

# IKA

designed for scientists

**HB digital**

ENGLISH

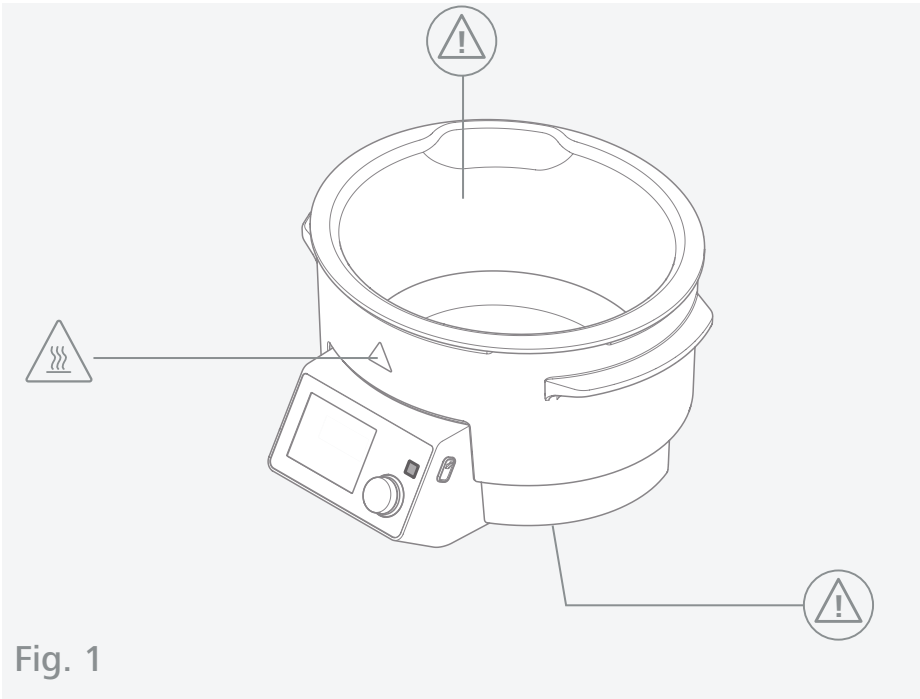











Fig. 1

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## EU Declaration of conformity

We declare under our sole responsibility that this product corresponds to the directives 2014/35/EU, 2014/30/EU and 2011/65/EU and conforms with the following standards or normative documents: EN 61010-1, EN 61010-2-010; EN 61326-1, EN 60529 and EN ISO 12100.

A copy of the complete Declaration of Conformity or further declarations of conformity can be requested at sales@ika.com.



## Explication of warning symbols

/// Symbols used in this instruction manual



"Safety instructions" chapter



"Unpacking" chapter



"Accessories" chapter



"Assembly" chapter



"Operation" chapter



"Error codes" 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.



### Burns hazard due to hot tempering media

- ▷ Do not touch hot tempering media.
- ▷ Note the danger of burns in case of tempering media that have a flashpoint of less than 260 °C.
- ▷ Note the danger resulting from flammable materials.

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



## /// Other risks

### Risk of burning at hot surfaces

The top edge of the heating bath can heat up to temperatures above 65 °C during operation.

- ▷ Do not touch hot device components without protective gloves.
- ▷ Only fill or empty the device when it is cold.

### 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 caused by self-igniting tempering media

- ▷ The safety temperature must be set in accordance with EN 61010-2-010 Chapter "Requirements for devices containing or using flammable liquids".  
The surface temperature of the flammable medium that is exposed to air may not exceed its flash point.
  - A danger usually arises if a medium is heated in open vessels.  
The surface temperature of the heating device may not exceed the value of  $(t - 25)$  °C (= set value of the safety circuit) on the surface of the flammable medium and in contact with air, whereby  $t$  is the fire point of the liquid.
  - A danger usually arises if a medium is heated in glass vessels (glass breakage).  
If a setting made by the user (medium temperature or safety temperature) could bring a flammable medium into a state in which the conditions mentioned above could be exceeded, additional measures must be introduced that will protect the user from this danger.
- ▷ Do not touch hot tempering media.

### Risk of burns due to self-igniting tempering media (also in connection with rotary evaporator or other devices)

- ▷ For tempering media with a flashpoint  $\leq 260$  °C: Note the danger resulting from ignition of the medium.
- ▷ Note the danger resulting from flammable materials.

### Risk of injury caused by electric shock

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

### Damage to the device due to improper use

- ▷ Empty the heating bath before transportation.
- ▷ Never operate the heating bath without tempering medium.
- ▷ 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).
- ▷ Avoid knocks or impacts to the device and accessories.

### Hazards resulting from uncontrolled restart

- ▷ After an interruption to the power supply, the device starts up again with previously set operating mode C.
- ▷ To cut the power supply, press the device main switch or unplug the mains or device plug.
- ▷ After interrupting the power supply, ensure that the device is not unintentionally restarted.

