

# IKA

designed for scientists

**EasySyn Reactor Systems**

ENGLISH

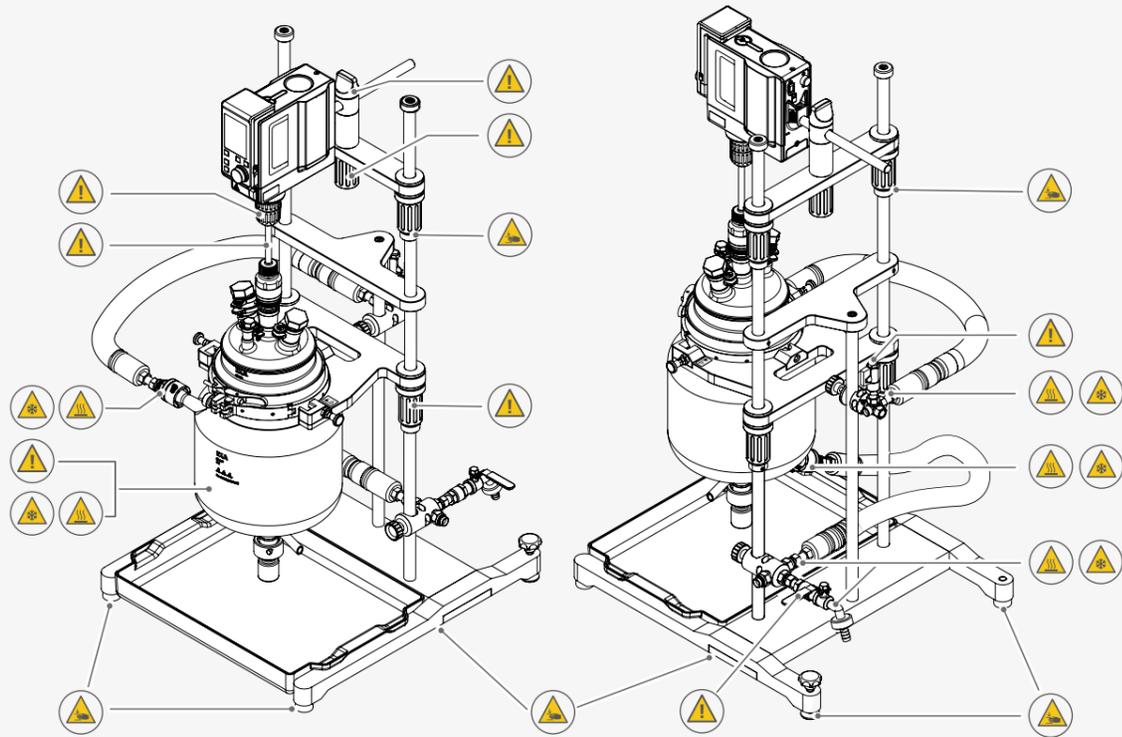


Fig. 1



**Note Terminology:**

The **EasySyn Reactor System** is often referred to the operating instructions as a device, reactor system or overall system.

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Source language: German

## EU Declaration of conformity

We declare under our sole responsibility that the product to which this declaration relates is in conformity with directive 2006/42/EC and the following standard or other normative document: EN ISO 12100.

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





## Explication of warning symbols

### /// Warning symbols

-  **Danger!** Indicates an (extremely) hazardous situation, which, if not avoided, will result in death, serious injury.
-  **Warning!** Indicates a hazardous situation, which, if not avoided, can result in death, serious injury.
-  **Caution!** Indicates a potentially hazardous situation, which, if not avoided, can result in injury.
-  **Notice!** Indicates practices which, if not avoided, can result in equipment damage.
-  **Caution!** Indicates a hazardous situation that can cause from a hot surface.
-  **Caution!** Indicates a hazardous situation that can cause from a frozen surface.
-  **Caution!** Indicates crushing risk to fingers / hands.
-  **Caution!** Indicates a hazardous situation that can cause from glass breakage.

### /// General Symbols

**A** — Position number

-  **Correct / Result!**  
Shows the correct execution or the result of an action step.
-  **Wrong!**  
Shows the incorrect execution of an action step.
-  **Note!**  
Displays action steps that require particular attention to detail.
-  **Closed lock**  
Indicates the status of "locked".
-  **Open lock**  
Indicates the status of "Unlocked".
-  **Configuration**  
Indicates the configuration of the reactor system.



## Safety instructions

### /// General information

- › **Read the operating instructions completely before starting up and follow the safety instructions.**
- › Keep the operating instructions in a place where it can be accessed by everyone.
- › Ensure that only trained staff work with the device.
- › Follow the safety instructions, guidelines, occupational health and safety and accident prevention regulations.
- › The device must only be used in a technically perfect condition. The correct functioning of the stand must be checked at regular intervals.
- › Prior to each use, always check the stand, overhead stirrer and accessories for damage. Never use damaged parts.
- › Check that the overhead stirrer is installed correctly before use and at regular intervals.
- › Check that there is no leak in the tempering circuit system and the reactor vessel prior to each use and at regular intervals. Leaking liquid can lead to slippery surface.

#### **Notice!**

- › Pay attention to the marked sites in Fig. 1.

### /// Device setup / Assembly

#### **Warning!**

- › Place the device in a fume hood (closed on all sides) or a comparable protective equipment when working with chemicals or hazardous substances that are harmful to health.

#### **Caution!**

- › The power switch of the device must be accessed immediately, directly and without risk at any time. If access to the power switch cannot be ensured, an additional EMERGENCY STOP switch that can be easily accessed must be installed in the work area.
- › When assembling the reactor system, there is a risk of glass breakage. Wear your personal protective equipment, e.g. protective gloves and goggles.
- › Ensure that the glass parts assembly is tension-free! There is danger of cracking as a result of:
  - stress due to incorrect assembly
  - external mechanical hazards
  - local temperature peaks.
- › Assemble the hose adapters on the glass vessel carefully. Note the risk of glass breakage.
- › When adjusting the height of the overhead stirrer and the reactor vessel, ensure:
  - that your fingers are not clamped by the clamping nut of the height adjustment of the stand.
  - nothing becomes caught between the stoppers and the clamping nuts.
- › Do not tighten the hand-tight clamping nuts using auxiliary tool with too much force.
- › Align the overhead stirrer and stirring tool axially to the reactor vessel and reactor lid.
- › Ensure that the stirring tool is tightly and securely fixed.
- › Accessories must be connected securely to the device and must not come loose on their own.
- › Make sure the stand is secure firmly, especially when attaching parts. The centre of gravity of the entire structure should be on a vertical to the installation area, in its centre.

### /// Working with the device

#### **Danger!**

- › Do not use the device in explosive atmospheres, it is not EX-protected.
- › With substances capable of forming an explosive mixture, appropriate safety measures must be applied, e.g. working under a fume hood.
- › To avoid body injury and property damage, observe the relevant safety and accident prevention measures when processing hazardous materials.

### **Warning!**

- › Only process media that will not react dangerously to the extra energy produced through processing. This also applies to any extra energy produced in other ways, e.g. through light irradiation.
- › Uncontrolled reactions can be triggered by mixing the heated material insufficiently or by the energy generated by selecting a speed that is too high. In case of these and other increased operational hazards, users must take additional appropriate safety precautions. In any case, when using critical or hazardous materials in your processes, IKA recommends to use additional appropriate measures to ensure safety in the experiment. For example, users can implement measures that inhibit fire or explosions or comprehensive monitoring equipment. Furthermore, users must make sure that the device switch of the IKA product can be accessed immediately, directly and without risk at any time.
- › Wear your personal protective equipment in accordance with the hazard category of the medium to be processed. There is risk of:
  - splashing of liquids
  - projectile parts
  - body parts, hair, clothing and jewelry getting caught.
- › Beware of hazards due to:
  - flammable materials
  - combustible media with a low boiling temperature
  - glass breakage
  - overfilling with media
  - damaged reactor vessel or reactor lid.
- › Certain applications and materials may be hazardous. You should take precautions to prevent contact with, or inhalation of, toxic liquids, gases, fumes, vapours or powders.
- › Risks may also be posed by biological or microbiological substances.
- › Process pathogenic materials only under a suitable fume hood. Please contact IKA application support if you have any question.
- › The reactor system must always be ventilated when working under normal pressure in order to prevent any pressure build-up caused by highly volatile gases or unpredictable reaction pressure gradients. Condense volatile gases using a cooler with a standard ground connector (e.g. a reflux condenser) on the reactor lid.
- › The device is not designed for excess pressure use.
- › The device is designed for vacuum operation.
- › IKA recommends using the safety function of the connected thermostat for temperature limitation. The maximum and minimum temperature limits can be set, as well as a maximum safety temperature.
- › Ensure that the thermostat used for tempering is fully efficient. A defective thermostat can cause uncontrolled reactions.
- › The tempering system must be operated without pressure.

### **Caution!**

- › Do not touch rotating parts. Moving and rotating equipment parts also constitute a hazard.
- › Electrostatic processes between medium and stirring tool cannot be excluded and lead to a hazard.

### **Caution!**

- › There is a risk of burns on the heated reactor vessel or reactor lid, on the adapters for the glass nozzles on the double jacket, on the hoses and on the manifold fittings. Wear safety gloves when handling heated parts.

### **Caution!**

- › There is a risk of frostbite on the cooled reactor vessel or reactor lid, on the adapters for the glass nozzles on the double jacket, on the hoses and on the manifold fittings. Wear safety gloves when handling cooled parts.

### **Notice!**

- › Switch off the overhead stirrer immediately in case of any vibration or imbalance. Check all attachments and accessories regularly for tight fit to the stand system.
- › Before you fill the reactor vessel, ensure that the reagents used do not damage the sealing.

- › Covering or parts that are capable of being removed from the device without accessory equipment have to be reattached to the device for safe operation in order to prevent, for example, the ingress of fluids, foreign matter, etc.
- › The feet of the stand must be clean and undamaged.

