °C	–
Temperature resistance protective shield	< 160 °C	–

3.3 Materials used

Table 3-4: Materials used

Component	Material designation
Housing Rotavapor	Aluminium
Guides lift	Hardened steel/stainless steel
Casting components	PBT partially glass reinforced
Housing bath	PBT partially glass reinforced
Bath	Stainless steel
Protective ring	PBT partially glass reinforced
Protective shield	Polycarbonate
Center rotation drive	Stainless steel
Condenser flange	Aluminium
Seal	NBR, PTFE

3.4 Solvent table

Table 3-5: Solvent table

Solvent	Formula	Molar mass in g/mol	Evaporation energy in J/g	Boiling point at 1013 mbar	Density in g/cm³	Vacuum in mbar for boiling point at 40 °C
Acetone	CH_3H_6O	58.1	553	56	0.790	556
n-amylalcohol, n-pentanol	$C_5H_{12}O$	88.1	595	37	0.814	11
Benzene	C_6H_6	78.1	548	80	0.877	236
n-butanol, tert. butanol	$C_4H_{10}O$	74.1	620	118	0.810	25
(2-methyl-2-propanol)	$C_4H_{10}O$	74.1	590	82	0.789	130
Chlorobenzene	C_6H_5Cl	112.6	377	132	1.106	36
Chloroform	$CHCl_3$	119.4	264	62	1.483	474
Cyclohexane	C_6H_{12}	84.0	389	81	0.779	235
Diethylether	$C_4H_{10}O$	74.0	389	35	0.714	atmospheric
1,2-dichloroethane	$C_2H_4Cl_2$	99.0	335	84	1.235	210
1,2-dichloroethylene (cis)	$C_2H_2Cl_2$	97.0	322	60	1.284	479
1,2-dichloroethylene (trans)	$C_2H_2C_{l2}$	97.0	314	48	1.257	751
Diisopropyl ether	$C_6H_{14}O$	102.0	318	68	0.724	375
Dioxane	$C_4H_8O_2$	88.1	406	101	1.034	107
DMF (dimethyl-formamide)	C_3H_7NO	73.1	–	153	0.949	11
Acetic acid	$C_2H_4O_2$	60.0	695	118	1.049	44
Ethanol	C_2H_6O	46.0	879	79	0.789	175
Ethylacetate	$C_4H_8O_2$	88.1	394	77	0.900	240
Heptane	C_7H_{16}	100.2	373	98	0.684	120
Hexane	C_6H_{14}	86.2	368	69	0.660	335
Isopropylalcohol	C_3H_8O	60.1	699	82	0.786	137
Isoamylalcohol 3-methyl-1-butanol	$C_5H_{12}O$	88.1	595	129	0.809	14
Methylethylketone	C_4H_8O	72.1	473	80	0.805	243
Methanol	CH_4O	32.0	1227	65	0.791	337
Methylene chloride, dichloromethane	CH_2Cl_2	84.9	373	40	1.327	atmospheric
Pentane	C_5H_{12}	72.1	381	36	06.26	atmospheric
n-propylalcohol	C_3H_8O	60.1	787	97	0.804	67
Pentachloroethane	C_2HCl_5	202.3	201	162	1.680	13
1,1,2,2-tetra-chloroethane	$C_2H_2Cl_4$	167.9	247	146	1.595	35
Tetrachlorocarbon	CCl_4	153.8	226	77	1.594	271
1,1,1-trichloroethane	$C_2H_3Cl_3$	133.4	251	74	1.339	300
Tetra-chloro-ethylene	C_2Cl_4	165.8	234	121	1.623	53
THF (tetrahydrofurane)	C_4H_8O	72.1	–	67	0.889	357
Toluene	C_7H_8	92.2	427	111	0.867	77
Trichloroethylene	C_2HCl_3	131.3	264	87	1.464	183
Water	H_2O	18.0	2261	100	1.000	72
Xylene (mixture)	C_8H_{10}	106.2	389	–	–	25
o-xylene	$C8H_{10}$	106.2	–	144	0.880	–
m-xylene	$C8H_{10}$	106.2	–	139	0.864	–
p-xylene	$C8H_{10}$	106.2	–	138	0.861	–

4 Description of function

This chapter explains the basic principle of the instrument, shows how it is structured and gives a functional description of the assemblies.

4.1 Functional principle of a Rotavapor

With a Rotavapor, single step distillations are performed quickly and in a product friendly manner. The basis of this procedure is the evaporation and condensation of solvents using a rotating evaporating flask under vacuum. Distilling products under vacuum increases the performance and helps to protect the products.

4.1.1 Functional principle considering the V assembly as example

Fig. 4.1: Overview of a V assembly

① Evaporation area

The solvent is heated by means of a heating bath. A thin solvent film forms on the inside of the rotating evaporating flask, resulting in an increased evaporation rate. The rotations also lead to an even mixing of the sample thus preventing stationary overheating in the flask.

② Rotation drive including vapor duct

The drive unit ensures that the evaporating flask rotates evenly.
The integrated vapor duct transports the vapor from the evaporation area to the cooling area.

③ Cooling area

The solvent vapor flows very quickly into the condenser. Here, the energy in the solvent vapor is transferred to the cooling medium (mostly water), so that the solvent condenses.

④ Receiving flask

The receiving flask collects the condensed solvent.

Vacuum

The vacuum reduces the boiling temperature and thus increases the distillation performance.
The evaporating performance is influenced by the distillation pressure (vacuum), the heating bath temperature, and the rotation speed and size of the evaporating flask.
For information on the optimum distillation conditions, see chapter Operation.

4.1.2 Controls of Rotavapor R II

① Mains switch of Rotavapor
② Knob for rotation speed
③ Combi-Clip for easy flask/vapor duct removal
④ Lock button to block the drive unit
⑤ Heating bath handle
⑥ Heating LED
⑦ Adjusting knob for heating bath temperature
⑧ Mains switch for heating bath
⑨ Quick-action jack to raise and lower the evaporating flask
⑩ Knob for immersion angle adjustment

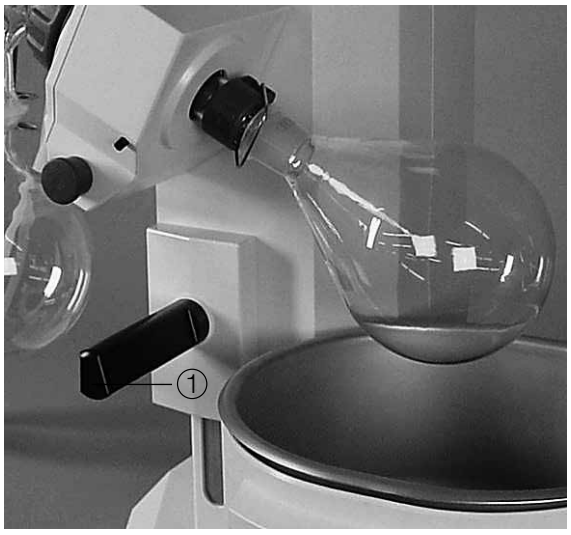
Fig. 4.2: Overview of the Rotavapor

4.1.3 Rear connections of the Rotavapor

① Power supply of Rotavapor
② Power supply of heating bath

Fig. 4.3: Rear connections of the Rotavapor

4.2 Quick-action jack



With the quick-action jack, the evaporating flask can be lowered into and raised from the water bath.
Turn the handle ① to the left-hand side and press it up or down.

Fig. 4.4: Quick-action jack

4.3 Heating bath

The heating bath can be used as a water heating bath up to 95 °C.

