Before operating the rotary evaporator and the accessories, please read the operating instructions on the web site (www.knf.com/downloads) and pay attention to the safety precautions!
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# General information

## 1.1 Information about the instructions

**Contents**

The operating instructions contain important information on how to use the rotary evaporator. In order to ensure safe working and proper functioning, it is essential to observe all the specified safety precautions.

**Storage location**

These operating instructions are part of the product and must be stored in its immediate vicinity in a location accessible to personnel at all times.

**Passing on**

These operating instructions are part of the product and must be passed on to the next owner if the device is resold.

**Illustrations in the instructions**

Illustrations in these operating instructions may or may not be to scale. The illustrations may differ slightly from the actual product.
## 1.2 Warnings
Warnings in the operating instructions are identified with the danger symbol, keywords and colours. These provide an indication of the extent of the danger.

<table>
<thead>
<tr>
<th><img src="image" alt="Danger" /></th>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a dangerous situation which will lead directly to death or serious injury if it is not avoided.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><img src="image" alt="Warning" /></th>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a dangerous situation which may lead to death or serious injury if it is not avoided.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><img src="image" alt="Caution" /></th>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a dangerous situation which may lead to moderate or minor injuries if it is not avoided.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><img src="image" alt="Note" /></th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a situation which may cause damage to property if it is not avoided.</td>
<td></td>
</tr>
</tbody>
</table>
## 1.3 Symbols

The following symbols appear in the operating instructions, on labels on the device, and on its packaging:

### WARNING

**Risk of injuries and property damage caused by illegible labels**

The labelling on the device may become illegible with time.
- Maintain labels on the device in a legible condition.
- Replace any illegible labels.

The following symbols in the operating instructions and on the device and its packaging indicate environmental protection considerations:

- Recycling
- Not to be disposed of in household waste

The following symbols in safety precautions and on the device indicate the nature of the danger:

- General warning sign
- Warning about electrical danger
- Warning about low temperature/frost
- Warning about hot surface

This symbol calls for disconnection from the mains.
1.4 Disclaimer of liability
In preparing the contents of these operating instructions, account has been taken of applicable regulations and the state of the art.

The manufacturer can accept no liability for any damage or malfunctions caused by failure to follow the operating instructions.

The manufacturer can accept no liability for any damage or malfunctions caused by modification or conversion of the device or improper handling.

The manufacturer can accept no liability for any damage or malfunctions caused by the use of non-approved spare parts and accessories.

1.5 Manufacturer’s address
KNF Neuberger AG
Stockenstrasse 6
8362 Balterswil, Switzerland
Tel +41 (0)71 973 993 0
Fax +41 (0)71 973 993 1
www.knf.com

1.6 Year of manufacture
The year of manufacture is shown on the device’s type plate.

1.7 Other applicable documents
The documents listed must also be taken into consideration.

- Chemical resistance list (www.knf.com/downloads)
- Sales documents
- GTCs

1.8 Copyright
The information, texts and illustrations in these operating instructions are protected by copyright. The contents of these operating instructions must not be copied, translated or passed to third parties without the written consent of the manufacturer.

1.9 Warranty conditions
The applicable warranty conditions are set out in the General Terms and Conditions of Business and the sales documents.
2 Use

2.1 Intended use
The RC 600 rotary evaporator is designed for use in chemical, pharmaceutical and biological laboratories. It is intended solely to separate solutions (distillation, drying, recovery, extraction, etc.).

Make sure that the installation location is dry and the rotary evaporator is protected against water in the form of rain, spray, splashes and drips.

The rotary evaporator may be used exclusively in indoor areas.

The rotary evaporator may be used only under a fume hood or with the properly installed protective cover (accessory).

Owner’s responsibility

<table>
<thead>
<tr>
<th>Operating parameters and conditions</th>
<th>Only install and operate the rotary evaporator under the operating parameters and conditions described in Chapter 4. Technical data.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use under a fume hood</td>
<td>Protect the rotary evaporator from moisture. Ensure that no hazardous materials can enter the surrounding environment (including heating and cooling media), even in the event of glass breakage, leaks, or loss of cooling. Ensure that no hazardous materials/reactions can be produced through contact of processed solutions and solvents with the heating and cooling media or the ambient air. It may be necessary to operate the unit only under a suitable fume hood. Whenever the rotary evaporator is operated outside a suitable fume hood (after eliminating these sources of danger), the protective cover must be used (refer to Chapter 11, Spare parts and accessories, p 48).</td>
</tr>
<tr>
<td>Requirements for processed substances</td>
<td>Before using a substance, investigate its compatibility with the materials used in the seals and tubing. Before using a substance, investigate whether it can be evaporated without risk.</td>
</tr>
<tr>
<td>Chilled condenser</td>
<td>Make sure the tubes for gas and coolant are correctly assigned on the chilled condenser. Adequately cool the chilled condenser at all times.</td>
</tr>
<tr>
<td>Accessories</td>
<td>Laboratory equipment and supplemental components attached to the rotary evaporator must meet the specifications provided in Chapter 4.</td>
</tr>
</tbody>
</table>
2.2 Improper use

The rotary evaporator may not be used in potentially explosive atmospheres.

The rotary evaporator may not be used in a corrosive environment.

The heating bath of the rotary evaporator may not be used to warm food. It serves exclusively to add heat to the evaporation flask.

Never apply excess pressure to the rotary evaporator’s vacuum connection.

The lift drive may not be blocked or put under load.
3 Safety

The rotary evaporator is constructed according to generally recognised rules of technology and in accordance with pertinent occupational safety and accident prevention regulations. Nevertheless, potential dangers during use can result in injuries to the user or others, or in damage to the rotary evaporator or other property.

Use the rotary evaporator only in a technically flawless condition, in accordance with its intended use, with awareness of safety and potential hazards, and in observance of the operating instructions.

Ensure that the distillation residue is not explosive.

Make sure that the temperature of the medium is always sufficiently below its ignition temperature in order to avoid ignition or explosion. This also applies to unusual operating situations.

Consider any external sources of energy, such as sources of radiation, that could additionally heat the medium.

In case of doubt, consult KNF customer service.

Proper handling of the initial and resulting substances / heating and cooling media must be ensured.

Manufacturer regulations must be observed when disposing of the heating and cooling media. Be aware that the heating and cooling media may become contaminated.
When ventilating the rotary evaporator with air or inert gas, be sure to prevent formation of reactive or explosive media. The maximum permissible operating pressure of the chilled condenser is 0.1 bar rel.

Ensure that the evaporation flask rotates throughout the entire heating phase (even during submersion/lifting) in order to avoid heating only one side of the evaporation flask or experiencing a vaporization delay.

Ensure that the evaporation flask is immersed or raised only at a low speed. Increase speed only to the extent that no heating medium is ejected from the heating bath.

All replacement parts should be properly stored and disposed of in accordance with the applicable environmental protection regulations. Ensure adherence to the pertinent national and international regulations. This especially applies to parts contaminated with toxic substances.

The rotary evaporator meets the safety stipulations of Directive 2004/108/EC for electromagnetic compatibility, Directive 2006/42/EC for machines, and Directive 2011/65/EU (RoHS2). The following harmonised standards are fulfilled:

- DIN EN 61010-1
- DIN EN 61010-2-010
- DIN EN 61326-1

The rotary evaporator complies with the following according to IEC 664:

- Overvoltage category II
- Contamination level 2

All repairs to the rotary evaporator must be carried out by the responsible KNF Customer Service team.

Housing parts with live parts may be opened by trained personnel only.