## /// Power supply / switching off the device (overhead stirrer)

- › **Read and follow the safety instructions contained in the operating instructions for the stirrer.**
- › The voltage stated on the type plate must correspond to the power voltage.
- › The device can only be disconnected from the power supply by pulling out the power plug.
- › The socket for the power cord must be easily accessible.
- › Socket must be earthed (protective ground contact).
- › Always switch the power switch in the OFF position or disconnect the power before changing stirring tool and fitting allowed accessories.
- › Disconnect the power plug before attaching or changing any accessories.
- › Disconnect the power plug before cleaning, maintenance and transportation of the unit.
- › The device must only be opened by trained specialists, even during repair. The device must be unplugged from the power supply before opening. Live parts inside the device may still be live for some time after unplugging from the power supply.

## /// Transportation and storage

### **Caution!**

- › Beware of the high dead weight of the device when transporting.

### **Vorsicht!**

- › There is risk of crushing of fingers and hands between stand and installation surface.

### **Notice!**

- › Remove the reactor vessel before transporting the device. Only transport the device without the reactor vessel.
- › The reactor vessel can be heavy. Empty the reactor vessel before removing it.
- › Do not transport or empty the reactor vessel while it is still hot/cold. This may result in accidents, especially scalding/freezing injuries.
- › The device must be protected against mechanical impact, vibrations, dust deposits and corrosive ambient air during transportation and storage.

## /// Accessories

- › Protect the device and accessories from bumping and impacting.
- › Check the device and accessories beforehand for damage each time when you use them. Do not use damaged components.
- › Use only IKA approved accessories.
- › Use only original IKA spare parts.

## /// Disposal instructions

- › The device, accessories and packaging must be disposed of in accordance with local and national regulations.



## Intended use

### /// Use

The **Easysyn** reactor system is designed for organic or aqueous syntheses. It ensures safe and reproducible chemical reactions on the way from laboratory to pilot scale.

**Intended use:** Tabletop device

### /// Range of use

Indoor environments similar to that a laboratory of research, teaching, trade or industry.

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.

## Unpacking



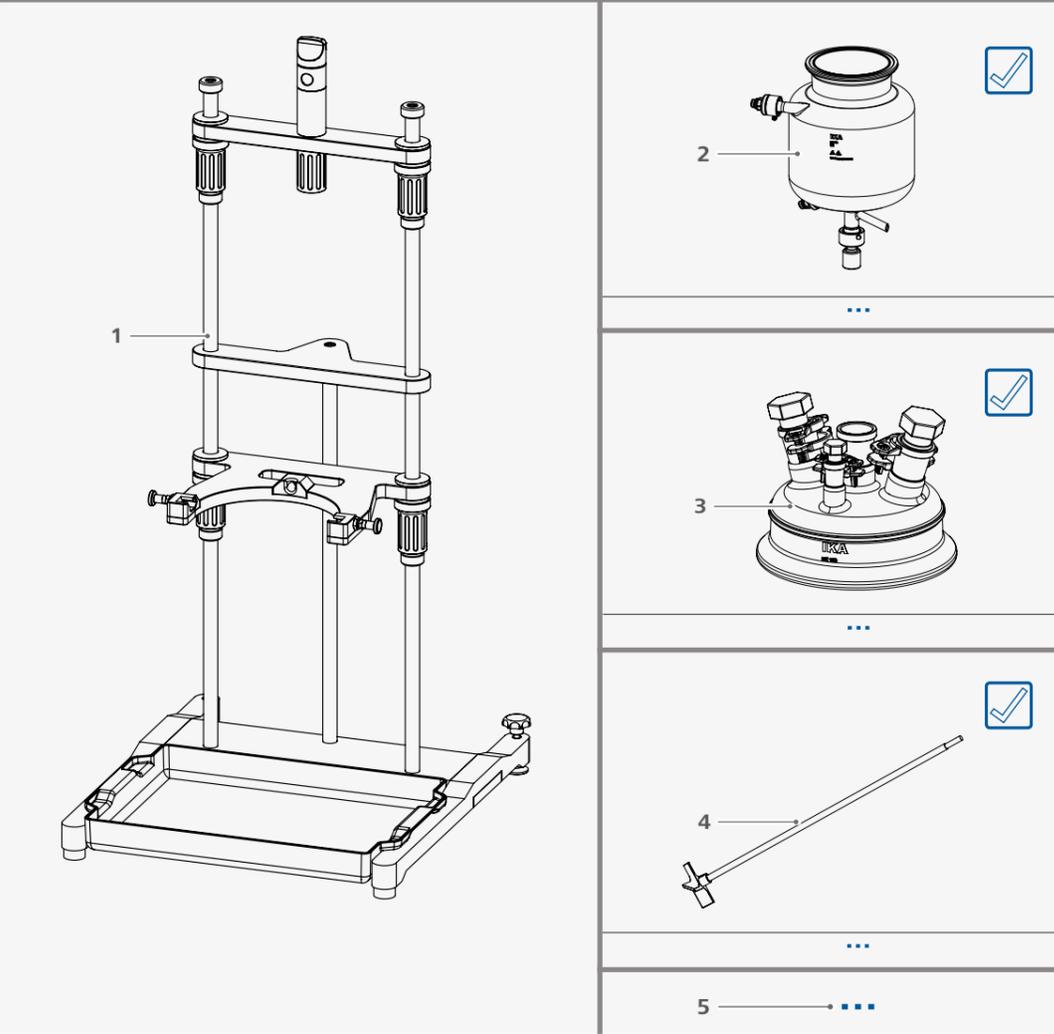
- › Please unpack the device carefully.
- › Any damage should be notified immediately to the shipping agent (post office, railway network or logistics company).

### /// Delivery scope

The scope of delivery of your reactor system depends on the configuration of your order and can be found in the accompanying documents (packing list, delivery bill or invoice).

**Note:** Due to the large modular system for the reactor system and the large many ordering options, we can only show examples here.

 **Example:** [EasySyn Configurator \(ika.com\)](https://www.ika.com)

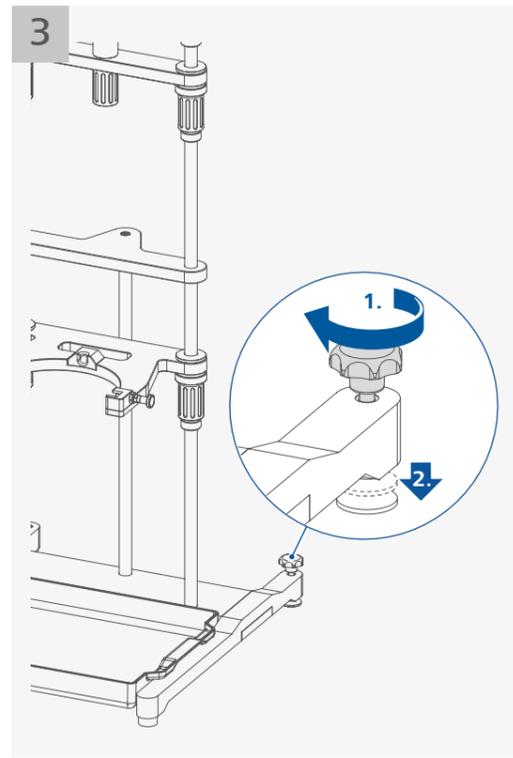
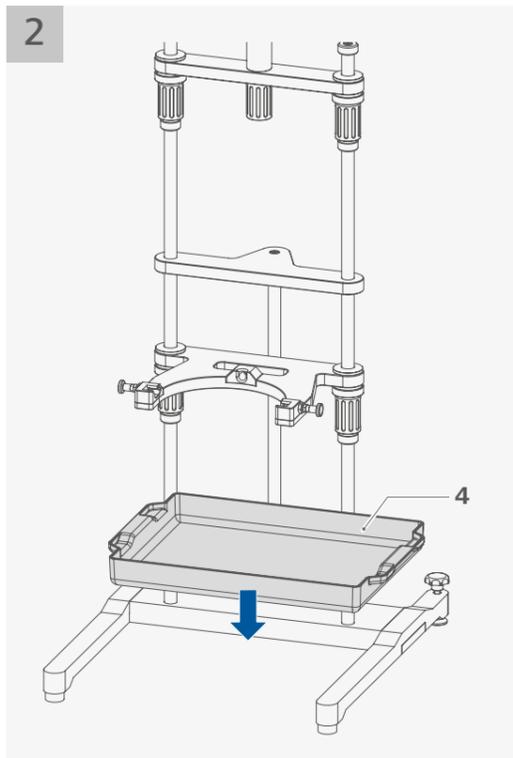
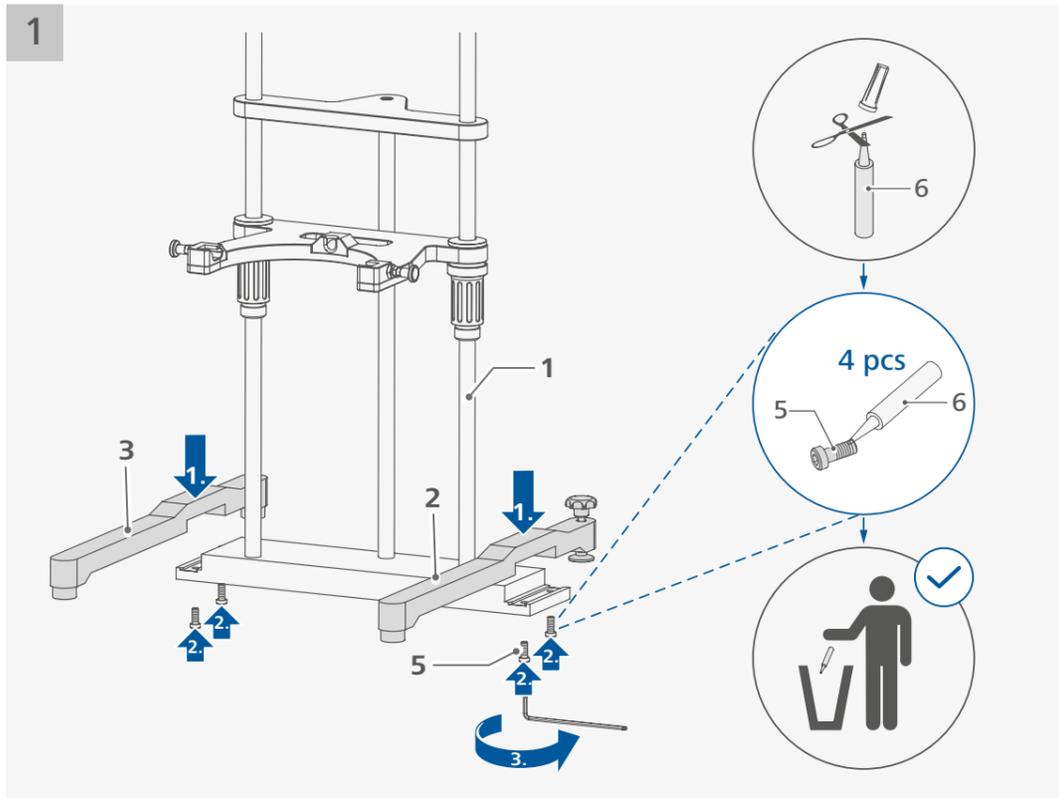