① Power supply of heating bath
② Mains switch (splash water protected)
③ Adjusting knob for setting the bath temperature
④ Heating LED
⑤ Handle for easy transport and movement

Fig. 4.5: Heating bath next to the base plate

4.4 Combi-Clip

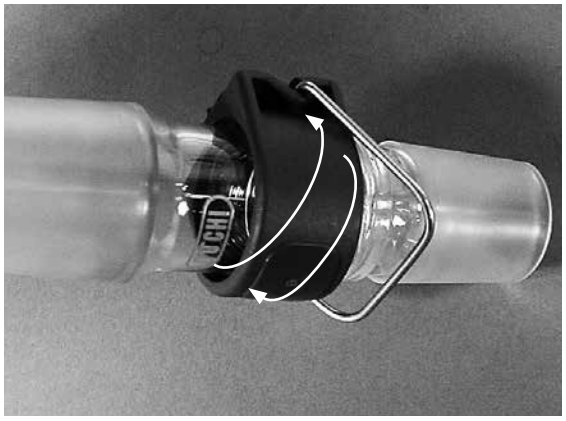


Fig. 4.6: Combi-Clip

Depending on the direction the patented Combi-Clip is turned, it performs the following functions:

Handling the evaporating flask:

- Release the evaporating flask by turning the clip counterclockwise.

NOTE

Secure the flask with one hand so that it does not fall down.

- Fix the mounted evaporating flask by pressing down the clamp and turning the clip clockwise.

Handling the vapor duct:

- Remove the evaporating flask first, then turn the clip clockwise until the vapor duct is released.

NOTE

Press the lock button to block the drive unit (position 5 in Fig. 4.2) while removing the vapor duct or fixing the evaporating flask.

4.5 Protective shield (optional)

Fig. 4.7: Protective shield

The protective shield protects the user from splashes of heating medium when the flask is rotating and from pieces of broken glass in the unlikely event of an implosion of the evaporating flask.

4.6 Woulff bottle

Fig. 4.8: Woulff bottle

The Woulff bottle serves as safety vessel between the Rotavapor and the vacuum pump. In case of an impure distillation the condensate is collected in the Woulff bottle and thus cannot reach the pump.

4.7 Manometer

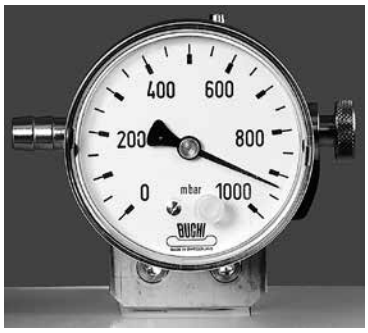


Fig. 4.9: Manometer

The manometer is a pressure measuring device for gaseous media and is connected between the vacuum source and the Rotavapor.

5 Putting into operation

This chapter describes how the instrument is installed and gives instructions on initial startup.

NOTE

Inspect the instrument for damages during unpacking. If necessary, prepare a status report immediately to inform the postal company, railway company or transportation company.

Keep the original packaging for future transportation.

5.1 Installation site

Place the instrument on a stable, horizontal plane and consider the maximum product dimensions. Perform the distillations under vacuum with the Rotavapor placed under a fume hood. If this is not possible due to shortage of space, mount the protective shield (optional accessory) and lead the exhaust gas from the pump into the fume hood.

5.2 Electrical connections

ATTENTION

Make sure that the voltage on the socket corresponds to the voltage given on the type plate of the instrument.

Always connect the instrument to an earthed socket. External connections and extension cables must be provided with an earthed conductor lead (3-pole couplings, cable or plug equipment) as the mains lead has a molded plug, thus avoiding risks due to inadvertent defective wiring.

Make sure that no electric sparks form in the instrument or its surroundings as they might damage the instrument.

5.3 Commissioning the heating bath

Place the bath on the base plate of the Rotavapor.

If you need to adjust the position of the bath, lift it up slightly at the right-hand side and pull or push it to the desired position.

Fig. 5.1: Moving the heating bath

Saving energy

For heating baths there are various ways to save energy. By using floating balls in the water bath, evaporation of water is reduced. As a result, the bath heating has to switch on less often. This measure helps to save up to 50 % of energy. At the same time approximately 70 % less water is used. Additionally, a cover is available to put over the heating bath during operation which also saves energy between distillations.

Fig. 5.2: Floating balls in the heating bath medium and cover for heating bath

NOTE

Turn on the heating bath about 10 –15 minutes before starting the distillation, since the bath has a certain warm-up time. Turn off the heating bath after a distillation.

ATTENTION

As soon as the power plug is connected and the mains switch is turned on, the bath starts heating if the actual temperature is below the set temperature. For this reason, make sure that there is always heating medium in the bath to prevent instrument damage.

5.4 Glass assembly

To install the glass assembly, consider the following:

- To fasten the flanges you do not have to remove the flange screwed connection (position ⑤ in Fig. 5.3). Just open the flange screwed connection wide enough, so that the flange can be pushed through.
- You can also secure the glass assemblies V, S, C, E, CR, BY using the corresponding optional support rod.
- Secure the receiving flask with the clip provided for this purpose.

ATTENTION

Check the glassware for damages prior to each operation and use only glassware that is in perfect condition. Glassware with cracks, stars or other damages can break during operation.

NOTE

To achieve optimum tightness of the system, all joints on the condenser side must be greased.

5.5 Installing the condenser and the seal

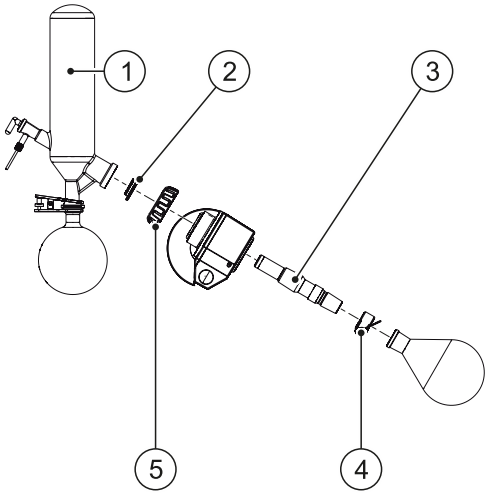


Fig. 5.3: Exploded view of condenser and seals

When installing the condenser and mounting the seal, consider the following order:

- Insert the vapor duct ③ until a click sound is heard.
- Fix the seal ② to the condenser ①.
- Screw on the condenser with the flange screwed connection ⑤ (normally, the flange screwed connection must not be removed).
- Screw the Combi-Clip ④ onto the vapor duct.

5.6 Mounting the support rod (optional accessory)

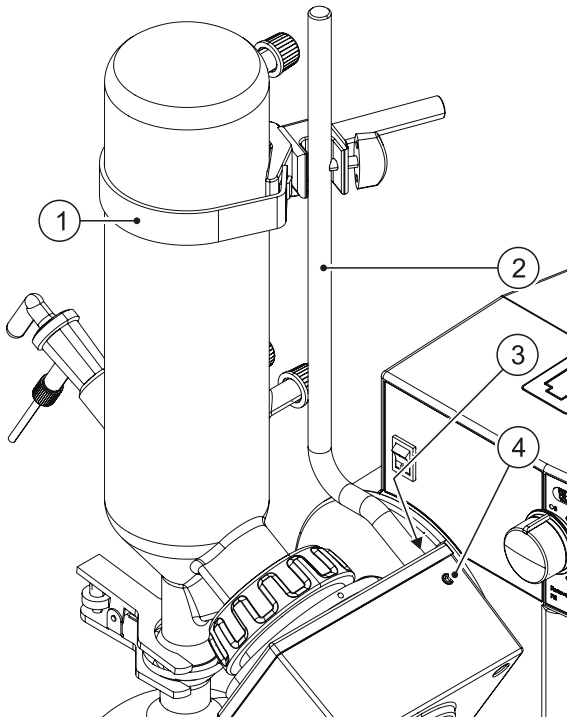


Fig. 5.4: Mounting the support rod

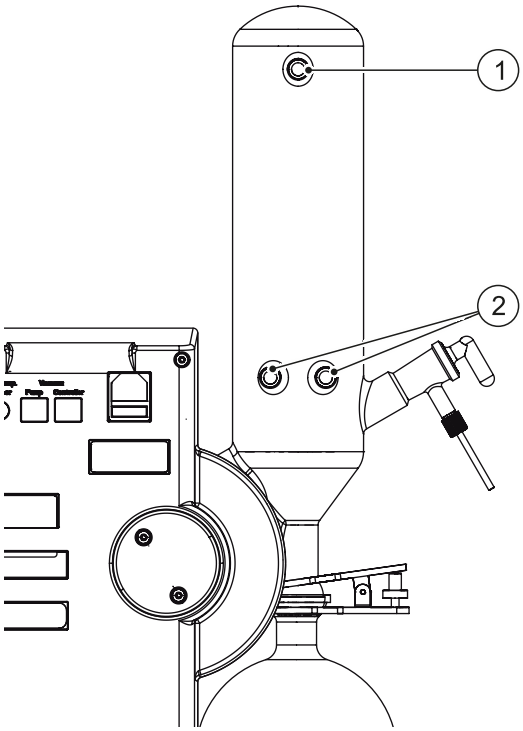
The support rod with bracket and plastic clip is used with the glass assemblies V, C, S, BY and CR. It is optional and has the sole purpose of providing additional stability. We especially recommend it for the glass assemblies C and CR. To attach the support rod to the drive unit, proceed as follows:

