

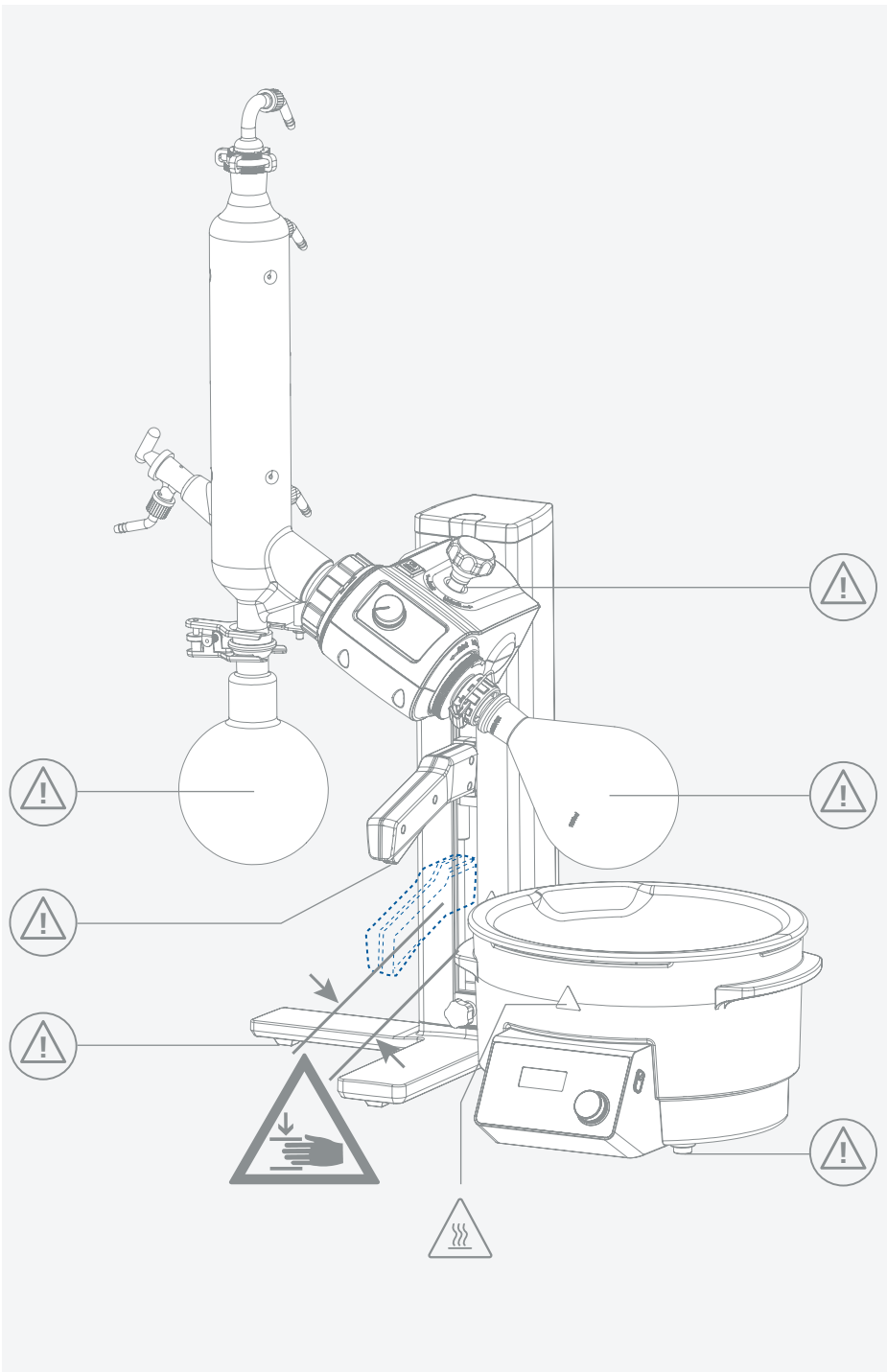
# IKA












designed for scientists

**RV 3 eco**



ENGLISH



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## EU Declaration of conformity

We declare under our sole responsibility that this product corresponds to the directives 2014/35/EU, 2006/42/EC, 2014/30/EU and 2011/65/EU and conforms with the following standards or normative documents: EN 61010-1, EN 61010-2-051, EN 61326-1, EN 60529 and EN ISO 12100.

A copy of the complete EU Declaration of Conformity can be requested at [sales@ika.com](mailto:sales@ika.com).



## Explication of warning symbols

/// Symbols used in this instruction manual



“Safety instructions” chapter



“Unpacking” chapter



“Accessories” chapter



“Assembly” chapter



“Operation” chapter



“Troubleshooting” chapter



“Maintenance and cleaning” chapter



“Technical data” chapter



Item numbers

Indicates relevant device components for actions.



Correct / result

Indicates correct implementation or the result of an action step.



Incorrect  
Indicates incorrect implementation of an action step.



Please note  
Indicates action steps for which particular attention must be paid to a particular detail.



Beep  
Indicates action steps, for which beep sounds are to be heard.



Power outage  
Indicates device restart after a power outage.



Internet  
Indicates action steps for which further information is included in the online instruction manual.



Indicates lists.



Indicates action steps.

## Safety instructions



/// Warnings used in this instruction manual



### Risk of burning at hot surfaces

- ▷ Do not touch hot surfaces without protective gloves.
- ▷ Only fill or empty the device when it is cold.
- ▷ Let the components cool off before continuing work with the device.



### Falling glass vessels

- ▷ Check that the glass vessel is securely fixed with the clamp before operating the device.



### **Caution - glass may break**

For the evaporating equipment (evaporating flask plus contents) the maximum permissible weight is 3.0 kg. Loads exceeding this risk breakage of glass at the steam pipe.

- ▷ When working with large loads, always use low speeds. Unbalanced loads can result in breakage of the steam pipe.



### **Risk of crushing when setting the height**

- ▷ Check that no objects or devices are located in the area below the hand lever.

- ▷ Before commissioning, read and observe the safety instructions.
- ▷ Keep the operating instruction manual accessible for all users.

## /// Other risks

### **Risk of injury from breakage of glass**

Incorrect assembly, mechanical influences from outside or local temperature peaks may produce critical stress levels in the glass.

- ▷ Make sure that the glassware assembly is free of stress.
- ▷ Do not subject the device to overpressure during operation.
- ▷ The glass equipment must always be ventilated when working under normal pressure (e.g. open outlet at condenser) in order to prevent a pressure build-up.
- ▷ When using oil as the tempering medium, make especially sure that personal protective equipment is fitted properly.

### **Risk of injury from breakage of glass with vacuum operation**

The glassware is designed to be used at a vacuum to 2 mbar. Failure to observe this may cause breakage of glass.

- ▷ Condense out uncondensed vapours or discharge without risk.
- ▷ If there is a risk that the distillation residue will decompose in the presence of oxygen, only ventilate with inert gases.

### **Risk of injury through operation with negative pressure**

A power failure may produce negative pressure in the glassware and result in injury following breakage of glass.

- ▷ Ventilate glassware manually.

### **Risk of injury from breakage of glass if weight is exceeded**

For the evaporating equipment (evaporating flask plus contents) the maximum permissible weight is 3.0 kg. Loads exceeding this risk breakage of glass at the steam pipe.

- ▷ When working with large loads, always use low speeds. Unbalanced loads can result in breakage of the steam pipe.



### **Risk of injury from breakage of glass with collision**

Depending on the size of the flask, the setting angle of the rotation drive and the position of the heating bath and lift, the evaporator flask may be in contact with the bottom of the heating bath.

- ▷ Set variable end stop to limit the lower lift position.