## /// Requirements for operators / users

- ▷ Ensure that only qualified persons use the device.
- ▷ Ensure that the device is only opened by a qualified technician.
- ▷ 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.
- ▷ Place device on an even, stable, clean, non-slip, dry, fire-resistant surface.
- ▷ Refer to the operating instructions for the accessories.
- ▷ Always check the device and accessories for damage prior to each use. Never use damaged parts.
- ▷ During operation with rotary evaporator: Observe the maximum filling quantity also for the displaced piston volume.

## Intended use

### /// Use

- ▷ The heating bath is used for tempering media. It is the user's responsibility to determine which medium is tempered. The heating bath is not used for tempering foods. The heating bath is suitable for use with rotary evaporators from IKA.

### Recommended tempering media

- ▷ Water (up to 80 °C)
- ▷ Low viscosity silicone oils (50 mPas) with a flashpoint  $\geq 260$  °C
- ▷ Untreated tap water is not recommended. It is recommended to use distilled water or high purity water (ion exchangers) and add 0.1 g soda (sodium carbonate  $\text{Na}_2\text{CO}_3$ )/liter, to reduce corrosive properties.

### /// 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.



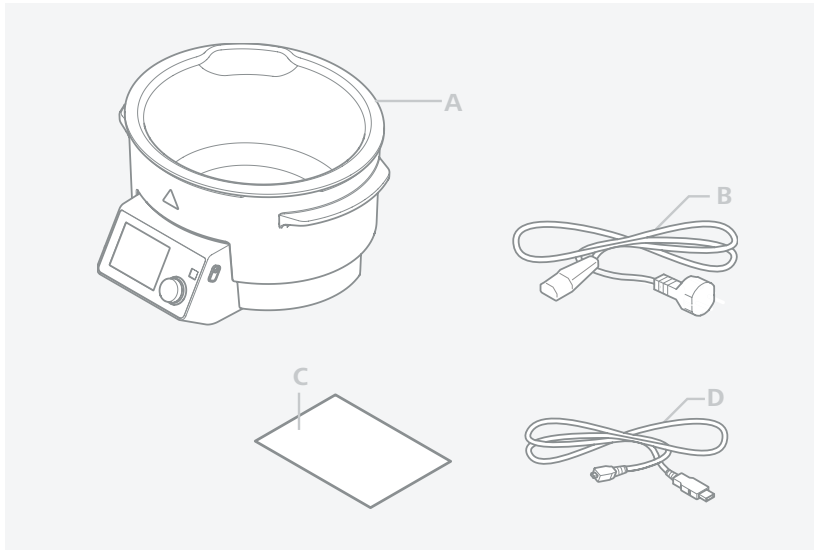


