



designed for scientists

HABITAT cell

HABITAT photo cell

HABITAT cell cct

HABITAT photo cell cct

HABITAT cell vessel

0.5 L sw

0.5 L dw

1 L sw

1 L dw

2 L sw

2 L dw

5 L sw

5 L dw

10 L dw

3.2 L su sw

HABITAT ferment

HABITAT photo ferment

HABITAT ferment cct

HABITAT photo ferment cct

HABITAT ferment vessel

0.5 L dw

1 L dw

2 L sw

2 L dw

5 L sw

5 L dw

10 L dw

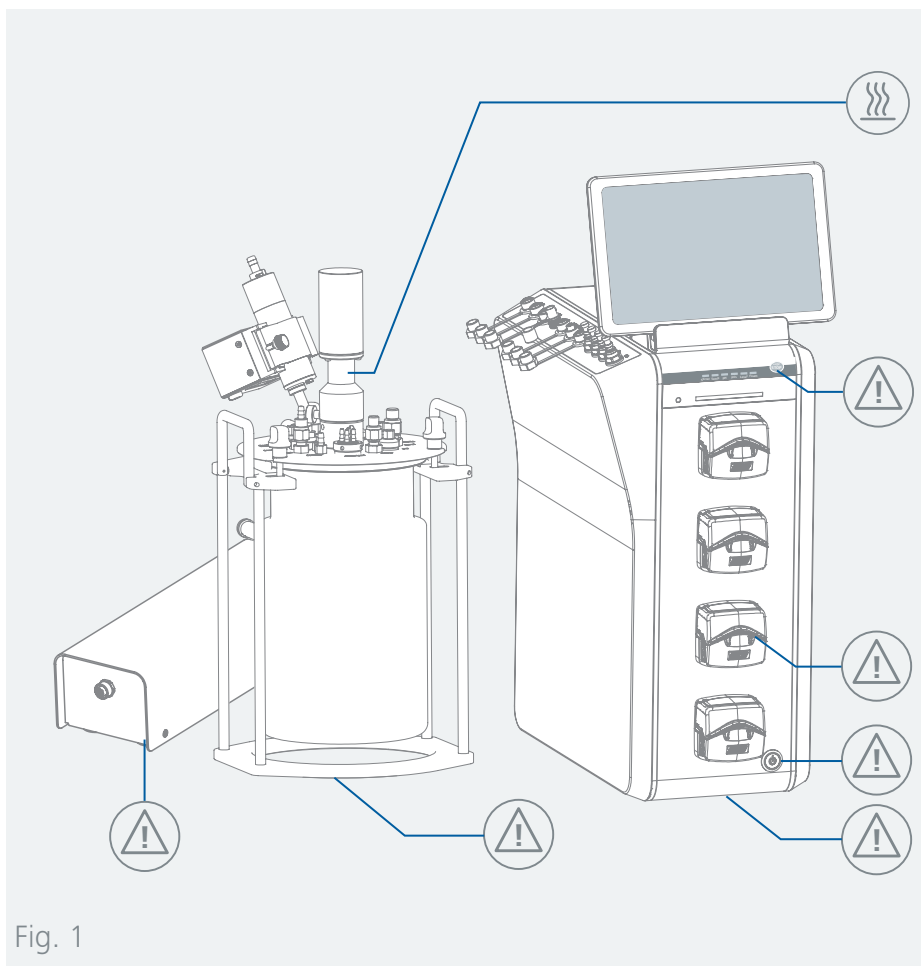


Fig. 1

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EU Declaration of conformity

We declare under our sole responsibility that this product corresponds to the directives 2014/35/EU, 2006/42/EC, 2014/30/EU and 2011/65/EU and conforms with the following standards or normative documents: EN 61010-1, EN 61010-2-051, EN 61326-1, EN 60529 and EN ISO 12100. A copy of the complete EU Declaration of Conformity or further declarations of conformity can be requested at sales@ika.com.



Explication of warning symbols

/// Warning symbols

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

/// General Symbols

-  **A** Position number
Indicates device components relevant to actions.
-  **Correct / result**
Indicates the correct execution or the result of an action step.
-  **Wrong**
Indicates the incorrect execution of an action step.
-  **Note**
Indicates steps of actions that require particular attention.
-  **Closed lock!**
Indicates the status of "locked".
-  **Open lock!**
Indicates the status of "Unlocked".

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. For the HABITAT operating instructions it is also available as PDF or to be downloaded from the UI.
- › Ensure that only trained staff work with the device.
- › Follow the safety instructions, guidelines, occupational health and safety and accident prevention regulations.
- › The device must only be used in a technically perfect condition.

Notice!

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

/// Device design

Caution!

- › The power switch of the device must be accessed immediately, directly and without risk at any time. If access to the power switch cannot be ensured, an additional emergency stop switch that can be easily accessed must be installed in the work area.
- › Ensure that your hands / fingers do not get crushed when setting down the device.

Caution!

- › Device surface is partially made of glass:
 - Glass surface can be damaged by impact.
 - If glass surface is damaged it could cause injury, don't use the device anymore.

Notice!

- › Set up the device in a spacious area on an even, stable, clean, non-slip, dry and fireproof surface.
- › The feet of the device must be clean and undamaged.
- › Ensure that the power cord set / temperature sensor cable does not touch the heating plate.
- › Ensure that the vessel stands safely on the device.