Use only genuine parts from KNF for servicing work.
4  Technical data

4.1  Rotary evaporator

<table>
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<td>Vapour tube seal</td>
</tr>
<tr>
<td>Refilling valve's fitting*</td>
</tr>
<tr>
<td>Fitting seal</td>
</tr>
<tr>
<td>Plug seals</td>
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<table>
<thead>
<tr>
<th>Coolant line materials</th>
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<tr>
<td>Fittings on condenser</td>
</tr>
<tr>
<td>Fitting seal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vacuum line materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitting on condenser</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pneumatic data</th>
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<tbody>
<tr>
<td>Max. permissible operating pressure [bar rel]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage [V]</td>
</tr>
<tr>
<td>Frequency [Hz]</td>
</tr>
<tr>
<td>Heating power [W]</td>
</tr>
<tr>
<td>Total power [W]</td>
</tr>
<tr>
<td>Total operating current [A]</td>
</tr>
<tr>
<td>Fuse [A]</td>
</tr>
<tr>
<td>Protection class</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heating bath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty weight [kg]</td>
</tr>
<tr>
<td>Volume [ml]</td>
</tr>
<tr>
<td>Fill volume [ml]</td>
</tr>
<tr>
<td>Heating temperature [°C]</td>
</tr>
<tr>
<td>Pull-out length [mm]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coolant supply (chilled condenser)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible pressure [bar rel]</td>
</tr>
<tr>
<td>Permissible temperature</td>
</tr>
<tr>
<td>Cooled surface [cm²]</td>
</tr>
</tbody>
</table>

* Accessory
### Evaporation flask parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporation flask size</td>
<td>50 - 3000 ml</td>
</tr>
<tr>
<td>Speed [rpm]</td>
<td>25 - 250</td>
</tr>
<tr>
<td>Vertical travel [mm]</td>
<td>150</td>
</tr>
<tr>
<td>Lifting speed [mm/s]</td>
<td>approx. 38</td>
</tr>
<tr>
<td>Angle of inclination [°]</td>
<td>12 - 45</td>
</tr>
</tbody>
</table>

### General

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total weight [kg]</td>
<td>9.1</td>
</tr>
<tr>
<td>Dimensions W x D x H [mm]:</td>
<td></td>
</tr>
<tr>
<td>- without glass set (footprint)</td>
<td>431 x 447 x 464</td>
</tr>
<tr>
<td>- with glass set (approx.)</td>
<td>487 x 447 x 823</td>
</tr>
<tr>
<td>Vacuum, coolant, and refilling connections</td>
<td>GL14</td>
</tr>
<tr>
<td>Maximum permissible ambient relative humidity</td>
<td>80 % for temperatures up to 31°C, decreasing linearly to 50% at 40°C</td>
</tr>
<tr>
<td>Maximum altitude of installation [m above sea level]</td>
<td>2000</td>
</tr>
</tbody>
</table>

### Safety functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>Drive motor fuses</td>
<td>Electronic overcurrent protection</td>
</tr>
<tr>
<td>Protection against overheating of heating bath</td>
<td>Thermal circuit breaker (manual reset)</td>
</tr>
<tr>
<td></td>
<td>Electronic temperature limit</td>
</tr>
<tr>
<td></td>
<td>Electronic cut-out if insufficient water</td>
</tr>
<tr>
<td>Protection during power failure</td>
<td>Evaporation flask automatically lifted from the heating bath</td>
</tr>
<tr>
<td>Protection against glass breakage</td>
<td>Digitally-adjustable stop</td>
</tr>
<tr>
<td>Monitoring of protective cover (accessory)</td>
<td>Hall effect sensor</td>
</tr>
</tbody>
</table>

*Tab. 1 (2nd part)*
4.2 Equipment delivered with RC 600

- Rotary evaporator
- Glass set, comprising:
  - Vapour tube
  - Chilled condenser
  - Collection flask, 500 ml
  - Bracket for collection flask
  - Evaporation flask, 1000 ml
- Heating bath
- Set of hose fittings
  - 1x Hose fitting ID10 (vacuum)
  - 2x Hose fittings ID8 (coolant)
  - 2x Hose clamps ID8
- Protective cover (optional)
- Refilling valve (optional)
- Power cable
- Operating instructions
- Abbreviated instructions
- Table of solvents
- CD with digital operating instructions
5 Components and functions

5.1 Components of the rotary evaporator

1 Power switch
2 Terminal
3 Collection flask (coated)
4 Flask clamp for 3
5 Refilling connection
6 Chilled condenser
7 Tension nut for chilled condenser
8 Flask mechanism
9 Tension nut for vapour tube
10 Flask nut
11 Tower
12 Rotary knob for pivot angle
13 Evaporation flask
14 Heating bath
15 Vacuum line
16 Coolant line
17 Coolant line
18 Rotary knob for pivot angle
19 USB connection
20 Fuses
21 Mains plug connection

Fig. 1: Rotary evaporator RC 600
The RC 600 rotary evaporator is designed for distillation and evaporation of solutions. The rotary evaporator is operated via the terminal (Fig. 1/2, p. 15).

The solution that is to be evaporated is located in the evaporation flask (13). The solution is evaporated through a suitable combination of temperature and vacuum. The evaporation flask is immersed into the heating bath (14), in which a heating liquid is located, typically water or a suitable oil. The drive (8) continually rotates the evaporation flask in the heating bath. Once the solvent begins to evaporate, it rises through the vapour tube and into the chilled condenser (6), which is continually cooled with cooling water or another cooling medium. Here the vapour is cooled to the point where it condenses and collects (again in liquid form) in the collection flask (3).

The chilled condenser and collection flask have a transparent coating that protects them against implosion.

A protective cover (accessory) is placed onto the heating bath to protect the evaporation flask from implosion and to protect against spray.

5.2 Rotary evaporator functions

- **Evaporation flask**
  Use the rotary knobs (Fig. 1/12+18) to adjust the evaporation flask's angle of inclination. Together with the ability to move the evaporation flask up and down and to displace the heating bath, the rotary evaporator may be adapted to various shapes and sizes of evaporation flasks.
  The drive (8) rotates the evaporation flask, thereby achieving a high rate of evaporation:
  - A more homogeneous distribution of temperature is achieved both in the heating bath and in the evaporation flask (optimisation of temperature control and heat transfer).
  - The moistened surface inside the evaporation flask is enlarged (increases heat transfer and the boiling surface).
  - Formation of a concentration gradient in the solution is avoided.

Additional advantages of rotation include:

- The risk of boiling delay is reduced
- No localized overheating, no crust formation

The terminal (2) is used to switch the rotation of the evaporation flask on or off and to select the desired speed (see Chapter 8, Operating the rotary evaporator).

In the event of a power failure the evaporation flask is automatically lifted from the heating bath.

- **Heating bath**
  Use the rotary evaporator's heating bath (14) to achieve and maintain the temperature for optimum distillation according to requirements.
  The heating bath may be pulled out on guide rails in order to permit the use of a wide range of evaporation flask sizes.
The specially shaped pouring lip makes it easier to empty the heating bath.

### 5.3 Terminal

#### Assembly

1. Rotary knob for:
   - Entering setpoints:
     - Heating temperature
     - Rotation
     - Fine adjustment of immersion depth
2. Button to lower lift
3. Button to raise lift
4. Button for rotation on/off
5. Display
6. Button for heating bath selection
7. Button for exchange flask function
8. Button for heating bath on/off

(see section *Evaporation flasks*).

**Fig. 2: Terminal RC 600**

**Function**

The terminal is used to set the process parameters with which the RC 600 rotary evaporator works.

Settings are adjusted via the terminal's membrane buttons (Fig. 2/2+3+4+6+7+8) or with the rotary knob (1).

The speed, heating bath setpoint and actual temperature, the lift position and the value of the digital end stop are shown on the display (5).
6 Setup and connection

Connect the rotary evaporator only under the operating parameters and conditions described in Chapter 4 Technical data (pages 12 + 13).

Observe all information about the device's intended use and safety precautions (see Chapter 2 and 3, page 8ff).

WARNING

Risk of personal injury from poisoning or explosion and damage to the rotary evaporator.

Hazardous gases and vapours may be produced during distillation.

- Gas drawn out of the rotary evaporator must be safely diverted.

6.1 Installation

Shipment

The rotary evaporator may be carried only by the components marked grey in Fig. 3. Carrying the rotary evaporator by any point other than the indicated points may result in damage to the unit.

Fig. 3: Carrying the rotary evaporator

Before setting up the rotary evaporator, allow it to reach ambient temperature at the location where it will be used.

