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IC\_HBC\_122015

# IKA®

## IKA® IC basic IKA® HBC 5 basic IKA® HBC 10 basic



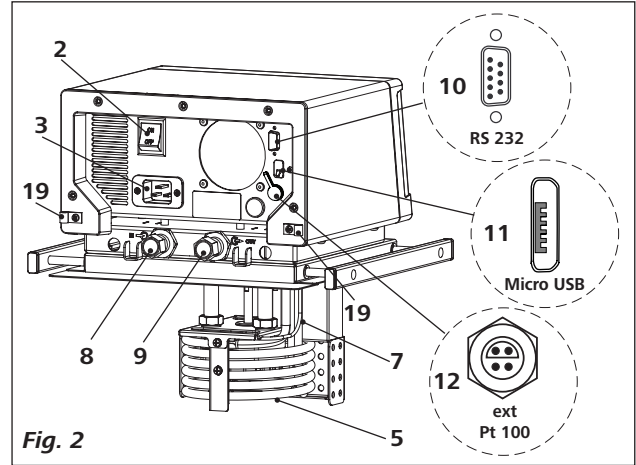
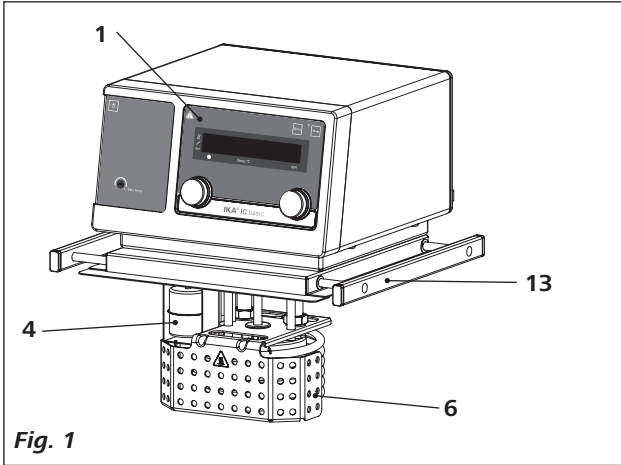
Operating instructions

EN

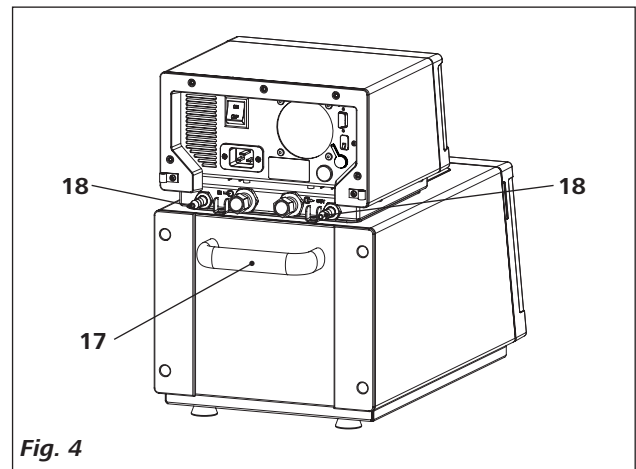
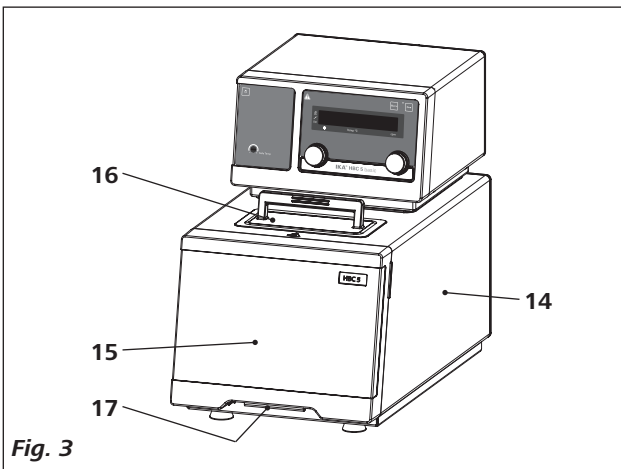


IKA®-Werke, Germany  
Reg. No. 004343

**IC basic, HBC 5 basic, HBC 10 basic:**



**HBC 5 basic, HBC 10 basic:**



| Item | Designation  |
|------|--|
| 1    | Operator panel and display                           |
| 2    | Mains switch   |
| 3    | Power socket   |
| 4    | Buoyage  |
| 5    | Heater   |
| 6    | Buffer plate   |
| 7    | Pt 100 + Pt 1000 temperature sensor                  |
| 8    | Pump connection <b>IN</b>                            |
| 9    | Pump connection <b>OUT</b>                           |
| 10   | RS 232 port  |
| 11   | USB port   |
| 12   | External temperature sensor socket                   |
| 13   | Bridge (only for <b>IC basic</b> )                   |
| 14   | Bath   |
| 15   | Front cover  |
| 16   | Lid  |
| 17   | Handle   |
| 18   | Cooling coil connection (only for <b>HBC basic</b> ) |
| 19   | Cable clip   |

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## Declaration of Conformity

We declare under our sole responsibility that this product corresponds to the regulations 2006/95/EC, 2004/108/EC and 2011/65/EU and conforms with the standards or standardized documents: EN 61010-1, -2-010, -2-051; EN 61326-1 and DIN 12876-1.

## Explication of warning symbols



**DANGER**

Indicates an (extreme) 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**

Reference to exposure to a hot surface!



Hot surface!

## 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, safety and accident prevention regulations.
- Set up the device in a spacious area on an even, stable, clean, non-slip, dry and fireproof surface.
- Do not operate the device in explosive atmospheres, with hazardous substances.
- Protect the device and accessories from bumping and impacting.
- Check the device and accessories for damage before each use. Do not use damaged components.
- Safe operation is only guaranteed with the accessories described in the "**Accessories**" section.
- The socket for the mains cord must be easily accessible.
- Socket must be earthed (protective ground contact).
- The voltage stated on the type plate must correspond to the mains voltage.
- The device can only be disconnected from the mains supply by pulling out the mains plug or the connector plug.
- Disconnect the mains plug before attaching or changing any accessories.
- Disconnect the mains plug before cleaning, maintenance or moving the circulator.
- 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.

### **NOTICE**

Coverings or parts that can be removed from the device without the aid of any tools must be put back on the device again to ensure safe operation, for example to keep foreign objects and liquids, etc. from getting into the device.

- The device may only be used as prescribed and as described in the operating instructions. This includes operation by instructed specialist personnel.
- 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.
- Process pathogenic material only in closed vessels under a suitable fume hood. Please contact **IKA®** application support if you have any question.

### **CAUTION**

If the **OFF** switch is not within reach when device is operating, an **EMERGENCY STOP** switch

that can be easily accessed must be installed in the work area.

