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IKA Algaemaster 10_082017

IKA®

IKA Algaemaster 10

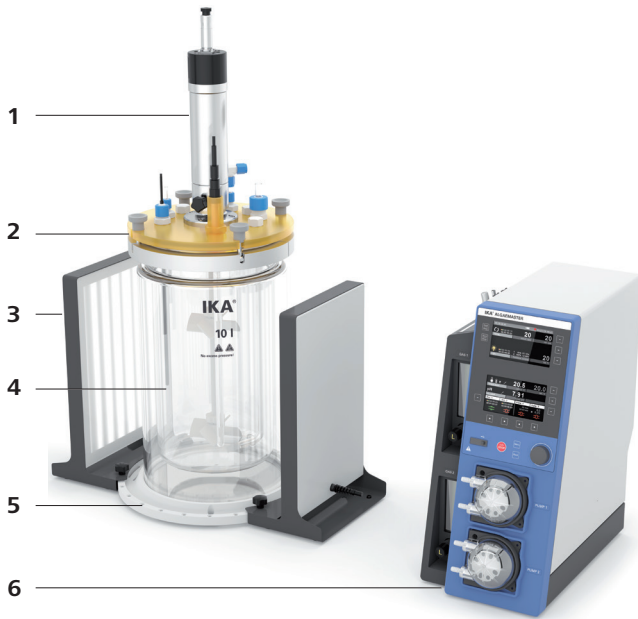


Operating instruction EN 6



IKA®-Werke, Germany
Reg. No. 004343

1 Device setup

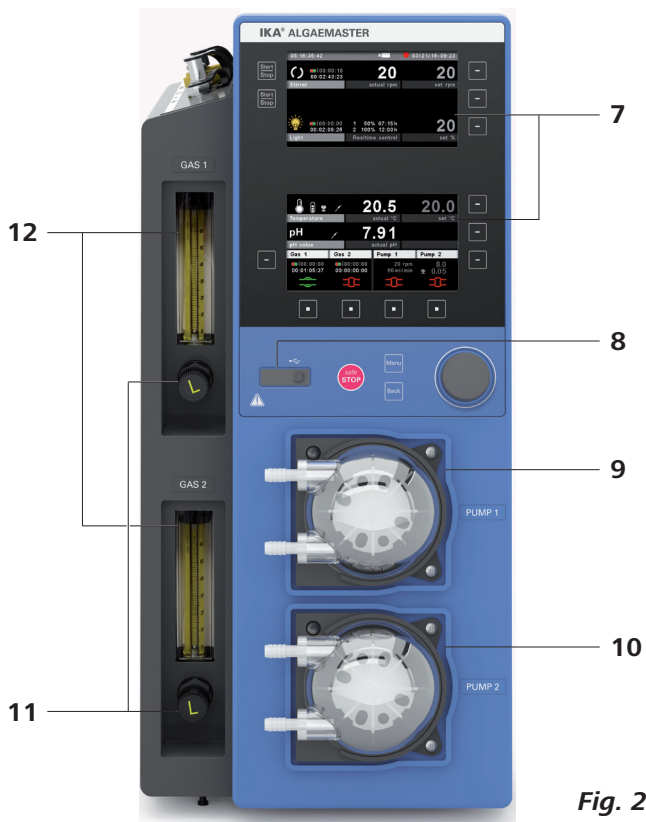


Pos. Description

- 1 Motor
- 2 Vessel lid
- 3 LED panel
- 4 Reactor vessel
- 5 Base plate
- 6 Controller

Fig. 1

Front Controller

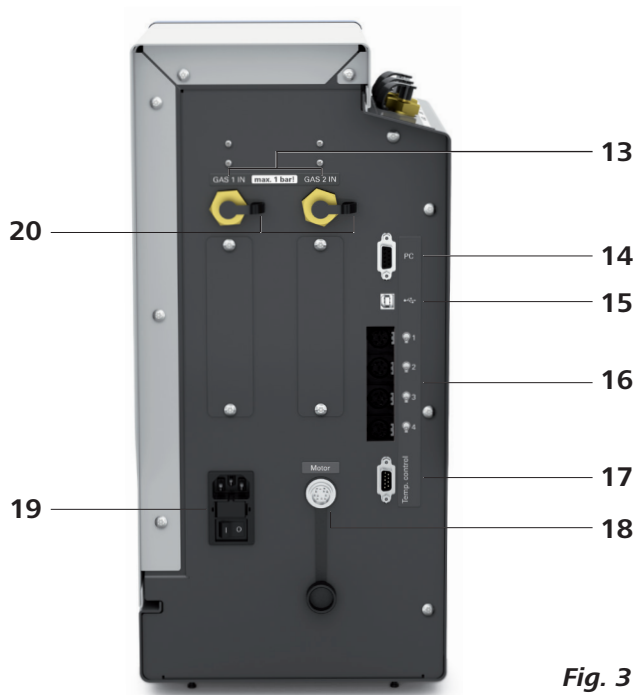


Pos. Description

- 7 Control elements and display
- 8 USB port data export
- 9 Hose pump 1
- 10 Hose pump 2
- 11 Needle valves for flow meter 1 and 2
- 12 Flow meter for gas 1 and 2

Fig. 2

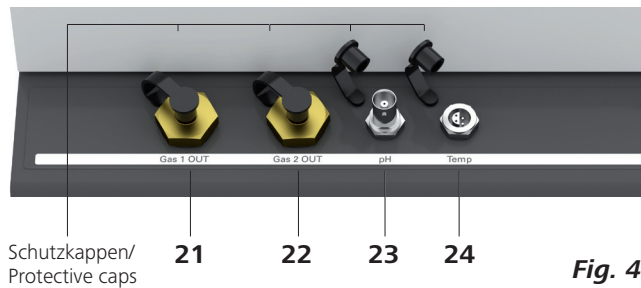
Back Controller



| Pos. | Description |
|------|--|
| 13 | Gas inlet 1 and 2 |
| 14 | RS 232 port communication PC |
| 15 | USB port communication |
| 16 | Connection sockets for LED panel |
| 17 | RS 232 interface thermostat communication |
| 18 | Connection socket for motor |
| 19 | Power supply connection with fuse and switch |
| 20: | Protective caps |

Fig. 3

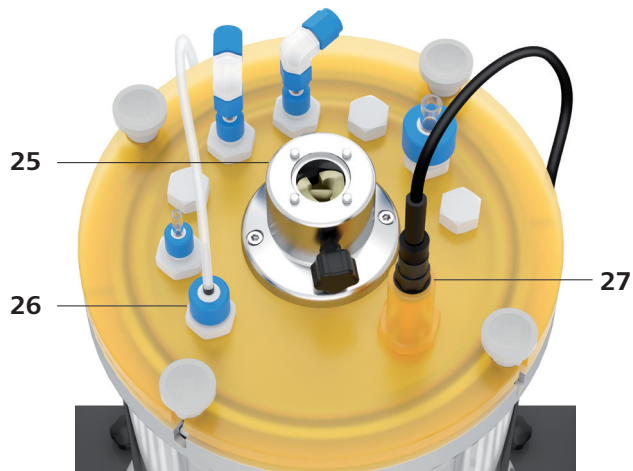
Top view Controller



| Pos. | Description |
|------|-------------------------|
| 21 | Output Gas 1 |
| 22 | Output Gas 2 |
| 23 | Port pH-Sensor |
| 24 | Port Temperature sensor |

Fig. 4

Vessel lid



| Pos. | Description |
|------|------------------------------|
| 25 | Motor coupling |
| 26 | Plugs/plugs with grommet |
| 27 | Adapter holder for pH sensor |