## Unpacking

### /// Unpacking

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

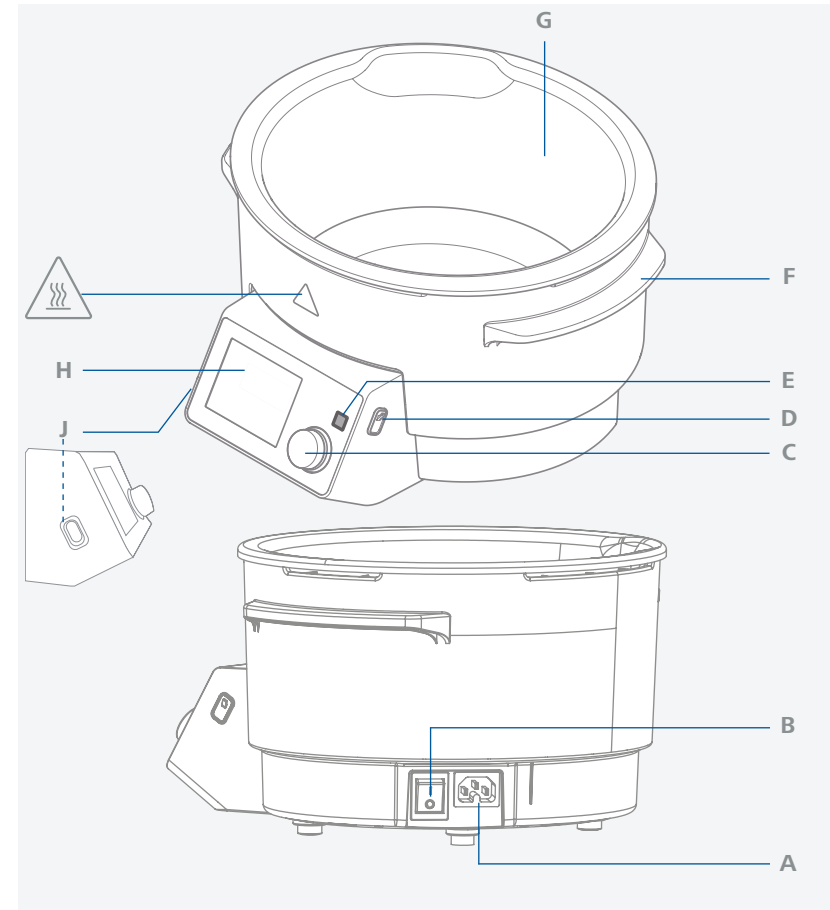
### /// Scope of delivery



<b>A</b>	heating bath
<b>B</b>	power cord
<b>C</b>	user guide
<b>D</b>	USB cable

## Operator panel and display

### /// Operator panel



<b>A</b>	Power socket	<b>F</b>	Handle
<b>B</b>	Mains switch	<b>G</b>	Bath insert
<b>C</b>	Rotating / pressing knob	<b>H</b>	Display
<b>D</b>	USB interface	<b>J</b>	IR interface
<b>E</b>	Key "Lock"		

## /// Display



Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12



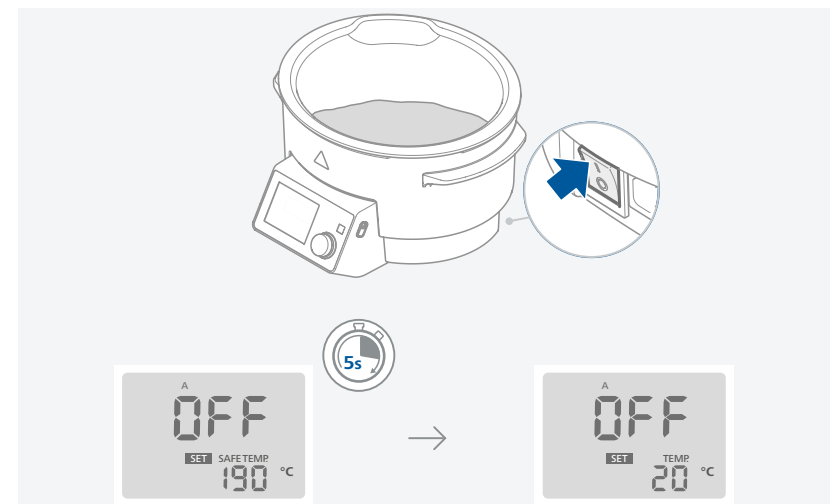
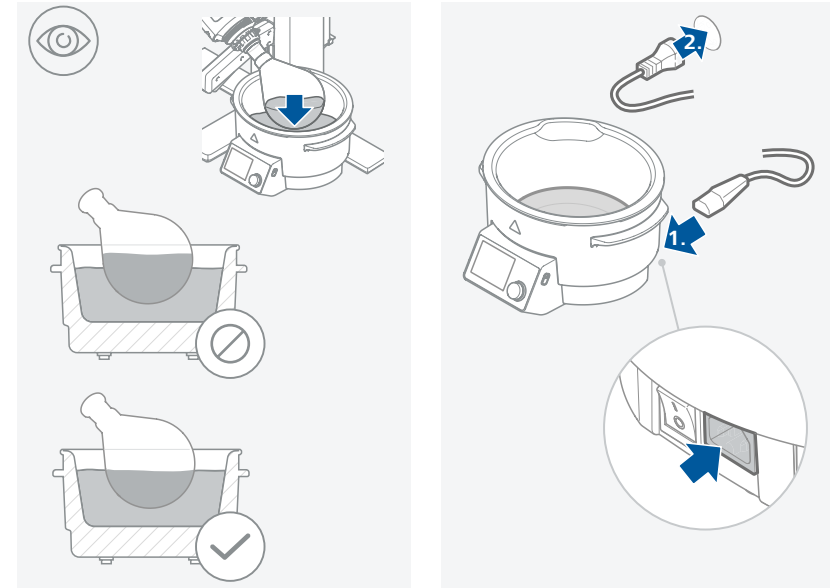
## Operation

### /// Start-up

- ▷ Observe the ambient conditions (temperature, humidity, etc.) listed under “Technical data”.
- ▷ The unit is ready for service when the mains plug has been plugged in.
- ▷ Prior to commissioning the device, determine the filling quantity of the tempering medium due to the used evaporator piston size (approx. 2.5 l tempering medium by using a standard 1 l evaporator piston).
- ▷ Switch on the device using the mains switch.
- ▷ At every start, the display will show all display segments (Fig. 2) and the software version (Fig. 4).