- A laboratory circulator heats and circulates fluid according to specified parameters. This involves hazards due to high temperatures, fire and general hazards due to the device of electrical energy. The user is largely protected by the device of relevant standards. Further hazard sources may arise due to the type of tempering fluid, e.g. by exceeding or undercutting certain temperature thresholds or by the breakage of the container and reaction with the heat carrier fluid. It is not possible to consider all eventualities. They remain largely subject to the judgment and responsibility of the operator. For this reason, it may become necessary for user to take other precautionary safety measures.
- Insufficient ventilation may result in the formation of explosive mixtures. Only use the device in well ventilated areas.

### **WARNING**

The safety circuit (safe temperature) must be adjusted so that the maximum permissible temperature cannot be exceeded even in the event of a fault. Check the safe temperature circuit on a regular basis.

- Securely fix the **IC basic** immersion circulator for use at the bath, so that it cannot tip over.
- When device is used for external circulation, extra precaution must be taken for hot fluid leakage due to damaged hose.
- Use suitable hoses for connection.
- Secure hoses and tubes against slippage and avoid kinks.
- Check hoses, tubes and bath at regular intervals for possible material fatigue (cracks/leaks).
- Mains cable should not get in contact with hot parts and fluids.
- If you are using plastic bath, observe the permitted working temperature range and fluids.

### **DANGER**

Do not start up the device if:

- It is damaged or leaking
  - Cable (not only supply cable) is damaged.
- Be careful when filling a hot bath.

**CAUTION**

At high operating temperatures, the temperature of housing parts, surfaces and tubes can exceed 70 °C.

**CAUTION**

It is dangerous to touch the heater. The temperature of the heater can be very high.

- After a power failure during operation, the device may start automatically (depending on operating mode).
- Transport the device with care.
- Do not transport or empty the bath while it is still hot. This may result in accidents, especially scalding injuries.

**NOTICE**

In order to prevent the power cord fall into the medium, the mains cable should be always be secured with the cable clips (19, see Fig. 2).

**Fluids:****CAUTION**

Beware of the risk of burning due to delay in boiling!

**WARNING**

Only use fluids, which fulfill the requirements for safety, health and device compatibility. Be aware of the chemical hazards that may be associated with the bath fluid used. Observe all safety warnings for the fluids.

- Depending on the bath fluid used and the type of operation, toxic or flammable vapors can arise. Ensure suitable extraction.
- Do not use any fluid which may cause dangerous reactions during processing.
- Only use recommended bath fluid. Only use non-acid and non corroding fluid.

**WARNING**

Only process and heat up any fluid that has a flash point higher than the adjusted safe temperature limit that has been set. The safe temperature limit must always be set to at least 25 °C lower than the flash point of the fluid used. Examine regularly the function of the safety temperature limiter.

**NOTICE**

Never operate the device without sufficient heat carrier fluid! You should also be careful to ensure that the minimum clearances and immersion depths in the fluid are observed. Check the fluid level detection at a regular basis (see section "Filling and draining").

- Continuous monitoring of the bath and the filling level of the bath fluid is required, especially at high temperatures.
- For optimum temperature stability, the fluids viscosity should be 50 mm<sup>2</sup>/s or less at its lowest operating temperature. This permits good fluid circulation and minimizes heating from the pump.

**NOTICE**

If water is used at higher temperature, there is heavy loss of fluid due to the evaporation.

- 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 Na<sub>2</sub>CO<sub>3</sub>) /liter, to reduce corrosive properties.

**CAUTION**

Risk of burning caused by vapor or hot water at the outlet of the cooling coil.

**NOTICE**

Do not use the cooling coil with water at bath temperatures > 95° C.

**NOTICE**

For bath temperatures > 60°C make sure that the flow rate through the cooling coil is high enough.

**NOTICE**

Don't use following fluids:

- Untreated tap water
- Acids or bases
- Solutions with halides: chlorides, fluorides, bromides, iodides or sulfur
- Bleach (Sodium Hypochlorite)
- Solution with chromates or chromium salts
- Glycerine
- Ferrous water.

**NOTICE**

When changing the bath fluid from water to a heat transfer fluid for temperatures above 100 °C, remove the remaining water from the complete system (including hoses and external devices). When doing this, also open the stopper and union nuts caps of the pump outputs and inputs and blow compressed air through all the pump outputs and inputs! Beware of the risk of burning due to delay in boiling!

## Correct use

### • Use:

Use **IC (Immersion Circulator)** and **HBC (Heating Bath Circulator)**  
- For heating and circulating fluids.

Intended Use: tabletop device

### • Range of use (indoor use only):

- Laboratories      - Schools
- Pharmacies      - Universities

This device is suitable for use in all areas except:

- Residential areas
- Areas that are connected directly to a low-voltage supply network that also supplies residential areas.

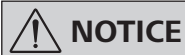
The safety of the user cannot be guaranteed:

- If the device is operated with accessories that are not supplied or recommended by the **IKA®**.
- If the device is operated improperly or in contrary to the **IKA®** specifications.
- If the device or the printed circuit board are modified by third parties.

## Unpacking

### • Unpacking:

- Please unpack the device carefully
- In the case of any damage a detailed report must be sent immediately (post, rail or forwarder).



### NOTICE

#### Transport safety:

Remove the transport protection under the buoyage (4). For

**HBC** device, you need to open the lid (16) and remove the protection.

### • Delivery scope:

#### **IC basic, HBC basic, HBC 10 basic**

- **IC basic** Immersion Circulator or **HBC 5 basic** Heating Bath Circulator or **HBC 10 basic** Heating Bath Circulator according to the order
- Mains cables
- Hose olive NW 12 (2 pieces)      see **Fig. 5**
- Screwdriver (use for safety circuit)      see **Fig. 6**
- User guide
- Warranty card.

### Additional for HBC 5 basic, HBC 10 basic:

- Temperature sensor **Pt 100.30**.

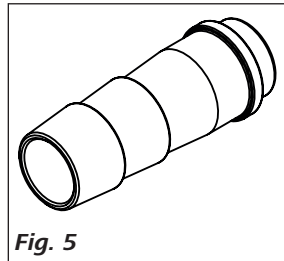


Fig. 5

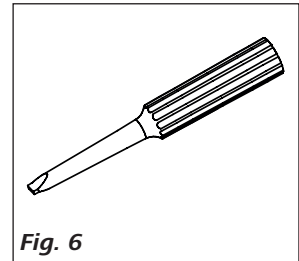


Fig. 6

## Preparations

### • Setting up:

- Place the device on an even, stable, clean, non-slip, dry and fireproof surface.
- Keep at least 20 cm of open space at the front and rear side.
- When a plastic bath is used, please ensure that the heater does not contact the bath.
- The place for installation should be large enough and provide sufficient air ventilation to ensure the room does not warm up excessively because of the heat from device radiates to the environment.
- Do not set up the device in the immediate vicinity of heat sources and do not expose to sun light.

### • Connecting the tubings:

- Unscrew the union nuts and stoppers using a wrench from the pump connection **IN (8)** and **OUT (9)**.