Fig. 5

2 Dangerous spots

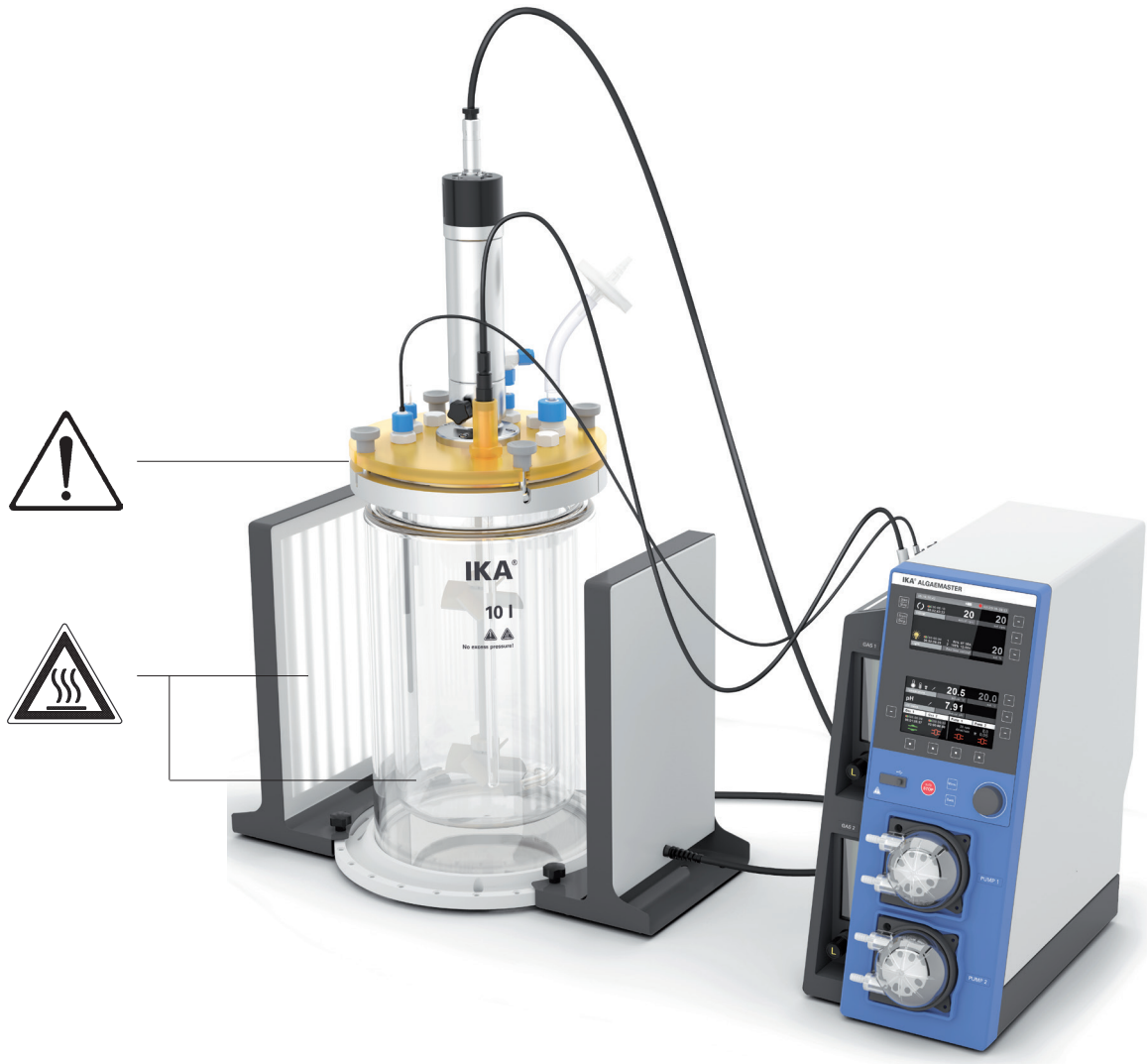


Fig. 6

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3 Declaration of conformity

We declare under our sole responsibility that this product corresponds to the directives 2006/42/EG, 2014/30/EU, 2014/35/EU and 2011/65/EU and conforms with the following standards or normative documents: EN 61010-1, EN 61010-2-051, EN 60204-1, EN 61326-1, EN 60529 and EN ISO 12100.

4 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.

5 Warning symbols



Indicates an (extremely) hazardous situation, which, if not avoided, will result in death, serious injury.



Indicates a potentially hazardous situation, which, if not avoided, can result in death, serious injury.



Indicates a potentially hazardous situation, which, if not avoided, can result in injury.



Indicates practices which, if not avoided, can result in equipment damage.



DANGER - note on hazards arising from a hot surface.

6 Safety instructions

General instructions



Read the operating instructions fully before starting up and follow the safety instructions.

- Keep the operating instructions in a place where they can be accessed by everyone.
- Ensure that only trained staff work with the equipment.
- Follow the safety instructions, guidelines, occupational health and safety and accident prevention regulations.



If installation or positioning can not ensure this access at all times, an additional EMERGENCY STOP switch that can be easily accessed must be installed in the work area.

Please pay attention to the dangerous parts of the equipment in Fig. 6.



Wear your personal protective equipment in accordance with the hazard category of the medium to be processed, otherwise there is a risk of:

- **splashing of liquids**
- **projectile parts**
- **body parts, hair, clothing and jewelry getting caught.**

- 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 unit switch of the **IKA** product can be accessed immediately, directly and without risk at any time.
- 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.

- Do not operate the instrument in explosive atmospheres, with hazardous substances or under water.
- Process pathogenic materials only under a suitable fume hood. Please contact **IKA** application support if you have any question.

Accessories



Always switch the main switch in the OFF position or disconnect the power before changing stirring element and fitting allowed accessories



Refer to the instruction manual of the accessories.

- Set up the device in a spacious area on an even, stable, clean, non-slip, dry and fireproof surface.
- Protect the instrument and accessories from bumping and impacting.
- Check the instrument and accessories beforehand for damage each time when you use them. Do not use damaged components.
- Only use **IKA** approved accessories!
- Use only original **IKA** spare parts!
- Accessories must be connected securely to the device and must not come loose on their own. The centre of gravity of the device must be located within the mounting plate.

Power supply

- The instrument can only be disconnected from the main supply by pulling out the mains plug or the connector plug.
- 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.
- After an interruption to the power supply, the device starts up again. The functions previously set do not start automatically.

Reactor vessel



Beware of hazards due to:

- flammable materials
- combustible media with a low boiling temperature
- glass vessel breakage
- overfilling of media
- unsafe condition of container.



Before filling the reactor container make sure that the reagents used do not damage the seal.

- Certain applications and materials may be hazardous. You should take precautions to prevent contact with, or inhalation of, toxic liquids, gases, fumes, vapors or powders.
- Risks may also be posed by biological or microbiological substances.
- For cleaning, the motor must be removed.
- Observe the maximum permissible temperatures (see chapter "18 Technical data") in the reactor vessel.
- Ensure that the external temperature sensor is inserted in the media to a depth of at least 20 mm.

Pressure

- The equipment is not designed for over- and negative pressure use.
- The reactor system must always warning 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.

Stirring



Moving and rotating equipment parts also constitute a hazard.



The stirrer must only be operated when the reactor vessel is fully closed.

- You must ensure that the stirring element is securely clamped!
- Gradually increase the speed.
- The equipment may heat up by stirring.

Tempering



The tempering medium and reactor vessel can become hot during operation and remain so for a long time afterwards! Let the components cool off before continuing work with the device.



Ensure that the thermostat used for tempering is fully efficient. A defective thermostat can cause uncontrolled reactions.

Using the adequate hoses for cooling purposes.

- **IKA** recommends to set the same safety temperature for the thermostat (see "Technical data").

LED panel



Do not look into the light source. Failure to do so can cause damage to the eyes.

Maintenance

- The feet of the equipment must be clean and undamaged.
- The controller 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 instrument may still be live for some time after unplugging from the power supply



Removable parts have to be reattached to the unit for safe operation in order to prevent, for example, the ingress of fluids, foreign matter, etc.

7 Useful information

| Function | Description |
|-------------|---|
| Stirrer | The stirrer is used for distributing gases and liquids inside the reactor container. |
| LED panel | Up to four LED panels can be connected, which supply the organisms with light energy. The light intensity can be set between 10 % and 100 %. |
| Temperature | The temperature of the reactor container can be controlled via an external temperature control unit or condenser. The tempered medium flows through the outer jacket of the reactor container and specifies the temperature inside the reactor container. |
| pH | The pH value can be controlled by using gases (e.g. air, CO ₂ and O ₂) or acidic/alkaline liquids. |
| Pumps | The pumps can be used for the following functions: <ul style="list-style-type: none">• Provision of nutrient media• Exchange of water• Control of the pH value |
| Gas | Gas can be used for the following functions: <ul style="list-style-type: none">• Provision of different gases (e.g. CO₂ for photosynthesis)• Control of the pH value |

8 Correct use

8.1 Use

The **IKA** Algaemaster 10 is a modular reactor system. It was developed for the cultivation of organisms (e.g. algae). Through definable ambient conditions, growth process can be examined and optimised. Algaemaster 10 is used as a tabletop device.

8.2 Range of use (only indoor)

- Laboratories
- Universities
- Schools

This equipment 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 instrument is operated with accessories that are not supplied or recommended by the manufacturer
- if the instrument is operated improperly or contrary to the manufacturer's specifications
- if the instrument or the printed circuit board are modified by third parties.

9 Unpacking

9.1 Unpacking

- Unpack the device carefully.
- Any damage should be notified immediately to the shipping agent (post, rail or logistics company).

9.2 Delivery scope

- Algaemaster 10 controller
- Reactor vessel incl. lid, lock, motor coupling and base plate
- Motor
- 2 LED panels
- Main cable H 11
- Accessories: Gas intake tube, various brackets, hoses, Y-connectors, motor cable, pH probe, temperature sensor
- Tool kit
- Operating instruction
- Warranty card

10 Motor protection

The stirring instrument is suitable for continuous operation. The motor current is limited electronically. The instrument has an anti-stall and antioverload system.

A fault occurs if the safe functioning of the instrument is compromised.

11 Setting up and assembly

11.1 Setting up



NOTICE

Place the components of the Alga-master 10 onto a clean, solid and even surface, ensuring they do not slip.

Be careful not to damage the reactor container.

Seal off all connections on the controller which are not being used with the protective caps.

Procedure

1. Carefully unpack the device and accessory parts and check for completeness.

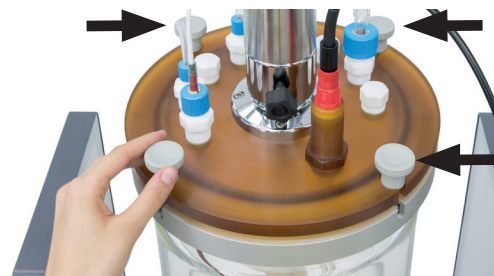
2. Place the reactor container onto the base plate and install the LED panels. Place it next to the controller and screw the vessel lid onto the reactor container (see following chapter).
3. Install the optional accessory parts, as required:
 - Gas intake tube
 - Temperature sensor
 - pH sensor
 - Hose pumps
 - Motor
4. Connect the device to the power supply (Fig. 3, (19)) using the supplied power cord and press the main power switch.
5. The device is ready for operation.

11.2 Assembly of the attachments

11.2.1 Securing the vessel lid

To open/close the vessel lid, screw/unscrew the 4 screws located on the outside of the vessel lid by hand.

Be careful not to damage the rim of the container.



11.2.2 Gas intake tube

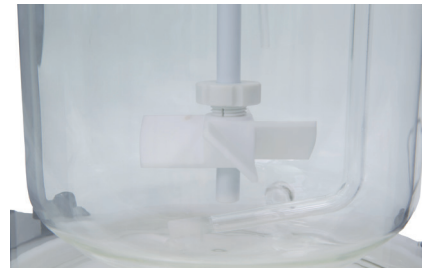


NOTICE

Make sure there is a distance between the stirrer and the correct installation of the tube.

Push the gas intake tube into the tube fitting of a plug with grommet (Fig. 5, (26)) underneath the lid.

In order not to disturb the stirring process, the gas intake tube must be positioned on the side or under the stirrer.



11.2.3 LED panels



NOTICE

The 4 connection sockets for the LED panels (Fig. 3, (16)) can be assigned freely, as required.

1. The 4 connection sockets for the LED panels (Fig. 3, (16)) can be assigned freely, as required.

2. Screw the LED panels to the base plate. The edge of the base plate has several drill holes (distance 15 degrees) for individual placement.
3. Connect the LED panels to the connection sockets of the controller (Fig. 3, (16)).



11.2.4 Gas hoses



NOTICE

Two connections are available for the gas intake.