### **Risk of injury through toxic / corrosive gases or suspended particles**

The open outlet at the cooler may allow gases, vapours or suspended particles to escape in hazardous concentrations.

- ▷ Make sure that any risk is ruled out, e.g. with downstream cold traps, gas wash bottles or an efficient extraction system.

### **Risk of burns from glass vessels**

The evaporator flask and glassware assembly can become hot during operation and remain so for a long time.

- ▷ Do not touch hot glass vessels without personal protective equipment.
- ▷ Allow components to cool off before continuing work with the device.

### **Risk of burns from splashing with hot tempering media**

Do not operate the device when the evaporator flask is rotating and the lift is raised.

- ▷ Adjust the speed of the drive to prevent tempering medium being ejected from the heating bath by the rotating evaporator flask.

### **Risk of crushing from rotating parts**

- ▷ Do not reach into rotating parts.

### **Risk of injury from delay in boiling**

Heating the evaporator flask in the heating bath without connecting the rotary drive may delay boiling.

- ▷ Connect rotary drive to avoid delay in boiling.
- ▷ Sudden foaming or exhaust gases indicate that flask content is beginning to decompose. Switch off heating immediately.
- ▷ Lift the evaporator flask out of the heating bath using the lifting mechanism and ventilate the system to normal pressure as appropriate.
- ▷ Clear the hazardous area and warn any persons in the vicinity.

### **Risk of injury caused by electric shock**

- ▷ Only put together accessories with the power supply cable disconnected.

### **Risk of injury caused by explosion**

- ▷ Do not use the device in explosive atmospheres, as it is not EX-protected.
- ▷ When using tempering media that could create explosive mixtures, take appropriate safety measures (e.g. work under an extractor hood).

### **Risk of injury through explosive decomposition of peroxides**

Organic peroxides can accumulate in distillation and exhaust residues and explode while decomposing. Numerous organic compounds are liable to form peroxides, e.g. dekalin, diethyl ether, dioxane, tetrahydrofuran (also unsaturated hydrocarbons such as tetralin, diene, cumene and aldehydes, ketones and solutions of these substances).

- ▷ Avoid peroxide formation.
- ▷ Keep liquids that are liable to form organic peroxides away from light (in particular UV rays).
- ▷ Check liquids for peroxides before distillation and exhaust.
- ▷ Eliminate any peroxides present.

### **Risk through occurrence of electrostatic discharge**

Electrostatic discharge may occur between the medium and drive unit, possibly leading to a risk from static electricity (e.g. risk of explosion).

- ▷ Rule out any interaction between the medium and drive unit prior to operation.

### **Risk of damage through imbalance**

Imbalance may result in uncontrolled resonance behaviour of the device or assembly. Glass apparatus may be damaged or destroyed.

- ▷ Immediately switch off the device with any imbalance or unaccustomed noise or reduce speed.

### **Risk of damage to glass vessels**

If the glass vessel is not properly secured, it may fall off.

- ▷ Check that the glass vessel is securely fixed before operating the device.

### **Risk of damage through incorrect use of distillate**

- ▷ Adapt the quantity and type of the distillation material to the size of the distillation apparatus.
- ▷ Check that the cooler is sufficiently effective.
- ▷ Monitor the flow of coolant at the cooler outlet.

## /// Requirements for operators / users

- ▷ Ensure that only qualified persons use the device.
- ▷ Ensure that the applicable safety and accident prevention measures are observed when processing hazardous materials.
- ▷ Wear personal safety equipment in accordance with the hazard class of the medium that is used.
- ▷ Inform the user about possible danger due to contact with or inhalation of media (e.g. poisonous liquids, gases, mist, vapours, dusts or biological or microbiological materials).
- ▷ Only work with media for which the energy input during processing is harmless. This also needs to take into account other sources of energy such as, for example, light irradiation.
- ▷ Ensure that the specified settings on the rating plate coincide with the actual power supply.
- ▷ Ensure that the power socket used is earthed (grounded contact).
- ▷ The outlet for the mains plug must be easily accessible.
- ▷ Place device on an even, stable, clean, non-slip, dry, fire-resistant surface.
- ▷ Ensure that there is sufficient space above the device as the glass assembly may exceed the height of the device.
- ▷ Set up the device so that ventilation slots are not covered.
- ▷ Position the positive pressure outlet of the vacuum pump under a fume hood.
- ▷ Make sure that the device is not operated while unattended.
- ▷ Only operate the device under a hood closed on all sides or a comparable protective device.
- ▷ Refer to the operating instructions for the accessories.
- ▷ Always check the device and accessories for damage prior to each use. Never use damaged parts.

# Intended use



## /// Use

- ▷ The rotary evaporator is a tabletop device. It is suitable for the following applications:
  - › Quick and gentle distillation of liquids,
  - › Evaporation of solutions and suspensions,
  - › Crystallization, synthesis or cleaning of fine chemicals,
  - › Drying of powder and granulate material,
  - › Recycling of solvents.

We recommend operation with IKA heating baths. Safe operation is guaranteed only with the use of original IKA accessories. Ensure that the device is only opened by a qualified technician.

## /// Area of use

- ▷ Indoor environments similar to that a laboratory of research, teaching, trade or industry area.
- ▷ The safety of the user cannot be guaranteed:
  - › if the device is operated with accessories that are not supplied or recommended by the manufacturer,
  - › if the device is operated improperly or contrary to the manufacture's specifications,
  - › if the device or the printed circuit board are modified by third parties.

## /// Further remarks

- ▷ Legal bases and country-specific characteristics, especially for medicine and food:  
The operator is responsible for compliance with the laws and regulations applicable to him.