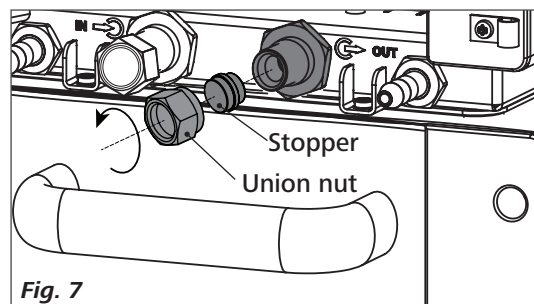


Fig. 7

- Connect the hoses for circulating the external system to the pump connectors **M 16 x 1** for **IN** and **OUT** directly or with the olives.
- Screw the hose olive to the pump connection **IN** and **OUT** with union nuts. Slide the hoses (NW 12) onto the olives. The hoses must be secured with suitable clamps.

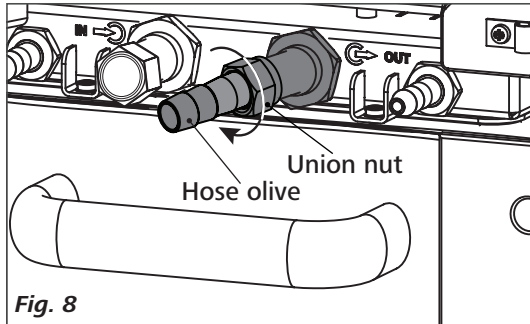


Fig. 8

**Note:** Please note the permissible temperature range of hoses. For hot fluids we recommend the **IKA® LT 5.20** hoses. When the external system is not necessary, please seal the pump connectors **IN** and **OUT** with the existing union nuts and stoppers.

• **Filling and draining:**

- Before filling the fluid into the bath, open the front cover as indicated in following figure.

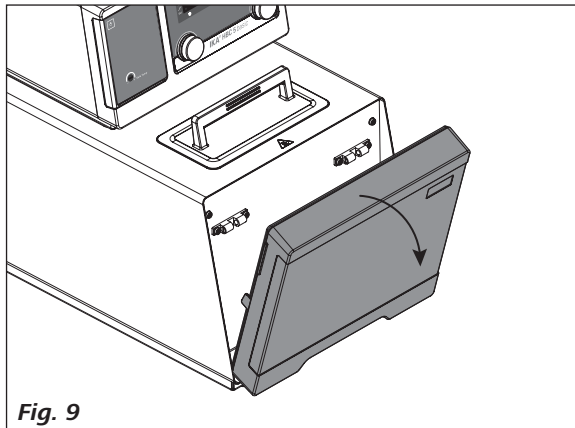


Fig. 9

- Check and make sure that the drain valve is closed (the stop position in clockwise direction, see **Fig. 10**).

**Note:** Please note information in chapter "**Commissioning**".

- Connect the mains plug and turn on the device with mains switch (2).
- The low level warning message appear on the display.
- Open the lid (16) and fill fluid to the bath.

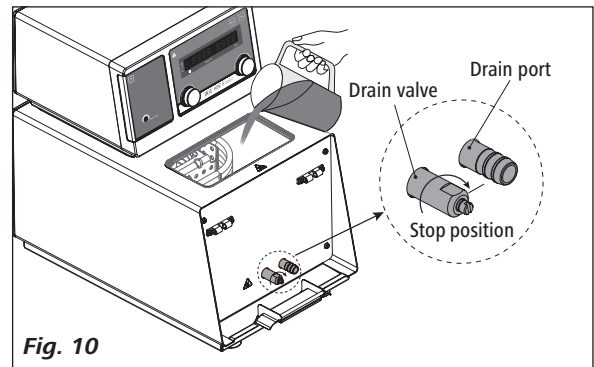


Fig. 10

**NOTICE**

**Note:** Pay attention to the fluid level information on the display:



Low Level



High Level

- To drain the fluid from the bath, connect a hose to the drain port and turn the drain valve in counter clockwise direction with a straight screwdriver.

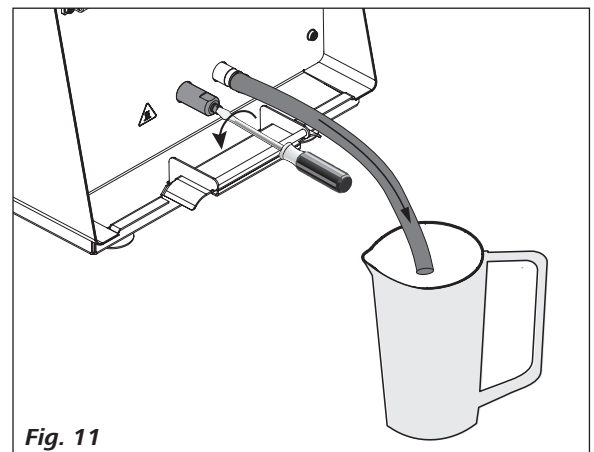


Fig. 11



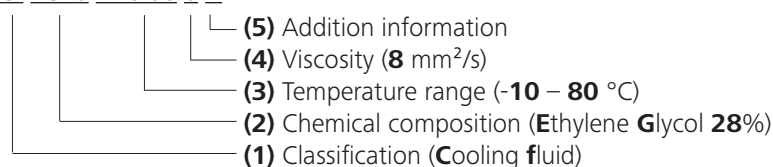
• **Fluid (Standard information for IKA® fluid):**

| No. | IKA® Designation   | Operating temperature range for open bath application (°C) | Operating temperature range for closed bath applications (°C) | Safety temperature (°C) | Flash point (°C) |
|-----|--------------------|--|---|-------------------------|------------------|
| 0   | CF.EG28.N10.80.8   | -10 ... 80   | -10 ... 80  | 80                      | 115              |
| 1   | CF.EG39.N20.80.16  | -20 ... 80   | -20 ... 80  | 80                      | 115              |
| 2   | CF.EG44.N25.80.19  | -25 ... 80   | -25 ... 80  | 80                      | 115              |
| 3   | CF.EG48.N30.80.22  | -30 ... 80   | -30 ... 80  | 80                      | 115              |
| 4   | UF.Si.N30.150.10LV | -30 ... 130  | -30 ... 150   | 145 ❶                   | >170             |
| 5   | HF.Si.20.200.50    | 20 ... 200   | 20 ... 200  | 255                     | >280             |
| 6   | HF.Si.20.250.50A   | 20 ... 200   | 20 ... 250  | 255                     | >280             |
| 7   | Water ❷            | 5 ... 95   | 5 ... 95  | -                       | -                |
| 8   | Customized         |  |   |                         |                  |

Check the suitability of the fluid according to your application.

Nomenclature for IKA® fluids:

CF.EG28.N10.80.8 --



(1) Classification:

**HF:** Heating Fluid  
**CF:** Cooling Fluid  
**UF:** Universal Fluid

(2) Chemical composition:

**Si:** Silicone oil  
**EG:** Ethylene Glycol

(3) Temperature range: (Minimum temperature. Maximum temperature)

**N:** Negative Temperature

(4) Viscosity:

Viscosity at 25 °C for Heating Fluid (**HF**)  
 Viscosity at -20 °C for Cooling Fluid (**CF**)  
 Viscosity at 25 °C for Universal Fluid (**UF**)

Dynamic viscosity [mPa.s] is a product of kinematic viscosity [mm<sup>2</sup>/s] and density [kg/m<sup>3</sup>] of the fluid divided by 1000.