1. Insert the first hose into the gas source and at the gas inlet (IN) (Fig. 3, (13)).
2. Insert the second hose into the gas outlet (OUT) (Fig. 4, (21 or 22)) and connect it to the vessel lid (Fig. 5, (26)).
When using two gases you can use the supplied Y-connector.



11.2.5 Flow meter



NOTICE

The maximum (inlet) pressure must not be exceeded (see chapter "18 Technical data").

Check the mobility of the measuring tube float before operating. Due to condensation, e. g. by temperature changes during shipping, the float might get stuck in the tube. In this case flush the flow meter with dry and clean gas.



The flow of gas 1 & 2 (Fig. 2, (12)) can be regulated using the needle valves (Fig. 2, (11)):

- Clockwise: Flow closed
- Counterclockwise: Flow open

The flow rate (ml/min) can be determined with the values on the measuring scale (middle of the float) and the tables for CO₂ flow measurement and air flow measurement.

Note: The calculations are based on following conditions.

| | | |
|----------------|----------------------|------------------------|
| <u>Ambient</u> | Temperature: | 21.1 °C (70 °F) |
| | Barometric pressure: | 1013.5 mbar (14.7 psi) |
| <u>Gas</u> | Temperature: | 21.1 °C (70 °F) |
| | Operating pressure: | 1013.5 mbar (14.7 psi) |
| | Accuracy: | 2 % |

CO₂ flow measurement

| Scale reading (mm) | Flow (ml/min) |
|--------------------|---------------|
| 65 | 310 |
| 60 | 284 |
| 55 | 256 |
| 50 | 229 |
| 45 | 204 |
| 40 | 177 |
| 35 | 149 |
| 30 | 122 |
| 25 | 100 |
| 20 | 82.0 |
| 15 | 64.0 |
| 10 | 48.0 |
| 5 | 34.0 |

Air flow measurement

| Scale reading (mm) | Flow (ml/min) |
|--------------------|---------------|
| 65 | 299 |
| 60 | 267 |
| 55 | 238 |
| 50 | 207 |
| 45 | 181 |
| 40 | 160 |
| 35 | 138 |
| 30 | 118 |
| 25 | 97.4 |
| 20 | 80.5 |
| 15 | 63.2 |
| 10 | 48.4 |
| 5 | 36.2 |

11.2.6 Temperature sensor

1. Push the temperature sensor through the grommet on the vessel lid (Fig. 5, (26)).
2. Tighten the nut.
3. Connect the cable to the controller (Fig. 4, (24)).



11.2.7 pH sensor



NOTICE

Carefully remove the pH sensor from the packaging.
Refer to the operating instructions for the pH sensor.

1. Push the sensor into the adapter holder of the vessel lid (Fig. 5, (27)).
2. Connect the cable to the controller (Fig. 4, (23)).

11.2.8 Pump cassette



NOTICE

Always check for the correct direction of flow.

Removing: Carefully turn the whole cassette counterclockwise.

Assembly: Insert the cassette into the holder at an offset and turn the pump carefully clockwise.

1. Attach one hose each (Fig. 2, (10 or 11)) to the input/output of the cassette.
2. Immerse the hose end of the input into the selected medium.
3. Attach the hose end of the output to a plug with grommet on the vessel lid (Fig. 5, (26)).



11.2.9 Motor

1. Insert the motor into the corresponding holder for the motor coupling on the vessel lid (Fig. 5, (25)).
2. Turn the motor until the motor coupling drill holes are visible and then hand tighten the locking screw.
3. Screw the motor cable to the motor. Connect the end to the controller (Fig. 3, (18)).



11.2.10 Mains socket



NOTICE

Refer to the Technical Data for further information.

The fuse located above the mains socket is replaceable (Fig. 3, (19)).

If a repair needs to be made, you can replace the fuse. If other problems occur, please contact our customer service (see chapter "17 Maintenance and cleaning").



11.2.11 Thermostat



NOTICE

Only use the permitted thermostats with the included PC 1.1 cable (scope of delivery).

Connect the thermostat to the controller (Fig. 3,(17)).



12 Operator panel and display

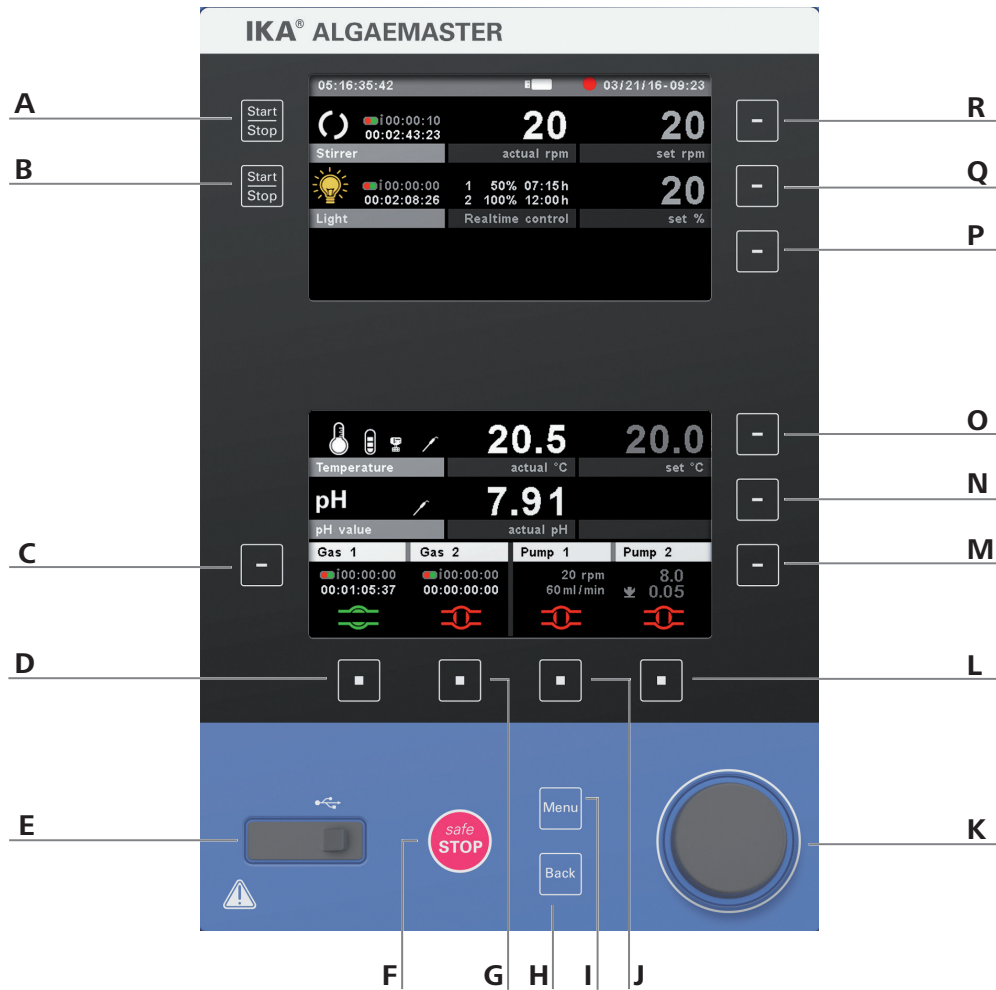


Fig. 8

| Pos. | Description | Functions on the working screen |
|------|---|---|
| A | "Start/Stop" key stirrer: | Start/Stop the stirring function |
| B | "Start/Stop" key LED panel: | Switch the light on/off (cannot be use in time-controlled mode) |
| C | Selection key for gas valve edit menu: | Open the edit menu for the gas valve |
| D | Selection key gas valve 1: | Open/close gas valve 1 |
| E | USB interface data export: | USB memory stick connection: exclusively for reading data |
| F | "safe/STOP" key: | Emergency key to stop all functions |
| G | Selection key gas valve 2: | Open/close gas valve 2 |
| H | "Back" key: | Back to previous menu level, deactivates edit mode |
| I | "Menu" key: | Open/close the main menu |
| J | Selection key pump 1: | Start/Stop pump 1 |
| K | Rotary/pressing knob: | For navigating through the menus, selection and changing settings |
| L | Selection key pump 2: | Start/Stop pump 2 |
| M | Selection key for pump edit menu: | Open the edit menu for the pump functions, selection of menu entries, selection of edit mode |
| N | Selection key for pH edit menu: | Open the edit menu for the pH functions, selection of menu entries, selection of edit mode |
| O | Selection key for thermostat edit menu: | Open the edit menu for the thermostat, selection of menu entries, selection of edit mode |
| P | Selection key for light edit menu: | No function on main screen |
| Q | Selection key for light edit menu: | Open the edit menu for the light functions, selection of menu entries, selection of edit mode |
| R | Selection key for stirrer edit menu: | Open the edit menu for the stirrer function selection of menu entries, selection of edit mode |

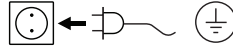
13 Commissioning

NOTICE

Assemble the Algaemaster 10 and all necessary accessories on a stable, even, non-slip surface.

The stirrer must always be securely fixed for safety reasons.

Prior to each use, always check the device and accessories for damage and proper assembly.



The power socket used must be earthed (protective earth conductor contact).

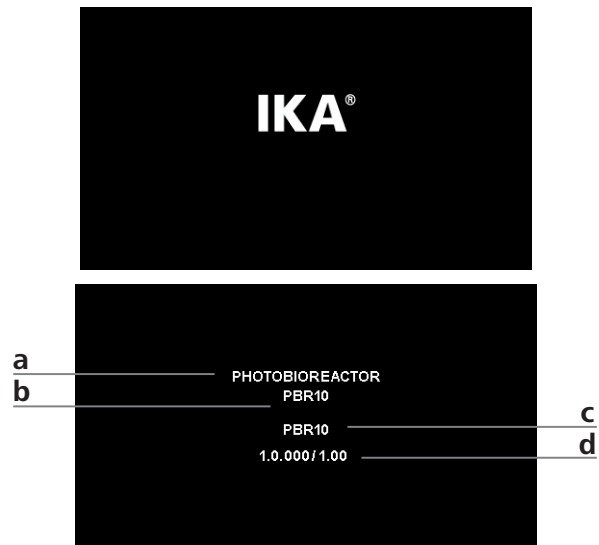
If these conditions are met, the device is ready for operating after plugging in the mains plug. If these procedures are not followed, safe operation cannot be guaranteed and/or the equipment may be damaged.