- Insert the support rod ② into the hole ③ on the drive unit.
- Secure the support rod by means of the screw ④.
- Fasten the clip ① at the desired height by means of the wing nut.

ATTENTION
The support rod is not designed to carry the weight of the glass assembly on its own. Its sole purpose is to stop the glass assembly tilting forward or backwards when the flanged coupling is released.

5.7 Tube connections

5.7.1 Connection scheme



① Vacuum connection to valve unit or Woulff bottle
② Cooling water connections

Fig. 5.5: Tubing scheme

5.7.2 Cooling water tubes

When connecting the cooling water tubes (white), consider the following:

- Use tube connections GL 14.
- The tubes used must all have the same inner diameter (approximately 6 mm).
- For safety reasons, secure the tubes with commercial tube pivoting clamps or cable binders.
- To save cooling water, you can use the Distillation Chiller F-1xx.
- Check the tubes from time to time and replace them when they are brittle.

Fig. 5.6: Cooling water tubes

5.7.3 Vacuum tubes

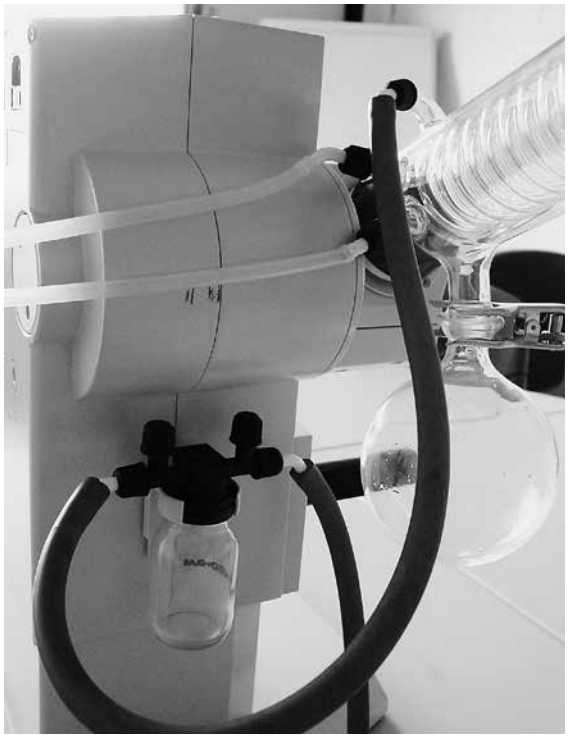


Fig. 5.7: Vacuum connections

When connecting the red vacuum tubes, proceed as follows:

- Use tube connections GL 14.
- The tubes used must all have the same inner diameter (approximately 5 mm).
- Keep vacuum tubes as short as possible.
- When you are operating with the new BUCHI Vacuum Controller V-850/V-855 and Vacuum Pump V-700/V-710 connect a Woulff bottle between the vacuum source and the Rotavapor.
- When you are operating with another pump than a V-700/V-710, connect a valve unit to the V-850/V-855 to control the vacuum.
- Tubes do not need to be secured.
- Check the tubes from time to time and replace them when they are brittle.

5.8 Functional test of vacuum tightness

Carry out the functional test after all described steps for putting the instrument into operation are finished.

NOTE

The functional test can only be carried out with a vacuum controller installed or when you have a pressure measuring device (manometer) connected to the tube between the pump and the Rotavapor.

For this purpose, proceed as follows:

- Start the instrument and adjust the rotation speed as desired.
- Apply a vacuum. The instrument is now evacuated while the flask is rotating.
- Now interrupt the vacuum to the Rotavapor by carefully bending the tube. You should see on the vacuum controller or on the measuring device whether the vacuum in the system remains constant, i.e. the pressure increase per minute should be less than 3 mbar.
- If the vacuum does not remain constant, check all tube connections, retighten them and grease all ball joints at the condenser side.
- If that still does not help, replace the seals as described in chapter 7.3.2.
- Afterwards, repeat the steps described above until the functional test is passed.

6 Operation

This chapter explains the operating elements and possible operating modes. It gives instructions on how to operate the instrument properly and safely.

WARNING
Risk of injury.
- *Never operate the instrument when glassware is damaged.*

6.1 Setting the heating bath temperature

ATTENTION
As soon as the power plug is connected and the mains switch is turned on, the bath starts heating if the actual temperature is below the set temperature. For this reason, make sure that there is always heating medium in the bath to prevent instrument damage.

WARNING
The heating bath can reach temperatures up to 95 °C. To avoid burns, consider the following:
- *Never remove a rotating flask from the bath because splashing oil can result in burns.*
- *Make sure that no liquid can overflow from the bath when the evaporating flask is submerged.*
- *Install the protective shield (optional accessory) only to a cold heating bath.*

6.2 Immersion angle of the evaporating flask into the heating bath

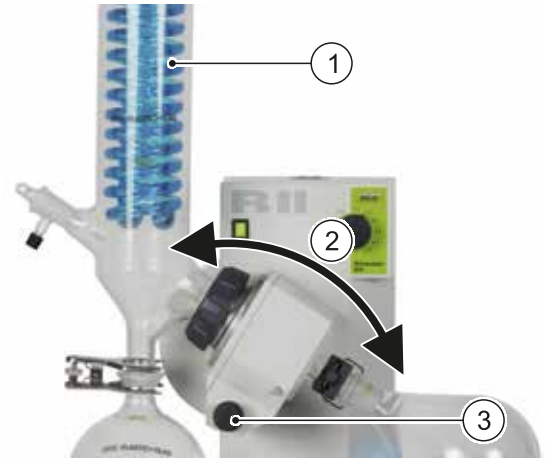


Fig. 6.1: Immersion angle of the evaporating flask into the heating bath

The immersion angle into the heating bath is, by default, set to 30°.
If you need to operate with another angle, e.g. when operating with a small flask, the angle can be changed as follows:
- Turn off the instrument.
- Hold the glass assembly ① with the one hand and loosen the anchoring ③ with the other hand by pulling the knob.
- Set the condenser in the desired position by tilting the drive unit ② accordingly and let it catch.
- Release the knob.

ATTENTION
Risk of instrument damage.
- *Do not change the immersion angle while the instrument is operating.*
- *When the anchoring is loosened the glass assembly can tilt to the left, so that glass breakage can occur. Always support the glass assembly with one hand when you loosen the anchoring.*

6.3 Selecting the distillation conditions

To achieve optimal distillation conditions, the distillation energy supplied by the heating bath must be removed by the condenser.

To ensure this, operate the instrument according to the following rule of thumb:

Cooling water: max. 20 °C Vapor: 40 °C Bath: 60 °C

How are these conditions achieved?:

- Set the bath temperature to 60 °C.
- Set the cooling water temperature not higher than 20 °C.
- Allow cooling water to flow through the condenser at approximately 40 – 50 L/h.
- Define the operating vacuum in such a way, that the boiling point of the solvent is 40 °C. The corresponding pressure can be seen from the Solvent Table in chapter 3.