Installation location

Make sure that the installation location is dry and the rotary evaporator is protected against water in the form of rain, spray, splashes and drips.

Choose a safe location (flat, stable surface) for the rotary evaporator.

Protect the rotary evaporator from dust.

Protect the rotary evaporator from vibration and impact.
Attach to the rotary evaporator only components that are designed for the rotary evaporator's pneumatic data and/or coolant-supply parameters (see Chapter 4 Technical data).

Installing the heating bath

Place the included heating bath (Fig. 1/14, p. 15) onto the base connector.
Once in place, the heating bath can be shifted along the axis of rotation (for maximum pull-out length, see Chapter 4 Technical data).

NOTE

When installing glass parts, allow sufficient space above the rotary evaporator because the glass structure may exceed the dimensions of the rotary evaporator itself.

The chilled condenser (Fig. 1/6, page 15) is delivered uninstalled. Install as follows:

1. Loosen tension nut (7) for chilled condenser until the chilled condenser can be inserted.
2. Insert chilled condenser (6).
3. Retighten tension nut (7) for chilled condenser.

NOTE

To finish tightening the tension nut, grasp the chilled condenser with your other hand and use it as a lever (see Fig. 4).
Tighten tension nut

Use chilled condenser to aid in fully tightening the tension nut

Fig. 4: Fully tightening the tension nut

4. Attach tubing (Fig. 5/2 and 3) or fill the cold trap with dry ice.

WARNING

Extreme cold may cause personal injury
There is a risk of serious local freezing when handling dry ice.

➤ Observe the manufacturer's hazard notices.
NOTE
When installing the hoses, make sure that they are sufficiently long for the entire stroke distance.

1 Vacuum - black
2 Coolant inlet - blue
3 Coolant outlet - red

Fig. 5: Attaching lines for coolant and vacuum

The chilled condenser is now fastened to the rotary evaporator.

NOTE
In order to ensure a proper seal, retighten the tension nut once more while under vacuum.
Removing the chilled condenser

Requirements:
- Loosen tubing
- Remove collection flask (see below)

1. Loosen tension nut (7) until the chilled condenser can be pulled out.

**NOTE**
When loosening the tension nut, grasp the chilled condenser with your other hand and use it as a lever (refer to Fig. 4).

2. Remove chilled condenser (6).

Installing the collection flask

Install the separate collection flask (Fig. 1/3, page 15) using the included flask clamp (Fig. 1/4, page 15).

Remove collection flask and empty if necessary

Requirements:
- Rotary evaporator must be ventilated

**WARNING**

**Personal injury by poisoning**
When opening the process space, such as when removing the flasks, residual solvent vapours may escape to the surrounding atmosphere.
- Extract any solvent vapours (e.g. under a fume hood)

**WARNING**

**Personal injury by hazardous materials**
The distillate in the collection flask may be a hazardous material.
- Observe all safety regulations and disposal requirements for the distillate!

Loosen the flask clip (Fig. 1/4, page 15) and remove the collection flask (Fig. 1/3, page 15). Empty the collection flask if necessary.
Installing the evaporation flask

Install the included evaporation flask (Fig. 1/13, page 15):

⚠️ WARNING

Risk of injury from glass splinters, chemical reactions (solvent with heating medium), solvent, and hot liquids.

The evaporation flask may slide down during installation and become damaged (glass breakage).
- When tightening the flask nut, make sure the fastening clip is not lifted.

1. Loosen flask nut (10) by about 2-3 revolutions.
2. Slide evaporation flask (13) onto the tapered adapter. The flask nut's (10) fastening clip must audibly engage. If it does not, further loosen the flask nut and slide the evaporation flask back into place.

NOTE

The wire clip now securely holds the evaporation flask in place.

3. Tighten evaporation flask via vacuum or by lightly tightening the flask nut (10).
4. Adjust the angle and heating bath position to the size of the evaporation flask.
5. When working outside the fume hood, use the protective cover (see Chapter 11, Spare parts and accessories).

The evaporation flask is now installed and secure.

Removing the evaporation flask

Requirements:
- Completely lift out the evaporation flask and allow it to cool sufficiently.
- Stop rotation
- Rotary evaporator must be ventilated

⚠️ WARNING

Personal injury by poisoning

When opening the process space, such as when removing the flasks, residual solvent vapours may escape to the surrounding atmosphere.
- Extract any vapours (e.g. under a fume hood).
<WARNING>

Personal injury by hazardous materials
The content of the evaporation flask may be a hazardous material. Additionally, mixing with the heating medium may produce hazardous materials.

- Observe all safety regulations and disposal requirements for the solvent!

1. If present, open or lift off the protective cover (see Chapter 11, Spare parts and accessories).

<NOTE>

If the protective cover is opened and the listed requirements are not fulfilled, an acoustic warning will sound.

2. If the flask nut (10) is tightened, loosen it.

<WARNING>

Risk of burns from hot media.
If the flask nut is rotated too far out, there is a risk that the evaporation flask could fall into the heating bath.

- Make sure that the flask nut is loosened by no more than three revolutions.

<NOTE>

If the evaporation flask is securely in place, the flask nut can be used to assist in removal.

<NOTE>

The fastening clip prevents the evaporation flask from sliding out.

3. Grasp the evaporation flask and lift up the fastening clip.

<WARNING>

Risk of burns from hot surfaces.
Skin contact with the hot evaporation flask may result in burns.

- Allow evaporation flask to cool
- Grasp evaporation flask at the cooler neck

4. Pull off evaporation flask

Adjust the angle of the evaporator flask

Set the evaporator flask's angle of inclination via the rotary knobs (12 and 18).
WARNING
Risk of injury from glass splinters, chemical reactions (solvent with heating medium), solvent, and hot liquids.
Evaporation flask and flask nut may collide with the wall or base of the heating bath during lowering and become damaged (glass breakage).
- Always monitor lowering of the evaporation flask. (If necessary, adjust the heating bath position, inclination, and immersion depth to the size of the evaporation flask).

Adjust the immersion depth of the evaporation flask using the terminal (see Chapter 8, Operating the rotary evaporator).

NOTE
In the event of power failure, in the interest of safety, the evaporation flask will automatically lift out of the heating bath to its upper endpoint.

If needed, install the refilling valve (see Chapter 11, Spare parts and accessories) (see Fig. 6):

1. Slide the PTFE tube (1) onto the refilling valve's (2) corresponding glass fitting.
2. Slide the drip washer (3) onto the PTFE tube (1).
3. Insert the PTFE tube (1) through the chilled condenser and into the evaporation flask.
   Ideally, the drip washer (3) will rest on the insertion tube (see Fig. 6).
4. Position the refilling valve (2) and securely tighten the union nut. The refilling valve is now installed.

---

Operating Instructions RC600 EN
Setup and connection

Adjusting the immersion depth of the evaporator flask

WARNING

风险来自玻璃碎片、化学反应（溶剂与加热介质）、溶剂和热液体。
蒸发瓶和瓶盖可能会在降低时与加热浴的墙或底部碰撞并损坏（玻璃破裂）。
- 总是监控蒸发瓶的降低过程。必要时，调整加热浴的位置、倾斜度和浸没深度，使之与蒸发瓶的尺寸相匹配。

使用终端调整蒸发瓶的浸没深度（参见第8章，旋转蒸发器的使用）。

NOTE
在电源故障时，出于安全考虑，蒸发瓶将自动从加热浴中提升到上端点。

如果需要，安装注油阀（附件）（参见第11章，备件和附件）（见图6）：

1. 将PTFE软管（1）滑到注油阀（2）相应的玻璃接头。
2. 将滴水器（3）滑到PTFE软管（1）上。
3. 将PTFE软管（1）穿过冷却冷凝器并插入蒸发瓶。
   理想情况下，滴水器（3）将靠在插入管（见图6）。
4. 将注油阀（2）定位并牢固地拧紧连接螺母。注油阀已安装完成。

---

Translation of original Operating and Installation Instructions, English, BA_RC600_EN_304763_20150817 25
NOTE

If the rotary evaporator is not operated under a fume hood (heating temperature no more than 90°C), then installation of the protective cover on the heating bath is mandatory for protection against implosion (airborne glass splinters and liquid) and hot spray water!