Observe the ambient conditions listed under "18 Technical Data".

After switching off via the main switch (Fig. 3, (19)), the device type, device designation, user-defined device name and the firmware version are shown in the display.

13.1 Start screen

| Pos. | Function | Name |
|------|--------------------------|-----------------|
| a | Device type | Photobioreactor |
| b | Device designation | Algaemaster 10 |
| c | User-defined device name | Algaemaster 10 |
| d | Firmware version | Display/Logik |



13.2 Firmware Update Tool

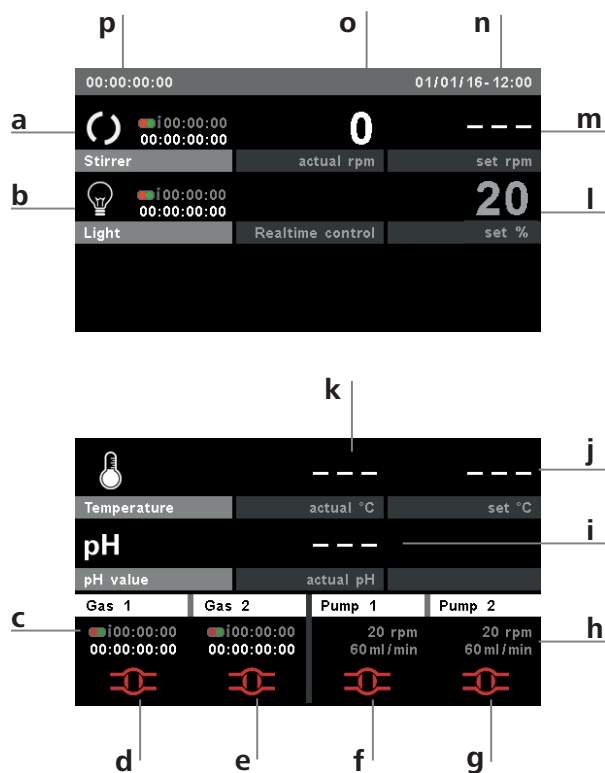
After the start screen, the information start screen for the Firmware Update Tool appears. You can use the tool to update the software of your IKA device to the latest version. Firmware updates contain new functions or optimisations of previous functions. You can download the Firmware Update Tool at www.ika.de/fut.



13.3 Working screen at the time of delivery:

After displaying the start screen and the Firmware Update Information, the working screen appears. The device switches to stand-by mode and is ready for operation.

| Pos. | Function | Description |
|------|--------------------|---|
| a | Stirrer | The symbol rotates when the stirrer is running. Time display for timer or counter (below) and interval mode (above). |
| b | Light | The symbol changes depending on the light status time display for the timer or interval mode (above) and counter (below). |
| c | Gas | Time display for timer and interval mode (above) and counter (below) for gas 1 and gas 2. |
| d | Gas valve 1 status | Displays whether gas valve 1 is closed (red) or open (green). |
| e | Gas valve 2 status | Displays whether gas valve 2 is closed (red) or open (green). |
| f | Pump 1 | Displays whether pump 1 has started (red) or stopped (green). |
| g | Pump 2 | Displays whether pump 2 has started (red) or stopped (green). |
| h | Pumps | Display of set values (rpm, ml/min, counter, timer). Settings are carried out in the pump edit menu. |
| i | Actual pH | Actual pH values. This is only correctly displayed when a pH sensor is connected to the device and activated in the pH settings in the main menu. |
| j | Set temperature | Displays the set temperature. A connected thermostat controls the temperature to this value. |
| k | Actual temperature | Displays the actual temperature. This is only displayed if a temperature sensor is connected to the device. The thermostat controls the temperature value through an external temperature sensor. |
| l | Set light | Set light intensity. |
| m | Stirrer speed | Set speed of stirrer. |

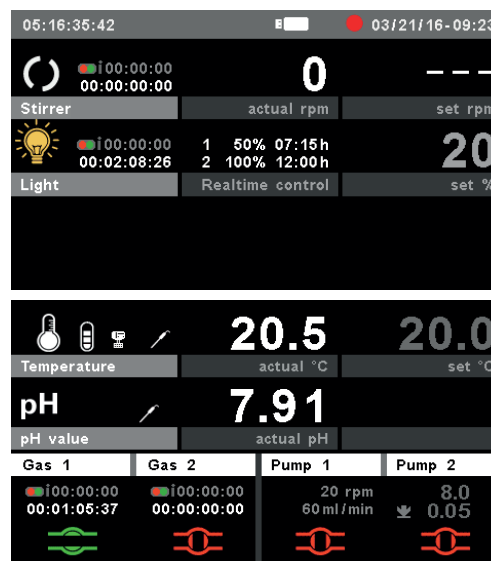


| | | |
|---|-----------------------|------------------------------------|
| n | Date and time | Date and time. |
| o | Actual stirrer speed | Displays the actual stirrer speed. |
| p | Timer/counter display | Displays the timer and counter. |

13.3.1 Explanation of symbols on the working screen

The symbols displayed vary depending on the status and settings of the device. The diagram below shows the most significant symbols on the working screen.

Using the rotary/pressing knob (K) you can enter the speed, light intensity and temperature on the working screen. Further setting options are available in the following sections.



**Bluetooth®:**

This symbol appears in the status bar when the Algaemaster 10 is connected via Bluetooth to another Bluetooth device (see chapter "15 Interfaces and outputs").

**USB interface data export:**

This symbol means the device is communicating via a USB cable.

**PC control:**

This symbol means that the device is connected to a computer and is being controlled from the computer. Manual entry is no longer possible.

**USB memory stick:**

This symbol is displayed when a USB memory stick is connected to the Algaemaster 10 and is recognised by the device.

**Measurement recording:**

This symbol is displayed during measurement recording.

**Motor activated:**

This symbol indicates the rotation status of the stirrer.

**Light status:**

This symbol displays whether the LED panels are switched off.



This symbol displays whether the LED panels are switched on.

**Thermostat:**

This symbol displays whether the LED panels are switched on.

**Thermostat filling level:**

This symbol indicates the current filling level of the connected thermostat.

**Sensor:**

This symbol appears when the external sensor (temperature sensor, pH sensor) is connected.



This symbol indicates that the corresponding function for pH control is being used (pH limit value and hysteresis).

**Pumps and valve status:**

This symbol displays whether a pump or gas valve has started or is open.



This symbol displays whether a pump or gas valve has stopped or is closed.

13.4 Menu navigation

**WARNING**

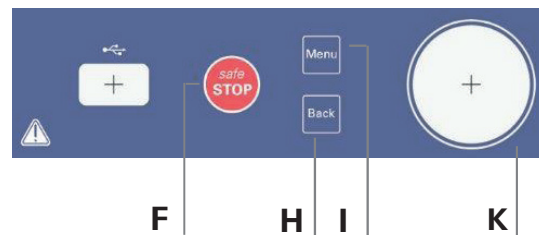
In an emergency the stirrer (station) can be switched off by pressing the "safe/STOP" button (Fig. 8, (F)).

**NOTICE**

On the display, the active menu option is highlighted in blue. In an emergency the stirrer (station) can be switched off by pressing the "safe/STOP" button (Fig. 8, (F)).

- Press the "Menu" key (I).
- Select the menu by turning the rotating/pressing knob (K) to the right or left to select the desired menu or sub-menu, which can then be selected by pressing the rotating/pressing knob (K).
- Push or turn the rotating/pressing knob (K) again to select the desired menu option and edit the values or settings, or activate/deactivate a function.
- Turn the rotating/pressing knob (K) on "OK" or press the "Back" key (H) to end the procedure and return to previous menu or working screen.

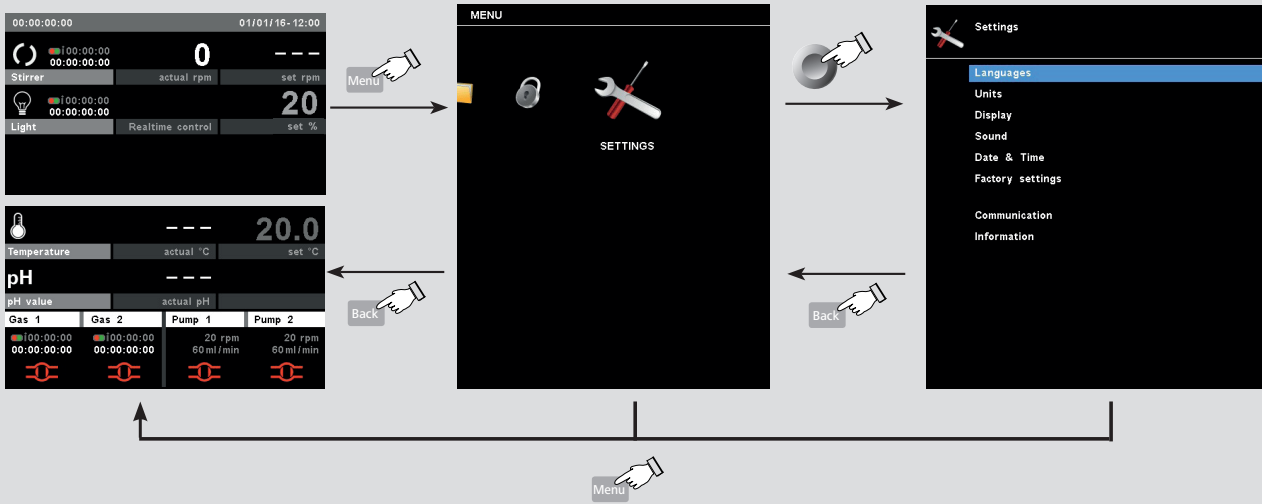
Navigation controls in the menu



Picture section Fig. 8.