Advantages associated with bath temperatures of 60 °C:

- The evaporating flask can be replaced without risk of burns.
- The evaporation rate of the water from the heating bath is low (low energy loss).
- The heating bath energy is used at a good degree of efficiency.

This rule can also be applied to lower bath temperatures, e.g.:

Cooling water: 0 °C Vapor: 20 °C Bath: 40 °C

Fig. 6.2: 20–40–60 °C rule

6.4 Distilling

To start operating the instrument, the following conditions have to be fulfilled:

- All electrical connections are established correctly.
- All sealing are inserted correctly.
- All joints are greased.

To start operating the instrument, proceed as follows:

- Switch on the instrument.
- Allow cooling water with a temperature not higher than 20 °C to flow through the condenser at approx. 40–50 L/h.
- Set the heating bath temperature to the desired value as described above and wait, until the heating medium has reached its operating temperature.
- Fill the solution you want to distill into the evaporating flask and make sure it does not exceed the filling weight of 3 kg.
- Mount the evaporating flask.

NOTE

Choose the pressure in such a way that the boiling point of the solvent is 40 °C (see solvent table).

- Set the rotation speed.

NOTE

If the last distillation was an automatic one and you now want to carry out a manual distillation, turn the knob for the rotation speed to its leftmost position first before setting the rotation speed by turning the knob to the right. Otherwise the instrument will not start operating.

- Use the quick-action jack to submerge the flask into the bath.
- After the set vacuum has been reached, wait for about 1–2 minutes to see whether distillation begins.
- If the distillation does not start, optimize the parameters (decrease the pressure gradually or increase the bath temperature).

Both possibilities lead to an increased distillation capacity, see also chapter 6.5.

6.5 Optimizing the distillation conditions

Depending on the solvent being distilled the distillation might have to be re-optimized. In the optimized case, the condenser should be steamed up to between 2/3 to 3/4, see figure below.

If this is not the case, there are two possibilities to optimize the distillation:

- When the heating bath has reached 60 °C slowly reduce the pressure. Thus, the boiling point of the solvent is reduced and ΔT_1 increases resulting in an increase of distillation capacity.
- When the heating bath has reached 60 °C increase the bath temperature. Thus ΔT_1 increases resulting in an increase of distillation capacity as well.

NOTE

When the bath temperature is increased, not all of the additional energy is used for distillation but a major part is discharged into the environment due to the increasing difference between heating bath and the ambient temperature.

Fig. 6.3: Optimal condensation area of a condenser

6.6 When the distillation “dies out”

When the distillation “dies out”, replace the receiving flask to eliminate the risk of back evaporation. Then, continue distillation. Repeat this process until all desired solvent is distilled off.
At the end of the distillation, stop the rotation, pull the flask off and aerate the system.
If you do not intend to immediately perform another distillation, turn off the heating bath and cooling water supply to save energy and resources.

7 Maintenance

This chapter gives instructions on all maintenance work to be performed in order to keep the instrument in good working condition.

WARNING

All maintenance and repair work requiring the opening or removal of instrument covers may only be carried out by trained personnel and with the tools provided for this purpose.

WARNING

Electrical hazard:

- *Prior to all maintenance work on the instrument switch off the power supply and remove all sources of flammable vapor.*

ATTENTION

When you carry out maintenance work at the lower part of the bath, always support it to prevent instrument damage.

Use only genuine consumables and genuine spare parts for maintenance and repair to assure good system performance and reliability. Any modifications to the spare parts used are only allowed with the prior written permission of the manufacturer.

7.1 Housing

Check the housing for defects (controls, plugs) and clean it regularly with a moist cloth.

ATTENTION

Never use solvents as cleaning agents as these might damage the instrument.

7.2 Tube connections

Visually examine the tube connections regularly. When tubes become cracked and brittle, replace them with new tubes.

Grease all joints on the condenser side regularly to achieve optimum tightness of the system.

7.3 Sealing system

ATTENTION

When removing and reinstalling the seals, make sure not to damage them. Always move them perpendicularly to the axis of the glass parts and ensure no damage occurs to the sealing lip. Never apply grease to the seals and never touch them with sharp object, otherwise they will get damaged.

7.3.1 Cleaning the seals

To prolong the lifetime of the seals, rinse them regularly with water, especially if “bumping” occurred during the distillation or if working with crystalline products. Afterwards, dry them with a solft cloth. To remove the seals, see chapter 5.5, Installing the condenser and the seal.

7.3.2 Replacing the seals

Seals are subject to wear and tear, thus you should check them regularly and replace them, if necessary, e.g. if they do not pass the vacuum tightness test described in chapter 5.8 anymore. For this purpose, see chapter 5.5, Installing the condenser and the seal.

7.4 Heating bath

The inner surface of the heating bath should be cleaned if:

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

For this purpose, remove the heating bath from the Rotavapor and empty it.
In the case of minor calcifications, use a non-abrasive cleaning agent (e.g. a bathroom cleaner). If the calcification is persistent, use e.g. acetic acid to remove it. Rinse the bath thoroughly afterwards.

7.5 Glass components

To prolong the lifetime of the glass components, consider the following:

- Rinse glass components with water and commercial cleaning agent (e.g. a mild soap solution).

NOTE
We recommend cleaning all the glass components manually.

- Use an alkaline cleaner to remove dirt, e.g. algae, adhering within the condenser coil.

NOTE
When a thin copper wire is introduced into the condenser coil, the risk of dirt adhering to the condenser coil is reduced.

- Remove grease from joints. After you have cleaned and completely dried each glass component, visually inspect the components for glass splinters or cracks. Since these components are under vacuum when the Rotavapor is operating, they are subject to strain.

Regularly check the glass components for damages and only use glassware that is in perfect condition. Glassware with cracks, stars or other damages can break during operation.

8 Troubleshooting

This chapter helps to resume operation after a minor problem has occurred with the instrument. It lists possible occurrences, their probable cause and suggests how to remedy the problem.

The troubleshooting table below lists possible malfunctions and errors of the instrument. The operator is enabled to correct some of those problems or errors by him/herself. For this, appropriate corrective measures are listed in the column “Corrective measure”.

The elimination of more complicated malfunctions or errors is usually performed by a BUCHI technical engineer who has access to the official service manuals. In this case, please refer to your local BUCHI customer service agent.

8.1 Malfunctions and their remedy

Table 8-1: General malfunction and their remedy

Malfunction	Possible cause	Corrective measure
Instrument does not work	Mains switch off	Switch on mains switch
	Instrument is not connected to power supply	Check if mains connection is okay
	Fuse defective	Replace the fuse. If the malfunction occurs again, contact the BUCHI customer service.
Bath does not heat	Mains switch off	Switch on mains switch
	Instrument is not connected to power supply	Check mains connection
	Over temperature protection was activated	Let the bath cool down and empty it. Then push the temperature sensor reset button at the bottom side of the heating bath e.g. by means of a tooth stick, see Fig. 8.1.
	Fuse defective	Replace the fuse. If the malfunction occurs again, contact the BUCHI customer service.
Servo lift does not work	Various causes	Contact the BUCHI customer service
Flask does not rotate	Adjusting knob for rotation speed at 0	Turn adjusting knob for rotation speed clockwise until rotation starts
	Restart instrument	Turn adjusting knob for rotation speed to 0 then slowly turn clock-wise until rotation starts
System is leaking	Joints have not been greased	Grease joints
	Tube connections have not been fixed correctly or are defective	Check tube connections
	Tubes are leaky (brittle)	Replace tubes
	Sealing system has been installed incorrectly	Check sealing system