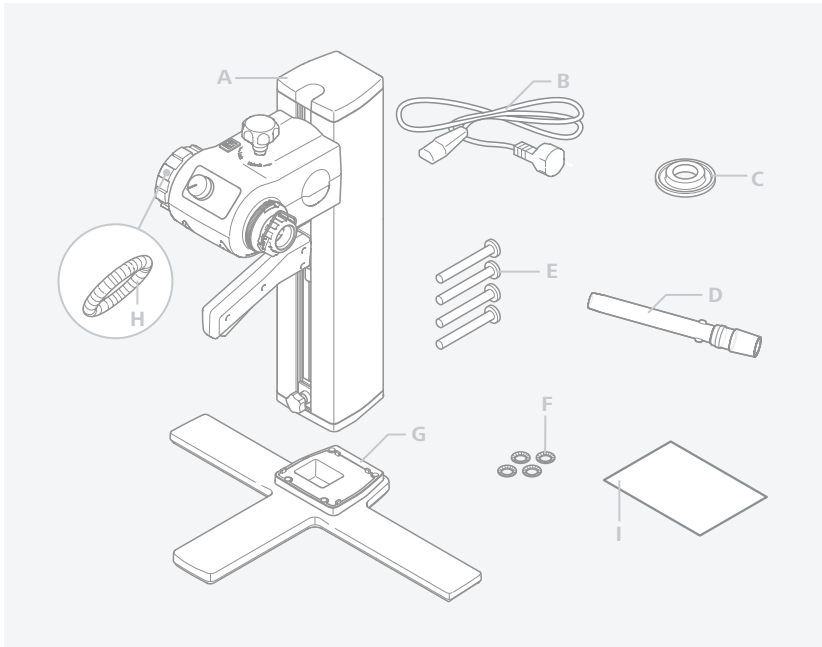


# Unpacking

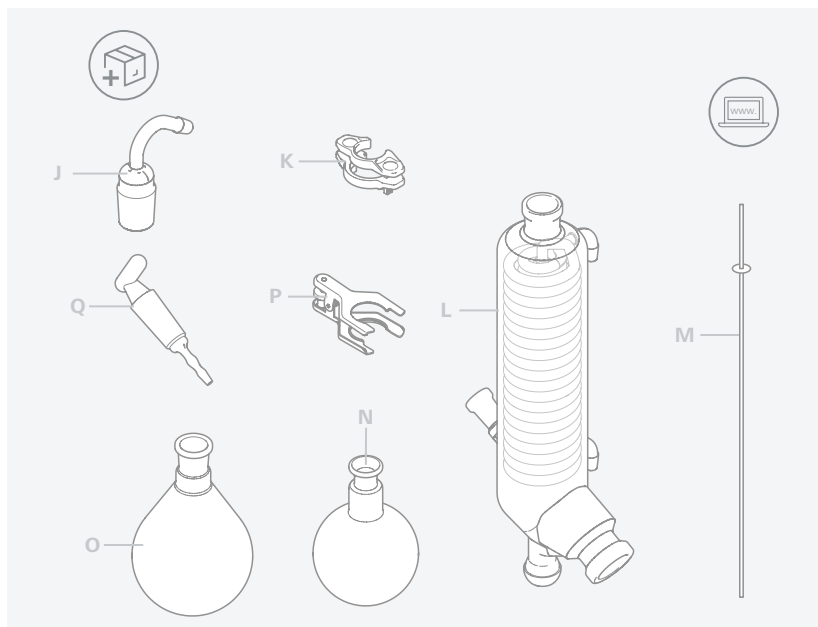
## /// Unpacking

▷ Unpack the device carefully. Any damage should immediately be reported to the carrier (mail, rail or freight forwarding company).

## /// Scope of delivery



<b>A</b>	lift
<b>B</b>	power cord
<b>C</b>	seal
<b>D</b>	vapour tube
<b>E</b>	(cylindrical) screw
<b>F</b>	(serrated) washer
<b>G</b>	base
<b>H</b>	annular spring / union nut
<b>I</b>	user guide



<b>J</b>	connection	<b>N</b>	receiving flask
<b>K</b>	clamp NS29 plastic	<b>O</b>	evaporator piston
<b>L</b>	condenser	<b>P</b>	ball joint clamp
<b>M</b>	(PTFE) tube	<b>Q</b>	stopcock

## Useful information

Distillation is a thermal separating process for liquid compounds based on substance-specific, pressure-dependent boiling points through evaporation and subsequent condensation.

The boiling point temperature decreases with decreasing external pressure which means that work is usually done under reduced pressure. In this way the heating bath can be maintained at a constant temperature (e.g. 60 °C).

Using the vacuum, the boiling point is set with a steam temperature of approx. 40 °C. The cooling water for the condensation condenser should not be warmer than 20 °C (60-40-20 rule).

A chemical resistant membrane pump with a vacuum controller should be used to create the vacuum. The pump is protected from solvent residue by the addition of a condensate flask and/ or a vacuum separator.

Working with a jet pump to create a vacuum can only be recommended to a limited extent as the solvents may contaminate the environment when using these systems.

Speed, temperature, flask size and system pressure all affect the evaporator air capacity.

The optimum capacity of the flow-through condenser is approx. 60%.

This corresponds to condensation on approx. 2/3 of the cooling coil. With larger capacities there is the risk that the uncondensed solvent vapor will be extracted.

The device is designed for operation with a cooling water supply system (e.g. laboratory thermostat), but can also be run off a water supply line. Please refer to the "Technical Data" for information on cooling water pressure, temperature constancy, and flow rate.

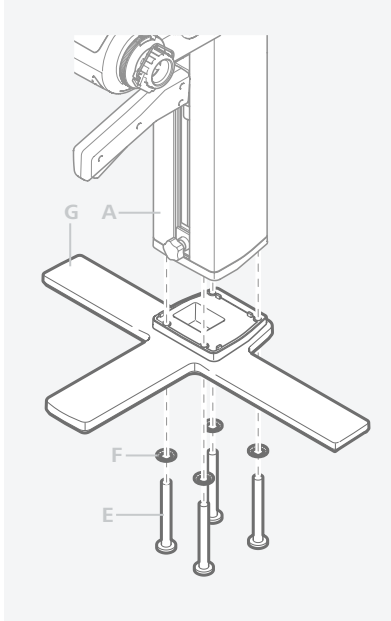


## Assembly

### /// RV 3 eco drive

#### ▷ Mount the base to the lift

Apply the cylindrical M5x25 (E) (4x) and the serrated washer M5 (F) (4x) to mount the base (G) with the lift unit (A) after you unpack the package.

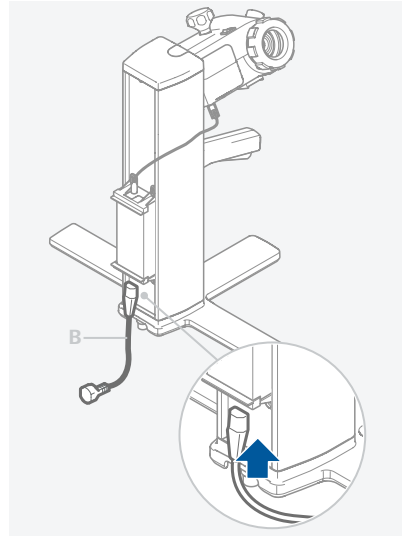


#### ▷ Fix the switching adapter

Attach the switching adapter on the rear side and secure it with the brackets.

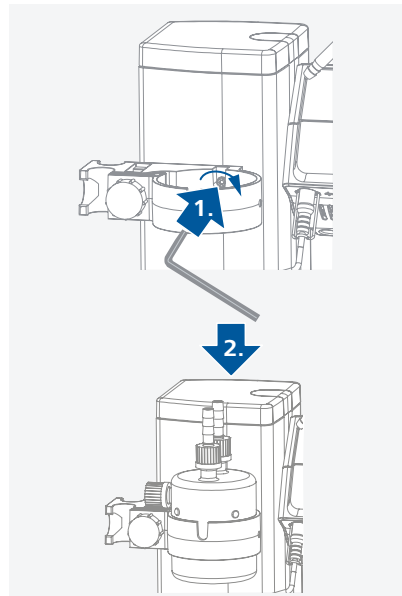
- › Insert the switching adapter into the upper bracket.
- › Bend down the lower bracket and push the switching adapter into it.
- › Connect the low-voltage connector to the connection socket and fix it with the clamp.
- › Plug the power cord in the switching adapter and connect it to the power supply of the valid voltage.

After connecting to the power supply, the power indicator will light up.



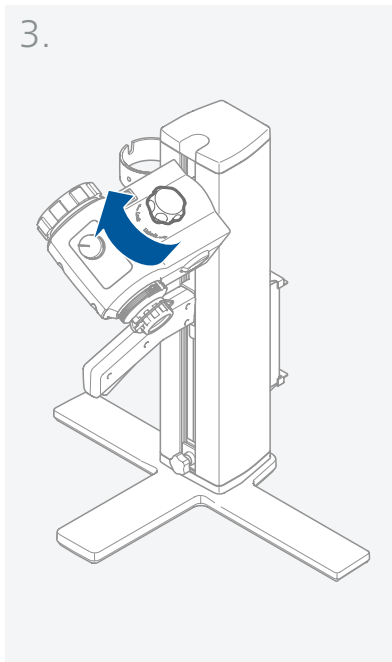
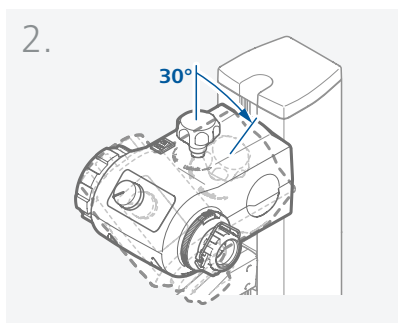
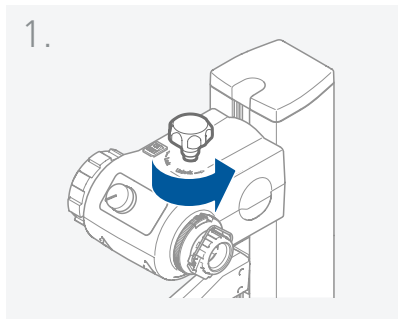
#### ▷ Fix the holding bracket (not included in delivery)

- ▷ Insert the condensate flask (not included in delivery) and attach the hose connectors to it



### ▷ Adjust the angle of the drive

1. Remove the clamping device for the angle setting of the rotary drive by rotating the angle adjustable knob anticlockwise according to the indication mark.
2. Set the desired angle for the rotary drive.
3. Then, secure the rotary drive against rotation by tightening the angle adjustable knob clockwise.