1	SY stand	4	Stirring tool
2	Reactor vessel	5	...
3	Reactor lid		

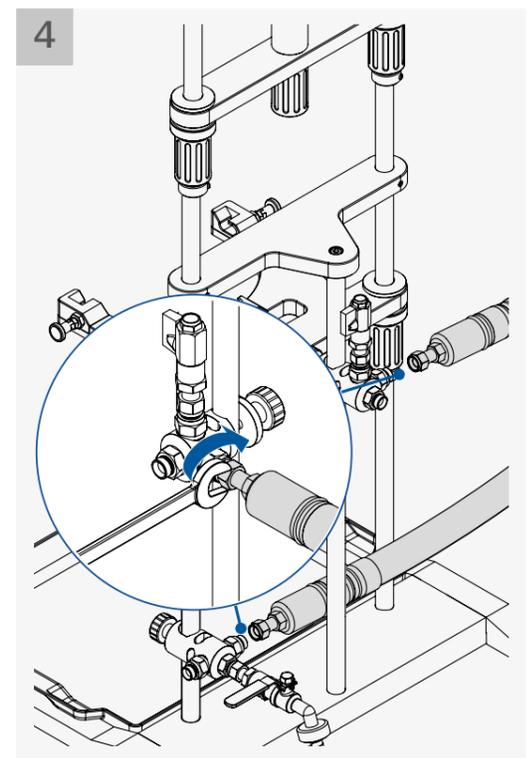
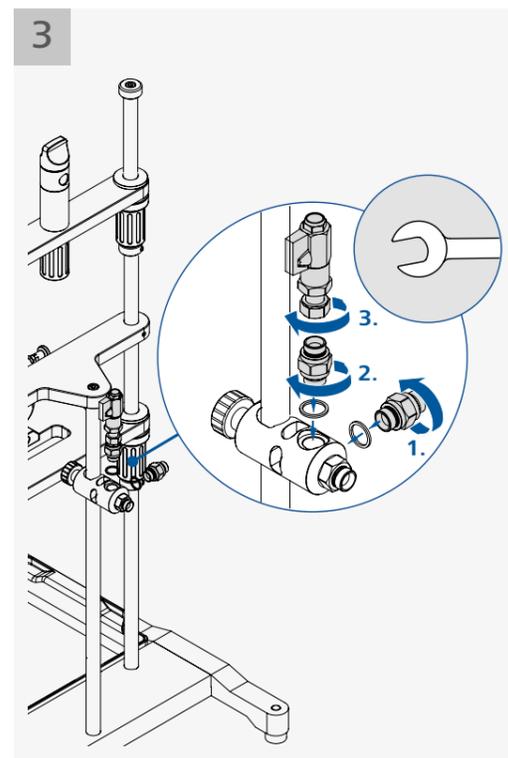
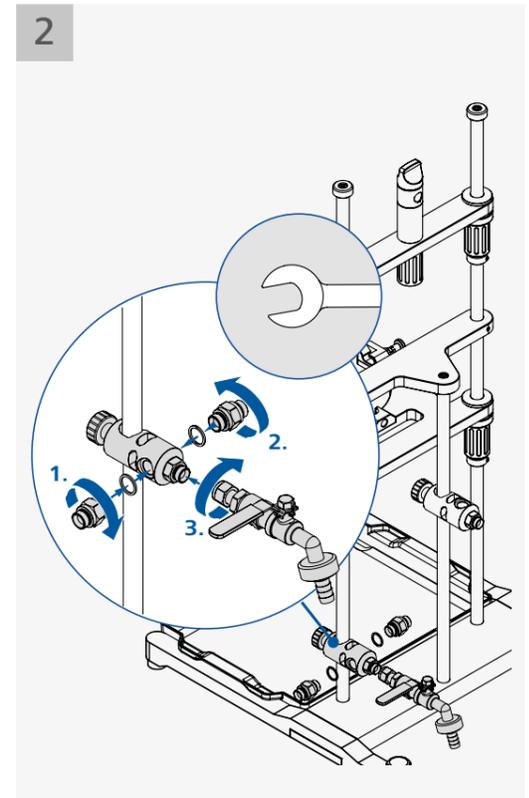
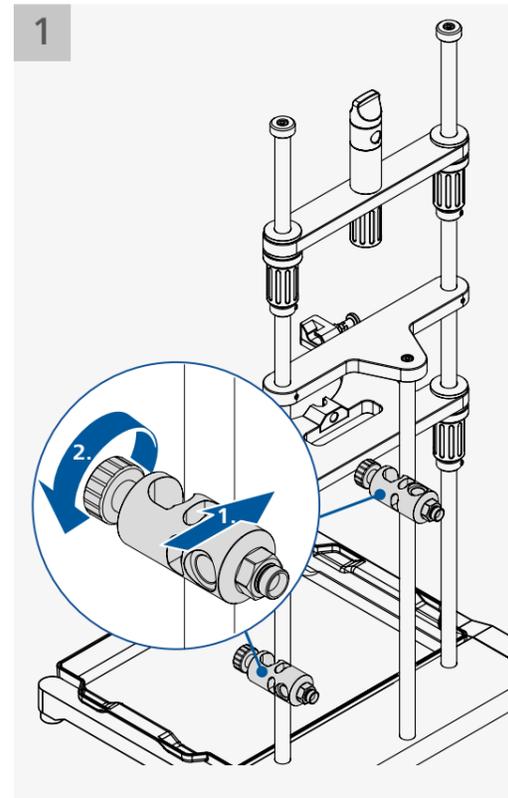