**Note:** Only the display segments shown on Fig. 3 are available in functions for the current device.

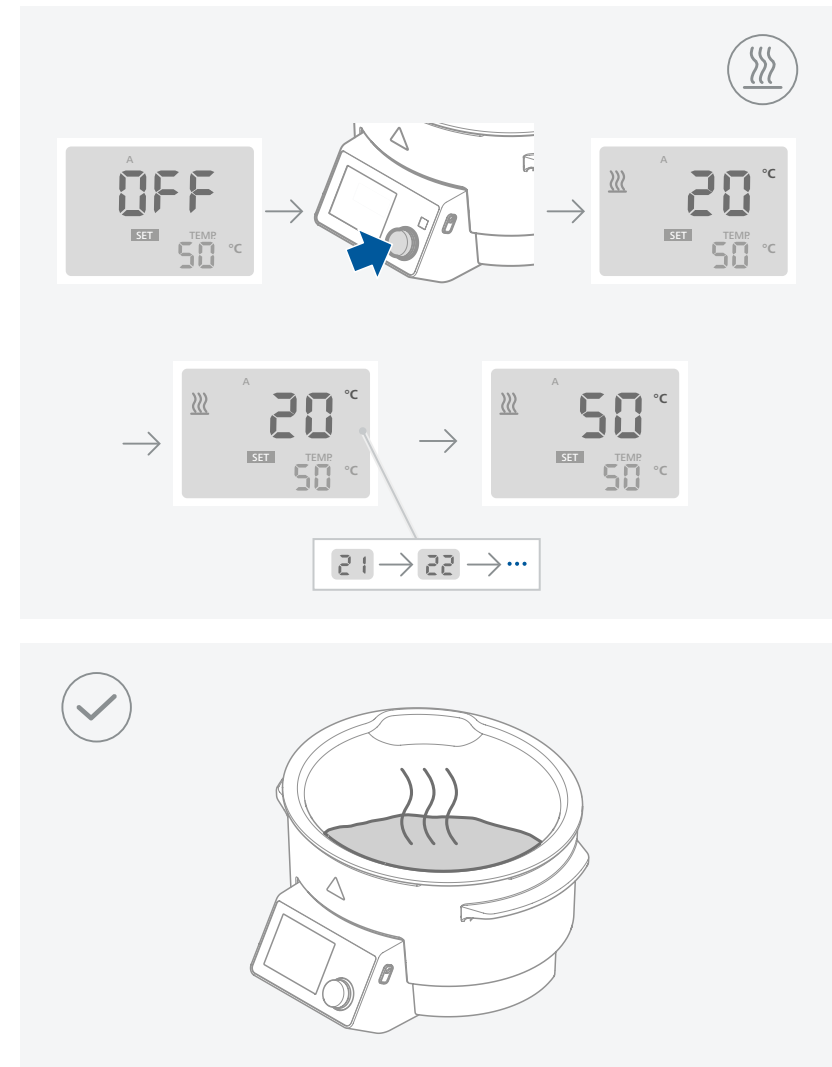
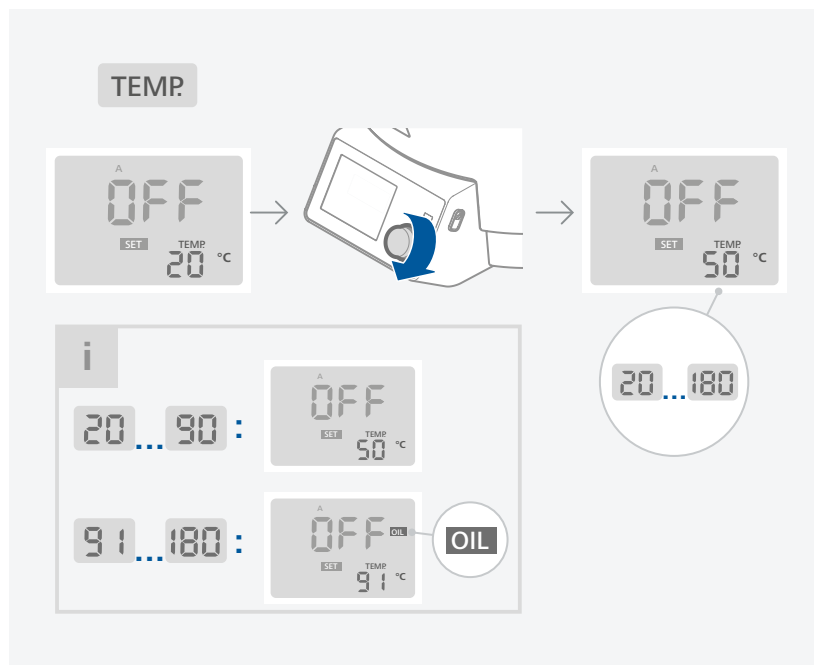
- ▷ The set operating mode (A/B/C) is indicated on the top of the display (Fig. 5).
- ▷ The heating bath temperature is held constant by the control circuit and is additionally monitored by the safety circuit.  
In the event of an error occurred in the control circuit, the heating bath is switched off permanently by the safety circuit.  
An error in the control or safety circuits is shown on the display.  
The heating function can no longer be started.
- ▷ When switching off the heating function and the medium temperature is higher than 50 °C, the display will alternately show OFF and HOT (Fig. 6, Fig. 8).