(5) Additional information:

**A:** Oil Additives  
**LV:** Low Viscosity

❶ **Note:** for open bath application!

❷ **Note:** Tap water may be unsuitable for operation because the calcium carbonate content may cause calcification. High purity water (from ion exchangers) and distilled or bi-distilled water are unsuitable for operation due to corrosive properties of these media. High purity water and distillates are suitable as a medium after adding 0.1 g soda (Na<sub>2</sub>CO<sub>3</sub>, sodium carbonate) per liter of water.

• **Cooling coil:**

When the set temperature is close to the ambient temperature, the cooling coil should be used for counter-cooling due to the self-heating.

Connect the water supply and return line hoses to the cooling coil connectors (see **Fig. 4**).

For bath temperatures > 95 °C do not use the cooling coil with water.

For bath temperatures > 60 °C make sure that the flow rate through the cooling coil is high enough, to avoid excessive calcification.

## Operator panel and display

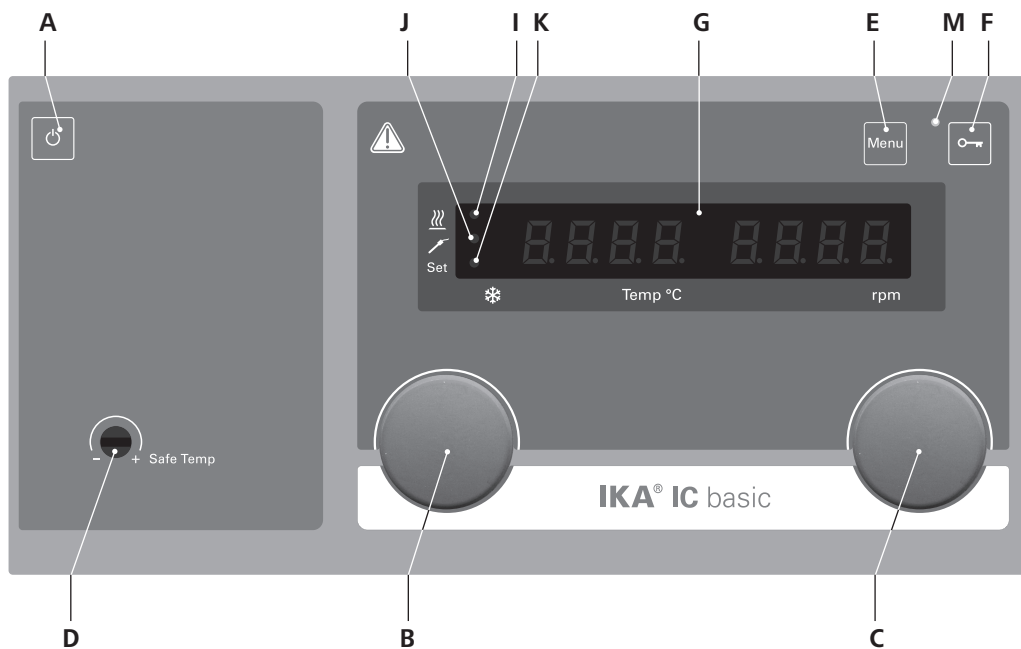
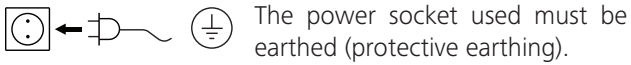


Fig. 12

| Item | Designation                       | Function  |
|------|-----------------------------------|---|
| A    | <b>ON/OFF button:</b>             | Switch on/off the circulator.   |
| B    | <b>Rotating/pressing knob:</b>    | Set the temperature value.<br>Start/stop the heating function.  |
| C    | <b>Rotating/pressing knob:</b>    | Navigation, selecting the settings in the menu.<br>Set the pump speed value.<br>Start/stop the pump function. |
| D    | <b>Adjustable safety circuit:</b> | Set and confirm the menu options.<br>Adjust the safety temperature limit with delivered screwdriver.          |
| E    | <b>Menu button:</b>               | Press it once: menu option is display.<br>Press it a second time: back to the working screen.                 |
| F    | <b>Key button:</b>                | Lock/unlock keys and knobs.   |
| G    | <b>LED display:</b>               | Display the settings and actual values.   |
| I    | <b>LED, heater:</b>               | Indicate the heating function is activated.   |
| J    | <b>LED, temperature sensor:</b>   | Indicates that an external temperature sensor is connected.   |
| K    | <b>LED, set:</b>                  | The LED lights up at the same time as the set value is displayed.   |
| M    | <b>LED, key button</b>            | Indicates that the function of keys and knobs is deactivated.   |

## Commissioning

Check whether the voltage specified on the type plate matches the mains voltage available.



If above conditions are met, the device is ready for operation after plugging in the mains plug.

If these conditions are not met, safe operation is not guaranteed and the device could be damaged.

Observe the ambient conditions (temperature, humidity, etc.) listed under “**Technical Data**”.

After switching on the mains switch (2) at the back of the device or pressing the power key (A), all LED segments light up during the self test.



Starting



Software version (ver)



Operating mode (mode)



Safety temperature (safe)



Working setting

After that, following two screens appear alternately.



Then the device enters standby status and is ready for operation.

Change the temperature setting with left knob (B). Change the pump speed setting with the right knob (C).

In standby status, activate the heating function by pressing the left knob (B). The device start heating function, meanwhile the pump start to run.

In working status, stop the pump function by pressing the right knob (C). The heating function and pump stops.

**Note:** In running status, the pump speed adjusts automatically according to the load. When the actual speed doesn't reach the setting speed, the actual speed and setting speed will appear on the screen alternately.

In standby status, press the right knob (C) to start the pump function. The heating function will not be activated. In working status, press the left knob (B) to stop the heating function, the pump keep running.

The control elements of the device allow to be locked by pressing the key button (F), so no accidental changes during operation are possible (LED (M) lights up).

By pressing the key button (F) again, the controls are released (LED (M) no longer lights up).

## Setting the safety temperature

Adjust the safety temperature with screwdriver delivered with the device.

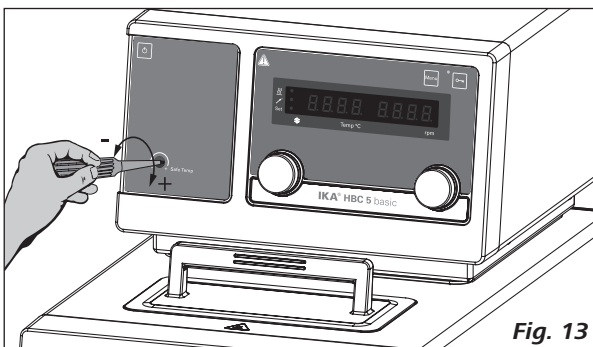


Fig. 13

The safety temperature setting will appear on the display.