# Installation

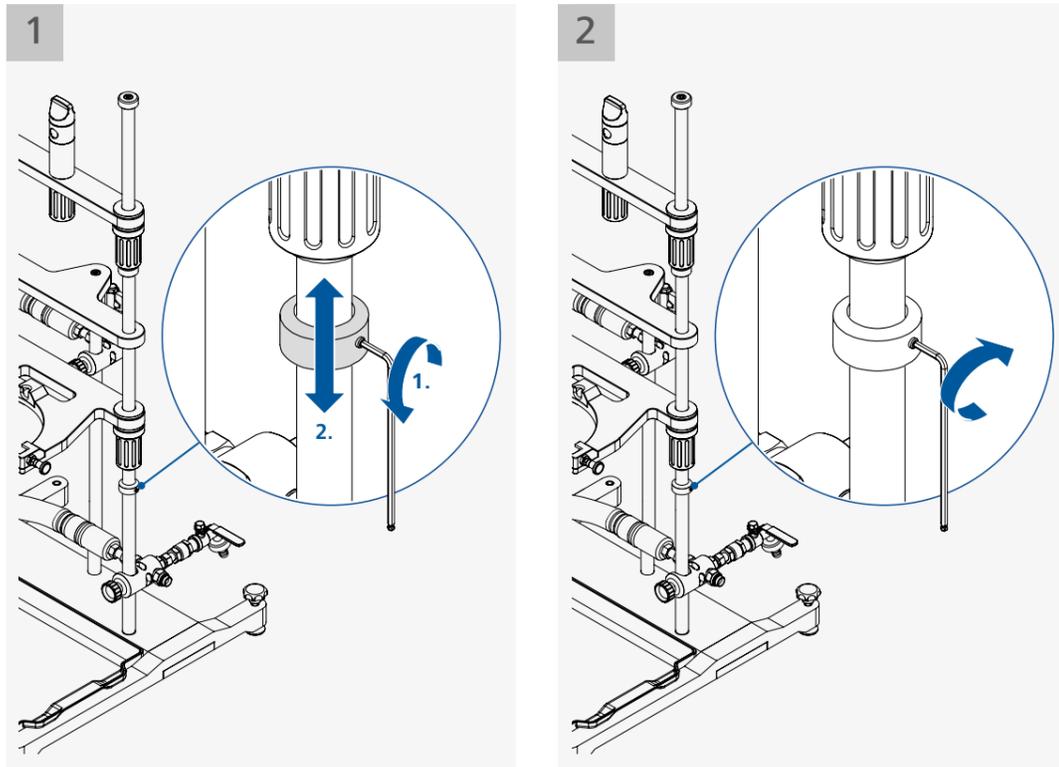
/// Assembling the SY stand



/// Assembling the draining set

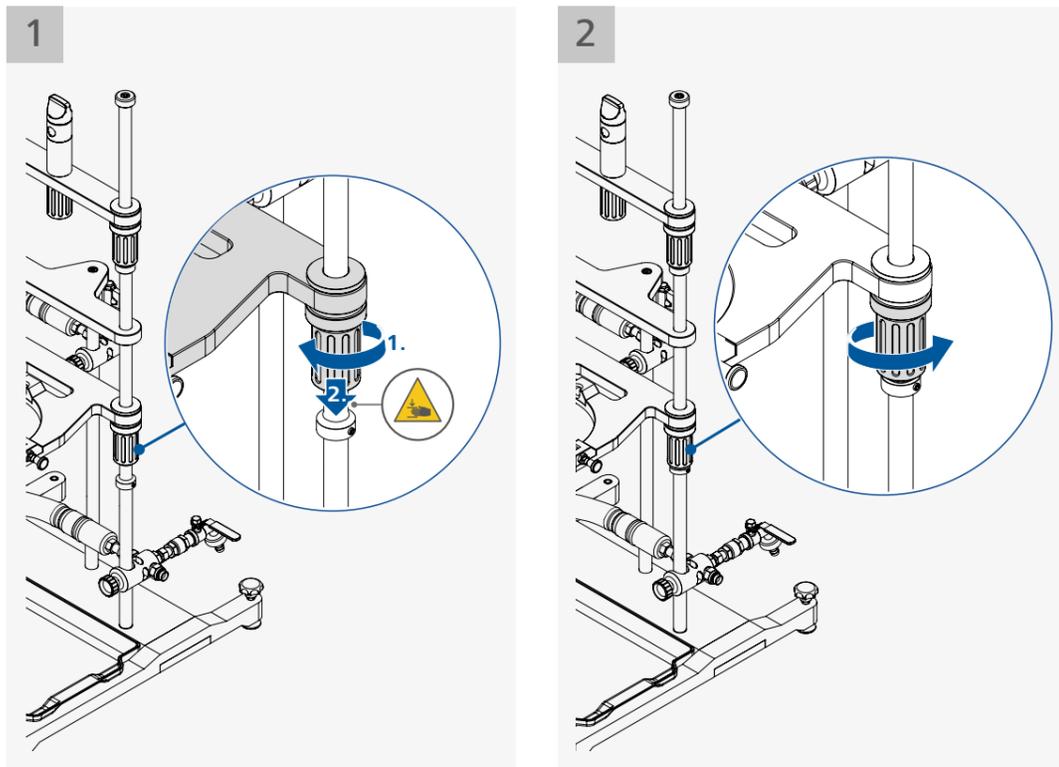


/// Adjusting and positioning the stoppers for vessel holder

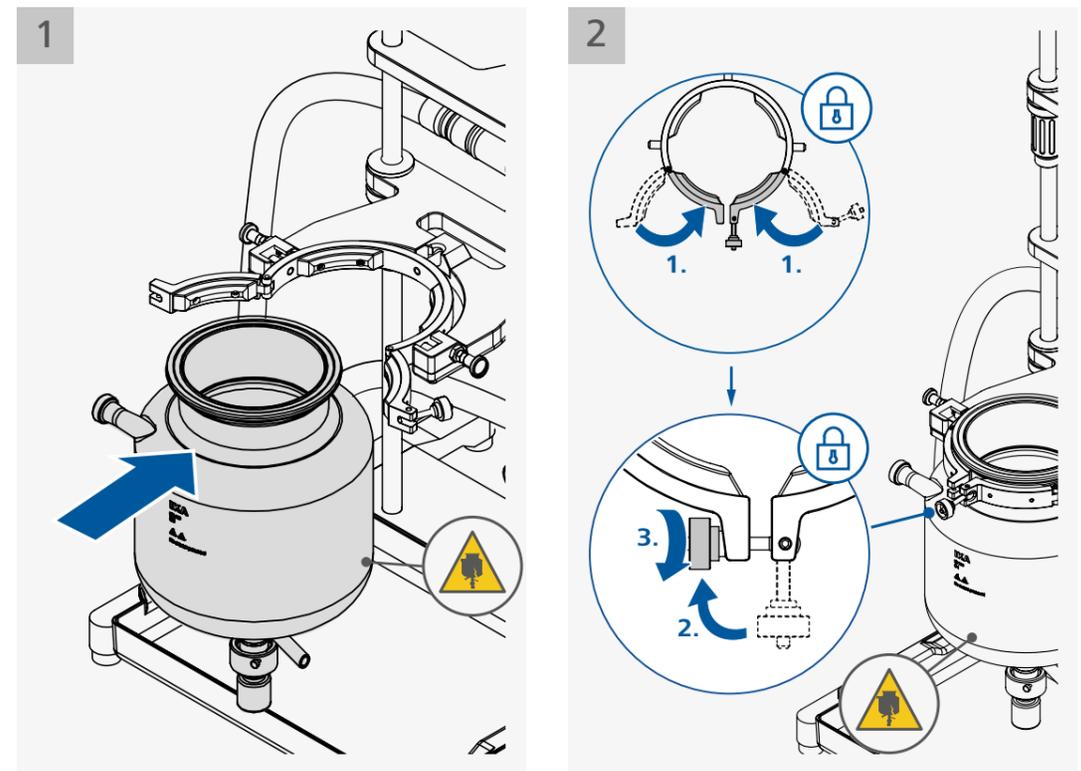
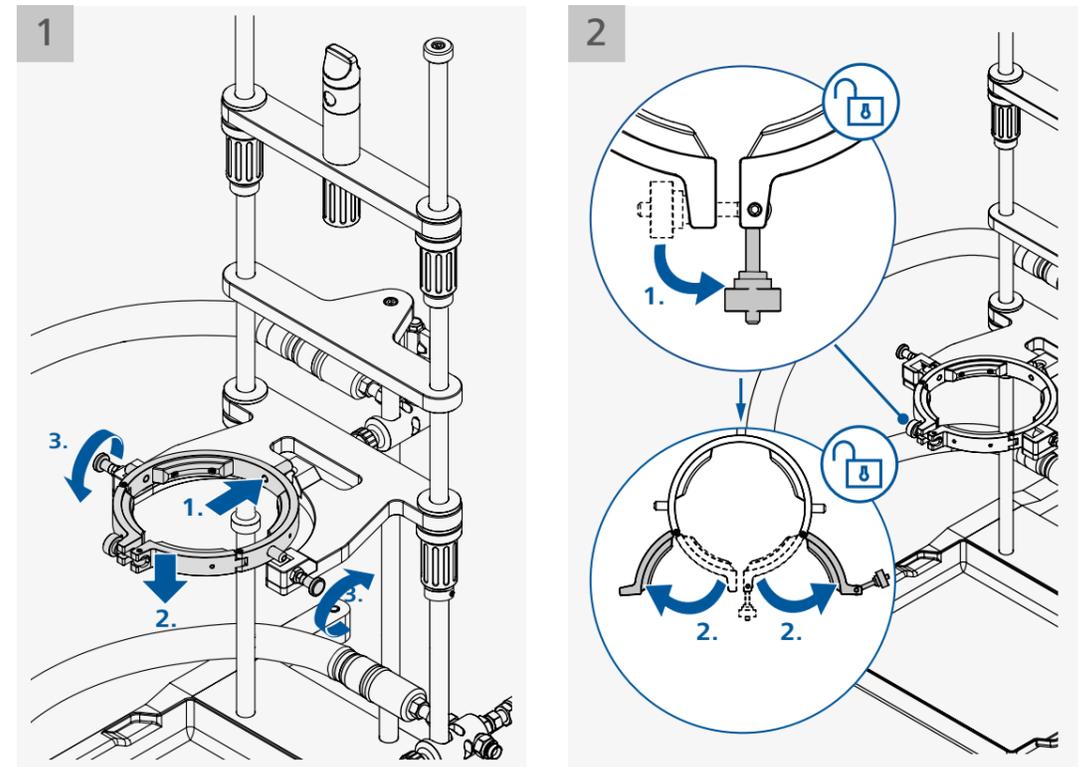


**Note:** Adjust and position the height of the stoppers roughly according to reactor vessel size.

/// Adjusting and positioning the vessel holder

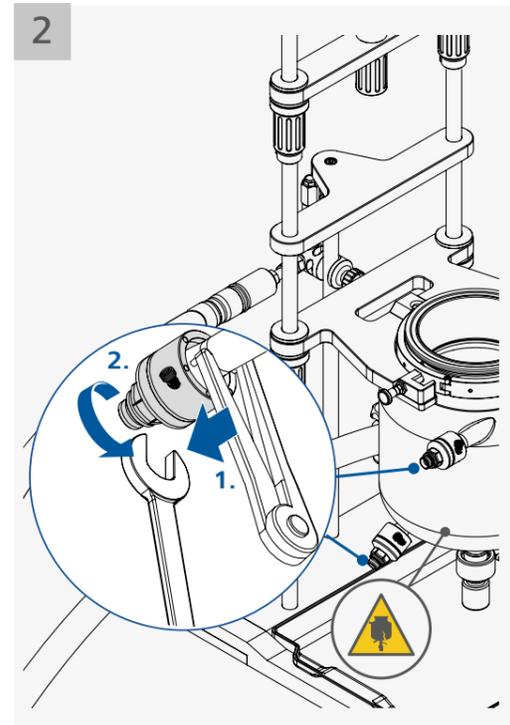
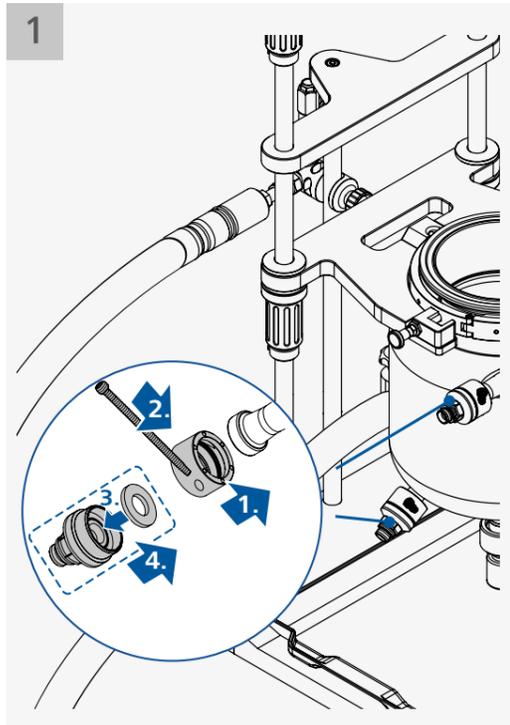


/// Assembling the vessel clamp and the reactor vessel

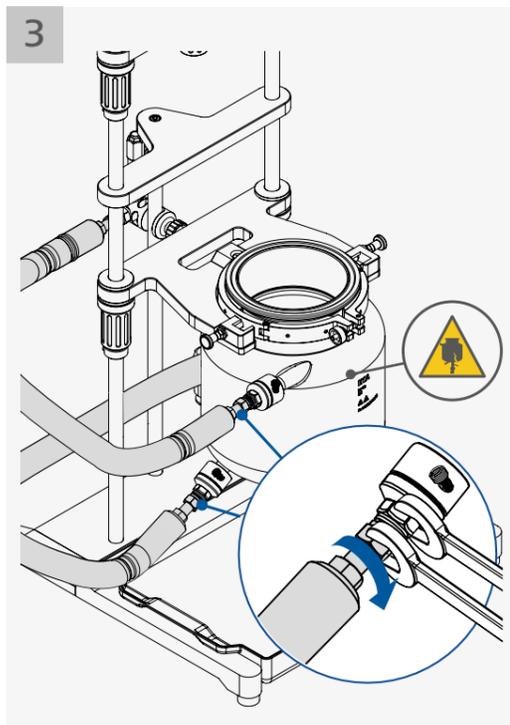


**Caution!**  
 › Note the risk of glass breakage.

### /// Assembling the hose adapters to reactor vessel



**Note:** Secure the union nut with the face wrench and the open end wrench. To fasten the adapters, use the face wrench on the union nut and the open end wrench on the counterpart!