Menu navigation:

- ➔ Press the "Menu" key (Fig. 8, (I)) and rotate rotating/pressing knob (Fig. 8, (K))
- ➔ If you press the „Back" key (Fig. 8, (H)) or the „Menu" key (Fig. 8, (I))



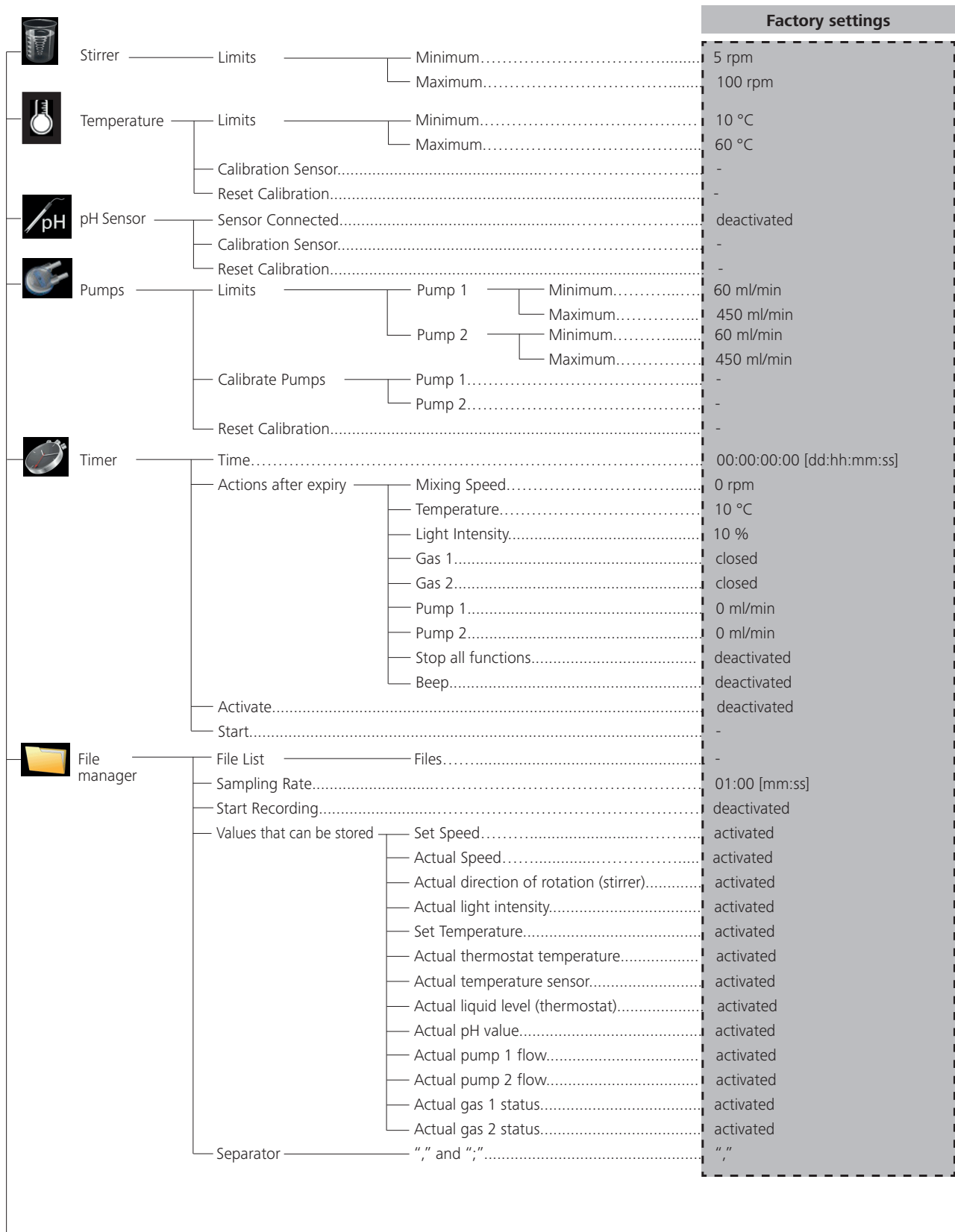
Note: If you press the "Menu" key (I), the system skips directly back to the working screen.
If you press the "Back" key (H), the system skips back to the previous display.



Edit modus








13.5 Menu structure:

13.5.1 Main menu



| | | Factory settings | | |
|--|-------------------------|----------------------------------|----------------------|---------------|
|  Security | Password | 000 master password: 111 | | |
| | | Exceeding the time | Time | 00:30 [mm:ss] |
| | Actions After Expiry | | Mixing Speed | activated |
| | | | Temperature | 10 °C |
| | | | Light Intensity..... | 10 % |
| | | | Gas 1..... | deactivated |
| | | | Gas 2..... | deactivated |
| | | | Pump 1..... | 0 ml/min |
| | Pump 2..... | | 0 ml/min | |
| | Stop all functions..... | deactivated | | |
| Activate..... | activated | | | |
|  Settings | Languages | English..... | activated | |
| | | German..... | deactivated | |
| | | | deactivated | |
| | Units | Temperature | °C | activated |
| | | | °F | deactivated |
| | Display | Brightness..... | 100 % | |
| | | Firmware Update Information..... | activated | |
| | Sound | Volume..... | 100 % | |
| | | Key Tone..... | activated | |
| | Date & Time | Date..... | 01/01/16 [mm:dd:yy] | |
| | | Time..... | 12:00 [hh:mm] | |
| | Factory Settings..... | - | | |
| | Communication | Device Name..... | Algaemaster 10 | |
| | | Bluetooth®..... | deactivated | |
| | Information | Firmware Update Tool..... | - | |
| Display 1 Version..... | | - | | |
| Display 2 Version..... | | - | | |
| Logic Version..... | | - | | |

13.5.2 Edit menu (working screen)

| | | Factory settings | | |
|---|---|---------------------------------------|---------------------------|---------------------------|
|  | Stirrer | Direction (CW/CCW)..... | CW | |
| | | Activate Timer..... | deactivated | |
| | | Time..... | 00:00:00:00 [dd:hh:mm:ss] | |
| | | Interval Mode..... | deactivated | |
| | | Interval Mode (CW/CCW, run/stop)..... | CW/CCW | |
| | | Time 1..... | 00:00:00 [hh:mm:ss] | |
| | Time 2..... | 00:00:00 [hh:mm:ss] | | |
|  | LED Panels | Activate Timer..... | deactivated | |
| | | Time..... | 00:00:00:00 [dd:hh:mm:ss] | |
| | | Interval Mode..... | deactivated | |
| | | Time 1..... | 00:00:00 [hh:mm:ss] | |
| | | Time 2..... | 00:00:00 [hh:mm:ss] | |
| | | Real Time..... | .. | |
|  | Temperature | Tempering..... | deactivated | |
|  | pH Sensor | Pump 1 | pH Control..... | deactivated |
| | | | Limit..... | 7.0 |
| | | | Action..... | above |
| | | Hysteresis..... | 0.05 | |
| | | Pump 2 | pH Control..... | deactivated |
| | | | Limit..... | 7.0 |
| | Action..... | | above | |
| | Gas 1 | pH Control..... | deactivated | |
| | | Limit..... | 7.0 | |
| | Gas 2 | pH Control..... | deactivated | |
| | | Limit..... | 7.0 | |
| |  | Pumps | Pump 1 | Flow Speed..... |
| Activate Timer..... | | | | deactivated |
| Time..... | | | | 00:00:00:00 [dd:hh:mm:ss] |
| Interval Mode..... | | | | deactivated |
| Time 1..... | | | | 00:00:00 [hh:mm:ss] |
| Time 2..... | | | | 00:00:00 [hh:mm:ss] |
| Pumpe 2 | | Flow speed..... | 60 | |
| | | Activate Timer..... | deactivated | |
| | | Time..... | 00:00:00:00 [dd:hh:mm:ss] | |
| | | Interval Mode..... | deactivated | |
| | | Time 1..... | 00:00:00 [hh:mm:ss] | |
| | | Time 2..... | 00:00:00 [hh:mm:ss] | |
| Gas | Gas 1 | Activate Timer..... | deactivated | |
| | | Time..... | 00:00:00:00 [dd:hh:mm:ss] | |
| | | Interval Mode..... | deactivated | |
| | Gas 2 | Activate Timer..... | deactivated | |
| | | Time..... | 00:00:00:00 [dd:hh:mm:ss] | |
| | | Interval Mode..... | deactivated | |

13.6 Menu (Details):

13.6.1 Main menu (Explanation of functions)



Stirrer

Pressing the rotary/pressing knob (K) starts and stops the stirrer function. The speed can be set during operation.

Interval modus:

The menu allows the user to activate the „run/stop“ and „CW/CCW“ function. The operating and stop times can be separately configured.

The mode “run/stop” allows the stirrer to run clockwise during time 1 and stops the stirrer during time 2.

The mode “CW/CCW” allows the stirrer to run clockwise during time 1 and counterclockwise during time 2.

Speed limit:

The menu allows the user to set the desired maximum upper speed limit for the stirrer. The factory setting corresponds to the maximum permitted speed of the stirrer. If the limit is changed, then the speed can only be selected within the set range.



Temperature

Temperature limit:

The factory setting corresponds to the maximum permitted temperature of the device. If the limit is changed, then the value can only be selected within the set range.

Calibration:

In chapter “14 Operation, Calibration” you can calibrate the external temperature sensor.

Reset calibration:

This option is used to reset the temperature measuring reference value.



pH sensor

This menu allows the user to carry out settings for the pH control. The gas valves and pumps can supply the corresponding gases of liquids to the reactor container of the Algaemaster 10 in order to change the pH value.

Connect sensor:



The pH sensor is not automatically detected by the controller. Connection is carried out manually in the menu.

Calibration:

The pH sensor must be calibrated before starting a pH measurement.

In chapter “14 Operation, Calibration” you can calibrate the pH sensor.

Reset calibration:

This option is used to reset the pH measuring reference value.



Pumps

Pump limits:

By changing the limits, the set value of the flow for the pumps can be set within the limit range.

Calibration:

In chapter “14 Operation, Calibration” you can calibrate the pumps.

Reset Calibration:

This option is used to reset the pump measuring reference value.



Timer

Time:

The set time indicates how long the timer should run.

Actions after expiry:

This setting defines which functions should be carried out after the time has expired.

Activate:

Ticking the “Activate” box switches the timer on. If the function remains inactive, the counter is automatically active.

Start/Stop:

Ticking the box starts/stops the timer. The set time is displayed in the status bar of the working screen.



File manager

In this menu, you can manage the measuring files stored internally. For further information, see chapter “14 Operation, File manager”.