Table 8-1: General malfunction and their remedy

Malfunction	Possible cause	Corrective measure
	Seal is defective	Replace seal

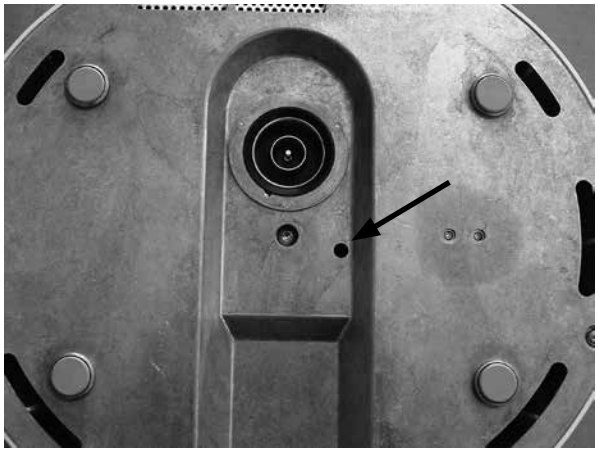
Table 8-2: Malfunctions with vacuum controller and vacuum pump and their remedy

Malfunction	Possible cause	Corrective measure
Frequent switching of valve or pump	System is leaky	Check all sealing points (tubes and their connections)
	Chosen hysteresis is too small	Choose larger hysteresis (if end-vacuum is higher than 700 mbar, switch to automatic hysteresis)
Vacuum is not reached	Back evaporation at Rotavapor	Empty receiving flask
	Water pressure of water jet pump is too low	Open water tap completely
Distillation “died out”		Manually decrease the pressure until the distillation starts again
Distillation stopped, although not dried out completely	Back evaporation from the receiving flask is too strong (especially for solvent mixtures)	Empty receiving flask and restart distillation
	Malfunction in distillation procedure which is not exactly defined (e.g. sudden cooling, heat flow too low, etc.)	Decrease the pressure manually until the distillation starts again

NOTE

At the R II no errors are displayed and read out via the RS485 interface.

Reset of the overtemperature sensor at the bottom of the Heating bath B-491



Let the bath cool down and empty it. Then push the temperature sensor reset button at the bottom side of the heating bath e.g. by means of a tooth stick.

Fig. 8.1: Heating bath B-491 bottom view

8.2 Customer service

Only authorised service personnel are allowed to perform repair work on the instrument. These persons have a comprehensive technical training and knowledge of possible dangers which might arise from the instrument.
Addresses of official BUCHI customer service offices are given on the BUCHI website under: www.buchi.com. If malfunctions occur on your instrument or you have technical questions or application problems, contact one of these offices.

The customer service offers the following:

- Spare part delivery
- Repairs
- Technical advice

9 Shutdown, storage, transport and disposal

This chapter instructs how to shut down the instrument, how to pack it for storage or transport, and specifies the storage and shipping conditions.

9.1 Storage and transport

WARNING
Biohazard:
- *Remove all dangerous substances from the instrument and clean it thoroughly.*

Store and transport the instrument in its original packaging.

WARNING
Electrical hazard:
- *Always remove the plug connector at the socket first to avoid having energized cables lying about.*

9.2 Disposal

To dispose of the instrument in an environmentally friendly manner, a list of materials is given in chapter 3. This helps to ensure that the components are separated and recycled correctly. Make especially sure to dispose of the gas springs appropriately.
Please follow valid regional and local laws concerning disposal.

NOTE
When you send the instrument back to the manufacturer for repair work, please copy the health and safety clearance form on the following page, fill it in and enclose it in the instrument package.

9.3 Health and safety clearance form

Declaration concerning safety, potential hazards and safe disposal of waste, e.g. used oil.
Safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations, safety at work laws and regulations regarding safe disposal of waste, e.g. waste oil, require that for all Rotavapors and other products this form must be send to our office duly completed and signed before any equipment is repaired or dispatched or to our premises.
Products will not be accepted for any procedure and handling and repair/DKD calibration will not start before we have received this declaration.

a) Fax or post a **completed copy of this form** to us in advance. The declaration must arrive before the equipment. **Enclose a second, completed copy with the product.** If the product is contaminated you must notify the carrier **(GGVE, GGVS, RID, ADR)**.
b) Inevitably, the repair process will be delayed considerably, if this information is missing or this procedure is not obeyed. We hope for your understanding for these measures which are beyond our control and that you will assist us in expediting the repair procedure.
c) **Make sure that you know all about the substances which have been in contact with the equipment and that all questions have been answered correctly and in detail.**

1. Product (Model): .....

2. Serial No.: .....

3. List of substances in contact with the equipment or reaction products:

3.1 Chemical/substance name, chemical symbol:

a) .....
b) .....
c) .....
d) .....

3.2 Important information and precautions, e.g. danger classification

a) .....
b) .....
c) .....
d) .....

4. Declaration (please mark as applicable):

4.1 for non dangerous goods:
We assure for the returned product that
- neither toxic, corrosive, bilogically active, explosive, radioactive nor contamination dangerous in any way has occurred.
- the product is free of dangerous substances.

The oil or residues of pumped media have been drained.

4.2 for dangerous goods:
We assure for the returned product that
- all substances, toxic, corrosive, biologically active, explosive, radioactive or dangerous in any way which have pumped or been in contact with the product are listed in 3.1, that the information is complete and that we have not withheld any information.
- the product, in accordance with regulations, has been
  ¤ cleaned
  ¤ decontaminated
  ¤ sterilized

5. Way of transport/carrier:

.....

Day of dispatch to BÜCHI Labortechnik AG:

.....

We declare that the following measures - where applicable - have been taken:
- The oil has been drained from the product.

Important: Dispose of according to national regulations.
- The interior of the product has been cleaned.
- All inlet and outlet ports of the product have been sealed.
- The product has been properly packed, if necessary, please order an original packaging (costs will be charged) and marked as appropriate.
- The carrier has been informed about the hazardous nature of goods (if applicable).

Signature: .....

Name (print): .....

Job title (print): .....

Company's seal: .....

Date: .....

10 Spare parts

This chapter lists spare parts, accessories, and options including their ordering information.
Order the spare parts from BUCHI. Always state the product designation and the part number when ordering spare parts.
Use only genuine BUCHI consumables and genuine spare parts for maintenance and repair to assure good system performance and reliability. Any modifications to the spare parts used are only allowed with the prior written permission of the manufacturer.