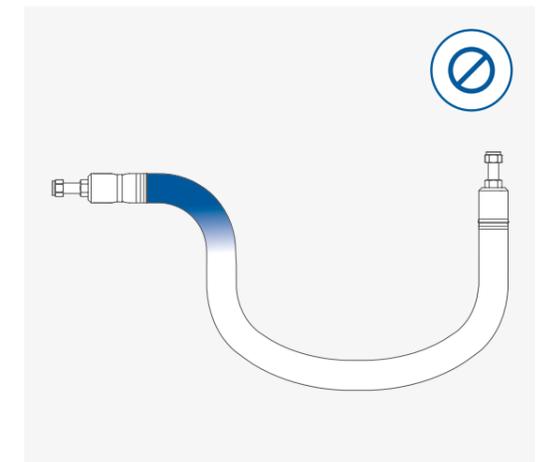
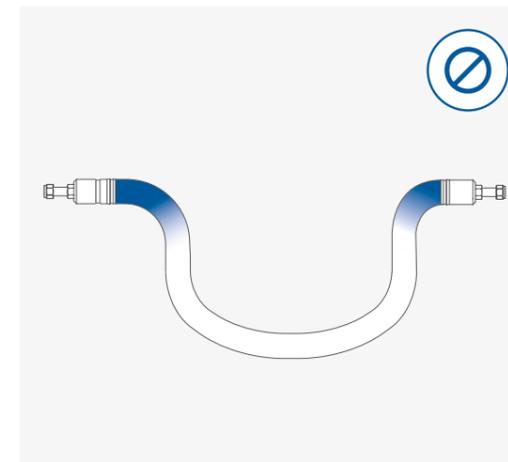
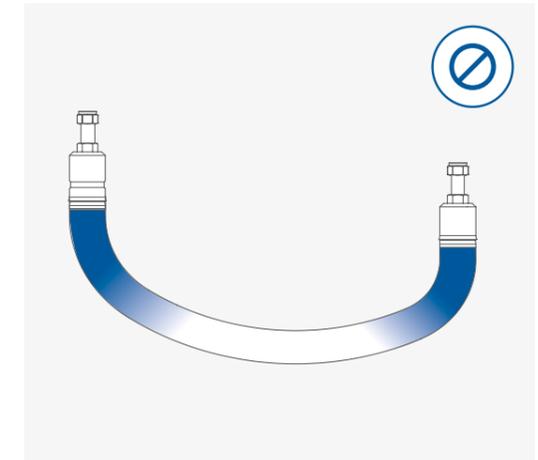
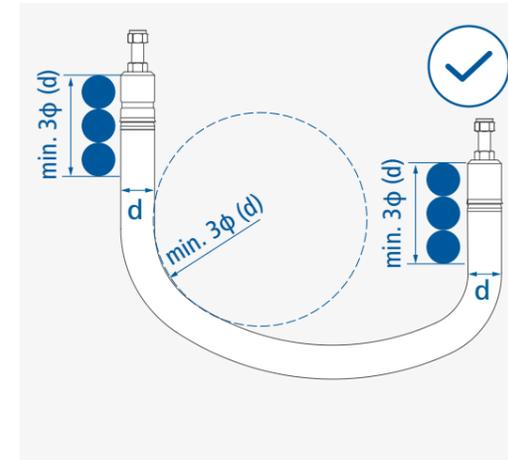


Use an open end wrench to fix the hose adapter and use another open end wrench to fasten the hose coupling to the hose adapter.

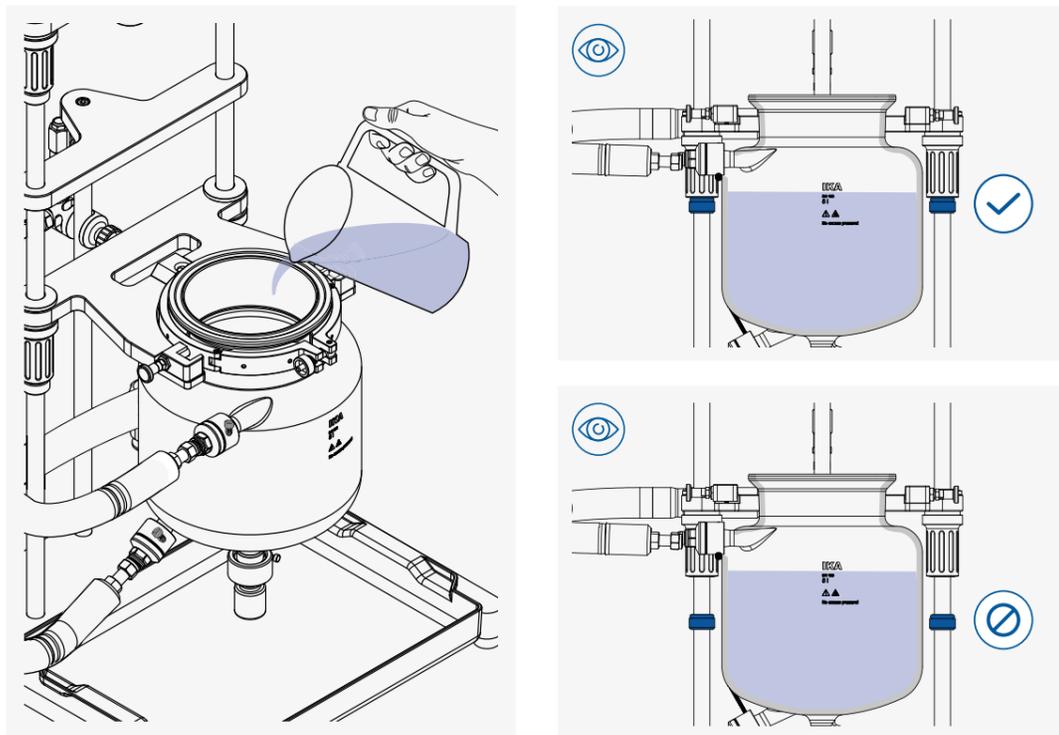
#### ⊗ Caution!

› Note the risk of glass breakage.

**Note:** Avoid flexional stress due to sharp bending on the tempering hose! The hose bending radius should not be less than 3 times of the hose diameter.



### /// Filling the reactor vessel



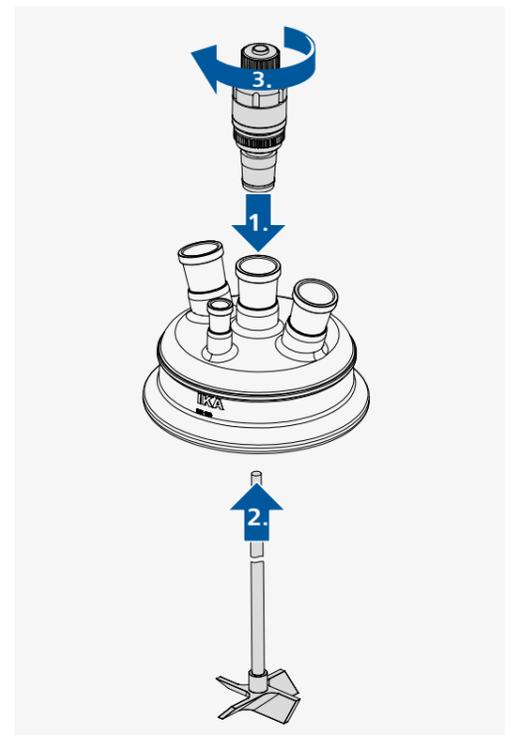
#### ⚠ Notice!

- › Before filling the reactor vessel make sure that the reagents used do not damage the O-rings.
- › Ensure the discharge valve is closed.
- › Make sure that the vessel holder is secured firmly with stoppers.

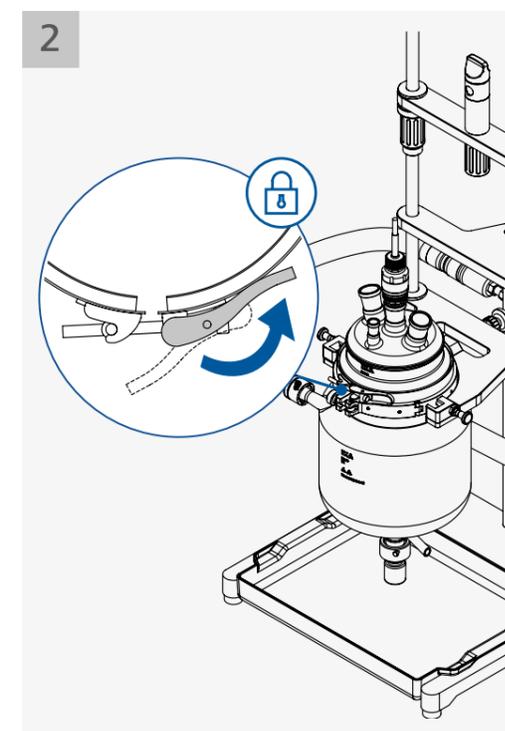
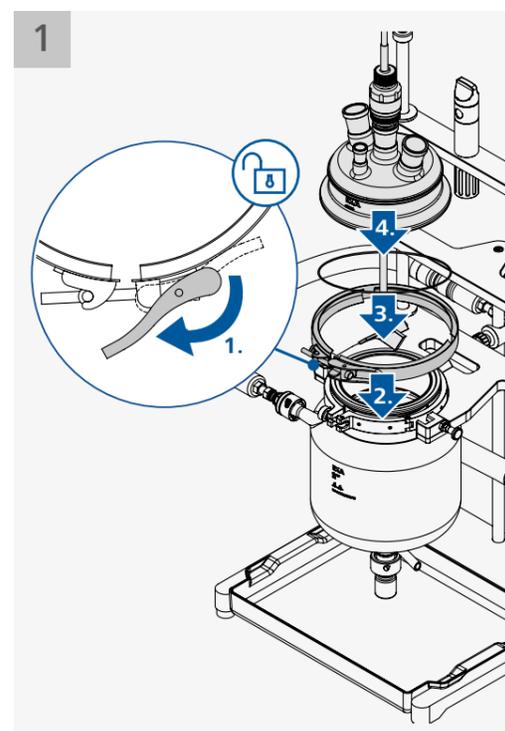
#### Note:

- › To close the valve, screw the adjusting screw in, until the spindle hits the valve seat.
- › Screw on carefully to the limit point. You will need increased torque, because now the spring of the valve spindle is tightened.
- › After reaching the final point, turn the adjusting screw at least half a turn back, to give the spring some expansion space.