Safety

Password:

In the “Password” menu, the menu settings can be locked by a 3-digit password (Factory settings: 000).



Settings

Languages:

The “Languages” option allows the user to select the desired language by turning and pressing the rotary/pressing knob (K). A tick indicates the language that is set for the system.

Units:

Here you can specify the measuring units for the temperature values in °C or °F. A tick indicates the unit that is set for the system.

Display:

The “Display” option allows the user to change the background color and brightness of the working screen.

Ticking the “Firmware Update Info” box, an info screen for the Firmware Update Tool is displayed when the device is started.

Sound:

The “Sound” option allows the user to activate/deactivate the key-press sound and to set the volume.

Date and time:

This menu allows the user to carry out settings for the date and time.



If the Algaemaster 10 is switched off, the details for the date and time are stored for a maximum of six weeks.

Factory Settings:

Select the "Factory Settings" option by turning and pressing the rotary/push knob. The system requests confirmation to recreate the factory settings. Pressing the "OK" button resets all the system settings to the original standard values set at dispatch from the factory (see chapter „13.5 Menu structure“).

Communication:

In the "Settings: communication, device name" menu, you can enter individual names for the devices. The names appear on the start screen after switching on the device.

When using multiple devices with different settings, giving the devices a name can be useful. It helps with identification and communication, for example, with a PC via USB interfaces, RS 232 and Bluetooth (see chapter "15 Interfaces and outputs").

Informationen:

The "Information" option offers the user an overview of the most important system settings of the Algaemaster 10.

Timer

The timer functions and the interval modes are available in the following menus:

| Device | Timer | Functions in interval mode |
|-------------|-------|----------------------------|
| Stirrer | yes | start/stop oder CW/CCW |
| LED panel | yes | on/off |
| Temperature | - | - |
| pH sensor | - | - |
| Pumps | yes | start/stop, |
| Gas | yes | open/close |

General timer functions

Activate timer: The set time starts as soon as you exit the menu.
After the time has expired the functions that were running also stop.

Interval mode:

| | |
|--------|--|
| CW | Clockwise |
| CCW | Counterclockwise |
| Time 1 | Indicates how long the status of function 1 is switched on and function 2 is switched off. |
| Time 2 | Indicates how long the status of function 2 is switched on and function 1 is switched off. |

The set time 1 with corresponding function starts as soon as you press the "Start" button.



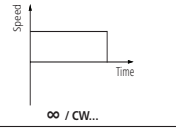


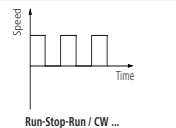


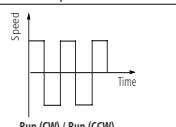
After time 1 has expired, the function stops and time 2 begins to run with the corresponding function.

After time 2 has expired, time 1 starts again with the corresponding function.

If a timer and interval mode is set at the same time, the interval mode ends when the timer has expired. If interval mode is only activated, without the timer being active, then interval mode must

be ended manually.

Interval mode example for stirrer:

| Symbol rotation direction | Chuck rotation direction | Graph | |
|---|--|--|---|
|  CW |  |  | Factory setting: continuous mode ∞ / CW... |
|  CW |  |  | Function "run/stop" activated: The run time and stop time can be set separately. Run-Stop-Run / CW ... |
|  CW/CCW |  |  | Function "CW/CCW" activated: The clockwise and counterclockwise running time can be set independently. Run (CW) / Run (CCW) ... |

13.6.2 Edit menu (working screen, explanation of functions)



The menu option activated is highlighted blue in the display. If a setting is in edit mode, this is highlighted in yellow and can be changed.

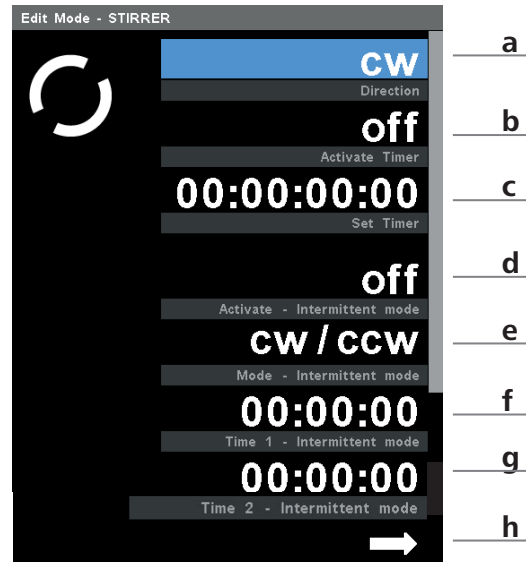
In the working screen you can carry out further settings for the functions.
Select the different selection buttons (Fig. 8) for the corresponding function.

By turning the rotary/pressing knob (K) you can scroll through the individual functions. By pressing the rotary/pressing knob (K) you can select the function and make further edits with the selection button (Fig. 8).

Stirrer

Select the selection button (R) on the main screen (Fig. 8).

| Pos. | Menu | Selection |
|------|------------------------------------|--|
| a | Stirrer direction | Rotational direction for the stirring procedure |
| b | Stirrer direction | On/Off |
| c | Time setting of timer | Setting the time |
| d | Activate interval | On/Off |
| e | Stirring operation during interval | Start/stop or CW (clockwise)/ CCW (counterclockwise) |
| f | Time 1 | Setting the time 1 (interval) |
| g | Time 2 | Setting the time 2 (interval) |
| h | Menu details for stirrer | Main menu for stirrer (see chapter "13.6 Menu details, main menu") |



LED panels

Time control:

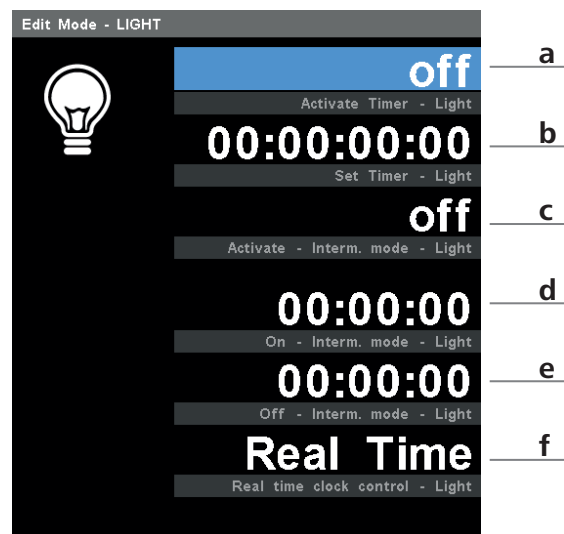


In time-controlled mode it is not possible to manually change the light.

The time control is used to set the light intensity in relation to the time.

Select the selection button (Q) on the main screen (Fig. 8).

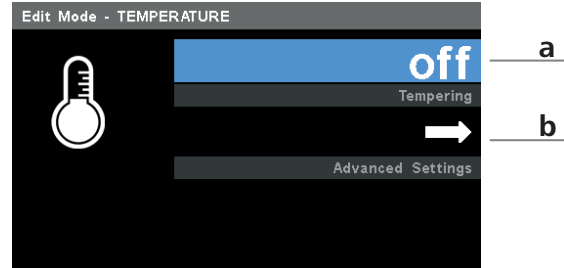
| Pos. | Menu | Selection |
|------|-----------------------|-------------------------------|
| a | Activate timer | On/Off |
| b | Time setting of timer | Setting the time |
| c | Activate interval | On/Off |
| d | Time 1 | Setting the time 1 (interval) |
| e | Time 2 | Setting the time 2 (interval) |
| f | Real Time | Time setting for light |



Temperature

1. You can control the temperature in conjunction with an **IKA** thermostat.
2. Once you have connected the thermostat to the controller (PC 1.1 cable included), select the selection button (O) on the main screen (Fig. 8).

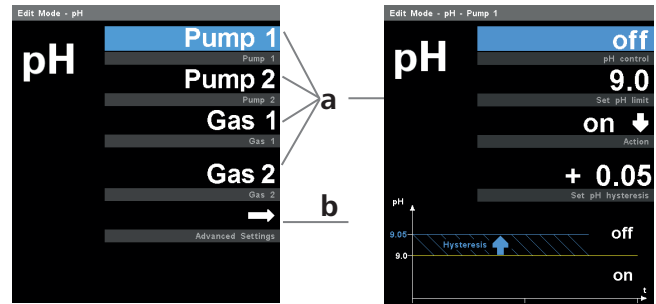
| Pos. | Menu | Selection |
|------|------------------------------|--|
| a | Temperature control | On/Off |
| b | Menu details for temperature | Main menu for temperature (see chapter "13.6 Menu details"). |



pH value control

Select the selection button (N) on the main screen (Fig. 8). The graph below in the menu shows your limits/hysteresis.

| Pos. | Menu | Selection | | | | |
|-------------------------------------|--|---|-------------------------------------|--|--------------------------|--|
| a | Setting for pumps and gas | <p><u>Activate pH value control:</u> On/Off: Uses the pump or gas valve for the pH control.</p> <p><u>Other options:</u></p> <ul style="list-style-type: none"> • Limit • Action on: <table border="1"> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td>Value below limit: - Valve open, pump starts Value above limit: - Valve close, pump stops</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Value below limit: - Valve close, pump stops Value above limit: - Valve open, pump starts</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Hysteresis | <input checked="" type="checkbox"/> | Value below limit: - Valve open, pump starts Value above limit: - Valve close, pump stops | <input type="checkbox"/> | Value below limit: - Valve close, pump stops Value above limit: - Valve open, pump starts |
| <input checked="" type="checkbox"/> | Value below limit: - Valve open, pump starts Value above limit: - Valve close, pump stops | | | | | |
| <input type="checkbox"/> | Value below limit: - Valve close, pump stops Value above limit: - Valve open, pump starts | | | | | |
| b | Menu details pH | Main menu pH (see chapter "13.6 Menu details") | | | | |



Pumps

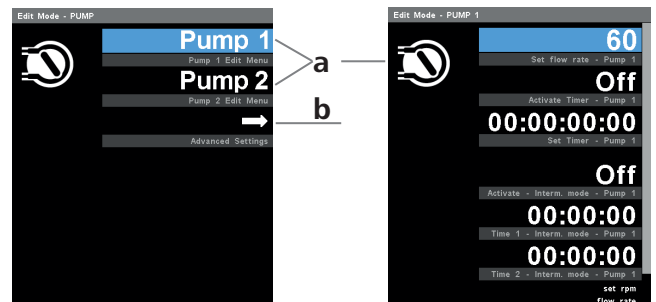


NOTICE

In the working screen, you can switch the pumps with selection buttons pump 1 (J) and pump 2 (L) on/off.