### /// Setting the target temperature

Activate the SET function by turning and pressing the rotating/pressing knob.

- ▷ Switch on the device using the mains switch, when the opening screen (Fig. 5) appears and the setting for the safety temperature is activated for 5 seconds. "SAFE TEMP." flashes on the display, see also "Setting the safety temperature".
- ▷ The display then switches from "SAFE TEMP." to "TEMP." and the SET function is activated. (Fig. 6)
- ▷ Set the desired heating bath temperature by turning the rotating/pressing knob.
- ▷ The SET function flashes every few seconds.
- ▷ Confirm the value by pressing the rotating/pressing knob.
- ▷ If not confirmed, the set value is not saved.
- ▷ The SET function stops flashing.
- ▷ Start the heating process by pressing the rotating/pressing knob.



### /// Setting the operating modes

#### Operating mode A

- ▷ Switch on the device at the mains switch.
- ▷ The heating function is switched off.
- ▷ Safe Temp (safety temperature) will appear for 5 seconds.
- ▷ The target value is set to 20 °C.
- ▷ The controller tempering medium is set to water.



- ▷ The heating function must be restarted following a power failure.
- ▷ The following settings are possible/adjustable:
  - the target value,
  - the safety circuit,
  - the controller tempering medium.
- ▷ Mode A always appears on the top of the screen.

Factory setting: Mode A

### Operating mode B

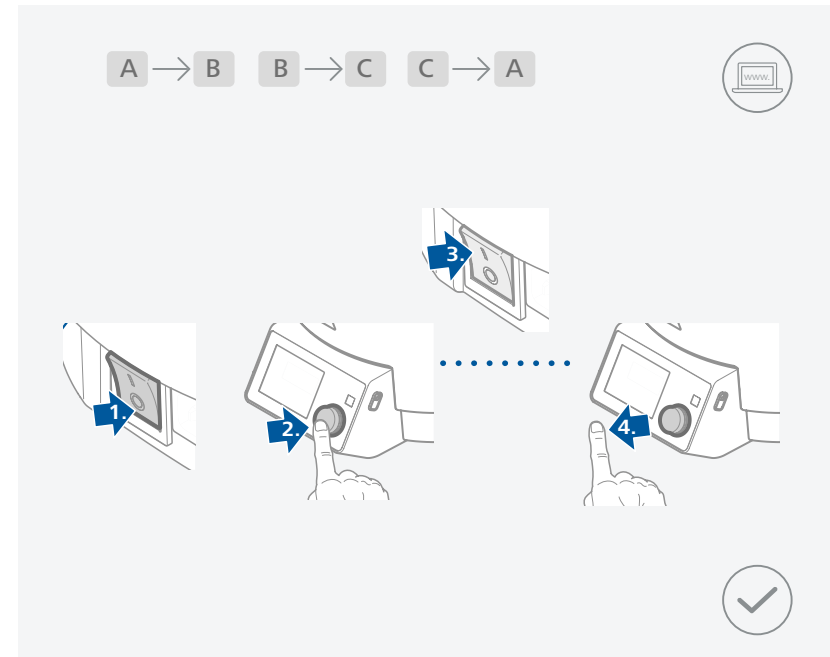
- ▷ Switch on the device at the mains switch.
- ▷ The heating function is switched off.
- ▷ Safe Temp (safety temperature) will appear for 5 seconds.
- ▷ The target value is set to 20 °C or the most recent temperature setting.
- ▷ The controller tempering medium is set to water or the most recent medium setting.
- ▷ The heating function must be restarted following a power failure.
- ▷ The following settings are possible/adjustable:
  - the target value setting,
  - the controller tempering medium.
- ▷ The safety circuit is set to the most recently set value and cannot be adjusted.
- ▷ Mode B always appears on the top of the screen.




### Operating mode C

- ▷ Switch on the device at the mains switch.
- ▷ The heating function is switched on or off depending on the last selected setting.
- ▷ Safe Temp (safety temperature) will appear for 5 seconds.
- ▷ The last target value set in mode B applies.
- ▷ The setting controller tempering medium set before the device was last switched off in mode B applies.
- ▷ The following settings cannot be adjusted:
  - the target value,
  - the safety circuit,
  - the controller tempering medium.
- ▷ Mode C always appears on the top of the screen.

### Switching the operating modes

- ▷ Switch the device off at the mains switch.
- ▷ Press and hold rotating/pressing knob and switch the device on at the mains switch. Release the rotating/pressing knob after 2 seconds. The new operating mode appears and flashes 3 times on the top of the screen.
- ▷ Sequence A, B, C, A etc.