## /// Glassware

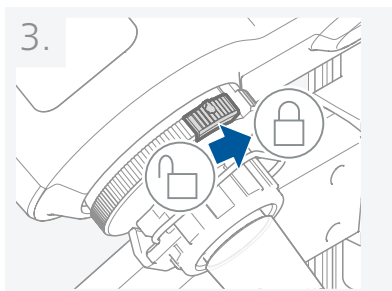
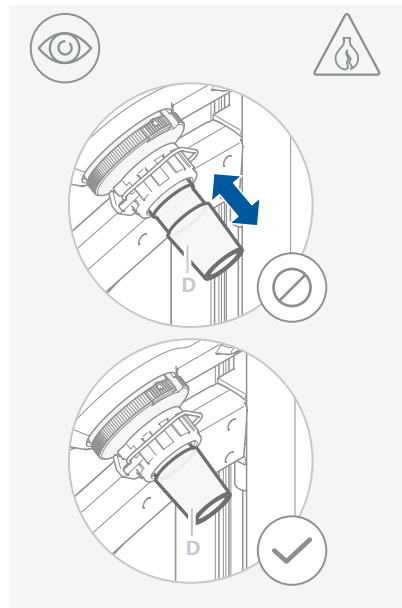
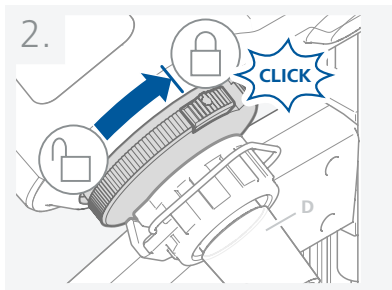
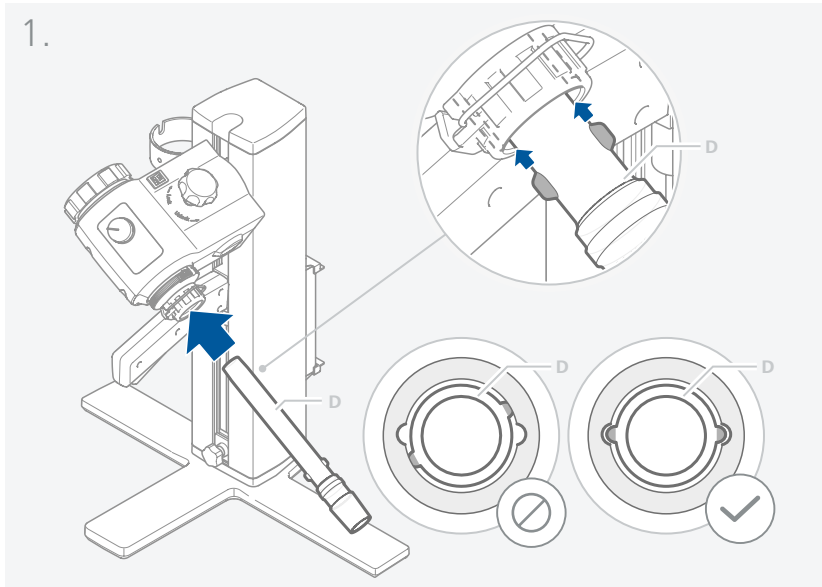
**Notice:** Please read the operating instructions of the glassware for the safe handling of laboratory glassware!

### ▷ Locking device

- ▷ There is a locking knob for locking or unlocking the locking device.
- ▷ If a red mark is shown, the locking device is unlocked, otherwise it is locked.
- ▷ To lock or unlock the locking device, push the locking knob to the end position.

### ▷ Feed the vapour tube

- ▷ Unlock the locking device by turning it 60° anticlockwise according to the indication mark. The red mark should be visible.
- ▷ Feed the vapour tube in until it stops.
- ▷ Then, lock the locking device by turning it clockwise by 60°.
- ▷ Push the lock knob to the end position. The red mark should be covered and invisible.
- ▷ The vapour tube is not allowed to be pulled out!
- ▷ Check the correct axial locking device on the vapour tube.
- ▷ Keep the red mark invisible.



▷ **Mount & remove the evaporation flask**

Turn clockwise for locking.

Turn anticlockwise for unlocking.

**Mount the evaporation flask:**

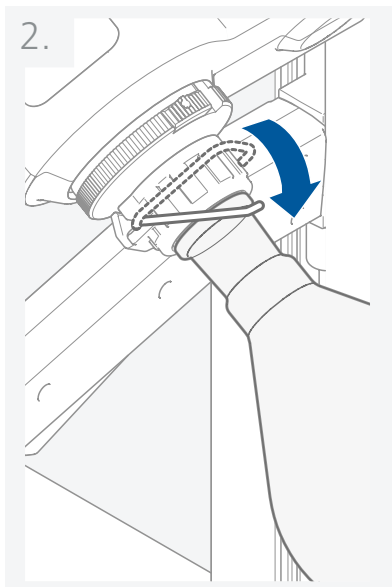
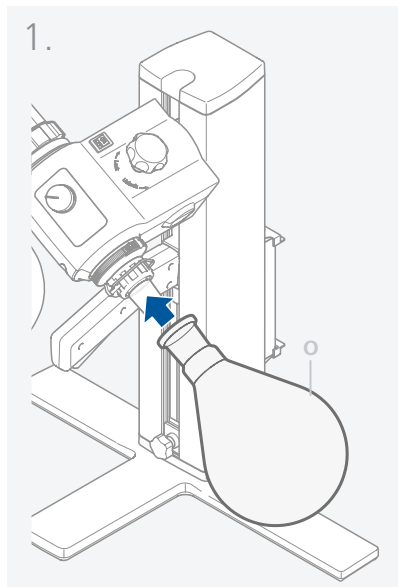
- ▷ Place the evaporation flask on the vapour tube.



- › Turn the plastic nut with the clip anticlockwise until the clip can be put on the flange.
- › Now turn the plastic nut clockwise until the clamp is hard up against the flange. When doing so, hold the locking device on the vapour tube.

#### **Remove the evaporation flask:**

- › Hold the locking device and loosen the plastic nut by turning it anticlockwise. This releases a tightly clamped evaporation flask.
- › Hold the evaporation flask at the flange and open the clip.
- › Remove the evaporation flask.
- › Check that the locking of vapour tube is still closed!



#### ▷ **Mount the condenser seal**

- › Place the RV 10.8001 condenser seal in the condenser receptacle and fit the glassware to the device according to the assembly instructions.