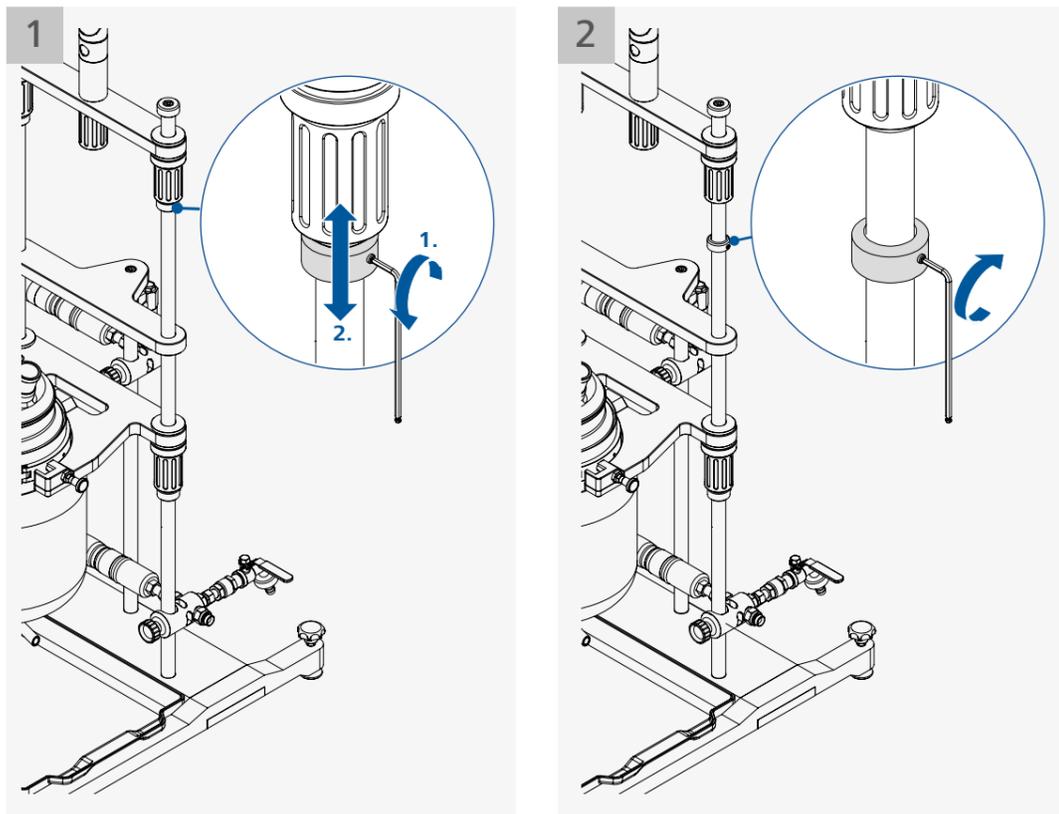
### /// Assembling the stirring tool and stirrer guide on the reactor lid



### /// Assembling the reactor lid, O-ring and clamp ring

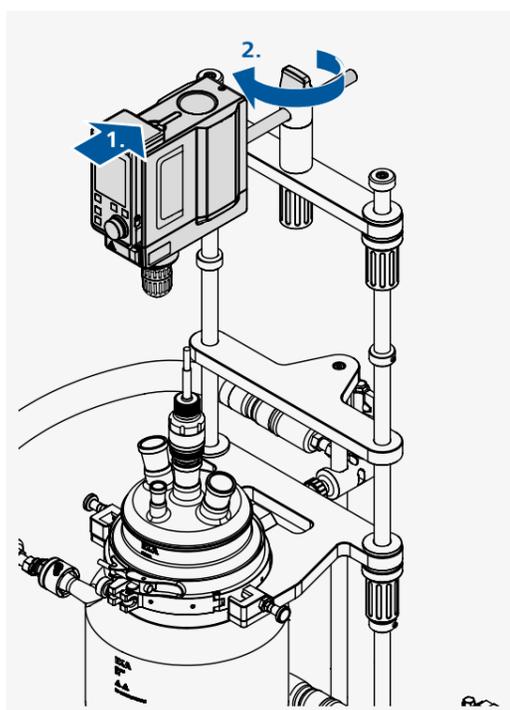


/// Positioning the stoppers for overhead stirrer holder

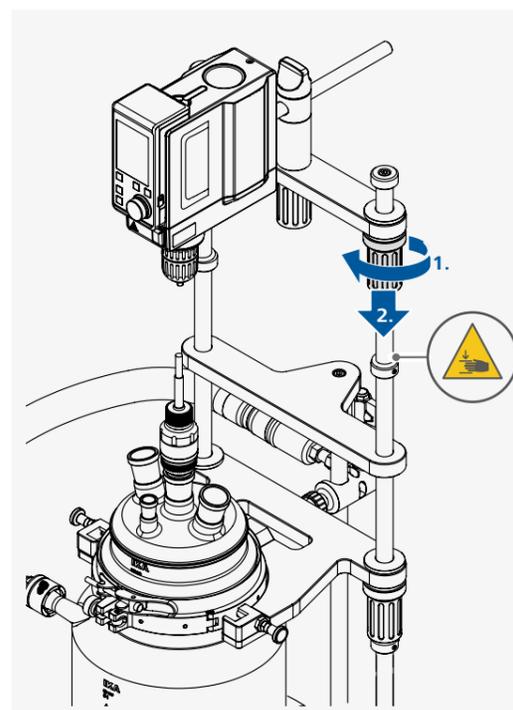


**Note:** Adjust and position the height of the stoppers roughly for overhead stirrer holder according to reactor vessel size and stirring tool length.

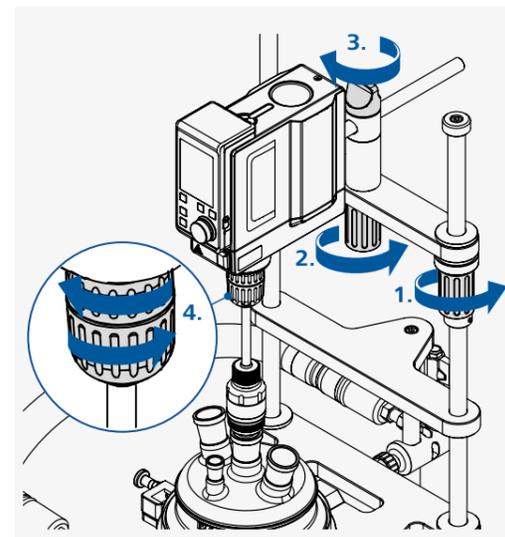
/// Assembling the overhead stirrer



/// Positioning of the overhead stirrer to the reactor vessel with stirrer tool



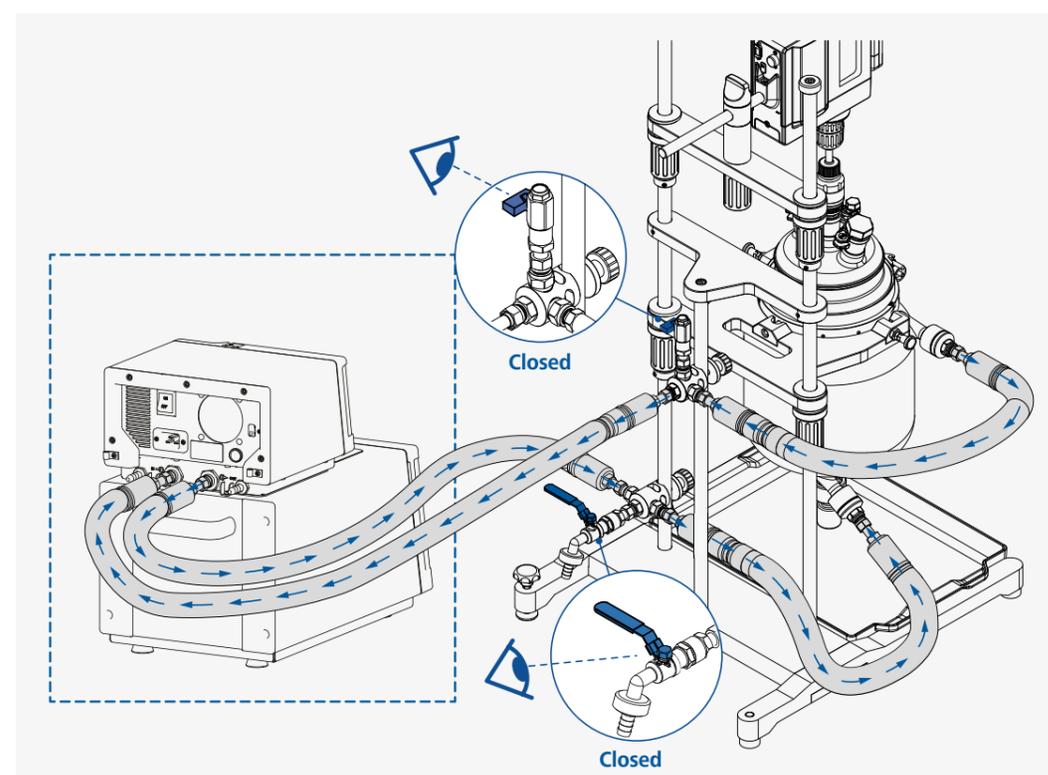
/// Securing the stirring tool to the chuck