	A	B	C
	20...180	20...180	—
	50...190	50...190	—
	A OFF °C SET TEMP °C 20 °C	B OFF °C SET TEMP °C 50 °C	C 45 °C SET TEMP °C 50 °C

## /// Setting the safety temperature

### Safety circuit

The adjustable safety circuit prevents the temperature of the heating bath from getting too high as a result of:

- a controller error,
- the rotating/pressing knob having been accidentally turned.

Once the safety temperature has been reached, the device switches off permanently.

Furthermore, dry running of the heating bath is detected. The device switches off permanently.

The dry running function detects both accidental heating of the heating bath without liquid and dry running caused by water evaporation starting at a set temperature of 60 °C. The error message E26 appears and the heating bath is switched off permanently. To remedy this error, see "Error codes".

When the safety circuit is set, an upper temperature limit between 50 and 190 °C is defined.

#### ▷ Silicone oils as tempering media

When increased safety is not necessary the temperature of the safety circuit stays at 190 °C. Temperature of the tempering medium rises to a maximum of 190 °C in the case of an error. Then the safety circuit switches the heating bath permanently off.

#### ▷ Demineralised water as the tempering medium

When increased safety is not necessary, the adjustment knob of safety circuit stays all the way to the right. As long as there is any demineralised water in the heating bath, the temperature of the tempering medium rises to a maximum of 100 °C, in the case of an error. If the water is evaporated completely, the temperature of the tempering medium rises to a maximum of 190 °C. Then the safety circuit switches off the heating bath permanently.

#### ▷ Temperature-sensitive or easily flammable media in the rotary evaporator

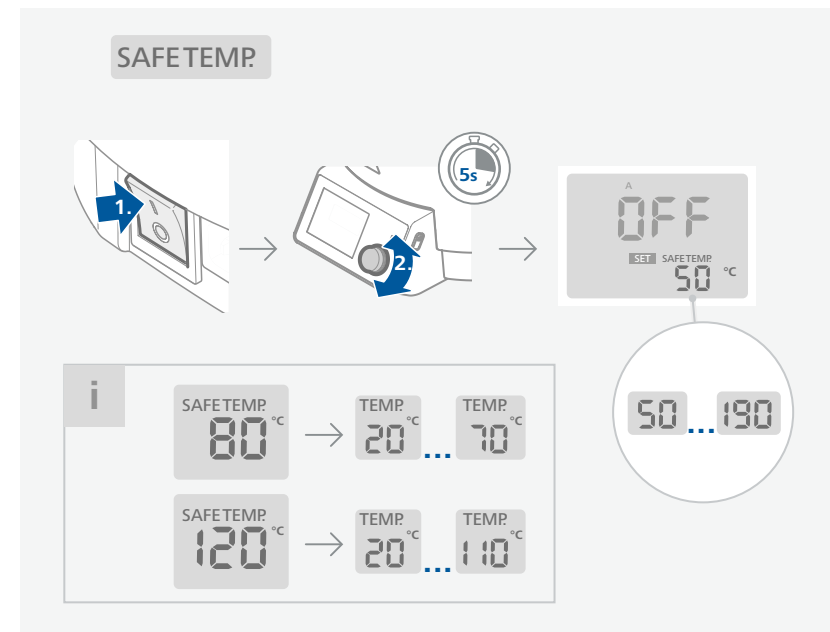
When the pre-set bath temperature may not be exceeded under any circumstances set the safety temperature as described below.

### Adjusting the safety temperature

- Set the desired safety temperature by turning the rotating/pressing knob within the 5 seconds of the "SAFE TEMP." appearing on the display after the device is switched on. (Fig. 5)

### Checking the safety circuit

- The safety circuit has to be checked by the user once a year.
- Fill the heating bath with 1 liter of water as tempering medium.
- Set the safety temperature to 100 °C.
- Set the set temperature to 80 °C.
- Start the heating function by pressing the rotating/pressing knob.
- When the set temperature is reached, turn the heating bath off and on again at the mains switch.
- Set the safety temperature to 70 °C.
- The medium temperature is thus 10 K above the safety temperature, the safety circuit trips, the display shows E24. (Fig. 7)



## /// Controlling the medium temperature

The medium temperature is limited by the set safety temperature, controlled by means of a PID controller and measured by the PT 1000 temperature sensor, and the medium is heated up as quickly as possible without overshooting to the set temperature.

The PID controller adapts to the different tempering media and ensures optimum temperature control with minimum temperature drift and fluctuation.

Optimum control is only achieved when the medium is mixed using a rotating evaporator piston.