NOTE

The protective cover may be used only with heating bath temperatures up to 90°C. When temperatures are higher, the evaporator must be used without the protective cover and under a fume hood!

NOTE

The protective cover is not included in delivery and must be ordered separately (see Chapter 11, Spare parts and accessories).

NOTE

Do not carry the heating bath by the protective cover!

1. Place the protective cover (Fig. 7/1) on the heating bath (2).
2. Fasten the protective cover (1) to the heating bath:
   To do this, tighten the three knurled screws (3).

Fig. 7: Protective cover closed
The walls of the protective cover are transparent, permitting observation of events inside the evaporator flask. It also has a flap (Fig. 8/1) that permits rapid access to the evaporator flask.

**Fig. 8: Protective cover open**

The protective cover and flap are monitored electronically. Using the terminal, you can select how the rotary evaporator will react when the protective cover is removed or the flap opened during operation (see Chapter 8.1).

**NOTE**

When working without the protective cover (under fume hood), electronic monitoring of the protective cover must be deactivated at the terminal (see Chapter 8.1.2).
6.2 Connections

1. Connect the suction side of the vacuum pump to the vacuum connection (Fig. 5/1, page 21).


NOTE

Use a vacuum hose for this purpose.


NOTE

Safely divert gas emissions (from the pump) so no gases escape into the ambient air.

2. Attach coolant feed and return lines to the chilled condenser (Fig. 5/2+3, p. 21, connections exchangeable).


NOTE

If the rotary evaporator is cooled by a cold trap with dry ice, additional coolant is not required.


WARNING

Risk of rupturing from excess pressure

If the discharge line is blocked, the permitted operating pressure of the chilled condenser may be exceeded.

➢ Block only the inlet of the coolant line

3. If necessary for safety reasons, connect an inert gas feed line in order to ventilate the glass parts.

4. Insert the power cable plug into a properly installed earthed socket.
7 Operation

7.1 Initial start-up

Before switching on the rotary evaporator, check the following points:

<table>
<thead>
<tr>
<th>Prerequisites for start-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ All hoses attached properly</td>
</tr>
<tr>
<td>▪ Specifications of the power supply correspond with the data on the rotary evaporator’s type plate</td>
</tr>
<tr>
<td>▪ Coolant connection on the chilled condenser is operational</td>
</tr>
<tr>
<td>▪ The rotary evaporator is at room temperature</td>
</tr>
<tr>
<td>▪ User ensures that the lift drive can move freely and without obstruction</td>
</tr>
<tr>
<td>▪ User ensures that the hoses on the condenser are long enough for the entire stroke</td>
</tr>
</tbody>
</table>

Tab. 1

Operate the rotary evaporator only under the operating parameters and conditions described in Chapter 4 Technical data (pages 12 + 13).

Make sure the rotary evaporator is used properly (see Chapter 2.1, page 8).

Make sure that the rotary evaporator cannot be misused (see Chapter 2.2, page 9).

Observe the safety precautions (see Chapter 3, page 10+11).

WARNING

Inadequate cooling may result in personal injury and damage to the rotary evaporator.

If cooling is inadequate, there will be a danger of the vacuum pump system sucking solvent vapours from the chilled condenser.

➢ Make sure that no solvent can enter the ambient atmosphere in the event of a cooling failure.

NOTE

In order for the chilled condenser to recover solvent from the rising gas, it must be cooled with a coolant.

Inspecting and emptying the collection flask

Check the fill level of condensate in the collection flask (Fig. 1/3, page 15) at suitable intervals. Empty the collection flask if necessary.

Shifting heating bath

The position of the heating bath must be adapted to the size and inclination of the evaporation flask.
Filling heating bath

**WARNING**

**Risk of burns from hot media.**
Hot vapours may be produced when filling the heating bath.
- Ensure that the heating bath temperature is always lower than the boiling temperature of the medium.
- Note that if the water level is low, the actual temperature of the heating coil may be significantly higher than the indicated temperature.

**WARNING**

**Risk of burns from hot media.**
When lowering the evaporation flask into the heating bath, the heating bath may overflow if the fill volume is too high.
- When filling the heating bath, consider how the evaporation flask will displace the heating medium in the bath.

**WARNING**

**Risk of burns from hot media.**
Hot media may be spilled when sliding or carrying the heating bath.
- Make sure that the heating bath is sufficiently cooled before sliding or carrying.

**WARNING**

**Personal injury by poisoning**
Risk of poisoning through inhaling oil vapours.
- Use under a suitable fume hood

**NOTE**

The heating bath contains a scale that indicates the maximum fill volume based on the size of the selected evaporation flask.
To more accurately estimate the proper filling volume, the evaporation flask may be lowered into the heating bath before filling (see Chapter 8, Operating the rotary evaporator).

**NOTE**

Do not use de-ionised or distilled water
Fill heating bath with heating medium.

**WARNING**

Risk of burns from hot surfaces.
If the heating bath is not sufficiently filled, the base of the bath in particular may overheat.
- Ensure that the heating bath contains sufficient heating medium at all times and that it does not run dry through evaporation during operation.

**NOTE**

If there is insufficient water in the heating bath (dry start or runs dry), it switches off automatically and an error message is displayed (see Chapter 10).
The temperature of the heating coil is limited in two ways (electronically and electromechanically).

Refilling evaporation flask

**WARNING**

Risk of personal injury from poisoning or explosion
Hazardous mixtures may be produced when refilling the evaporation flask.
- Ensure that this does not result in a hazardous situation.

Using the refilling valve, the evaporation flask may be refilled under vacuum during operation, as follows:
1. Connect the refilling valve to the additional medium.
2. Open the refilling valve.
The additional medium will be drawn into the evaporation flask.

**Switching on the rotary evaporator**

Switch on the rotary evaporator at the power switch (see Fig. 1/1, page 15).

**NOTE**

For information about operating the rotary evaporator, refer to Chapter 8, page 33ff.
7.2 Shutdown

- Stop the current process.
- Ventilate rotary evaporator

**WARNING**

Risk of personal injury from poisoning or explosion and damage to the rotary evaporator.
Ventilation of the rotary evaporator may result in poisonous or explosive mixtures.
- If necessary, ventilate the rotary evaporator with inert gas.
- Switch off rotary evaporator at the power switch (Fig. 1/1, page 15).

**WARNING**

Risk of burns from hot media.
Skin contact with hot surfaces and medium may occur when emptying the heating bath and evaporation flask.
- Allow heating bath and evaporation flask to cool completely.
- Empty heating bath

**WARNING**

Personal injury by hazardous materials
The media located in the evaporation and collection flasks may be hazardous materials.
- Observe all safety regulations and disposal requirements for the media!

**WARNING**

Personal injury by poisoning
When opening the process space, such as when removing the flasks, residual solvent vapour may enter the surrounding atmosphere.
- Extract any solvent vapours (e.g. under fume hood).
- Empty evaporation and collection flasks.
- Stop the feed of coolant, separate any coolant connections.
- Separate vacuum connection, if present.
8 Operating the rotary evaporator

8.1 Terminal

8.1.1 General functions and displays

1 Rotary knob for:
   - Entering setpoints:
     - Heating temperature
     - Rotation
     - Fine adjustment of immersion depth

2 Button to lower lift
3 Button to raise lift
4 Button for rotation on/off
5 Display
6 Button for heating bath selection
7 Button for exchange flask function
8 Button for heating bath on/off

The rotary evaporator is operated via the terminal with the aid of:
- the rotary knob (Fig. 9/1) and
- the membrane buttons (2+3+4+6+7+8).