Select the selection button (M) on the main screen (Fig. 8).

| Pos. | Menu | Selection |
|------|--------------------------------|---|
| a | Settings for pump 1 and pump 2 | <p><u>Target value for flow speed:</u> Set target value for the flow speed of the current pump.</p> <p><u>Activate timer:</u> On/Off <u>Timer:</u> Setting the time</p> <p><u>Activate interval:</u> On/Off</p> <p><u>Time 1:</u> Setting the time 1 (interval) <u>Time 2:</u> Setting the time 2 (interval)</p> <p><u>Displayed values:</u> The set values are displayed in the working screen.</p> <ul style="list-style-type: none"> • Timer, interval and speed or • Timer, interval and flow speed |
| b | Menu details for pumps | Main menu for pumps (see "13.6 Menu details") |

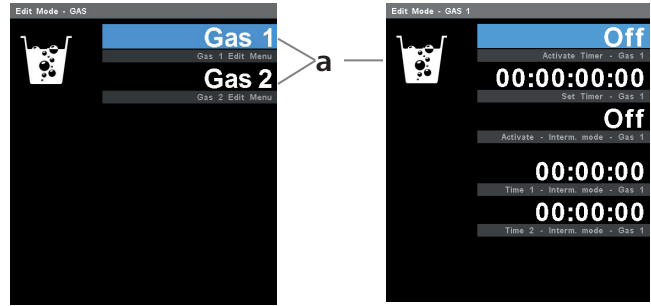




NOTICE In the working screen, you can switch the gas with selection buttons gas 1 (D) and gas 2 (G) on/off.

Select the selection button (C) on the main screen (Fig. 8).

| Pos. | Menu | Selection |
|------|------------------------------|--|
| a | Settings for gas 1 and gas 2 | Activate timer: On/Off Timer: Setting the time Activate interval: On/Off Time 1: Setting the time 1 (interval) Time 2: Setting the time 2 (interval) |



14 Operation

14.1 Calibration



WARNING In an emergency the stirrer (station) can be switched off by pressing the "safe/STOP" button (Fig. 8, (F)).



NOTICE Observe to comply with all safety instructions, correct set up and assembly of the accessory parts.

14.1.1 pH sensor



NOTICE To complete the calibration, use buffer solutions in accordance with DIN 19266.

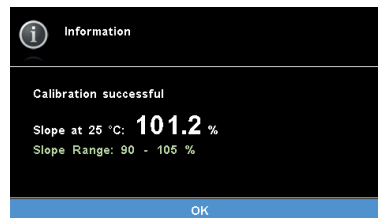
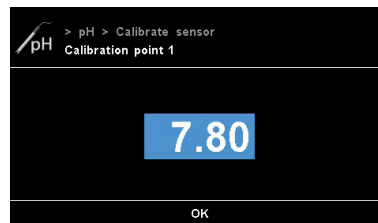
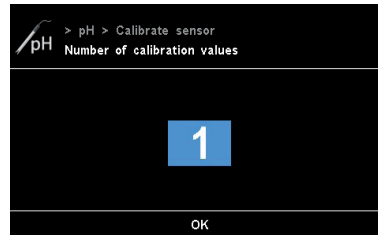
A pH calibration can only be carried out with an inserted pH sensor. (section "8.1 Setting up").

Regularly recalibrate the device.

Calibration is used to adjust the pH sensor and the device so that they work together correctly. The pH sensor to be calibrated is immersed in a medium, whose pH value is known. As part of the process, the neutral and pH gradient are specified for the measurement chain.

The pH value of the buffer solution remains constant and is referred to as the calibration value.

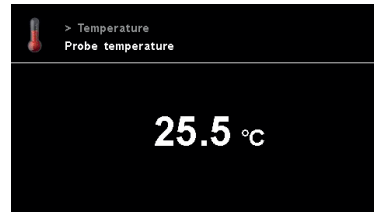
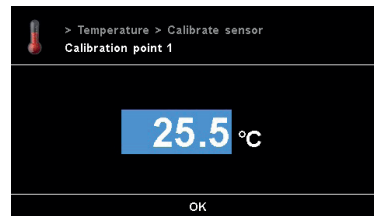
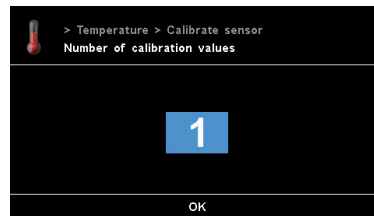
1. Immerse the pH sensor into the desired buffer solution.
2. Select "pH" in the main menu.
3. Activate the tickbox "Connect pH sensor".
4. Then select "Calibrate sensor".
5. Enter the number of calibration points (max. 3 calibration points).
6. Turn the rotary/pressing knob (K) to "OK" and confirm the entry by pressing.
7. Immerse the pH sensor into the reactor container and determine the water temperature.
8. Enter the measured pH value (calibration value) of the reference measuring device or the pH value of the buffer solution
9. Press "OK" to confirm the calibration value and to complete the calibration process.
10. In the following info screen you will receive information about the steepness of the sensor.
11. Press "OK" to return to the pH menu.



14.1.2 Temperature sensor

The principle of calibrating the temperature sensor is that the sensor to be calibrated and a reference probe are immersed in the same medium. The medium e.g. water has a constant temperature. The temperature of the water is measured by the reference sensor and used as a calibration value.

1. Fill the reactor container with (salt) water (approx. 500 ml)
2. Select "Temperature" in the main menu.
3. Then select "Calibrate sensor".
4. Enter the number of calibration points.
5. Confirm with "OK".
6. Immerse the temperature sensor into the reactor container. Then determine the water temperature.
7. In the upper display, enter the measured temperature value (calibration value) of the reference measuring device. The lower display shows the actual measured temperature of the sensor.
8. Press "OK" to confirm the calibration value and to end the calibration. You will then return to the temperature menu.



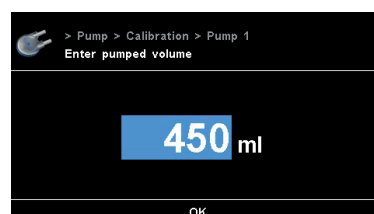
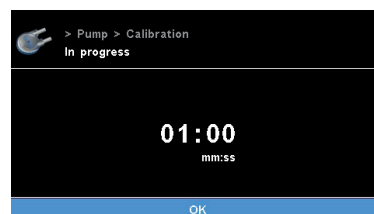
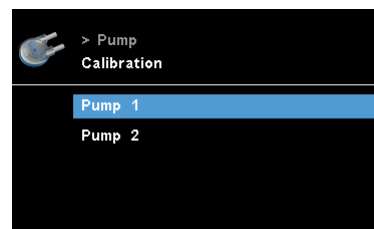
14.1.3 Pumps

The pumps to be calibrated must pump water from a filled vessel 1 into an empty vessel 2 for a period of one minute. The pumped volume is referred to as a calibration value.

NOTICE Vessel 2 must at least correspond to the volume of the filled vessel 1.

| Menu | Description |
|-----------------------------|--|
| Target value for flow speed | Set target value for the flow speed of the current pump. |
| Displayed values | The set values are displayed in the working screen. |

1. Fill vessel 1 with water (approx. 500 ml)
2. Install the pump input and pump outputs on each hose. (section "8.1 Setting up").
3. Immerse the hose end of the pump input into vessel 1 filled with water.
4. Insert the hose end of the pump output into the empty vessel 2.
5. Select "Pumps" in the main menu.
6. Then select "Calibrate pumps".
7. Select the pump to be calibrated.
8. Turning the rotary/pressing knob (K) to "OK" starts the pump process for a period of one minute (this cannot be changed). The hose at the pump input must always be under water during the calibration.
9. After one minute the pump stops. Measure the volume of water pumped from vessel 2.
10. Enter the calibration value.
11. Press OK to confirm the calibration value and to end the calibration. You will then return to the pump menu.



14.2 File manager



NOTICE

Ensure that there is sufficient free storage space.

You can select several files at the same time.

The files are output to .csv format.

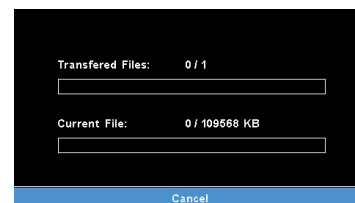
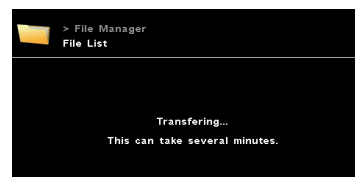
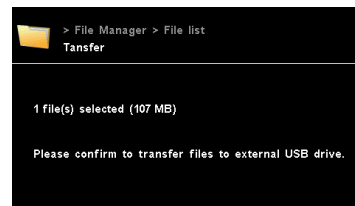
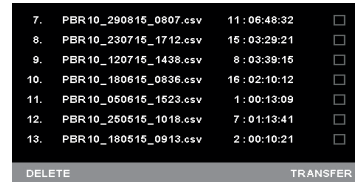
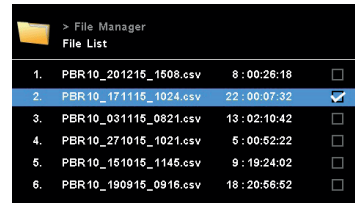
14.2.1 Save files

Via the USB interface data export on the front (Fig.2, (8)) of the Algaemaster 10 it is possible to transfer internally saved measurements to an external USB memory stick.

| Menu | Description |
|--------------------|--|
| File list | The file list shows all the saved measurement files stored in the internal memory. |
| Set sampling rate | This setting indicates how often the measured values are to be saved. High sampling rates of a few seconds increase the file size of the measurement file. |
| Start recording | Ticking the checkbox of the rotary/pressing knob starts the measurement recording. Pressing it again stops the measurement recording. |
| Saved values | In this setting, values can be defined which should be saved during a measurement. Reducing the values to be saved lowers the file size of the measurement file. Press the "Back button" (H) to return to the main menu. |
| Memory information | This entry contains information about the total size of the internal memory as well as the current memory available. |
| Separator | Delineation of multiple values within the .csv file with "," (comma) or ";" (semicolon). |

1. Insert a USB memory stick with sufficient memory into the USB interface (Fig .2, (6)).
 2. Select "File manager" in the main menu.
 3. Then select "File list".
 4. Using the rotary/pressing knob (K) navigates you to the desired measurement. Selection is made by pressing it.
 5. Press the selection button (L) to select the data transfer. The total size of the file selected is then displayed.
 6. Pressing the "Confirm" selection button (L) again starts the transfer. You will then return to the file manager menu.
- To cancel the process, press the "Cancel" button. You will return to the file list and can re-select your file.