10.1 Glass assembly A

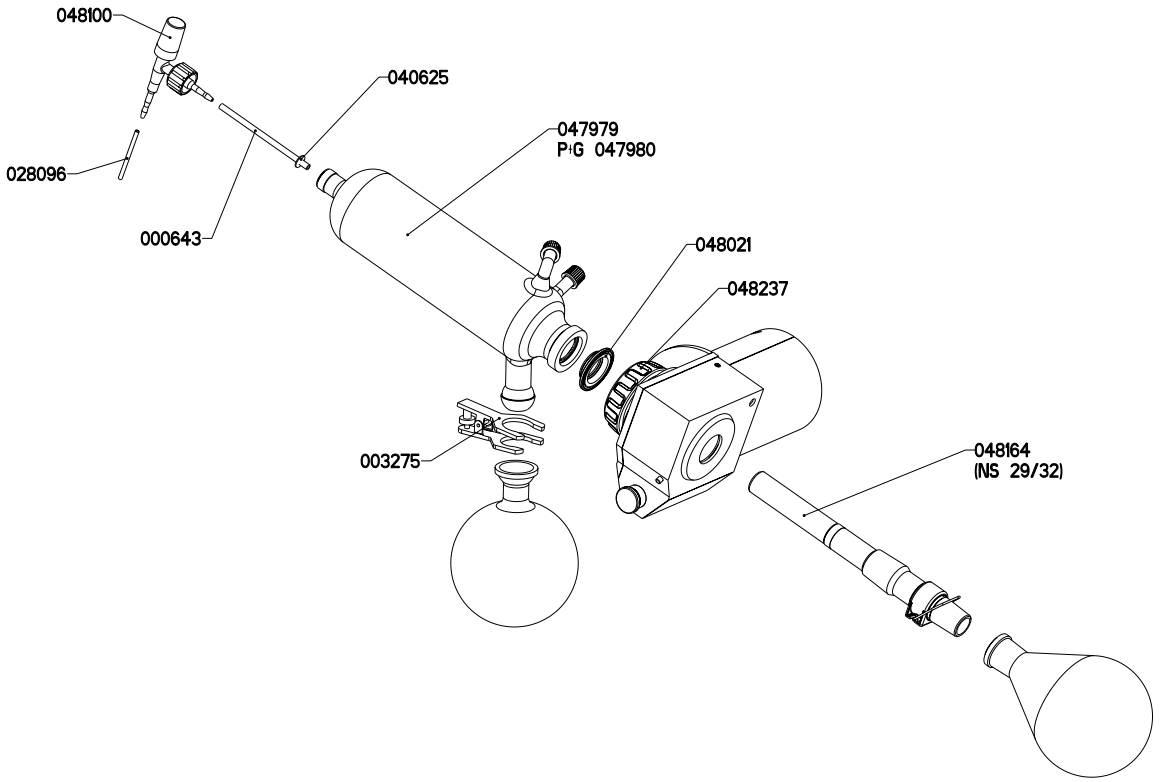


Fig. 10.1: Glass assembly A

Table 10-1: Glass assemblies A

Product	Order number	Product	Order number
Glass assembly A 05 R II complete with 1 L receiving flask, without seal and vapor duct	048170	Vapor duct long SJ 29/32 with Combi-Clip	048164
Glass assembly A 05 R II complete P+G with 1 L coated receiving flask, without seal and vapor duct	048171	PTFE drain disk	040625
Diagonal condenser A 05 R II	047979	PTFE feed tap for R II	048100
Set of tube connections GL 14, 4× bent/2× straight/6× screw caps	038000	Flange screwed connection	048237
Diagonal condenser A 05 R II P+G	047980	PTFE tube 460 mm	000643
PTFE tube, 600 mm	028096	Clip for receiving flask S35	003275
Tube connection GL 14, bent, complete, set of 4	037287	Set of tube connections straight GL 14, 4 pieces, 4× olive straight with screw caps	037642
Gasket WD26 (seal)	048021		

10.2 Glass assembly V

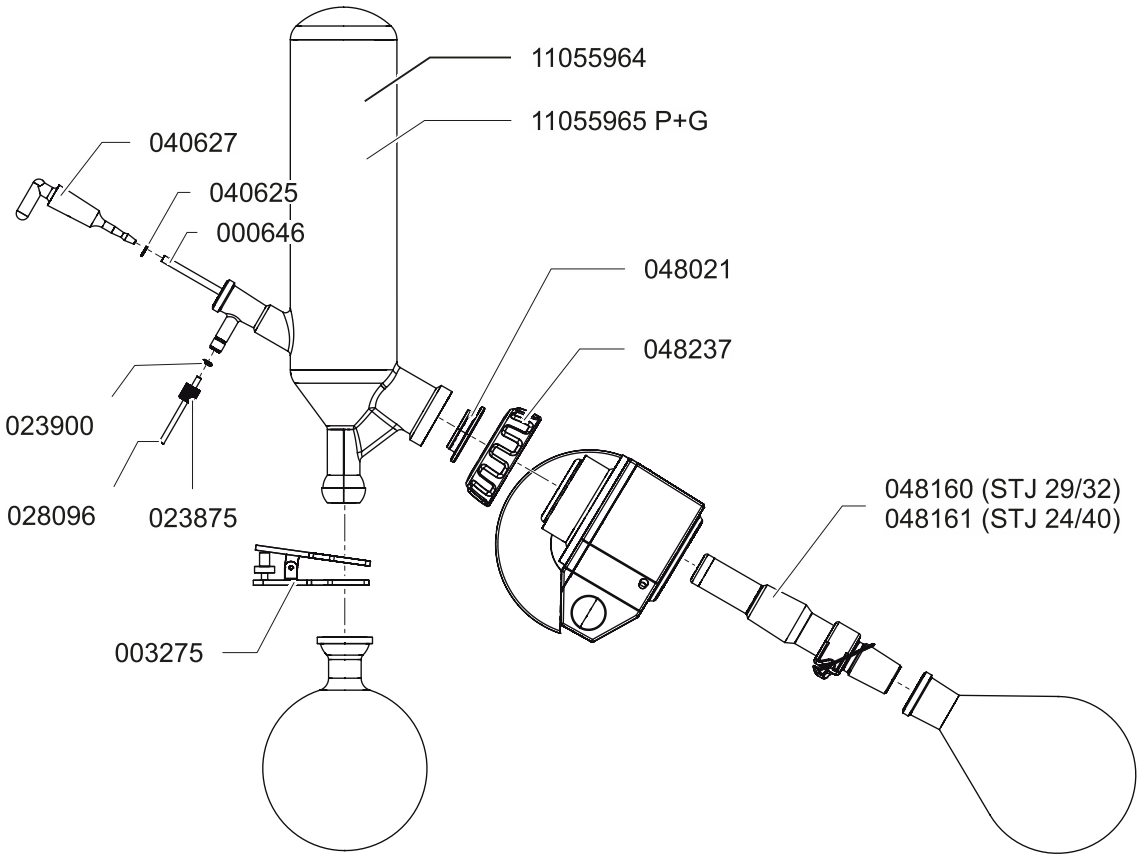


Fig. 10.2: Glass assembly V

TABLE 10-2: GLASS ASSEMBLIES V

Product	Order number	Product	Order number
Glass assembly V R II complete with 1 L receiving flask, without seal and vapor duct	048172	PTFE-Hose 4,7×300 mm	000646
Vertical condenser R II V (023875+023900) + Hose clips GL 14 complete	11055964	Gasket WD26 (seal)	048021
Glass assembly R II V complete with 1 L receiving flask, P+G, without seal and vapor duct	048173	PTFE hose, 600 mm	028096
Diagonal condenser R II V (023875+023900) + Hose clips GL 14 complete, P+G	11055965	PTFE drain disk	040625
Set of hose connections GL 14, 4× bent/ 2× straight/6× screw caps	038000	Clip for receiving flask S35	003275
Vapor duct short SJ 24/40 with Combi-Clip	048161	Stop cock SJ 18.8/38	040627
Vapor duct short SJ 29/32 with Combi-Clip	048160	Set of hose connections straight GL 14, 4 pieces, 4× olive straight with screw caps	037642

TABLE 10-2: GLASS ASSEMBLIES V			
Product	Order number	Product	Order number
Combi-Clip	040621	Set of hose connections bent, GL 14, 4 pieces, 4× olive bent with screw caps	037287