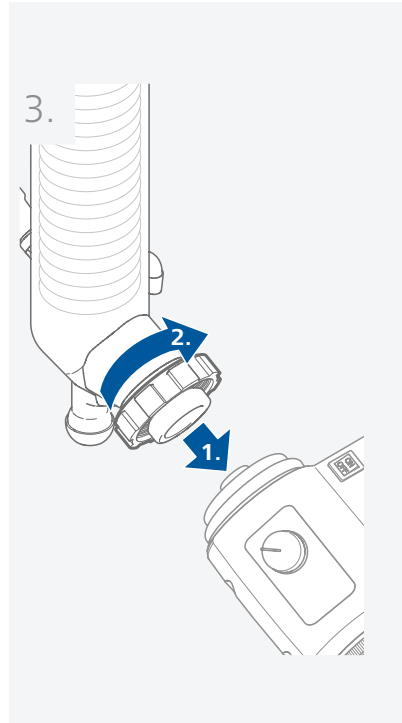
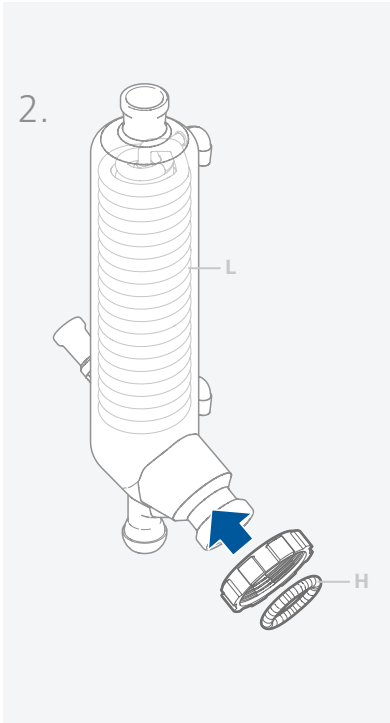
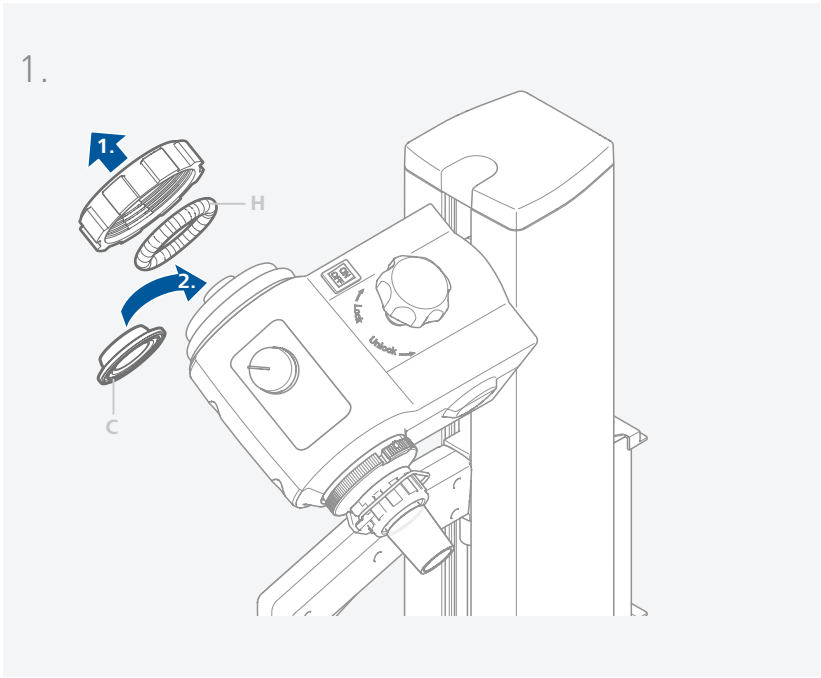
#### ▷ **Mount & remove the condenser**

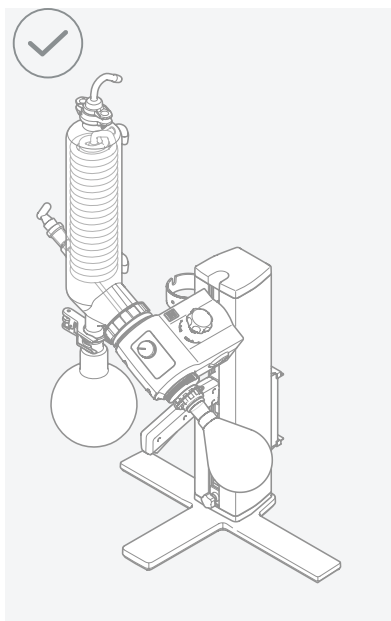
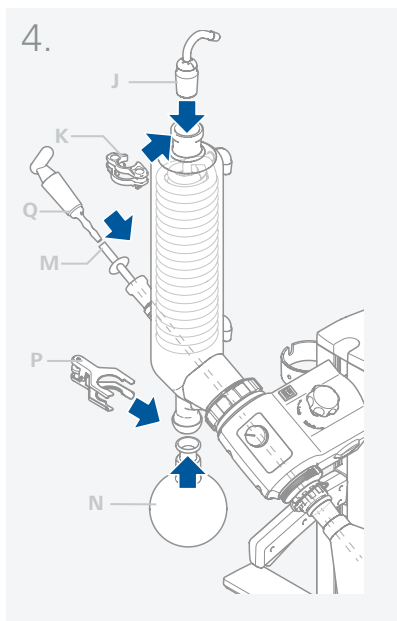
##### **Mount the condenser:**

- › Place the cap nut into the condenser, and then put the spring ring to the flange of the condenser.
- › Place the condenser on the rotary drive and tighten the cap nut by hand.
- › Fix the receiving flask and hose connectors as shown.  
See also operating instructions of glassware.

##### **Remove the condenser:**

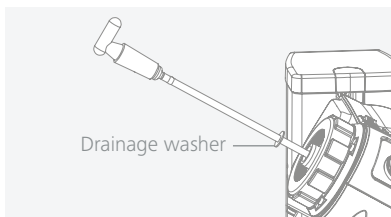
- › Use the ring spanner provided to loosen union nuts that are tightly fitted.
- › Loosen the union nut by turning anticlockwise.





▷ **Mount the washer**

**Notice:** Pay attention to the correct position of the washer!



▷ **Description of special condensers**

(See products/accessories at [www.ika.com](http://www.ika.com))

- RV 10.3 Vertical-intensive condenser with manifold.

This vertical-intensive condenser features a double jacket design for particularly efficient condensation.

Also available with coating (RV 10.30)

- RV 10.4 Dry ice condenser

Dry ice condenser is for distilling low-boiling solvents.

Cooling by dry ice, no cooling water is required.

Maximum condensation thanks to low temperatures.

Also available with coating (RV 10.40)

- RV 10.5 Vertical-condenser with manifold and cut-off valve for reflux distillation.