Safety temperature (safe)

Factory setting: approximate max. value  
Adjustment range: 0 – 260 °C



**WARNING**

**Note:** The safety temperature must always be set to at least 25 °C lower than the flash point of the fluid used.

# Menu settings

## • Menu structure:

|                    |   | Default settings                                  |
|--------------------|---|---|
| Menu               | MODE  | A ..... activated                                 |
|                    | B ..... -   |   |
|                    | C ..... -   |   |
|                    | Maximum temperature (HI T) .....                      | 200 °C  |
|                    | Minimum temperature (LO T) .....                      | 0 °C  |
|                    | Maximum speed (HI R) .....                            | 4000 rpm  |
|                    | Minimum speed (LO R) .....                            | 1000 rpm  |
|                    | Fluid type (FLUI) .....                               | 8   |
|                    | The type of temperature PID control arithmetic (AUTO) | AUTO 1 ..... -                                    |
|                    | AUTO 0  | Proportional coefficient of PID (Kp 1) ..... 15.0 |
|                    |   | Integrate time of PID (Ti 1) ..... 5.00           |
|                    |   | Differential time of PID (Td 1) ..... 5.0         |
|                    | External and internal temperature control (ET)        | ET 0 ..... activated                              |
|                    |   | ET 1  |
|                    |   | External sampling time (EuT 2) ..... 120 s        |
|                    |   | Proportional coefficient of PID (Kp 2) ..... 1.0  |
|                    |   | Integrate time of PID (Ti 2) ..... 1.5            |
|                    |   | Differential time of PID (Td 2) ..... 0.0         |
|                    |   | DF t* ..... 100.0                                 |
|                    |   | FASt 0 ..... -                                    |
|                    |   | FASt 1 ..... activated                            |
|                    | Alarm and key tone (BEEP)                             | BEEP 0 ..... -                                    |
|                    |   | BEEP 1 ..... activated                            |
| Calibration (CALI) | CALI 0 ..... activated                                |   |
|                    | CALI 2 ..... -  |   |
|                    | CALI 3 ..... -  |   |

**DF t\***: maximum temperature difference between internal and external temperature.

### • Basic guide to setting the menu options:

- ☞ Enter the menu by pressing "Menu" key (E).
- ☞ Turn the left knob (B) to select a menu option.
- ☞ Turn the right knob (C) to change the menu value settings.
- ☞ Confirm the menu settings by pressing the right knob (C).

### • Operating mode (MODE):



**Mode A:** After power on/power failure no automatic restart of functions.

**Mode B:** After power on/power failure automatic restart of functions, depending on previous settings.

**Mode C:** Set values (set in A or B) cannot be changed. After power on/power failure automatic restart of functions, depending on previous settings.

### • Maximum temperature (HI T):



The maximum adjustable value: 200° C. This value can be limited additionally by the selected liquid (No., see "Fluid (Standard information for IKA® fluid)" section).

**Note:** The maximum value is limited by the set safety temperature.

### • Minimum temperature (LO T):



The minimum adjustable value: 0° C

### • Maximum speed (HI R):



The maximum adjustable value: 4000 rpm.

• **Minimum speed (LO R):**



The minimum adjustable value: 1000 rpm

• **Fluid type (FLUI):**



The chosen fluid (No.) of the temperature setting is limited. See "Fluid (Standard information for IKA® fluid)" section

• **Temperature control type (AUTO):**



**AUTO 1:**

**AUTO 1** is the default setting. The optimum settings are determined automatically.

Heat-up curve in auto-tuning control (**AUTO 1**):

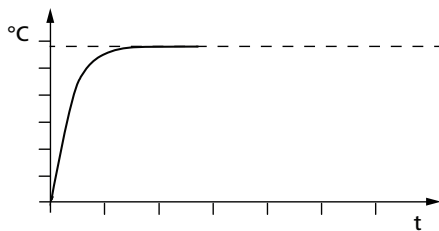


Fig. 14

**AUTO 0:**

For special requirements, **AUTO 0** can be used with manual adjustment of the control parameters.

If the PID control (**AUTO 0**) option is selected, the following items including **Kp 1**, **Ti 1** and **Td 1** could be set. Otherwise they are not displayed in the menu list.

**Note:** Inappropriate settings may produce the following heat-up curves:

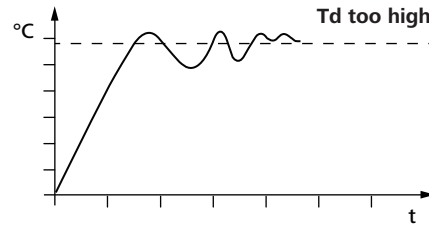
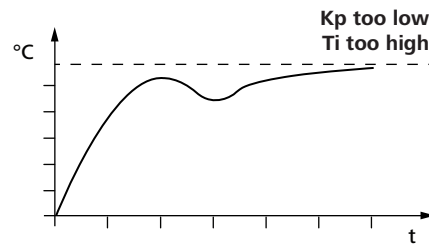
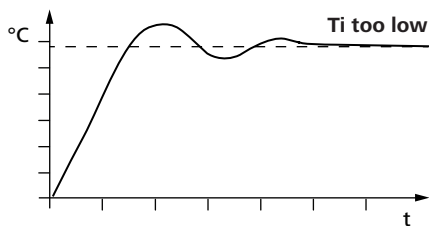
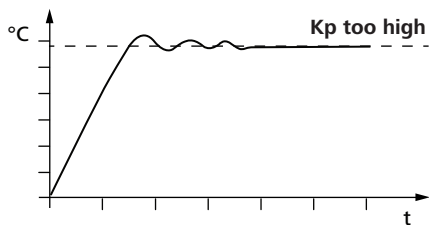


Fig. 15

Proportional coefficient of PID (**Kp 1**):



The proportional coefficient **Kp** is the controller amplification and determines how strongly the control deviation (the difference between the target temperature and actual temperature) directly affects the control variable (on-time of the heater). **Kp** values that are too large can lead to the controller overshooting.

Integral time of PID (**Ti 1**):



The integral time **Ti (s)** is the correction time and determines how strongly the duration of the control deviation affects the control variable. **Ti** compensates an existing control deviation. A high **Ti** means a smaller and slower effect on the control variable. **Ti** values that are too small can lead to instability of the controller.

Differential time of PID (**Td 1**):



The differential time **Td (s)** is the derivative time and determines how strongly the rate of change of the control deviation affects the control variable. **Td** compensates for rapid control deviations. A high **Td** means a smaller and slower effect on the control variable. **Td** values that are too small can lead to instability of the controller.

• **External and internal temperature control (ET):**



**ET 0:** internal temperature control  
**ET 1:** external temperature control

If the external temperature control (**ET 1**) is selected, the following items **EuT 2** (sampling time), **Kp 2**, **Ti 2**, **Td 2**, **Df t** (maximum temperature difference between internal and external temperature) and **FAST** could be set. Otherwise they are not displayed in the menu list.