10.3 Glass assembly C

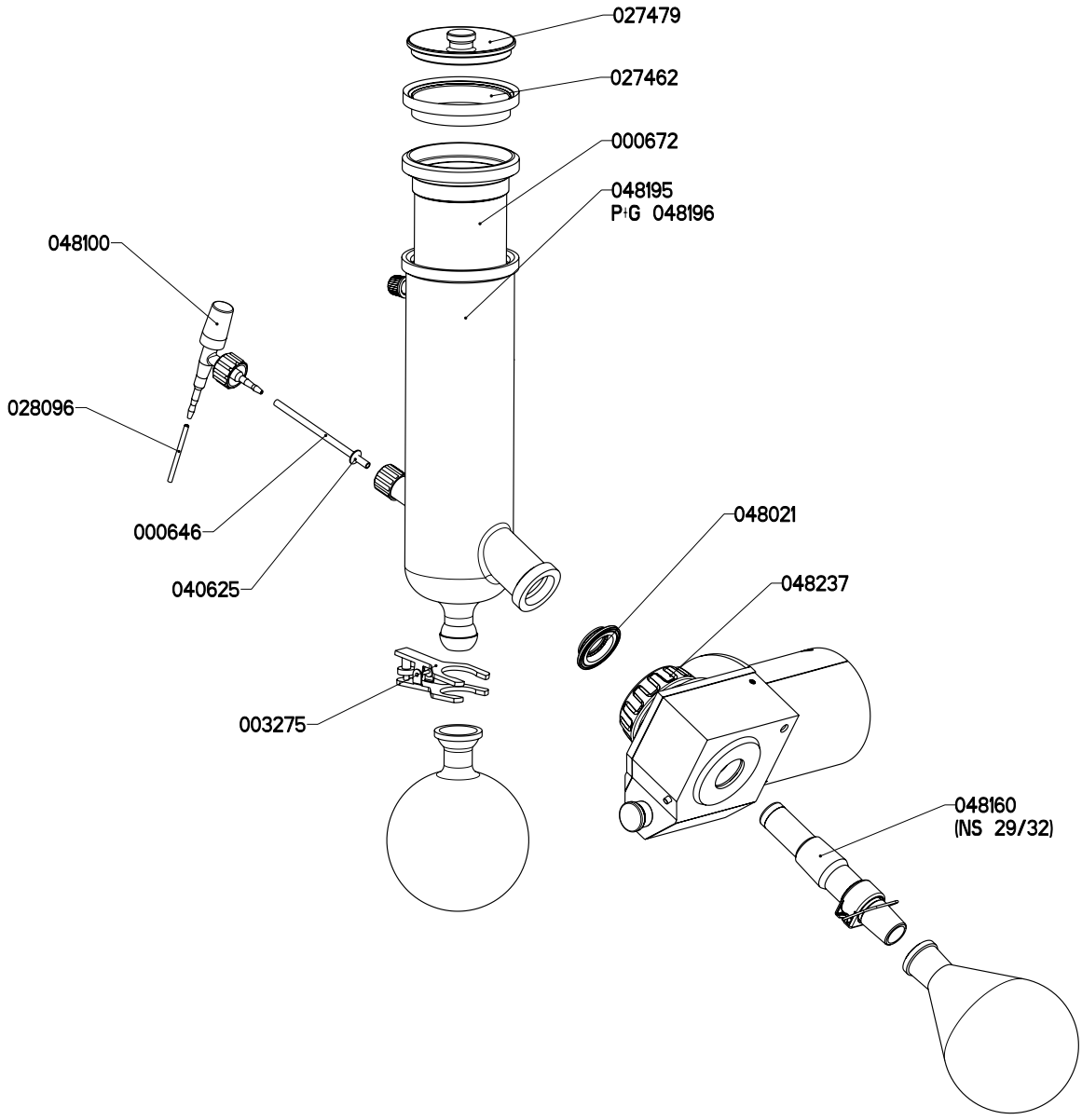


Fig. 10.3: Glass assembly C

TABLE 10-3: GLASS ASSEMBLIES C			
Product	Order number	Product	Order number
Glass assembly C05 complete with 1 L receiving flask, without seal and vapor duct	048174	Cap for cold trap	027479

TABLE 10-3: GLASS ASSEMBLIES C			
Product	Order number	Product	Order number
Glass assembly C complete, P+G with 1 L coated receiving flask, without seal and vapor duct	048175	PTFE feed tap for R II	048100
Cold trap outer part P+G (including 023900+023875 + tube connection GL 14 complete)	048196	PTFE tube 300 mm	000646
Cold trap	000672	Clip for receiving flask S35	003275
Cold trap outer part	048195	Seal PTFE/Viton complete	027462
PTFE tube, 600 mm	028096	PTFE drain disk	040625
Tube connection GL 14, bent, complete, set of 4	037287	Set of tube connections straight GL 14, 4 pieces, 4× olive straight with screw caps	037642
Gasket WD26 (seal)	048021	Set of tube connections GL 14, 4× bent/2× straight/6× screw caps	038000
Flange screwed connection	048237	Cross sleeve	027344
Support rod complete (optional)	048180	Rubber band	032013

10.4 Sealing system

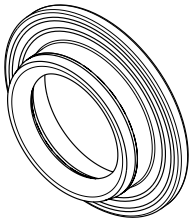


Table 10-4: RE Sealing system	
Product	Order number
Gasket WD26 (vacuum seal)	048021

10.5 Various glass parts

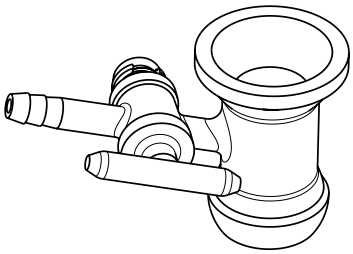


Table 10-5: Vacuum connection	
Product	Order number
Vacuum connection including cock	001006

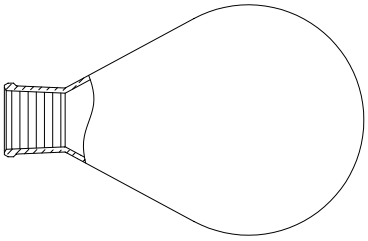


Table 10-6: SJ Evaporating flask (pear-shaped)

Content	SJ 29/32	SJ 24/40	SJ 29/42
50 mL	000431	008750	008736
100 mL	000432	008751	008737
250 mL	000433	008754	008738
500 mL	000434	008758	008739
1000 mL	000435	000440	008762
2000 mL	000436	008765	008769
3000 mL	000437	008767	008770
4000 mL	047991	047990	–

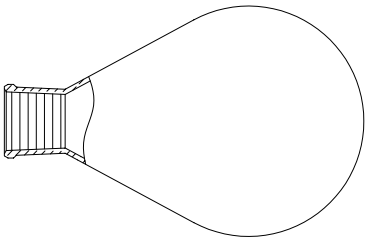


Table 10-7: SJ Evaporating flask (pear-shaped) P+G

Content	SJ 29/32	SJ 24/40	SJ 29/42
50 mL	033405	–	–
100 mL	033404	–	–
250 mL	025520	–	–
500 mL	025322	025261	–
1000 mL	020729	020730	025517
2000 mL	025323	025262	–
3000 mL	025324	025263	027346
4000 mL	047993	047992	–

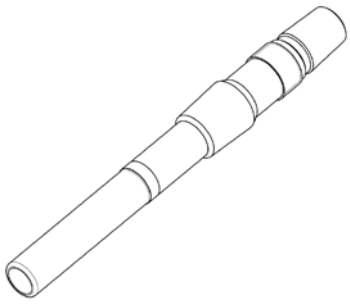


Table 10-8: Vapor duct long for condenser A

Standard joints	without Combi-Clip	with Combi-Clip
SJ 24/40	048068	048165
SJ 29/32	046964	048164
SJ 29/42	048072	048166
NS34/35	048074	048167

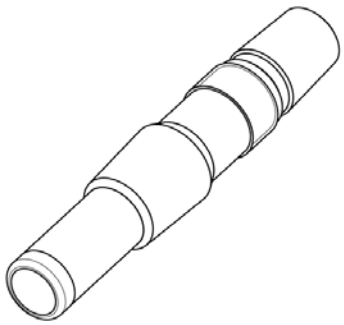


Table 10-9: Vapor ducts for condenser C, V

Standard joints	without Combi-Clip	with Combi-Clip
SJ 24/40	048067	48161
SJ 29/32	046962	048160
SJ 29/42	048069	048162
SJ 34/35	048073	048163

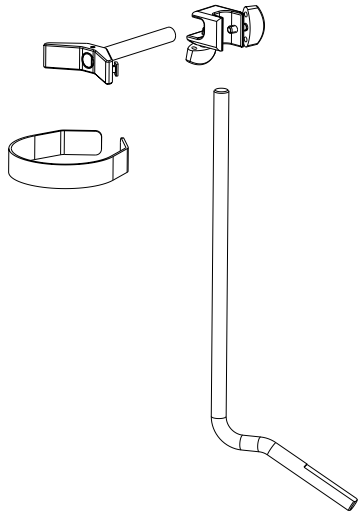


Table 10-10: Condenser holder

Product	Order number
Support rod complete	048180

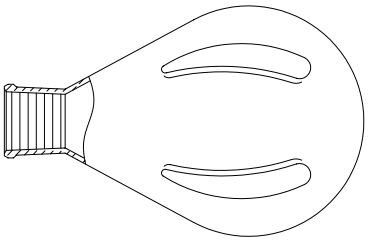


Table 10-11: SJ Drying flask (pear-shaped)