Also available with coating (RV 10.50)

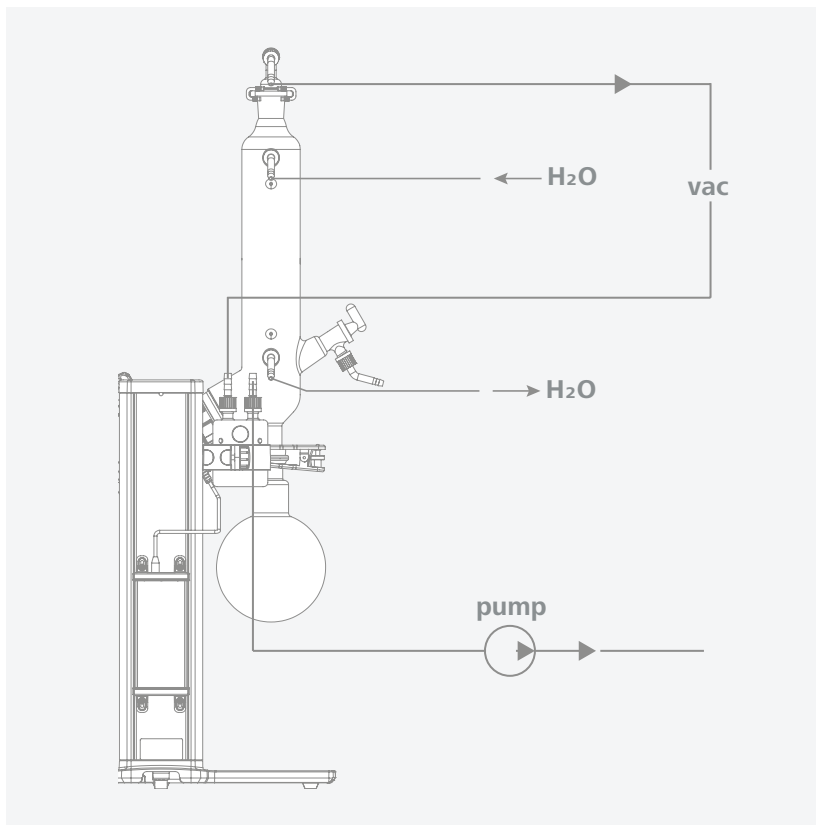
- RV 10.6 Vertical-intensive condenser with manifold and cut-off valve for reflux distillation

This vertical-intensive action condenser features a double jacket design for particularly efficient reflux distillation.

Also available with coating (RV 10.60)

### /// Hose system

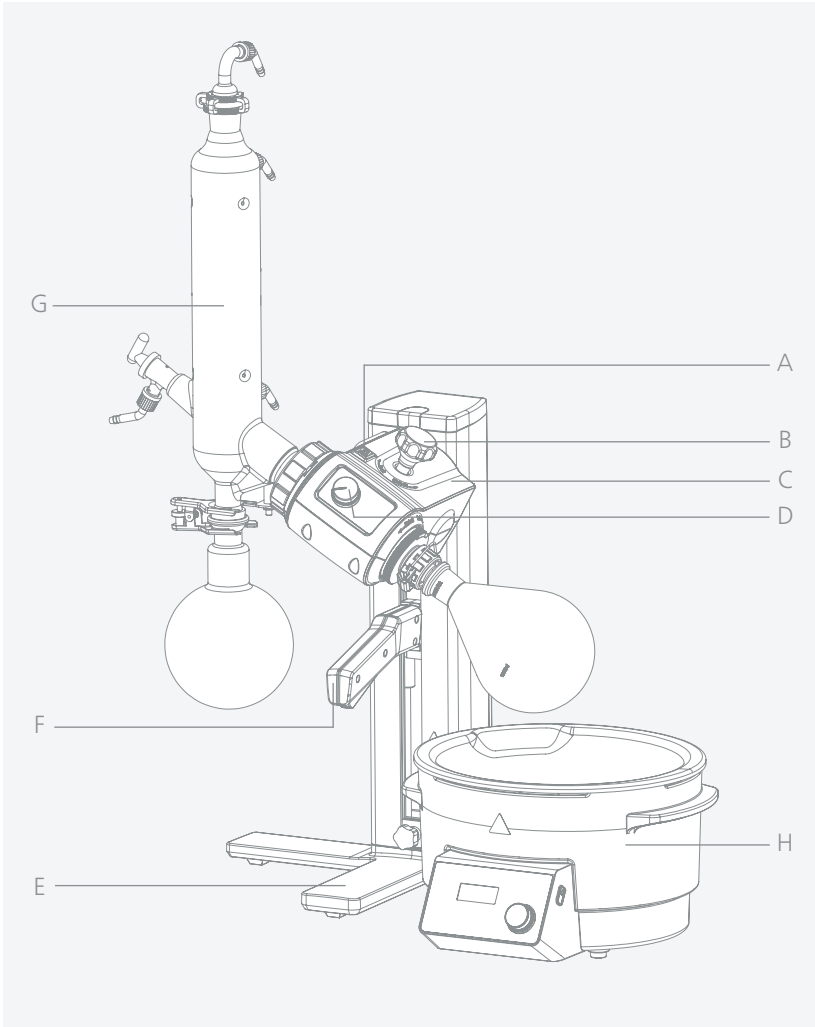
- ▷ Connect the water hoses (**H<sub>2</sub>O**) to the condenser according to the counter-flow principle.
- ▷ Install the vacuum connections to the condenser, condensate flask, vacuum controller with valve and vacuum pump.
- ▷ Always connect the vacuum hose (**vac**) to the condenser at the highest point to minimize solvent losses during suctioning.
- ▷ Use standard laboratory vacuum hoses with an inside diameter of 8 mm and a wall thickness of 5 mm.



### /// Heating bath

- ▷ Refer to the chapter entitled "Operation" in the operating instructions of heating bath.

# Operator panel



<b>A</b>	Mains switch	<b>E</b>	Base
<b>B</b>	Angle adjusting knob	<b>F</b>	Height adjusting handle
<b>C</b>	Drive	<b>G</b>	Glassware
<b>D</b>	Speed adjusting knob	<b>H</b>	Heating bath

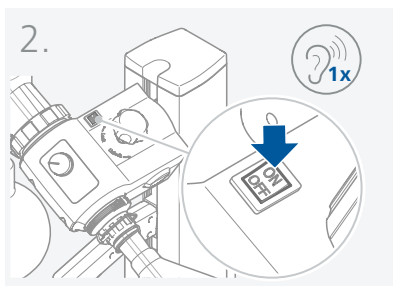
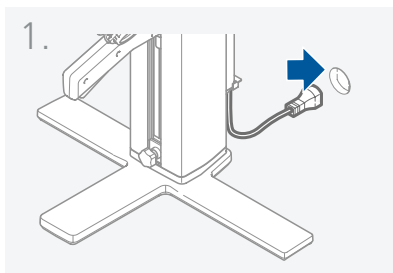
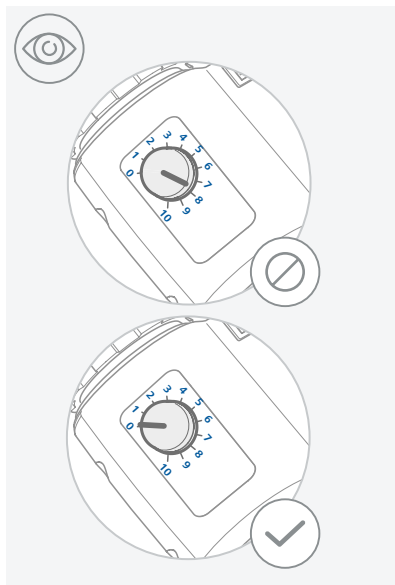


## Operation

### /// Start-up

- ▷ The unit is ready for service when the mains plug has been plugged in.
- ▷ Use the power switch to switch on or off the device.  
Adjust the speed by turning the speed adjusting knob. The scale from 1 to 10 corresponds to a speed range of 20 to 300 rpm under nominal load.

**Notice:** Make sure that the speed adjusting knob is in the “0” position when switching on the power switch, otherwise a warning sound will be given.



### /// Fill the evaporation flask

**Manual filling:** You can fill the evaporation flask manually prior to creating the vacuum. The evaporation flask should not be filled more than half its volume.

**Automatic filling:** Prior to filling the evaporation flask, a vacuum controller is used to regulate the glass apparatus to the target pressure.

- ▷ Now fill the evaporation flask using the back feed line.
- ▷ Due to the vacuum present, the solvent is suctioned into the evaporation flask. This enables you to keep solvent loss due to suctioning to a minimum.

**Notice:** The maximum allowed load (evaporation flask and contents) is 3 kg.

## /// Set up the heating bath

**Notice:** Refer to the operating instructions of the heating bath!

▷ Move the drive to the bottom position and check the position of the heating bath in relation to the evaporation flask. When using larger evaporation flasks or depending on the angle of the rotary drive, you can move the heating bath to the right.