The sampling time **EuT 2** (s) is the interval over which the external control deviation and the respective control variable (dependent on **Kp 2**, **Ti 2**, **Td 2**, **Df t** and **FAST**) is determined.

**EuT 2** must be adjusted to match the response characteristic (total of all time constants) of the external closed loop controlled system, so that the control variable can deliver a uniform and measurable change in the control deviation. **EuT 2** values that are too small or too large can lead to instability of the controller.

Dynamics of the external PID temperature control (**FAST**)



**FAST=0:** accurate, without overshoot  
**FAST=1:** fast, with overshoot

• **Alarm and key tone (BEEP):**



**BEEP 0:** no alarm and key tone  
**BEEP 1:** alarm and key tone is activated

• **Calibration and adjustment (CALI):**

If **ET 0:** adjustment of the internal temperature measurement.

If **ET 1:** adjustment of the external temperature measurement.



**CALI 0:** Reset calibration  
**CALI 2:** 2-point calibration  
**CALI 3:** 3-points calibration

*Example: 2-point calibration:*

Dip the temperature sensor of the reference measuring instrument into the bath fluid:

- If **ET 0:** into the internal bath (open the lid (**16**))
- If **ET 1:** at the same position as the external Pt100 temperature sensor (**12**).

Select 2-point calibration in the menu. Press the right knob (**C**) to start the 2-point calibration.



Set the first point temperature (e.g. 80 °C). Confirm the setting by pressing the right knob (**C**).



Left area of the display appears the set value (80 °C) and the right area of the display appears the actual temperature value measured. The set LED (**K**) flashes briefly.



The unit now starts and controls to the set value. When the temperature has reached the set value and has become constant, the "Set" LED (**K**) no longer flashes and the following display appears.

The temperature measured by the unit appears on the left hand side.



Input the calibration value from the reference measuring instrument (e.g. 80.2 °C) with the right knob (**C**).



Confirm the value by pressing the right knob (**C**). Back to previous screen for input a new value by pressing the left knob (**B**).



**Back**

**OK**

The first point calibration is finished now. Calibration of the other points is performed in the same way.

## Interface and output

The device can be operated in "Remote" mode via the RS 232 interface (**10**) or the USB interface (**11**) connected to a PC and with the laboratory software Labworldsoft®.

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

### **USB interface:**

The Universal Serial Bus (USB) is a serial bus for connecting the device to the PC. Equipped with USB devices can be connected to a PC during operation (hot plugging). Connected devices and their properties are automatically recognized. Use the USB interface in conjunction with labworldsoft® for operation in "Remote" mode and also to update the firmware.

### **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 through the USB data cable to the PC.

The data communication is via a virtual COM port. Configuration, command syntax and commands of the virtual COM ports are as described in RS 232 interface.

### **RS 232 interface:**

Configuration:

- The functions of the interface connections between the stirrer machine and the automation system are chosen from the signals specified in EIA standard RS 232 in accordance with DIN 66 020 Part 1.
- For the electrical characteristics of the interface and the allocation of signal status, standard RS 232 applies in accordance with DIN 66 259 Part 1.
- Transmission procedure: asynchronous character transmission in start-stop mode.
- Type of transmission: full duplex.
- Character format: character representation in accordance with data format in DIN 66 022 for start-stop mode. 1 start bit; 7 character bits; 1 parity bit (even); 1 stop bit.

- Transmission speed: 9600 bit/s.
- Data flow control: none
- Access procedure: data transfer from the stirrer machine to the computer takes place only at the computer's request.

### **Command syntax and format:**

The following applies to the command set:

- Commands are generally sent from the computer (Master) to the device (Slave).
- The device sends only at the computer's request. Even fault indications cannot be sent spontaneously from the 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 device and the PC. With a suitable terminal or communications programme these commands can be transmitted directly to the circulator equipment. The **IKA**® software package, Labworldsoft®, provides a convenient tool for controlling circulating equipment and collecting data under MS Windows, and includes graphical entry features, for pump motor speed ramps for example.

The following table summarizes the (NAMUR) commands understood by the **IKA**® control equipment.

### **Commands:**

| Commands | Function   |
|----------|--|
| IN_PV_1  | Read the external actual temperature   |
| IN_PV_2  | Read the internal actual temperature   |
| IN_PV_3  | Read the safety actual temperature   |
| IN_PV_4  | Read the pump actual speed   |
| IN_SP_1  | Read the internal setting temperature (if ET=0)<br>Read the external setting temperature (if ET=1) |
| IN_SP_3  | Read the safety setting temperature  |
| IN_SP_4  | Read the pump setting speed  |

|              |   |
|--------------|---|
| IN_TMODE     | Read temperature control<br>0: internal regulation<br>1: external regulation  |
| OUT_SP_1 xxx | Set the internal setting temperature XXX (if ET=0)<br>Set the external setting temperature XXX (if ET=1)  |
| OUT_SP_12@n  | Set the WD safety temperature with echo of the set (defined) value.   |
| OUT_SP_4 xxx | Set the pump speed XXX  |
| OUT_SP_42@n  | Set the WD-safety speed with echo of the set (defined) value.   |
| OUT_TMODE_0  | Set to Internal temperature control   |
| OUT_TMODE_1  | Set to External temperature control   |
| OUT_WD1@n    | Start the watchdog mode 1 and set the time for the watchdog to n (20...1500) seconds.<br>Echo of the Watchdog time.<br>During a WD1-event, the heating and pump functions are switched off.<br>This command needs to be send within the watchdog time.  |
| OUT_WD2@n    | Start the watchdog mode 2 and set the watchdog time to n (20...1500) seconds.<br>Echo of the watchdog time.<br>During a WD2-event, the set temperature is changed to the WD safety temperature and the pump set speed is set to the WD safety speed.<br>This command needs to be send within the watchdog time. |
| RESET        | Reset the PC control and stop the device functions.   |
| START_1      | Start the heating function  |
| START_4      | Start the pump function   |
| STOP_1       | Stop the heating function   |
| STOP_4       | Stop the pump function  |

**PC 1.1 Cable:**

This cable is required to connect RS 232 port (10) to a PC.

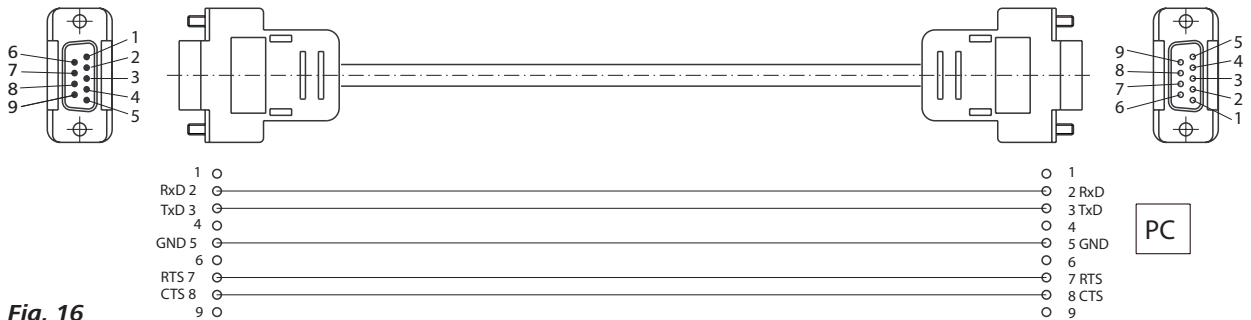


Fig. 16

**USB 2.0 cable: A - Micro B:**

This cable is required to connect USB port (11) to a PC.