- Set the desired medium temperature between room temperature and 180 °C by turning the rotating/pressing knob. The max. medium temperature setting is the safety temperature minus 10 °C.
- Start the heating function by pressing the rotating/pressing knob.
- An animated heating symbol appears on the display. (Fig. 9)
- The heating bath is heated up to the set temperature.
- The set and actual temperature referred to the medium are shown on the display. (Fig. 9)

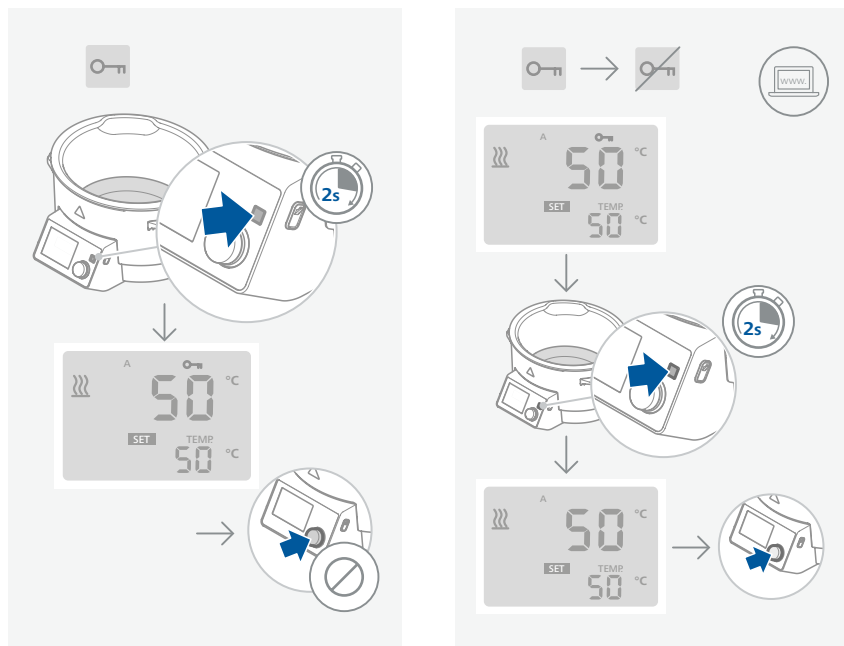
### Select tempering medium

- If a target value > 90 °C is set, the PID controller is adapted specially for oil.
- The "OIL" symbol appears on the display. (Fig. 11)
- If the target value is reset to 20 °C the PID controller is adjusted again specially to water.
- The "OIL" symbol will disappear from the display. (Fig. 9)

### /// Key "Lock"

The operating settings can be locked by pressing and holding the key for 2 seconds, preventing any inadvertent changes during operation. The lock symbol appears on the screen when this function is activated. (Fig. 10)

Press and hold the key again for 2 seconds to unlock the operating settings. The lock symbol disappears when function is deactivated.



### /// IR interface

#### Data transfer via IR interface

The heating bath transfers data via IR interfaces. These interfaces are located on the left display side of the heating bath or on the right side of the drive unit. Do not place any objects between the two operating units as otherwise the data transfer may be interrupted!

#### Remote Mode

Using the laboratory device software "labworldsoft®" and the rotary evaporator RV 10 digital/control the device can be operated in "Remote" mode. In this mode, the device can no longer be hand-operated. (Fig. 12)

**Note:** Please comply with the system requirements together with the operating instructions and help section included with the software.

## Interfaces and outputs

▷ Please comply with the system requirements together with the operating instructions and help section included with the software.

### /// USB interface:

The connected devices and their properties are detected automatically. The USB interface is used in conjunction with software control for "remote" operation and can also be used for software update of the device.

### /// USB device drivers:

First, download the latest driver for IKA devices with USB interface from:

<http://www.ika.com/ika/lws/download/usb-driver.zip>

Install the driver by running the setup file. Then connect the IKA device to the PC via the USB data cable and follow the instructions.

The data communication is via a virtual COM port.

### /// Command syntax and format

The following applies to the command set:

- Commands are generally sent from the computer (Master) to the lab device (Slave).
- The lab device sends only at the computer's request. Even fault indications cannot be sent spontaneously from the lab device to the computer (automation system).
- Commands are transmitted in capital letters.
- Commands and parameters including successive parameters are separated by at least one space (Code: hex 0x20).
- Each individual command (incl. parameters and data) and each response are terminated with Blank CR LF (Code: hex 0x20 hex 0x0d hex 0x20 hex 0x0A) and have a maximum length of 80 characters.
- The decimal separator in a number is a dot (Code: hex 0x2E).

The above details correspond as far as possible to the recommendations of the NAMUR working party (NAMUR recommendations for the design of electrical plug connections for analogue and digital signal transmission on individual items of laboratory control equipment, rev. 1.1).