Content	SJ 29/32	SJ 24/40
500 mL	000452	011579
1000 mL	000453	000420
2000 mL	000454	011580

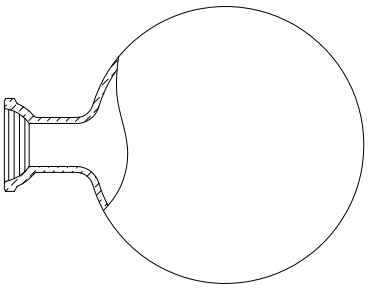


Table 10-12: Receiving flask (pear-shaped)

Content	uncoated	P+G	P+G low temperature
50 mL	000421	–	–
100 mL	000422	–	–
250 mL	000423	–	–
500 mL	000424	025264	040774
1000 mL	000425	020728	040775
2000 mL	000426	025265	040776
3000 mL	000427	025266	040777

Beaker flask

For working with high viscosity or solid substances. The large opening allows for smooth draining and cleaning. Foaming solutions can be processed more easily.
Filling volume:
1.5 L version = 500 mL
0.5 L version = 150 mL

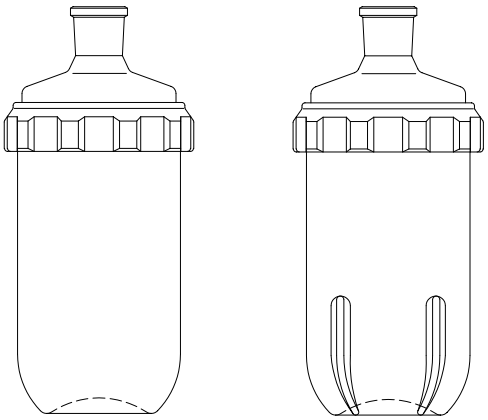


Table 10-13: SJ Beaker flask

1.5 L version		
	Beaker flask complete	Drying flask
SJ 29,2/32	034230	034269
SJ 24/40	034247	034770
0.5 L version		
	Beaker flask complete	Drying flask
SJ 29,2/32	034764	034767
SJ 24/40	034765	034768

Distillation spider SJ 29/32

For simultaneous distillation from a 20 mL cylinder flask.

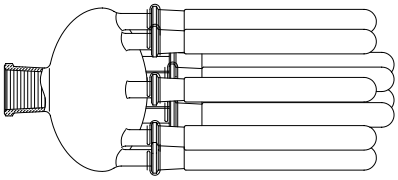


Table 10-14: Distillation spider 20 mL

Number of flasks	Order number
6× SJ 14.5/23	001334
12× SJ 14.5/23	001335
20× SJ 14.5/23	001336
20 mL evaporating flask to spider	000477

For simultaneous distillation from 5 evaporating flasks.

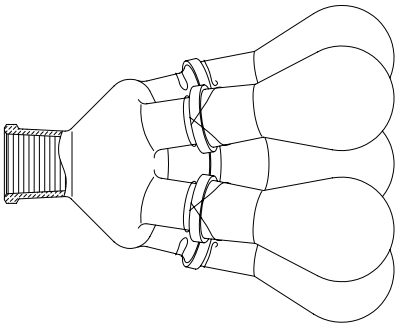


Table 10-15: Distillation spider with 5 flasks

Content	Order number
50 mL with SJ 24/29	001332
100 mL with SJ 24/29	001333

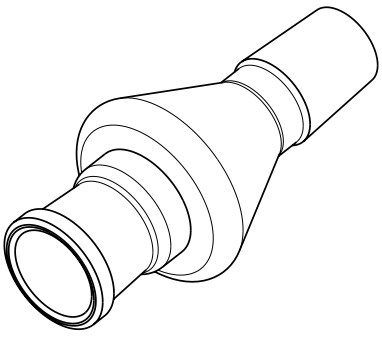


Table 10-16: Reitmeyer trap for slightly foaming solutions

Product	Order number
SJ 29/32	036576
SJ 24/40	036577

10.6 Miscellaneous

Floating balls

The floating balls form a cover on the water surface, so that the energy consumption is reduced.

Table 10-17: Floating balls	
Product	Order number
250 pieces	036405

Table 10-18: Cover	
Product	Order number
Top cover B-491	048230

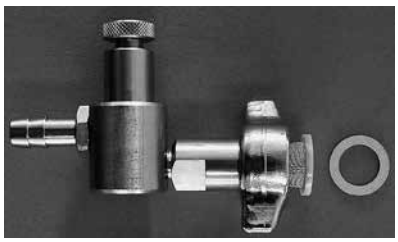


Table 10-19: Water control valve ½”	
Product	Order number
Water control valve ½”	011606

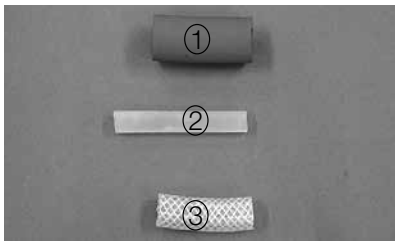


Table 10-20: Tubes	
Product	Order number
Vacuum tube Ø16/6 mm ①	017622
Cooling water tube silicone Ø 9/6 mm ②	004133
Nyflex tube Ø 14×8 ③	004113

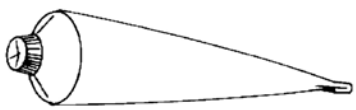


Table 10-21: Glisseal laboratory grease	
Product	Order number
60 g tube	01330

Table 10-22: Base plate	
Product	Order number
Base plate B-491 for R-210/R-215/R II, 230 V	048268
Base plate B-491 for R-210/R-215/R II, 100–120 V	048269

11 Declarations and requirements

11.1 FCC requirements (for USA and Canada)

English:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to both Part 15 of the FCC Rules and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Français:

Cet appareil a été testé et s'est avéré conforme aux limites prévues pour les appareils numériques de classe A et à la partie 15 des réglementations FCC ainsi qu'à la réglementation des interférences radio du Canadian Department of Communications. Ces limites sont destinées à fournir une protection adéquate contre les interférences néfastes lorsque l'appareil est utilisé dans un environnement commercial.
Cet appareil génère, utilise et peut irradier une énergie à fréquence radioélectrique, il est en outre susceptible d'engendrer des interférences avec les communications radio, s'il n'est pas installé et utilisé conformément aux instructions du mode d'emploi. L'utilisation de cet appareil dans les zones résidentielles peut causer des interférences néfastes, auquel cas l'exploitant sera amené à prendre les dispositions utiles pour palier aux interférences à ses propres frais.

11.2 Declaration of conformity

Declaration of conformity
Konformitätserklärung
Déclaration de conformité
Dichiarazione di conformità
Declaración de conformidad

BÜCHI Labortechnik AG
Meierseggstrasse 40
CH-9320 Flawil 1
Switzerland

Declares, that the products / Erklärt, dass die Produkte / Déclare par la présente que les produits / Dichiara che i prodotti / Declara que los productos:

Rotavapor R-210
Rotavapor R-215
Rotavapor R II
Heating Bath B-491
Heating Bath B-495

comply with the requirements of the European Directives / den Anforderungen der Richtlinien / est conforme aux exigences des directives européennes / soddisfa i requisiti delle norme europee / cumple los requerimientos de las Directivas Europeas:

2006/95/EEC (low voltage directive)
2004/108/EEC (EMC directive)
2006/42/EC (machinery directive)

and are in accordance with the following standards / und den folgenden Normen entsprechen / ainsi qu'aux normes suivantes / ed sono conformi ai seguenti standard / y son conforme a los estándares siguientes:

EN 61010-1:2001
(Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.)

EN 61010-2-010:2003
Safety requirements for electrical equipment for measurement, control, and laboratory use Part 2-010: Particular requirements for laboratory equipment for the heating of materials

EN 61326-1:2006
(Electrical equipment for measurement, control and laboratory use. EMC Requirements: General requirements.)

Flawil, November 16th, 2009

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