The duration of the file transfer depends on the total size of the file selected. The file transfer can take several minutes.



14.2.2 Delete file

Files which are no longer required can be deleted using the file manager.

1. Select "File manager" in the main menu.
2. Then select "File list".
3. Using the rotary/pressing knob you can scroll to the desired measurement. Selection is made by pressing it.

4. Press the "Delete" selection button (D).
5. The total size of the file selected is then displayed.
6. Pressing the "Confirm" selection button (L) again starts the delete process. You will then return to the file manager menu.

15 Interfaces and outputs



NOTICE

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

Firmware updates can be transferred using the "Firmware Update Tool".

The RS 232 interface is equipped with a 9-pole SUB-D jack and is located on the rear of the device. The pins are assigned serial signals.

The USB interface communication and the RS 232 interface communication PC allow connection to the PC.

RS 232 interface communication PC

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.

USB interface communication

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.

First, download the latest driver for **IKA** devices with USB interface from <http://www.ika.com/ika/lws/download/usb-driver.zip> and install the driver by running the setup file. Then connect the **IKA** device through the USB data cable to the PC.

Bluetooth®

Using your device (e.g. PC or tablet) you can scan the environment around you for available Bluetooth devices. Bear in mind that the maximum range for Bluetooth devices can be restricted indoors. For optimum communication the Algaemaster 10 should be located within sight. Walls or furniture can restrict the connection between the Algaemaster 10 and end device.

IKA devices are generally identifiable by the Bluetooth names which are followed by the device ID „IK @“.

Individual devices can be identified by user-defined names of the device, which is followed by the device identifier.

Example:

"IK@102Labor01"

IK@ = device identifier **IKA** device (specified)

102 = security number (specified)

Labor01 = user-defined name

Setting a user-defined name:

1. In the main menu, select "Settings", "Communication", "Device name".
2. Enter a name.
3. Select "OK".

Connect Algaemaster 10 using Bluetooth:

1. In the main menu, select "Settings", "Communication", "Bluetooth".
2. Select the device from the list of available Bluetooth devices. The pairing process starts.
Caution: If a pin code is required, enter "0000" (without quotation marks).
3. After a short period the Algaemaster 10 and your end device will be connected.

PC commands

For communication with the Algaemaster 10, a separate, detailed description of communication commands are available, which you can download from our homepage.

16 Error codes

Any malfunctions during operation will be identified by an error message on the display. Proceed as follows in such cases:

1. Switch off device using the main switch at the back of the device
2. Carry out corrective measures
3. Restart device

| Error code | Description | Effect | Causes | Solutions |
|----------------|------------------------------|---|---|---|
| Error 2 | RS 232 Communication Error | Watchdog time elapsed. | Watchdog was set. Unstable connection. Connection lost. | Check the LWS setting. Check the PC tools. Check the connection. |
| | Internal Communication Error | Internal Watchdog elapsed. | Communication lost between logic board and display board. | Restart device (unplug mains cable, plug in mains cable). Check communication between logic board and display board. |
| | USB Communication Error | Watchdog time elapsed. | Watchdog was set. Unstable connection. Connection lost. | Check the LWS setting. Check the PC tools. Check the connection. |
| Error 3 | Temperature Error | Temperature probe position isn't ok. | Temperature probe position isn't ok | Check position of temperature probe. |
| Error 4 | Stirrer is blocked | No stirrer rotation. | Stirrer is blocked. | Unblock stirrer. |
| Error 6 | Device Temperature Error | Analysis of internal PCB temp. Sensor. Inside temperature reaches limit value. | Room temperature >40 °C PCB or valve is broken. | Switch off device for cool down. Call service department. |
| Error 7 | Temperature Is Too High | Measured temperature is too high. Temperature is higher than maximum value. | Medium temperature is too high. Sensor is broken. | Check the medium temperature. Call service department. |
| Error 8 | Temperature Is Too Low | Measured temperature is too low. Temperature is lower than minimum value. | Medium temperature is too low. Sensor is short connected. | Check the medium temperature. Call service department. |
| Error 9 | EEPROM Error | Read or write internal storage error. | Read or write internal storage error. | Call service department. |

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.

17 Maintenance and cleaning



NOTICE

Remove the motor.



Remove the device from the mains before cleaning.

- Wear protective gloves during cleaning the instruments.
- Electrical instruments may not be placed in the cleansing agent for the purpose of cleaning.
- Do not allow moisture to get into the instrument 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 instrument.
- The only cleaners or disinfectants that may be used are those that:
 - Lie in the pH range 5 - 8,
 - Contain no corrosive alkalis, peroxides, chlorine compounds, acids or brine.
 - All product contacting components are suited for cleaning in the laboratory dish washers.

Only clean **IKA** appliances using these **IKA** approved cleaning agents.

| Dirt | Cleaning agent |
|--------------------|---|
| Dyes | Isopropanol |
| Building materials | Water containing detergent, Isopropanol |
| Cosmetics | Water containing detergent, Isopropanol |
| Food | Water containing detergent |
| Fuels | Water containing detergent |
| Other materials | Please consult IKA |

Spare parts order:

When ordering spare parts, please give:

- machine type
- serial number, see type plate
- item number and designation of the spare part see www.ika.com, spare parts diagram and spare parts list.
- Software version.

Repair:

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

For repairing, please request the **"Decontamination Certificate"** from **IKA**, or download the printout of it from the **IKA** website www.ika.com.

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

18 Technical data

General

| | | |
|---|----|-----------|
| Permissible Ambient temperature (min.) | °C | 5 |
| Permissible Ambient temperature (max.) | °C | 40 |
| Permissible relative humidity | % | 80 |
| Setup area controller (B x T) | mm | 210 x 400 |
| Setup area reactor vessel with 2 LED panels (B x T) | mm | 550 x 340 |

Reactor vessel

| | | |
|---|---------------------|------------------------|
| Dimensions (Ø x H) | mm | 340 x 540 |
| Weight | kg | 14 |
| Design type | | Double jacket |
| Base outlet | | no |
| Flange | DIN 12214 | DN 200 |
| Connections for temperature control, inflow and outflow | DIN 168 | GL 18 |
| Material | DIN ISO 3585 | Borosilicate glass 3.3 |
| Usable volume min. | ml | 6000 |
| Usable volume max | ml | 10000 |
| Usable volume with temperature sensor/ pH sensor min. | ml | 6000 |
| Cooling medium temperature min. | °C | 4 |
| Cooling medium temperature max. | °C | 60 |
| Cooling medium pressure max. | bar | 0.5 |
| Dimensions (Ø x H) | mm | 260 x 450 |

Reactor lid

| | | |
|---|------|--|
| Material | | PEI (Ultem 100) |
| Flange seal | | NBR O-ring 215.27 x 5.33 |
| Connections | | 8 x 1/2" NPT threaded holes 1 x M25 x 1.5 threaded holes 1 x motor coupling, central |
| Sealing plugs and grommets, 1/4" NPT | | PTFE |
| pH sensor adapter M25 x 1.5 <-> PG 13.5 | | PEI (Ultem 100) |
| Stirrer shaft | mm | Ø12, L380 |
| Stirrer | mm | Ø100, propeller, 2x |
| Stirrer shaft material, stirrer | | PTFE |
| Viscosity max. | mPas | 100 |

Base plate

| | | |
|--------------------|----|----------|
| Dimensions (Ø x H) | mm | 340 x 30 |
| Material | | POM |

Stirrer drive

| | | |
|----------------------------|-------|----------|
| DC motor | V | 24 |
| Speed min. | rpm | 10 |
| Speed max | rpm | 100 |
| Speed variation | ± rpm | 5 |
| Permissible operating time | % | 100 |
| Dimensions (Ø x H) | mm | 60 x 280 |
| Weight | kg | 2.6 |

Controller

| | | |
|---|---------------|---|
| Voltage | V | 100-240 |
| Frequency | Hz | 50/60 |
| Protection class according to DIN EN 60529 | | IP 21 |
| Colour TFT display | | 2x frontside |
| Colour TFT display | | 2x T4A 250V |
| Dimensions (B x T x H) | mm | 210 x 400 x 440 |
| Weight | kg | 12.5 |
| Temperature measurement | | |
| Measuring range | °C | 0-100 |
| Temperature measurement resolution | K | 0.1 |
| Connection for external temperature sensor | | IKA PT 100.XX with Lemo connector plug |
| pH value measurement | | |
| Measuring range | pH | 0-13 |
| pH measurement resolution | pH | 0.01 |
| Connection for pH sensor | | BNC |
| Interfaces-data | | |
| USB 1.0/2.0 - type A socket, data transfer USB stick | | Frontside |
| USB 1.0/2.0 - type B socket, PC control | | Backside |
| RS 232 PC control | | Rear, 9-pin socket |
| RS 232 thermostat control | | Rear, 9-pin plug |
| Gas connections | | |
| Inlet | | 2x hose adapters, backside |
| Outlet | | 2x hose adapters, above |
| Hose adapter Ø | mm | 6 |
| Inlet pressure max. | bar | 1 |
| Max. flow rate | ml/min | 300 |
| Connections for liquids | | |
| Hose pump | | 2x front panel |
| Hose adapter Ø | mm | 6.5 |
| Hose adapter Ø | ml/min | 450 |

LED panels

| | | |
|------------------------|-----------|-----------------|
| Colour temperature | K | 6000-6500 |
| Dimensions (B x T x H) | mm | 220 x 160 x 380 |
| Weight | kg | 3.5 |

Subject to technical changes!

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