The **rotary knob** has the following functions:
- Rotate the knob:
  - Entering setpoints:
    - Speed of evaporator flask
    - Fine adjustment of immersion depth
    - Temperature of heating bath

Content of the **display**:
- Displays setpoint and actual temperature (Fig. 10/2+4, page 34);
- Displays the height of the evaporator flask and the digital end stop (7+10)
- Displays the speed of the evaporator flask (12)
The **membrane keyboard** has the following functions:

- Operating keys (Fig. 11) with the functions:
  - Switch heating bath on and off (8)
  - Heating bath selection (6)
  - Switch rotation on and off (4)
  - Lift selection through short press of the buttons (1/2)
  - Raise lift (3)
  - Lower lift (4)
  - Exchange flask function (7)

**Displays**
1. Heating bath status display
2. Heating bath setpoint
3. Selection icon for heating bath
4. Actual value of heating bath
5. Unit of temperature
6. Icon for digital end point
7. Set digital end point
8. Selection icon / status display for speed
9. Selection icon for lift
10. Lift position
11. Unit of speed
12. Speed

**Menus, fields, and buttons**
1. Button to raise lift
2. Button for rotation on/off
3. Button for heating bath selection
4. Button to lower lift
5. Button for exchange flask function
6. Button for heating bath on/off
8.1.2 Operation

Base settings

When the rotary evaporator is switched on, a start screen is displayed for 2-5 seconds with the logo and version number of the firmware.

a) Activate/deactivate electronic monitoring of the protective cover

If the rotary evaporator is not operated under a suitable fume hood, the protective cover (accessory) must be used (see Chapter 6.1) and electronic monitoring must be switched on.

The various safety settings can be changed by pressing the buttons simultaneously (Fig. 11/2+3).

- After 3 seconds, a single sound indicates that the EMERGENCY STOP function is inactive. When the rotary evaporator is running with the cover open, a continuous acoustic warning will be heard.
- After 6 seconds, you will hear two acoustic signals in quick succession. They indicate that the EMERGENCY STOP function is active. If the cover is opened during operation, the evaporator flask is automatically raised from the heating bath and rotation stops.
- After 9 seconds, you will hear three acoustic signals in quick succession. This deactivates the electronic monitoring of the protective cover

b) To change the unit of temperature, press button 3 (Fig. 11/3) for 5 seconds. This is confirmed with an acoustic signal.

Switch heating bath and rotation of evaporation flask on and off.

Use the button (Fig.11/6) to switch the heating bath on and press it again to switch it off.

Rotation of the evaporator flask is activated and deactivated via the button (2).

**NOTE**

When the heating bath or rotation of the evaporation flask is switched on, the corresponding icon will flash (Fig. 10/1+8).

Entering setpoints

The following setpoints may be selected through the membrane keyboard:

<table>
<thead>
<tr>
<th>Input field *</th>
<th>Function</th>
<th>Setpoint range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 4</td>
<td>Immersion depth</td>
<td>0...12.9</td>
</tr>
<tr>
<td>2</td>
<td>Speed [rpm]</td>
<td>25…250</td>
</tr>
<tr>
<td>3</td>
<td>Heating bath temperature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- [°C]</td>
<td>20…180</td>
</tr>
<tr>
<td></td>
<td>- [°F]</td>
<td>68…356</td>
</tr>
<tr>
<td></td>
<td>- [K]</td>
<td>293…453</td>
</tr>
</tbody>
</table>

*according to Fig. 11
Press input field for the desired setpoint.

**NOTE**
The selected input field will be highlighted on the display with a black background.

- Use the rotary knob to adjust the setpoint.
- After 2 seconds, the display returns to the starting state.

**NOTE**
The speed is selected in the starting state.

**Changing the immersion depth**

**WARNING**
Risk of burns from hot media
When the evaporation flask is being immersed in the heating bath, heating medium may spray out of the bath if the rotation speed is too fast.
- Before immersing the evaporation flask in the heating bath, reduce the rotation speed.

The immersion depth can be raised via button 1 (see Fig. 11/1) or lowered via button 4 (see Fig. 11/4).
- Press button 1 or 4 (see Fig. 11/1+4) and then turn rotary knob 1 (see Fig. 9/1) to finely adjust the lift.
- Hold button 5 (see Fig. 11/5) for 5 seconds to apply the current position of the evaporation flask. The flask cannot pass the stored position. Press the button again for 5 seconds to delete the stored position.
Exchange flask function

⚠️ **WARNING**

**Risk of injury from glass splinters, chemical reactions (solvent with heating medium), solvent, and hot liquids.**

When using the “Exchange flask” button, any changes to the size or shape of the evaporation flask may cause the flask to collide with the heating bath tank or other parts.

- The heating bath position, angle and immersion depth must not be changed while the evaporating flask is being exchanged.
- Replace only with a flask with the same size and shape.

- When you press the Exchange flask function button (Fig. 11/5) the flask moves to its top position. Rotation is stopped.
- Change the evaporation flask.
- When you press the Exchange flask function button (5) again, the evaporator flask returns to the stored position and rotation is started again.

8.2 **Change the evaporation flask**

See Chapter 6.1 for information on installing and removing the evaporation flask.

**NOTE**

It may be necessary to coordinate the angle of inclination, heating bath position, and immersion depth (lower stop position).
9 Servicing

If you have any questions about servicing, call your KNF technical adviser (see last page for contact telephone number).

9.1 Servicing schedule

<table>
<thead>
<tr>
<th>Component</th>
<th>Servicing interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary evaporator</td>
<td>Inspect regularly for external damage or leaks</td>
</tr>
<tr>
<td>Heating bath medium</td>
<td>Inspect regularly for contamination of the heating medium</td>
</tr>
</tbody>
</table>

Tab. 3

9.2 Cleaning

**NOTE**
When cleaning, make sure that no liquids enter the inside of the housing.

**WARNING**

Personal injury by hazardous materials
After operation, the components of the rotary evaporator may be contaminated with aggressive materials.

- Always wear protective clothing (protective glasses, gloves, etc.) as required for workplace safety in a laboratory.

9.2.1 Cleaning the rotary evaporator

Clean the outside of the rotary evaporator only with a moist cloth. Do not use flammable cleaning agents.

9.2.2 Cleaning glass parts

- Glass parts adequately cooled
- Rotary evaporator must be ventilated
- For chilled condenser only:
  - Remove any coolant that is present
  - Chilled coil/cold trap is at room temperature

Requirements

Collection flask

1. Remove collection flask (see Ch. 6.1)
2. Dispose of contents in collection flask according to local regulations.
3. Rinse collection flask with suitable cleaning agent.
4. Re-install collection flask (see Ch. 6.1)
Evaporation flask
1. Remove evaporation flask (see Ch. 6.1).
2. Dispose of contents in evaporation flask according to local regulations.
3. Rinse evaporation flask with suitable cleaning agent.
4. Re-install evaporation flask (see Ch. 6.1).

Chilled condenser
1. Remove chilled condenser (see Ch. 6.1).
2. Rinse chilled condenser with suitable cleaning agent.
3. Re-install chilled condenser (see Ch. 6.1).

Vapour tube
1. Remove vapour tube (see Ch. 9.3).
2. Rinse vapour tube with suitable cleaning agent.
3. Re-install vapour tube (see Ch. 9.3)

9.2.3 Clean seal
1. Remove seal (see Ch. 9.4.)
2. Clean seal with suitable cleaning agent.
3. If necessary, clean seal receiver with suitable cleaning agent.
4. If necessary, clean vapour tube (see Ch. 9.2.2).
5. Re-install seal (see Ch. 9.4)

9.2.4 Clean heating bath
- Heater must be shut off
- Heating bath adequately cooled
- Evaporation flask in upper stop position
- Protective cover removed (if present)
1. Remove heating bath
2. Dispose of contents of heating bath according to local regulations.
3. Clean heating bath with suitable cleaning agent.
4. Re-install heating bath

9.2.5 Cleaning protective cover (accessory)
Rinse protective cover with clear water; clean with a soft cloth.

NOTE
Synthetic glass scratches easily and is sensitive to solvents.
9.3 Changing vapour tube

- Rotary evaporator disconnected from mains power and de-energised
- Heating bath empty
- Evaporation flask removed (see Ch. 6.1).
- Rotary evaporator free of hazardous materials
- Rotary evaporator must be ventilated
- Protective cover removed (if present)

**WARNING**

Dangerous substances in the rotary evaporator can cause a health hazard
Depending on the distilled solvent, caustic burns or poisoning are possible.
- Wear protective clothing if necessary, e.g. protective gloves.