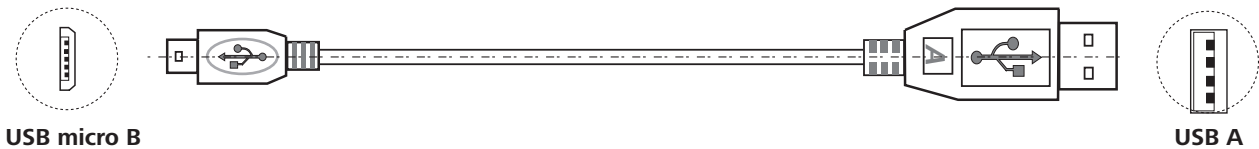


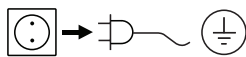
Fig. 17



## 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 IKA® devices.

| Dirt                  | Cleaning agent                              |
|-----------------------|---|
| Dye                   | Isopropyl alcohol                           |
| Construction material | Water containing tenside/ isopropyl alcohol |
| Cosmetics             | Water containing tenside/ isopropyl alcohol |
| Foodstuff             | Water containing tenside                    |
| Fuel                  | Water containing tenside                    |

**For materials which are not listed, please request information from IKA® application support.**

Wear protective gloves while cleaning the device.

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 damage the device.

### **Spare parts order:**

When ordering spare parts, please give:

- machine type
- serial number, see type plate
- item and designation of the spare part, see [www.ika.com](http://www.ika.com), spare parts diagram and list
- Software version.

### **Repair:**

**Please send the 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.

## Error codes

Any malfunctions during operation will be identified by an error message on the display.

Proceed as follows in such cases:

- ☞ Switch off device using the main switch at the back of the device
- ☞ Carry out corrective measures
- ☞ Restart device

| <b>Error code</b> | <b>Effect</b>           | <b>Cause</b>  | <b>Solution</b>  |
|-------------------|-------------------------|---|--|
| <b>Err 01</b>     | Pump off<br>Heating off | No external Pt 100 temperature sensor                                       | - Check this sensor  |
| <b>Err 02</b>     | Pump off<br>Heating off | Motor over current (rate current)   | - Reduce pump motor speed<br>- Use fluid with lower viscosity<br>- Check if the pump impeller is blocked |
| <b>Err 03</b>     | Pump off<br>Heating off | Motor over current (Max current)  | - Reduce pump motor speed<br>- Use fluid with lower viscosity<br>- Check if the pump impeller is blocked |
| <b>Err 04</b>     | Pump off<br>Heating off | Motor hall signal missing   | - Reduce pump motor speed<br>- Use fluid with lower viscosity<br>- Check if the pump impeller is blocked |
| <b>Err 05</b>     | Pump off<br>Heating off | Too high liquid level   | - Check the liquid level and buoyage   |
| <b>Err 06</b>     | Pump off<br>Heating off | Too low liquid level  | - Check the liquid level and buoyage   |
| <b>Err 07</b>     | Pump off<br>Heating off | Too high voltage  | - Check the mains power  |
| <b>Err 08</b>     | Pump off<br>Heating off | Too low voltage   | - Check the mains power  |
| <b>Err 09</b>     | Pump off<br>Heating off | Device internal temperature is too high                                     | - Check the ambient temperature and let the device cool down   |
| <b>Err 10</b>     | Pump off<br>Heating off | PC communication failure  | - Check communication cable  |
| <b>Err 11</b>     | Pump off<br>Heating off | Temperature difference between control sensor and safety sensor is too much | - Check safety temperature circuit and bath fluid  |
| <b>Err 12</b>     | Pump off<br>Heating off | Safety temperature alarm  | - Check the bath temperature measurement   |
| <b>Err 13</b>     | Pump off<br>Heating off | Heater switched off by safety circuit                                       | - Check safety temperature set value, fluid level  |
| <b>Err 14</b>     | Pump off<br>Heating off | Fan error   | - Check the fan and clean the grids at the rear side   |

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.

## Accessories

|   | IC basic | HBC 5 basic | HBC 10 basic |
|---|----------|-------------|--------------|
| <b>Water bath protective media</b>  |          |             |              |
| <b>AQ.1</b> Aquacide 1  | •        | •           | •            |
| <b>Tubing and hoses</b>   |          |             |              |
| <b>LT 5.20</b> metal hose (isolated M16 x 1)  | •        | •           | •            |
| <b>LT 5.21</b> PTFE hose (isolated M16 x 1)   | •        | •           | •            |
| <b>H.PVC.8</b> PVC hose (nominal width 8)   | •        | •           | •            |
| <b>H.PVC.12</b> PVC hose (nominal width 12)   | •        | •           | •            |
| <b>H.SI.8</b> silicone hose (nominal width 8)   | •        | •           | •            |
| <b>H.SI.12</b> silicone hose (nominal width 12)   | •        | •           | •            |
| <b>Tubing Insulations</b>   |          |             |              |
| <b>ISO. 8</b> insulation (8 mm)   | •        | •           | •            |
| <b>ISO.12</b> insulation (12 mm)  | •        | •           | •            |
| <b>Bath vessels</b>   |          |             |              |
| <b>IB eco 8</b> plastic bath (8 litres)   | •        |             |              |
| <b>IB eco 18</b> plastic bath (18 litres)   | •        |             |              |
| <b>IB pro 9</b> stainless steel bath (9 litres)   | •        |             |              |
| <b>IB pro 12</b> stainless steel bath (12 litres)   | •        |             |              |
| <b>IB pro 20</b> stainless steel bath (20 litres)   | •        |             |              |
| <b>Bridges and Covers</b>   |          |             |              |
| <b>BS.IC</b> small bridge (for <b>IB pro 12</b> , <b>IB eco 18</b> and <b>IB pro 20</b> ) | •        |             |              |
| <b>CM.IC</b> medium cover (for <b>IB pro 12</b> )   | •        |             |              |
| <b>CL.IC</b> large cover (for <b>IB pro 20</b> )  | •        |             |              |
| <b>Additional accessories</b>   |          |             |              |
| <b>Pt 100.30</b> temperature sensor   | •        | •           | •            |
| <b>PC 1.1</b> cable (RS 232)  | •        | •           | •            |
| <b>USB 2.0 Kabel A - Micro B</b>  | •        | •           | •            |
| <b>CC 1</b> Cooling coil  | •        |             |              |
| <b>Labworldsoft®</b>  | •        | •           | •            |