**⊗ Caution!**

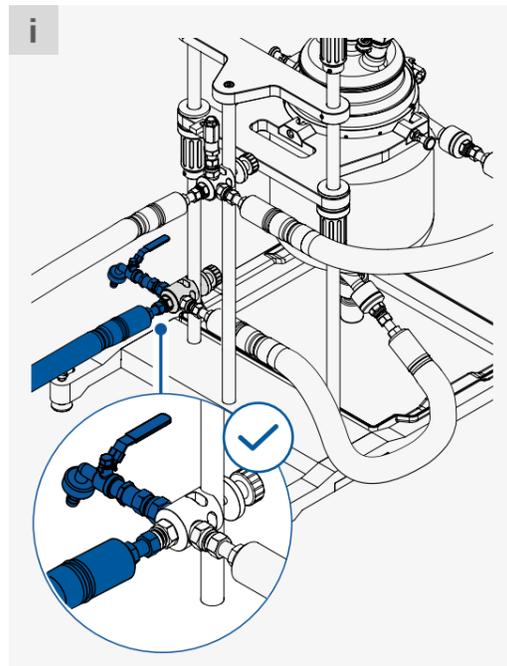
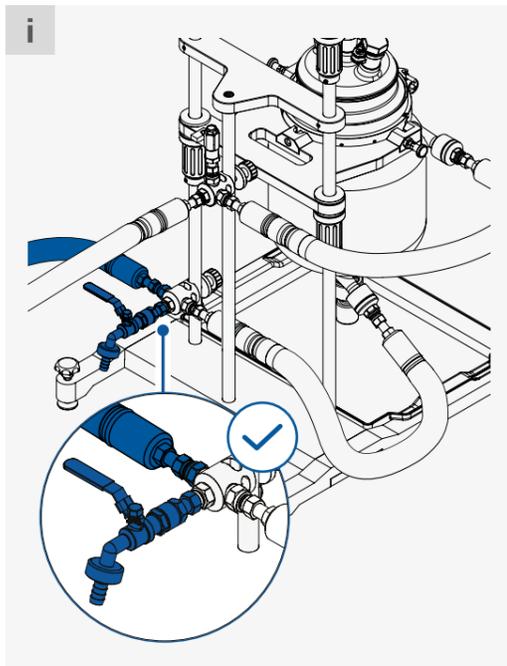
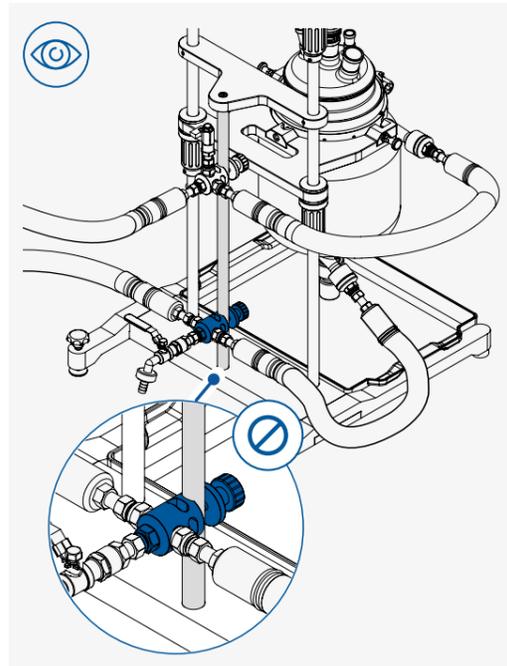
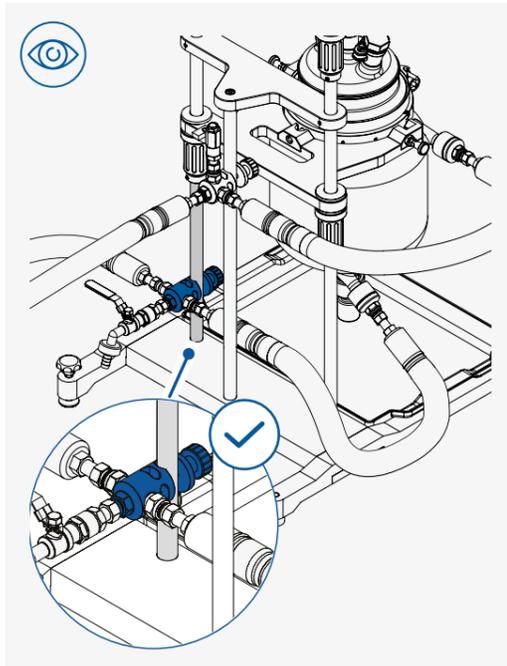
Align the chuck from overhead stirrer axially with the shaft of the stirring tool. Make sure that the stirring tool is not under tension after fastening. Check whether imbalances occur during stirring. Start the stirring process at low speed and increase it slowly.

/// Connecting to an external thermostat



**Note:**

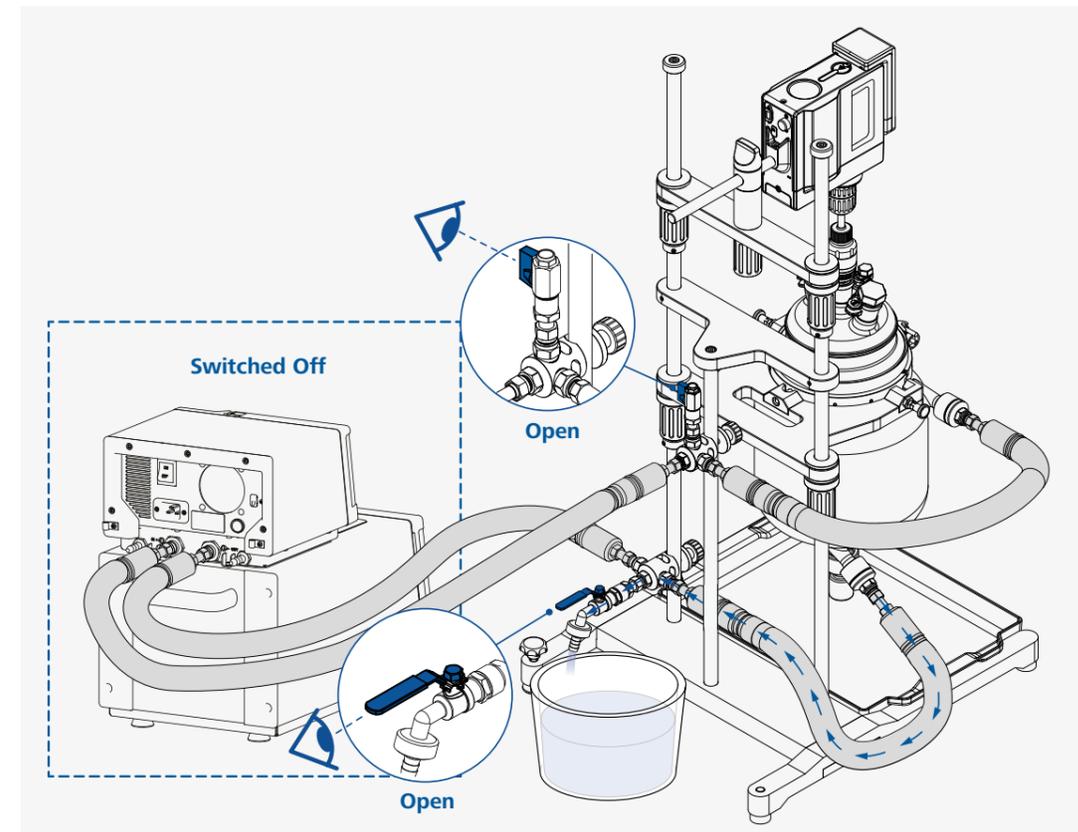
- > Ensure the valves are switch to "closed" position when connecting an external circulator!
- > Ensure the circulation flow from the circulator is attached to the lower connection and circulation return into the circulator is attached to the higher connection of the reactor vessel.



**⚠ Notice!**

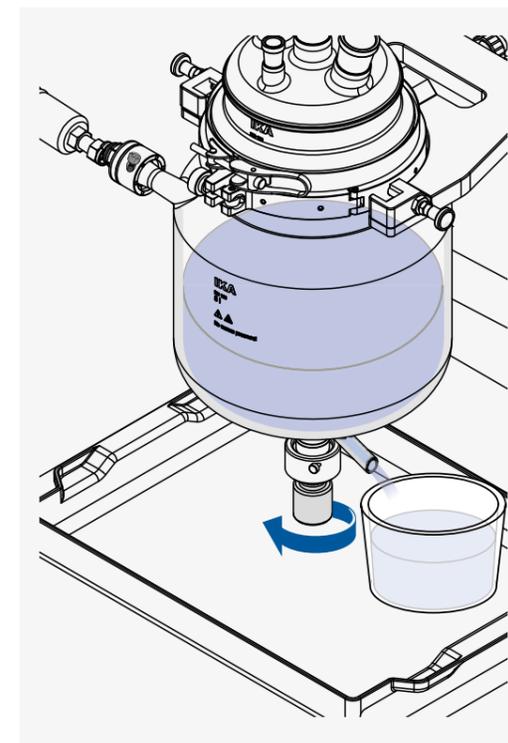
- › When assembling the fittings and hoses, pay attention to the stability and steadiness of the reactor system.