**CAUTION**

Danger of burns from hot parts
Glass parts and the heating bath may be hot even after the rotary evaporator has been shut off.
- Allow the rotary evaporator to cool off after operation.

1. Screw off flask nut (Fig. 12/1).

**NOTE**

With the other hand, hold the vapour tube's tension nut (3).

2. Loosen the vapour tube's tension nut (3) until the vapour tube (2) can be pulled out.

**NOTE**

While doing this, press and hold the block for the rotation drive (4).

3. Pull out the vapour tube (2).

4. Insert the new vapour tube (2) until it engages.

**NOTE**

If you have difficulty finding the engagement point, slightly tighten the tension nut after inserting the vapour tube.
5. Lightly tighten the vapour tube's tension nut (3).

6. Screw on the flask nut (1).

**NOTE**

While doing this, press and hold the block for the rotation drive (4).

With the other hand, hold the vapour tube's tension nut (3).

---

1 Flask nut
2 Vapour tube
3 Vapour tube’s tension nut
4 Catch for the rotation drive

---

*Fig. 12: Changing vapour tube*
9.4 Changing seal

1. Remove chilled condenser (see Ch. 6.1).
2. Remove vapour tube (see Ch. 9.3).
3. Remove old seal (see Fig. 13).
4. Re-install vapour tube (see Ch. 9.3).
5. Slide the new seal (see Ch. 11.1 “Spare parts”) onto the vapour tube.

**NOTE**

The lip of the seal must be aligned inward (see Fig. 13).

6. Install vapour tube (see Ch. 9.3).
7. Install chilled condenser (see Ch. 6.1).
8. Properly dispose of old seal.
9.5 Changing fuses

- Rotary evaporator disconnected from mains power and de-energised
- Heating bath empty
- Rotary evaporator free of hazardous materials

**CAUTION**

Danger of burns from hot parts

Glass parts and the heating bath may be hot even after the rotary evaporator has been shut off.

- Allow the rotary evaporator to cool off after operation.

1. Loosen cover (Fig. 14/2) and remove (2).
2. Replace blown fuses (Fuse specification, see Chapter 4, page 12).
3. Replace cover (2).

Fig. 14: Changing fuses
10 Troubleshooting

**DANGER**

Risk of electric shock, danger of death
Separate the rotary evaporator from the power supply before working on the rotary evaporator.
- Make sure that the pump is de-energised.

- Rotary evaporator generally: see Tab. 4.
- Terminal generally: see Tab. 4.
- Error message in display: see Tab. 6.

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The rotary evaporator is switched on, but the power switch does not illuminate.</td>
<td>Power cable not plugged in.</td>
<td>Plug the rotary evaporator's mains power cable into a properly installed grounded socket.</td>
</tr>
<tr>
<td>No voltage in the mains.</td>
<td></td>
<td>Check the room's fuses.</td>
</tr>
<tr>
<td>Power cable's internal fuse is burned out.</td>
<td></td>
<td>Use a suitably-sized power cable (see rotary evaporator's type label for power consumption). Replace power cable's fuse if necessary.</td>
</tr>
<tr>
<td>Fuses in rotary evaporator are blown.</td>
<td>4. Identify and eliminate cause of overload. 5. Change the rotary evaporator's mains fuses (see Ch. 9.5, page 43).</td>
<td></td>
</tr>
<tr>
<td>The desired vacuum is not reached.</td>
<td>The attached vacuum device is inadequate.</td>
<td>Attach an adequate vacuum device.</td>
</tr>
<tr>
<td>Leaks in the tubing connections at the tower and chilled condenser.</td>
<td></td>
<td>Check tubing and fittings; tighten or replace as necessary.</td>
</tr>
<tr>
<td>Sealing caps on chilled condenser have leaks.</td>
<td></td>
<td>Check the caps' internal seals; retighten / replace as necessary.</td>
</tr>
<tr>
<td>The refilling valve (accessory) is not fully closed.</td>
<td></td>
<td>Close the refilling valve. Securely tighten the refilling valve's through cap. Check the cap's seal if necessary.</td>
</tr>
<tr>
<td>The rotary drive's seal is worn.</td>
<td></td>
<td>Replace seal (see Ch. 9.4.).</td>
</tr>
<tr>
<td>The vapour tube's sealing surface is damaged.</td>
<td></td>
<td>Replace vapour tube (see Ch. 9.3).</td>
</tr>
<tr>
<td>Troubleshooting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td>The rotary drive does not reach the selected speed or does not move.</td>
<td>Flask drive blocked by foreign parts. Remove foreign parts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The wrong speed setpoint has been selected. Correct the setpoint (see Ch. 8.1.2, page 35).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Condensate residue is adhered to the seal. Clean seal (see Ch. 9.2.3, page 38).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaporation flask or flask nut collide with the heating bath. Lift evaporation flask (see Ch. 8.1.2, page 36) or reposition heating bath. Observe Chapter 6.1 (page 18) when re-immersing evaporation flask.</td>
<td></td>
</tr>
<tr>
<td>Evaporation flask cannot be lowered / raised.</td>
<td>Foreign parts / objects are blocking lift drive. Remove foreign parts / objects.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setpoint for immersion depth is reached. Change the evaporation flask's immersion depth (see Ch. 8.1.2, page 36).</td>
<td></td>
</tr>
<tr>
<td>Heating bath does not heat.</td>
<td>Heating bath is not switched on (symbol in display not flashing). Switch on heating bath (see Ch. 8.1.2, page 35).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not enough heating medium in heating bath (error message, see Table 6). Replenish heating medium (see Ch. 7.1, page 30).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating bath has no electrical contact. Make sure heating bath sits properly on rotary evaporator. Make sure no foreign parts are underneath heating bath.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal circuit breaker has triggered. Reset circuit breaker (see Fig. 15).</td>
<td></td>
</tr>
<tr>
<td>Condensate in separators / vacuum system's secondary condensers.</td>
<td>Cooling capacity inadequate for the volume of vapour (chilled condenser backs up with liquid). Ensure that the chilled condenser is supplied with sufficient cooling medium (observe volume and temperature, Ch. 2.1). Adapt vapour volume to available cooling capacity.</td>
<td></td>
</tr>
<tr>
<td>Inside of chilled condenser is fogged up to the vacuum connection.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tab. 4: General troubleshooting
Resetting the heating bath's thermal circuit breaker

If an error occurs and the temperature of the heating bath exceeds 240°C the circuit breaker will automatically switch off the heating bath. The circuit breaker must then be reset manually, as follows:

1. Allow heating bath to cool
2. Empty heating bath
3. Determine cause of error and remove

![Fig. 15: Resetting the heating bath's circuit breaker](image)

NOTE

If you are unable to determine the cause of the error, call your KNF technical adviser (see last page for telephone number).

4. Reset circuit breaker

NOTE

Use a pointed object such as a pencil or a pointed tool to press the button on the underside of the heating bath (see arrow in 15).
Terminal

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature display shows implausible values.</td>
<td>Temperature unit was changed.</td>
<td>➔ Select the desired temperature unit.</td>
</tr>
</tbody>
</table>

Tab. 5: Terminal troubleshooting

Error message in the display with simultaneous acoustic warning

<table>
<thead>
<tr>
<th>Error message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E01</td>
<td>Temperature sensor defective or temperature difference between the two temperature sensors too high</td>
</tr>
<tr>
<td>E02</td>
<td>Heating bath has run dry</td>
</tr>
<tr>
<td>E04</td>
<td>Heating coil defective</td>
</tr>
<tr>
<td>E05</td>
<td>Flask mechanism blocked</td>
</tr>
<tr>
<td>E08</td>
<td>Display defect (with an intermittent acoustic warning)</td>
</tr>
<tr>
<td>E09</td>
<td>Heating bath temperature sensor defective</td>
</tr>
<tr>
<td>E10</td>
<td>Flask drive defective</td>
</tr>
</tbody>
</table>

Tab. 6: Error message

Fault persists

If you are still unable to diagnose the problem, please send the rotary evaporator to KNF customer service (see address on last page).