The NAMUR commands and the additional specific IKA commands serve only as low level commands for communication between the lab device and the PC. With a suitable terminal or communications program these commands can be transmitted directly to the lab device. The IKA software package, labworldsoft®, provides a convenient tool for controlling lab device and collecting data under MS Windows, and includes graphical entry features, for motor speed ramps for example.

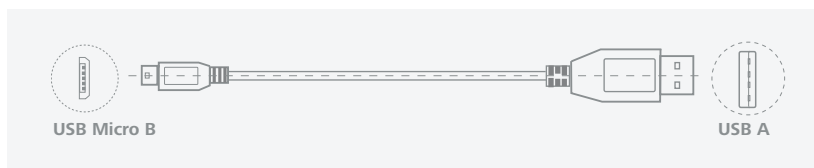
The following table summarises the (NAMUR) commands understood by the IKA equipment.

NAMUR Commands	Function
IN_NAME	Read the device name
IN_PV_2	Read medium temperature actual value
IN_SP_2	Read medium temperature set value
OUT_SP_2 V	Set medium temperature set value

IN_SP_3	Read safety temperature set value
OUT_SP_3 V	Set safety temperature value
IN_SP_74	Read medium type set value (1 - water, 0 - oil)
OUT_SP_74 V	Set medium type value (1 - water, 0 - oil)
START_2	Start heating
STOP_2	Stop heating

### /// USB cable A - B:

This cable is required to connect USB port to a PC.



## 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.

### /// 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.



## Error codes

- ▷ The fault is shown by an error code on the display as following if the error occurs.  
Proceed as follows in such cases:
- › Turn off the device by using the main switch.
  - › Carry out corrective measures.
  - › Restart the device.

### Error code | Causes | Effect | Solutions

#### E 2

Causes	› In remote operation (PC), no communication between RV 10 and HB digital › IR connection to RV 10 disconnected
Effect	› Heating switched off
Solutions	› Switch off the device › Clean the IR interface or remove the objects from around the IR interface › Switch on the device

#### E 3

Causes	› Temperature inside the device is too high
Effect	› Heating switched off
Solutions	› Switch off the device › Let the device cool down › Switch on the device

#### E 9

Causes	› Fault in storing the safety circuit set temperatures › Memory chip (EPROM) defective
Effect	› Heating switched off
Solutions	› Switch off the device › Let the device cool down › Switch on the device

#### E21

Causes	› Safety relay does not open
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

#### E23

Causes	› Adjustable safety circuit defective
Effect	› Heating switched off
Solutions	› Switch off the device › Let the device cool down › Switch on the device

#### E24

Causes	› Set safety temperature exceeded
Effect	› Heating switched off
Solutions	› Switch off the device › Let the device cool down › Switch on the device

#### E25

Causes	› The heater control circuit switch (TRIAC) is faulty. › The heater or the supply line is disconnected.
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

#### E26

Causes	› Dry running
Effect	› Heating switched off
Solutions	› Switch off the device › Let the device cool down › Fill up the tempering medium › Switch on the device

#### E27

Causes	› Error in calibration
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

#### E28

Causes	› Breakage of the controller sensor
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

#### E29

Causes	› Short-circuit in the safety sensor
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

#### E30

Causes	› Short-circuit in the controller sensor
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

#### E31

Causes	› Breakage of the safety sensor
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

#### E32

Causes	› Temperature deviation is too big
Effect	› Heating switched off
Solutions	› Switch off the device and switch on again

- ▷ If the actions described fails to resolve the fault or another error code is displayed 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

### Power supply

Voltage	VAC	200...240 ±10 % 100...120 ±10 %
Frequency	Hz	50 / 60
Power input	W	1450
Power input standby	W	3

### Heating function

Heat control	-	LCD
Set temperature resolution	K	± 1
Heating temperature min. ... max.	°C	Room temperature ... 180
Heat output	W	1400
Controller oscillation (3l water / 90 °C):	K	± 1
Absolute deviation / mean value (3l water / 90 °C)	K	± 2
Fixed safety temperature	°C	190
Adjustable safety temperature min. ... max.	°C	50 ... 190
Filling point min.	mm	60
Filling volume max.	l	4

### General information

USB interface	-	yes
Protection class according to DIN EN 60529	-	IP 21
Overvoltage category	-	II
Permissible relative humidity	%	80
Permissible ambient temperature min. ... max.	°C	5 ... 40
Material in contact with medium	-	Stainless steel 1.4404
Dimensions (W x D x H)	mm	330 x 325 x 190
Outer diameter	mm	257
Weight	kg	3.9
Inner diameter	mm	225
Inner height	mm	130
Outer height	mm	190
Class designation acc. DIN 12876	-	II
Operation at a terrestrial altitude	m	max. 2000 above sea level

*Subject to technical changes!*

## Warranty

- ▷ In accordance with IKA Terms and Conditions of Sale, 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 manual.



designed for scientists

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