▷ Fill the heating bath with the tempering medium until the evaporation flask is surrounded by tempering medium to 2/3 of its volume.

▷ Switch on the rotary drive and slowly increase the speed.

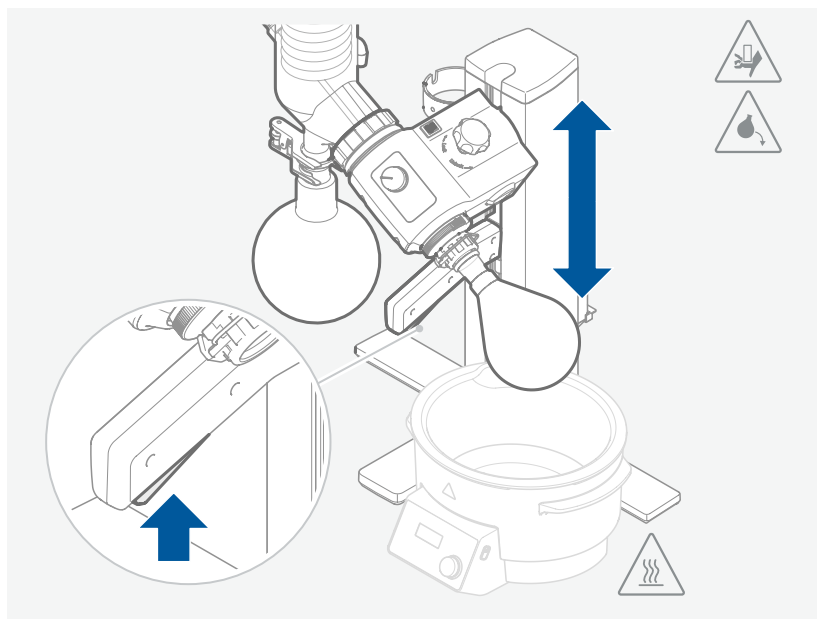
**Notice:** Avoid creating waves.

▷ Switch on the heating bath using the power switch.

**Notice:** Avoid stress on the glass due to different evaporation flask and heating bath temperatures when lowering the evaporation flask into the heating bath!

## /// Adjust the drive height

▷ To adjust the drive height, grasp the height adjusting handle and hold the trigger. The lift is unlocked and you can move the drive up and down. Release the trigger, the lift is locked in the adjusted height.

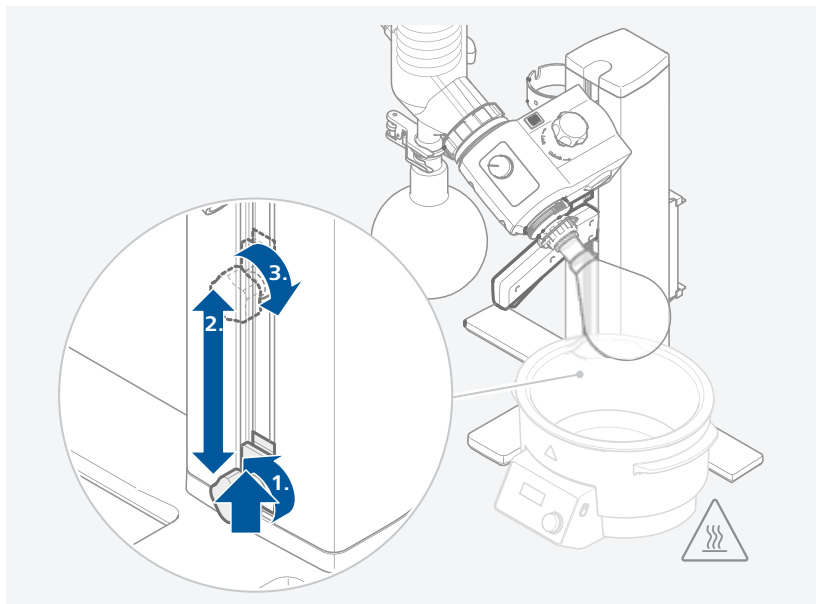


### /// Adjust the lower end stop

**Notice:** Depending on the size of the evaporation flask, the setting angle of the rotary drive and the position of the heating bath and lift, the evaporation flask can be in contact with the bottom of the heating bath.

**Notice:** Glass may break!

- ▷ Limit the lower lift position with the variable end stop.
- ▷ Turn the knob anticlockwise to unlock the stopper, and then you may adjust the lower end stop by moving it up and down.
- ▷ Turn the knob clockwise, the stopper is locked in the adjusted lower end stop.





### /// Assemble the stand pole RV 3.1 (Accessories)

Assemble the condenser locking device according to the diagram.

- ▷ Mount the plate (A) using the thumb screw (B).
- ▷ Put the support rod (D) on the plate (A) and attach it with the screw nut (C).
- ▷ Attach the rubber protector (E).
- ▷ Fasten the Velcro® band (F) to the support rod (D).
- ▷ Secure the vertical glassware with the Velcro® band (F).

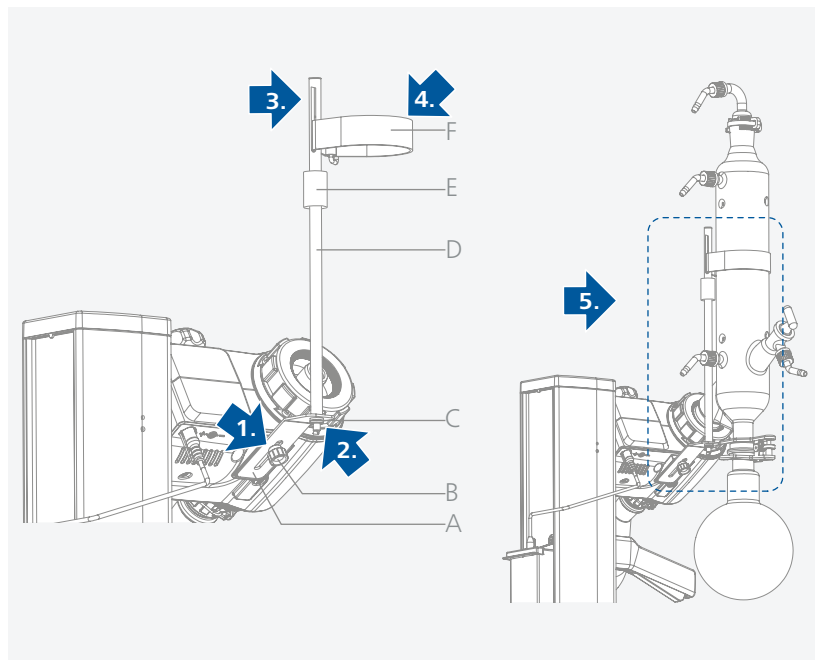
No stand is required if the condenser has been properly fitted and secured by tightening the condenser union nut on the rotary drive.

The purpose of the stand is solely to prevent the condenser from twisting.

#### **Notice:**

If the stand is fitted incorrectly, the strong forces at the Velcro strap can cause stresses within the glass, which in turn can cause damage to the glass condenser.

After the condenser has been fitted, the stand is attached to the rotary drive. Make sure that the condenser is installed parallel to the lift body.





## Maintenance and cleaning

- ▷ The device is maintenance-free. It is only subject to the natural wear and tear of components and their statistical failure rate.
- ▷ The seal on the glass condenser should be checked at regular intervals and replaced if necessary.