1. Clean rotary evaporator, heating bath, and any parts that come into contact with the medium (see Chapter 9.2, page 38ff).
2. Send the rotary evaporator, together with completed Declaration of No Objection and Decontamination (Chapter 13, page 51), to KNF stating the nature of the distilled medium.
# 11 Spare parts and accessories

## 11.1 Spare parts

<table>
<thead>
<tr>
<th>Spare part</th>
<th>Order No.</th>
</tr>
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<tbody>
<tr>
<td>Seal</td>
<td>113046</td>
</tr>
<tr>
<td>Mains cable D</td>
<td>026363</td>
</tr>
<tr>
<td>Mains cable CH</td>
<td>027523</td>
</tr>
<tr>
<td>Mains cable UK</td>
<td>129326</td>
</tr>
<tr>
<td>Mains cable USA/JP</td>
<td>127875</td>
</tr>
<tr>
<td>Norprene® hose ID6 (sold by the metre*)</td>
<td>055535</td>
</tr>
<tr>
<td>Hose fitting ID6 with cap GL14</td>
<td>301092</td>
</tr>
<tr>
<td>Hose clamp ID6</td>
<td>127329</td>
</tr>
<tr>
<td>Collection flask 500 ml (coated)</td>
<td>128158</td>
</tr>
<tr>
<td>Flask clamp collection flask</td>
<td>025968</td>
</tr>
<tr>
<td>Evaporation flask 1000 ml NS29/32</td>
<td>128159</td>
</tr>
<tr>
<td>Evaporation flask 1000 ml NS24/40</td>
<td>128893</td>
</tr>
<tr>
<td>Vapour tube NS29/32</td>
<td>126059</td>
</tr>
<tr>
<td>Vapour tube NS24/40</td>
<td>128762</td>
</tr>
<tr>
<td>Flask nut NS29/32</td>
<td>126056</td>
</tr>
<tr>
<td>Flask nut NS24/40</td>
<td>128781</td>
</tr>
<tr>
<td>Mains fuses</td>
<td></td>
</tr>
<tr>
<td>- 240 V, 50/60Hz: T 8 (2x)</td>
<td>136067</td>
</tr>
<tr>
<td>- 115 V, 50/60Hz: T 15 (2x)</td>
<td>136309</td>
</tr>
</tbody>
</table>

*Indicate desired length in whole metres.

**NOTE:** Observe Chapter 9.5 when changing fuses.
### 11.2 Accessories (see also Chapter 6)

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective cover for heating bath</td>
<td>127204</td>
</tr>
<tr>
<td>NOTE: Always activate the protection function when using the protective cover outside of a suitable fume hood (see Chapter 8.1.2).</td>
<td></td>
</tr>
<tr>
<td>Refilling valve</td>
<td>300639</td>
</tr>
<tr>
<td>Insulation for cooling hoses</td>
<td>301270</td>
</tr>
<tr>
<td>Norprene® hose ID10 (sold by the metre*)</td>
<td>028187</td>
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<tr>
<td>Hose fitting ID10 with cap GL14</td>
<td>301198</td>
</tr>
</tbody>
</table>

Tab. 8  * Indicate desired length in whole metres.

### 11.3 Glass product

<table>
<thead>
<tr>
<th>Glass product</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection flask (coated)</td>
<td></td>
</tr>
<tr>
<td>100 ml</td>
<td>300557</td>
</tr>
<tr>
<td>250 ml</td>
<td>300558</td>
</tr>
<tr>
<td>500 ml</td>
<td>128158</td>
</tr>
<tr>
<td>1000 ml</td>
<td>113939</td>
</tr>
<tr>
<td>2000 ml</td>
<td>113938</td>
</tr>
<tr>
<td>Evaporation flask NS29/32</td>
<td></td>
</tr>
<tr>
<td>50 ml</td>
<td>113079</td>
</tr>
<tr>
<td>100 ml</td>
<td>113080</td>
</tr>
<tr>
<td>250 ml</td>
<td>113081</td>
</tr>
<tr>
<td>500 ml</td>
<td>113082</td>
</tr>
<tr>
<td>1000 ml</td>
<td>128159</td>
</tr>
<tr>
<td>2000 ml</td>
<td>113083</td>
</tr>
<tr>
<td>3000 ml</td>
<td>113084</td>
</tr>
<tr>
<td>Evaporation flask NS24/40</td>
<td></td>
</tr>
<tr>
<td>50 ml</td>
<td>300561</td>
</tr>
<tr>
<td>100 ml</td>
<td>300562</td>
</tr>
<tr>
<td>250 ml</td>
<td>300563</td>
</tr>
<tr>
<td>500 ml</td>
<td>300564</td>
</tr>
<tr>
<td>1000 ml</td>
<td>128893</td>
</tr>
<tr>
<td>2000 ml</td>
<td>300565</td>
</tr>
<tr>
<td>3000 ml</td>
<td>300566</td>
</tr>
<tr>
<td>Powder flask NS29/32</td>
<td></td>
</tr>
<tr>
<td>500 ml</td>
<td>300588</td>
</tr>
<tr>
<td>1000 ml</td>
<td>300589</td>
</tr>
<tr>
<td>2000 ml</td>
<td>300590</td>
</tr>
<tr>
<td>Powder flask NS24/40</td>
<td></td>
</tr>
<tr>
<td>500 ml</td>
<td>300591</td>
</tr>
<tr>
<td>1000 ml</td>
<td>300592</td>
</tr>
<tr>
<td>2000 ml</td>
<td>300593</td>
</tr>
<tr>
<td>Foam brake</td>
<td></td>
</tr>
<tr>
<td>NS29/32</td>
<td>301114</td>
</tr>
<tr>
<td>NS24/40</td>
<td>301115</td>
</tr>
</tbody>
</table>

Tab. 9
12 Returns

Pumps and systems used in laboratories and process-based industries are exposed to a wide variety of conditions. This means that the components contacting transferred media could become contaminated by toxic, radioactive, or otherwise hazardous substances.

For this reason, customers who send any pumps or systems back to KNF must submit a Declaration of No Objection and Decontamination in order to avoid a hazardous situation for KNF employees. This Declaration of No Objection and Decontamination provides information about, for example:

- physiological safety
- whether medium-contacting parts have been cleaned
- whether decontamination was completed
- media that have been transferred or used

and must declare physiological safety. To ensure worker safety, work may not be started on pumps or systems without a signed Declaration of No Objection and Decontamination.

For optimal processing of a return, a copy of this declaration should be sent in advance via e-mail, regular mail, or fax to KNF Customer Service (refer to final page for address). In order to avoid endangering employees who open the shipment's packaging, despite any residual hazards, the original version of the Declaration of No Objection and Decontamination must accompany the delivery receipt on the outside of the packaging.

The form for the Declaration of No Objection and Decontamination is included with these operating instructions and may also be downloaded from the KNF website.

The customer must specify the device type(s) and serial number(s) in the Declaration of No Objection and Decontamination in order to provide for the unambiguous assignment of the Declaration to the device that is sent to KNF.

In addition to the customer's declaration of physiological safety, information about operating conditions and the customer's application are also of importance to ensure that the return shipment is handled appropriately. Therefore, the Declaration of No Objection and Decontamination requests this information as well.
13 Declaration of No Objection and Decontamination

Health and safety clearance and decontamination form

This declaration must be present and complete (the original must accompany the shipment's delivery receipt) before the returned device can be examined.

Device type: ..........................................................................................................................
Serial number(s): ....................................................................................................................
...........................................................................................................................................

Reason for returning the device (please describe in detail):
(The device(s) was(were) in operation □ yes □ no)
...........................................................................................................................................
...........................................................................................................................................
...........................................................................................................................................
...........................................................................................................................................

We confirm that the above device(s)
□ has(have) pumped exclusively physiologically unobjectionable media and that it(they) are free of hazardous materials and any materials that are harmful to health.
   □ yes □ no
□ has(have) pumped media of the following category(categories) which are not physiologically unobjectionable and that cleaning of the device(s) (potentially only media-contacting parts) is required.
   □ aggressive
   □ biological
   □ radioactive
   □ toxic
   □ other

The device(s) was(were) decontaminated and work can proceed without special measures □ yes
Method / proof:
...........................................................................................................................................
...........................................................................................................................................