/// Draining of the tempering system



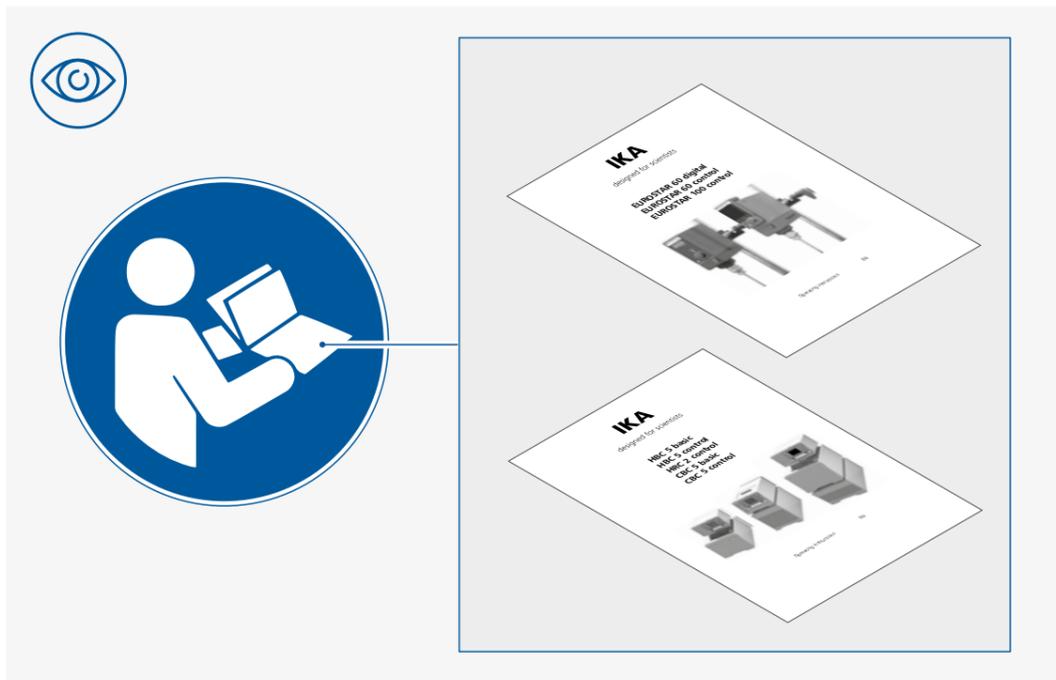
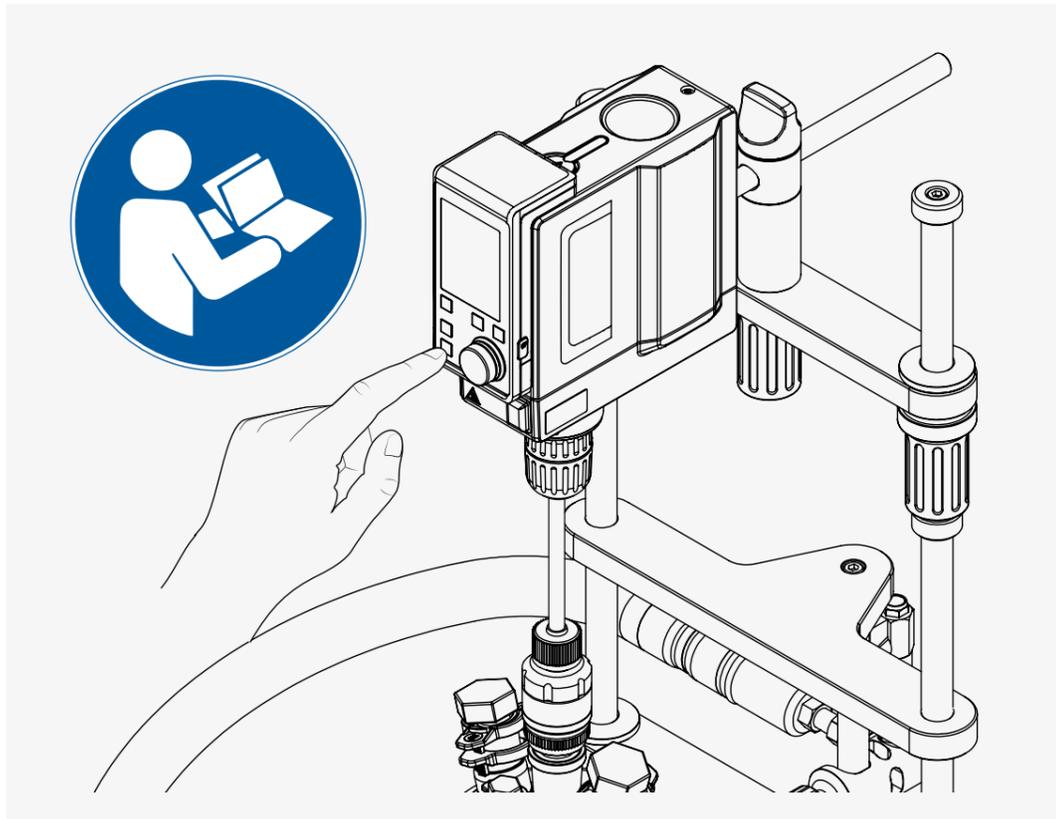
**Note:** To drain the tempering system, switch off the thermostat and open the valves. Open the valves by moving the levers to the "Open" position.

/// Draining the reactor vessel





## Operation



**Note:** Read and follow the instructions in the separate operating manuals of the devices and accessories used, especially from overhead stirrers and thermostats!

## 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.

### /// Cleaning

For cleaning disconnect the mains plug!  
Use only cleaning agents which have been approved by IKA to clean the devices:  
Water containing surfactant / isopropyl alcohol.

- › 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.

### /// Ordering spare parts

When ordering spare parts, please indicate:

- › Device type.
- › Serial number, see type plate.
- › Item and designation of the spare part, see: [www.ika.com](http://www.ika.com).

### /// Repairs

**Please send in device for repair only after it has been cleaned and is free from any materials which may constitute a health hazard.**

For repair, please request the "Decontamination Certificate" from **IKA**, or download printout of it from the **IKA** website [www.ika.com](http://www.ika.com).

If you require servicing, return the device in its original packaging. Storage packaging is not sufficient. Please also use suitable transport packaging.

## Accessories

### /// Vessels

<b>SY 500</b>	Reactor vessel, 500 ml, DN 100
<b>SY 1000</b>	Reactor vessel, 1000 ml, DN 100
<b>SY 2000</b>	Reactor vessel, 2000 ml, DN 150
<b>SY 5000</b>	Reactor vessel, 5000 ml, DN 150
<b>SY 500 D</b>	Reactor vessel with bottom discharge, 500 ml, DN 100
<b>SY 1000 D</b>	Reactor vessel with bottom discharge, 1000 ml, DN 100
<b>SY 2000 D</b>	Reactor vessel with bottom discharge, 2000 ml, DN 150
<b>SY 5000 D</b>	Reactor vessel with bottom discharge, 5000 ml, DN 150

### /// Reactor lids

<b>SY 100.1</b>	Reactor lid, for reactor vessels with DN 100
<b>SY 150.1</b>	Reactor lid, for reactor vessels with DN 150
<b>SY 150.2</b>	Reactor lid, for reactor vessels with DN 150

### /// Stirring tools

<b>R 4011 SY</b>	Propeller stirrer, PTFE-coated
<b>R 4012 SY</b>	Propeller stirrer, PTFE-coated
<b>R 4013 SY</b>	Propeller stirrer, PTFE-coated
<b>R 4021 SY</b>	Anchor stirrer, PTFE-coated
<b>R 4022 SY</b>	Anchor stirrer, PTFE-coated

### /// Overhead stirrers

<b>EUROSTAR 60 digital</b>	Overhead stirrer
<b>EUROSTAR 100 digital</b>	Overhead stirrer
<b>EUROSTAR 100 control</b>	Overhead stirrer

### /// Thermostat

<b>HBC 5 control</b>	Circulation thermostat
<b>HRC 2 control</b>	Circulation thermostat
<b>CBC 5 control</b>	Circulation thermostat

### /// Additional accessories

<b>LT 5.40</b>	Draining set
<b>LT 5.30</b>	Insulated high temperature hose set (2 x 800 mm)
<b>LT 5.31</b>	Insulated high temperature hose set (2 x 1200 mm)
<b>LT 5.32</b>	Insulated high temperature hose set (2 x 1600 mm)
<b>SY NS.6</b>	Swivelling screw fitting
<b>SY NS.8</b>	Swivelling screw fitting
<b>SY NS.12</b>	Swivelling screw fitting
<b>SY pH 325</b>	pH electrode, 325 mm
<b>SY pH 425</b>	pH electrode, 425 mm
<b>PT 100.300</b>	PTFE coated temperature sensor, 300 mm
<b>PT 100.500</b>	PTFE coated temperature sensor, 500 mm
<b>SY guide</b>	Stirrer guide
<b>SY C1</b>	Reflux Condenser

See more accessories on [www.ika.com](http://www.ika.com).

## Technical data

		EasySyn 500 Starter	EasySyn 1000 Starter	EasySyn 2000 Starter	EasySyn 5000 Starter
Useable volume max.	ml	500	1000	2000	5000
Working temperature	°C	- 50 ... + 200			
Attainable vacuum	mbar	3			
Flange dimension		DN 100	DN 100	DN 150	DN 150
Reactor lid openings (units/standard)		1 x center NS 29/32, 2 x NS 29/32, 1 x NS 14/23			
Part in contact with product		Reactor vessel: borosilicate glass 3.3 Bottom discharge valve: PTFE O-Ring: FEP Stirring tool: PTFE			
Dimensions (W x H x D)	mm	500 x 950 x 580			
Permissible ambient temperature	°C	+5 ... +40			
Permissible relative humidity	%	80			
Operation at a terrestrial altitude	m	max. 2000			
Included overhead stirrer		<b>EUROSTAR 60 digital</b>			
Torque max. at stirring shaft	Ncm	60			

		EasySyn 500 Advanced	EasySyn 1000 Advanced	EasySyn 2000 Advanced	EasySyn 5000 Advanced
Useable volume max.	ml	500	1000	2000	5000
Working temperature	°C	-50 ... + 200			
Attainable vacuum	mbar	3			
Flange dimension		DN 100	DN 100	DN 150	DN 150
Reactor lid openings (units/standard)		1 x center NS 29/32, 2 x NS 29/32, 1 x NS 14/23			
Part in contact with product		Reactor vessel: borosilicate glass 3.3 Bottom discharge valve: PTFE O-Ring: FEP Stirring tool: PTFE			
Dimensions (W x H x D)	mm	500 x 950 x 580			
Permissible ambient temperature	°C	+5 ... +40			
Permissible relative humidity	%	80			
Operation at a terrestrial altitude	m	max. 2000			
Included overhead stirrer		<b>EUROSTAR 100 control</b>			
Torque max. at stirring shaft	Ncm	100			
Torque trend measurement		Yes			
Temperature measurement function		Yes			
Timer function		Yes			
Intermittent operation		Yes			
Program operation		Yes			
Reversible direction of rotation		Yes			
Interface		USB, RS 232			

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 machine 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 manual.

**Note:**

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designed for scientists

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Technical specifications may be changed without prior notice.