### /// Cleaning:

- ▷ For cleaning disconnect the mains plug!
- ▷ Use only cleaning agents which have been approved by IKA to clean IKA devices. These are water (with tenside) and isopropanol.
- ▷ Wear protective gloves during cleaning the devices.
- ▷ Electrical devices may not be placed in the cleansing agent for the purpose of cleaning.
- ▷ Do not allow moisture to get into the device when cleaning.
- ▷ Before using another than the recommended method for cleaning or decontamination, the user must ascertain with IKA that this method does not destroy the device.

### /// Spare parts order:

- ▷ When ordering spare parts, please give:
  - › device type.
  - › serial number, see type plate.
  - › position number and description of spare part, see [www.ika.com](http://www.ika.com).
  - › software version.

### /// Repair:

- ▷ Please only send devices in for repair that have been cleaned and are free of materials which might present health hazards.
- ▷ For repair, please request the “**Safety Declaration (Decontamination Certificate)**” from IKA or use the download printout of it from IKA website at [www.ika.com](http://www.ika.com).
- ▷ If your appliance requires repair, return it in its original packaging. Storage packaging is not sufficient when sending the device - also use appropriate transport packaging.

**Note:** For glassware unit, please contact your local dealer and do not send the glassware back to our factory.



## Accessories

- ▷ For accessories see [www.ika.com](http://www.ika.com).

# Troubleshooting



▷ Any malfunctions during operation will be identified by the error sound.

Proceed as follows in such cases:

- › Turn off the device by using the main switch.
- › Carry out corrective measures.
- › Restart the device.

## Error sound | Causes | Effect | Solutions

### Continuously beeping

Causes	<ul style="list-style-type: none"><li>› The speed has not been adjusted to 0 rpm when starting the device</li><li>› PCBA failure</li></ul>
Effect	<ul style="list-style-type: none"><li>› Motor can't run</li></ul>
Solutions	<ul style="list-style-type: none"><li>› Turn the speed adjusting knob and set the speed to 0 rpm, after which you may set the required speed value.</li></ul>

### Alternatively beep 1 sec and stop 1 sec

Causes	<ul style="list-style-type: none"><li>› Overload</li><li>› Motor blocked</li><li>› Defective cable</li><li>› PCBA failure</li></ul>
Effect	<ul style="list-style-type: none"><li>› Motor stops running</li></ul>
Solutions	<ul style="list-style-type: none"><li>› Reduce the volume in the evaporator</li><li>› Contact the service department</li></ul>

### Alternatively beep 0.5 sec and stop 1.5 sec

Causes	<ul style="list-style-type: none"><li>› Temperature inside the device is too high</li><li>› PCBA failure</li></ul>
Effect	<ul style="list-style-type: none"><li>› Motor stops running</li></ul>
Solutions	<ul style="list-style-type: none"><li>› Switch off the device</li><li>› Let the device cool down</li><li>› Switch on the device</li><li>› Contact the service department</li></ul>

### Alternatively beep 1.5 sec and stop 0.5 sec

Causes	<ul style="list-style-type: none"><li>› Overvoltage</li><li>› Undervoltage</li><li>› PCBA failure</li><li>› Desktop power supply failure</li></ul>
Effect	<ul style="list-style-type: none"><li>› Motor stops running</li></ul>
Solutions	<ul style="list-style-type: none"><li>› Use the original power supply to supply the device</li><li>› Contact the service department</li></ul>

▷ If the actions described fail to resolve the fault or the other kind of error occurred, then take one of the following steps:

- › contact the service department.
- › send the device for repair, including a short description of the fault.



## Technical data

Operating voltage range	<b>Vac</b>	(100...240) ± 10%	
Rated voltage	<b>Vac</b>	100...240	
Frequency	<b>Hz</b>	50/60	
Rated power without heating bath	<b>W</b>	40	
Rated power (max.) of switching adaptor	<b>W</b>	90	
Speed	<b>rpm</b>	20...300	
Speed tolerance	Set speed: < 100 rpm	<b>rpm</b>	± 1
	Set speed: ≥ 100 rpm	<b>%</b>	± 1
Speed display		Plastic part + scale	
Smooth start		yes	
Lift		manual	
Stroke	<b>mm</b>	150	
Head angle adjustable		0°...60°	
Cooling surface	<b>cm<sup>2</sup></b>	1500	
Cooling water flow rate min.	<b>l/h</b>	30	
Cooling water flow rate max.	<b>l/h</b>	100	
Cooling water pressure max.	<b>bar</b>	1	
Perm. On-time	<b>%</b>	100	
Perm. ambient temperature	<b>°C</b>	5...40	
Perm. relative humidity	<b>%</b>	80	
Protection acc. to DIN EN 60529		IP 20	
Protection class		I	
Contamination level		2	
Weight (no glassware; no heating bath)	<b>kg</b>	8	
Dimensions (W x D x H)	<b>mm</b>	440 x 330 x 530	
Operation at a terrestrial altitude	<b>m</b>	max. 2000	

*Subject to technical changes!*

## Warranty

- ▷ In accordance with IKA warranty conditions, the warranty period is 24 months. For claims under the warranty please contact your local dealer. You may also send the device direct to our factory, enclosing the delivery invoice and giving reasons for the claim. You will be liable for freight costs.
- ▷ The warranty does not cover worn out parts, nor does it apply to faults resulting from improper use, insufficient care or maintenance not carried out in accordance with the instructions in this operating instructions.

## Solvent table (excerpt)

Solvent	Formula	Pressure for boiling point 40 °C in mbar (For HB approx. 60 °C)
Acetic acid	$C_2H_4O_2$	44
Acetone	$C_3H_6O$	556
Acetonitrile	$C_2H_3N$	226
N-Amylalcohol	$C_5H_{12}O$	11
n-Pentanol	$C_5H_{10}O$	11
n-Butanol	$C_4H_{10}O$	25
tert. Butanol	$C_4H_{10}O$	130
2-Methyl-2-Propanol	$C_4H_{10}O$	130
Butylacetate	$C_6H_{12}O_2$	39
Chlorobenzene	$C_6H_5Cl$	36
Chloroform	$CHCl_3$	474
Cyclohexane	$C_6H_{12}$	235
Dichloromethane	$CH_2Cl_2$	atm. press.
Methylenechloride	$CH_2Cl_2$	atm. Press.
Diethylether	$C_4H_{10}O$	atm. press.
1,2,-Dichloroethylene (trans)	$C_2H_2Cl_2$	751
Diisopropylether	$C_6H_{14}O$	375
Dioxane	$C_4H_8O_2$	107
Dimethylformamide (DMF)	$C_3H_7NO$	11
Ethanol	$C_2H_6O$	175
Ethylacetate	$C_4H_8O_2$	240
Ethylmethylketone	$C_4H_8O$	243
Heptane	$C_7H_{16}$	120
Hexane	$C_6H_{14}$	335
Isopropylalcohol	$C_3H_8O$	137
Isoamylalcohol	$C_5H_{12}O$	14
3-Methyl-1-Butanol	$C_5H_{12}O$	14
Methanol	$CH_4O$	337
Pentane	$C_5H_{12}$	atm. press.
n-Propylalcohol	$C_3H_8O$	67
Pentachloroethane	$C_2HCl_5$	13
1, 1, 2, 2, -Tetrachloroethane	$C_2H_2Cl_4$	35
1, 1, 1, -Trichloroethane	$C_2H_3Cl_3$	300
Tetrachloroethylene	$C_2Cl_4$	53
Tetrachloromethane	$CCl_4$	271
Tetrahydrofuran (THF)	$C_4H_8O$	357
Toluene	$C_7H_8$	77
Trichloroethylene	$C_2HCl_3$	183
Water	$H_2O$	72
Xylene	$C_8H_{10}$	25



designed for scientists

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Technical specifications may be changed without prior notice.