The device(s) was(were) not decontaminated and special measures are required before starting work □ yes
Measures:
...........................................................................................................................................
...........................................................................................................................................

Legally binding declaration

We hereby affirm that the information provided in this form is correct and complete. Shipment of the devices and components is in compliance with statutory regulations.

...........................................................................................................................................
Company (stamp)..................................................................................................................
...........................................................................................................................................
Date........................................................................................................................................
...........................................................................................................................................
Name......................................................................................................................................
...........................................................................................................................................
Authorized signature.............................................................................................................
...........................................................................................................................................
Position.....................................................................................................................................
.............................................................................................................................................
**KNF worldwide**

<table>
<thead>
<tr>
<th>Region</th>
<th>Address</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Netherlands</strong></td>
<td>KNF Verder B.V. Utrechtestegeweg 4a NL-3451 GG Vleuten</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tel. 0031 (0)30 677 92 40 Fax 0031 (0)30 677 92 47</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:info@knf-verder.nl">info@knf-verder.nl</a> <a href="http://www.knf-verder.nl">www.knf-verder.nl</a></td>
<td></td>
</tr>
<tr>
<td><strong>Belgium, Luxembourg</strong></td>
<td>KNF Verder N.V. Kontichsesteenweg 17 B-2630 Aartselaar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tel. 0032 (0)3 8719624 Fax 0032 (0)3 8719628 E-mail: <a href="mailto:info@knf.be">info@knf.be</a> <a href="http://www.knf.be">www.knf.be</a></td>
<td></td>
</tr>
<tr>
<td><strong>China</strong></td>
<td>KNF Neuberger Trading (Shanghai) Co., Ltd No. 36 Lane 1000 Zhang Heng Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shanghai 210203, P.R. China Tel. 0086 (0)21 685 965 66 Fax 0086 (0)21 339 006 26 E-mail: <a href="mailto:info@knf.com.cn">info@knf.com.cn</a> <a href="http://www.knf.com.cn">www.knf.com.cn</a></td>
<td></td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td>KNF Neuberger GmbH Alter Weg 3 D-79112 Freiburg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tel. 0049 (0)7664 5909-0 Fax 0049 (0)7664 5909-99 E-mail: <a href="mailto:info@knf.de">info@knf.de</a> <a href="http://www.knf.de">www.knf.de</a></td>
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<tr>
<td><strong>France, Morocco, Algeria</strong></td>
<td>KNF Neuberger 4, Blvd. d’Alsace Z.I. F-68128 Village-Neuf</td>
<td></td>
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<tr>
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<td>Tel. 0033 (0)389 70 35 00 Fax 0033 (0)389 69 92 52 E-mail: <a href="mailto:info@knf.fr">info@knf.fr</a> <a href="http://www.knf.fr">www.knf.fr</a></td>
<td></td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td>KNF Neuberger U.K. Ltd. Avenue 2 Station Lane Industrial Estate Witney Oxon OX28 4FA Tel. 0044 (0)1993 77 83 73 Fax 0044 (0)1993 77 51 48 E-mail: <a href="mailto:info@knf.co.uk">info@knf.co.uk</a> <a href="http://www.knf.co.uk">www.knf.co.uk</a></td>
<td></td>
</tr>
<tr>
<td><strong>India</strong></td>
<td>KNF Pumps + Systems (India) Pvt. Ltd. RAJIV GANDHI INFOTECH PARK Phase 1 Ganga Estate, Survey No. 152/2/2 Above AXIS BANK Hinjewadi Pune 411 057 Tel. 0091 (0)20 640 13 923 Fax 0091 (0)20 640 08 923 E-mail: <a href="mailto:info@knfpumps.in">info@knfpumps.in</a> <a href="http://www.knfpumps.in">www.knfpumps.in</a></td>
<td></td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>KNF ITALIA S.r.l. Via Flumendosa, 10 I-20132 Milano Tel. 0039 02 27 30 38 60 Fax 0039 02 27 30 38 48 E-mail: <a href="mailto:info@knf.it">info@knf.it</a> <a href="http://www.knf.it">www.knf.it</a></td>
<td></td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td>KNF Japan Co.Ltd. Chichibu, Bldg. 7F 1-8-6 Shinkawa, Chuo-ku, Tokyo, Japan 104-0033 Tel. 0081 (0)3 3551-7931 Fax 0081 (0)3 3551-7932 E-mail: <a href="mailto:info@knf.co.jp">info@knf.co.jp</a> <a href="http://www.knf.co.jp">www.knf.co.jp</a></td>
<td></td>
</tr>
<tr>
<td><strong>Korea</strong></td>
<td>KNF Neuberger Ltd. Woosan Bldg.RM#202, 336-4, Hawkyung-Dong Dongdaemun-Ku., 130-090, Seoul Tel. 0082 (0)2 959-0255/6 Fax 0082 (0)2 959-0254 E-mail: <a href="mailto:knf@knfkorea.com">knf@knfkorea.com</a> <a href="http://www.knfkorea.com">www.knfkorea.com</a></td>
<td></td>
</tr>
<tr>
<td><strong>Sweden, Denmark, Finland, Norway</strong></td>
<td>KNF Neuberger AB Mejervägen 4, P.O. Box 40460 SE-10073 Stockholm Tel. 0046 (0) 87445113 Fax 0046 (0) 87445117 E-mail: <a href="mailto:info@knf.se">info@knf.se</a> <a href="http://www.knf.se">www.knf.se</a></td>
<td></td>
</tr>
<tr>
<td><strong>Switzerland</strong></td>
<td>Sales KNF Neuberger AG Stockenstrasse 6 CH-8362 Bichelsee-Balterswil Tel. 0041 (0)71 973 993 0 Fax 0041 (0)71 973 993 1 E-mail: <a href="mailto:knf@knf.ch">knf@knf.ch</a> <a href="http://www.knf.ch">www.knf.ch</a></td>
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<tr>
<td><strong>Taiwan</strong></td>
<td>KNF Neuberger Ltd. 9-2 FL., No., 24, Lane 123, Section 6, Ming Chuan East Road Taipei City, Taiwan Tel. 00886-2-2794-1011 Fax 00886-2-8792-1648 E-mail: <a href="mailto:knftwn@knfch.tw">knftwn@knfch.tw</a> <a href="http://www.knftwn.com.tw">www.knftwn.com.tw</a></td>
<td></td>
</tr>
<tr>
<td><strong>USA, Canada, South America</strong></td>
<td>KNF NEUBERGER, INC. Two Black Forest Road Trenton, New Jersey 08691-1810 Tel. 001 (609) 890 86 00 Fax 001 (609) 890 83 23 E-mail: <a href="mailto:knfusa@knf.com">knfusa@knf.com</a> <a href="http://www.knfn.com/usa.htm">www.knfn.com/usa.htm</a></td>
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<tr>
<td></td>
<td>South America Direct Phone: 001 609 649 1010 E-mail: <a href="mailto:ahs@knf.com">ahs@knf.com</a></td>
<td></td>
</tr>
</tbody>
</table>

**KNF product centres**

**Product centre for gas pumps:**
- **Germany**
  - KNF Neuberger GmbH Alter Weg 3 D-79112 Freiburg Tel. 0049 (0)7664 5909-0 Fax 0049 (0)7664 5909-99 E-mail: info@knf.de www.knf.de

**Product centre for liquid pumps:**
- **Switzerland**
  - KNF FLODOS AG Wassertalstrasse 2 CH-8210 Surselva Tel. 0041(0)41 925 00 25 Fax 0041(0)41 925 00 35 E-mail: info@knf-flodos.ch www.knf-flodos.ch

**Product centre for micro pumps:**
- **Switzerland**
  - KNF Micro AG Ziegelmatte 1b CH-6260 Reiden Tel. 0041(0)62 787 88 88 Fax 0041(0)62 787 88 99 E-mail: info@knf-micro.ch www.knf-micro.ch