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

## Technical data

|   |              | IC basic   | HBC 5 basic     | HBC 10 basic    |
|---|--------------|--|-----------------|-----------------|
| Nominal voltage   | <b>VAC</b>   | 230 ±10% / 115 ±10%  |                 |                 |
| Frequency   | <b>Hz</b>    | 50 / 60  |                 |                 |
| Max. input power  | <b>W</b>     | 2650 (230 VAC) / 1400 (115 VAC)                                |                 |                 |
| Working temperature range<br>(RT+10 at 1000rpm)   | <b>°C</b>    | RT + 10 ... 200  |                 |                 |
| Operating temperature range<br>(with forced cooling)  | <b>°C</b>    | -20 ... 200  |                 |                 |
| Temperature stability – Internal temperature<br>control 70°C, water (according to DIN12876)   | <b>K</b>     | ± 0.02   |                 |                 |
| Temperature control   |              | PID  |                 |                 |
| Temperature measurement, absolute accuracy<br>Internal (int) (adjustable by calibration)  | <b>K</b>     | ± 0.2  |                 |                 |
| External (ext) (adjustable by calibration)  | <b>K</b>     | ± 0.2  |                 |                 |
| External Pt 100.3 temperature sensor tolerance<br>to DIN EN 60751 class A, $\leq \pm (0.15 + 0.002 \times  T )$ ,<br>e.g. at max. 100°C (adjustable by calibration) | <b>K</b>     | ± 0.35 (at 100 °C)   |                 |                 |
| Temperature setting   |              | Knob   |                 |                 |
| Temperature setting resolution  | <b>K</b>     | 0.1  |                 |                 |
| Temperature display   |              | LED  |                 |                 |
| Temperature display resolution  | <b>K</b>     | 0.1  |                 |                 |
| Classification according to DIN12876-1  |              | Class III (FL) suitable for flammable and non-flammable fluids |                 |                 |
| Safety circuit (adjustable)   | <b>°C</b>    | 0 ... 260  |                 |                 |
| Safety temperature display  |              | LED  |                 |                 |
| Heating capacity  | <b>W</b>     | 2500 (230 VAC) / 1250 (115 VAC)                                |                 |                 |
| Pump speed (adjustable)   | <b>rpm</b>   | 1000 ... 4000  |                 |                 |
| Max. pump pressure/suction  | <b>bar</b>   | -0.45 / 0.35   |                 |                 |
| Max. flow rate (at 0 bar)   | <b>l/min</b> | 26   |                 |                 |
| Bath volume   | <b>l</b>     | -/-  | 5–7             | 8–11            |
| Sub-level protection  |              | Yes  |                 |                 |
| Interface   |              | USB, RS 232  |                 |                 |
| Permitted on-time   | <b>%</b>     | 100  |                 |                 |
| Protection class according to EN 60529  |              | IP 21  |                 |                 |
| Protection class  |              | I  |                 |                 |
| Excess voltage category   |              | II   |                 |                 |
| Contamination level   |              | 2  |                 |                 |
| Permitted ambient temperature   | <b>°C</b>    | +5 ... +40   |                 |                 |
| Permitted ambient humidity  | <b>%</b>     | 80   |                 |                 |
| Dimension (W x D x H)   | <b>mm</b>    | 285 x 291 x 313  | 275 x 500 x 406 | 275 x 510 x 456 |
| Weight  | <b>kg</b>    | 8.5  | 17.0            | 18.0            |
| 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 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.

## Pump performance curve

### Pump performance curve measured with water:

(Measurements done according DIN 12876-2 with water at 20°C; pump in a closed-loop circuit).

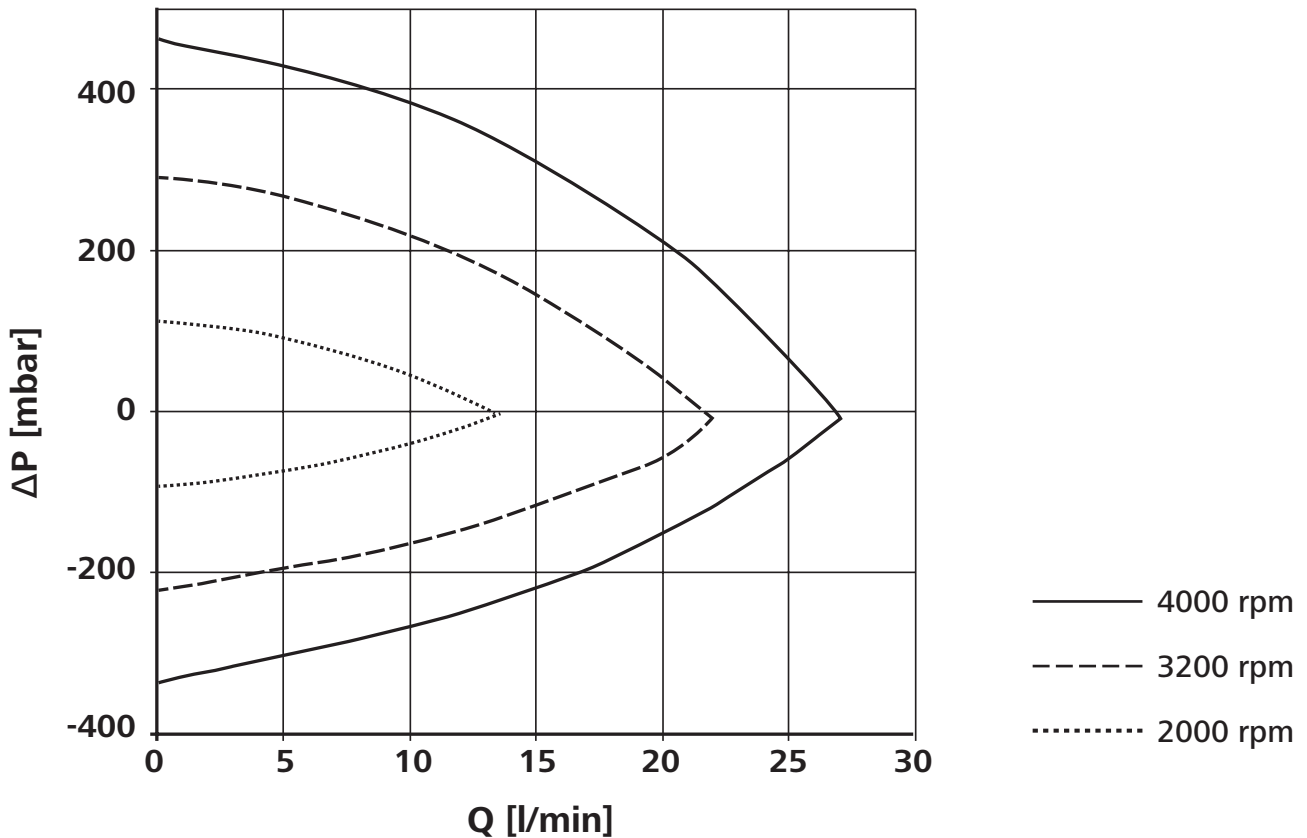


Fig. 18

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