/// Working with the device

Danger!

- › Do not use the device in explosive atmospheres, it is not EX-protected.
- › With substances capable of forming an explosive mixture, appropriate safety measures must be applied, e.g. working under a fume hood.
- › To avoid body injury and property damage, observe the relevant safety and accident prevention measures when processing hazardous materials.
- › Before use, the vessel system has to be cleaned and sterilized.
- › The device is not suitable for hand-held operation.
- › Do not touch the rotating parts during operation!
- › Autoclaving: 121°C / time, 15-20 minutes
Do not close the hose jacket connectors for the temperature chamber of the double wall glass vessel while autoclaving! The vessel might get broken! Be aware of the hot surface after autoclaving!
- › Turn off the peristaltic pumps before replacing any tubes or pump heads.

Warning!

- › Only process media that will not react dangerously to the extra energy produced through processing. This also applies to any extra energy produced in other ways, e.g. through light irradiation.
- › Beware of hazards due to:
 - flammable materials,
 - glass breakage,
 - overfilling of media,
 - rotating parts.
- › When handling hazardous substances or mixtures of substances which are toxic or are contaminated with pathogenic micro-organisms, the user should take appropriate precautions. Observe the national regulations, the biosafety level of your laboratory, the material safety data sheets.
- › For germs or biological material or risk group II or higher, please observe the "Laboratory Biosafety Manual" issued by the World Health Organisation).
- › It may be possible for wear debris from rotating accessory parts to reach the material being processed.
- › The operation of a free rotating shaft end is prohibited.
- › Over- or low pressure can damage the glass reactor.
- › Don't use hoses or tubes when leaking.
- › Keep all the connections tight, especially for the gases.

Caution!

- › Wear your personal protective equipment in accordance with the hazard category of the media to be processed. There may be a risk from:
 - ejection of parts,
 - release of toxic or combustible gases,
 - splashing and evaporation of liquids,
 - parts of hot surfaces.
- › Stop operating if:
 - the medium splashes out of the vessel because the speed is too high,
 - the device is not running smoothly,
 - the device begins to move around because of dynamic forces,
 - an error occurs.

Notice!

- › Remove the motor, the sensor cables and the foam sensor before autoclaving, all other parts could be autoclaved.
- › Cover the sensor connectors while autoclaving.
- › Covers or parts that can be removed from the device without tools must later be refitted to ensure safe operation. This will prevent the infiltration of foreign objects, liquids and other contaminants.
- › There may be electrostatic activity between the medium and the output shaft which could cause a direct danger.
- › Never operate the device with the stirrer tools rotating freely. Ensure that parts of the body, hair, jewelry or items of clothing cannot be trapped by the rotating parts.
- › Pay attention when setting the speed to any imbalance of the stirrer tools and possible spraying of the medium to be stirred.

/// Accessories

- › 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 guaranteed only with the use of original IKA accessories.
- › Ensure that the external temperature sensor is inserted into the medium to a depth of at least 20 mm when connected.
- › Observe the operating instructions of the accessories.

/// Power supply / Switching off the device

Warning!

- › Depending on the chosen mode, the device will automatically restart following any interruption to the power supply.
- › Restart PC / App and the IKA Biolab software if a software failure occurs or automatically shuts down. IKA HABITAT will run without an active connection with PC / App.
- › The voltage stated on the type plate must correspond to the mains voltage.
- › The device can only be disconnected from the power supply by pulling out the mains plug or the connector plug.
- › The device must only be operated with the original power cord set.
- › The socket for the power cord must be easily accessible.
- › Socket must be earthed (protective ground contact).

/// Maintenance

- › The device may only be opened by qualified and approved experts. 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.
- › Only use original IKA spare parts!

/// Disposal instructions

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



Intended use

/// Use

- › Bioreactors are designed to run cell growth or fermentation processes.

/// Area of use

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

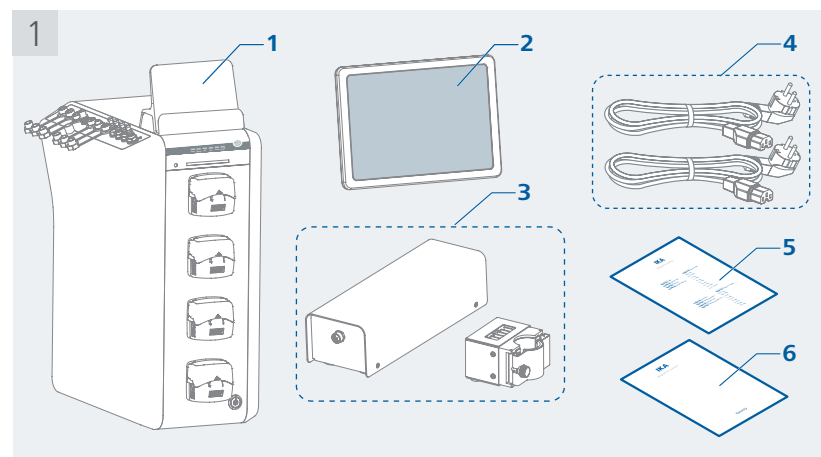


Unpacking

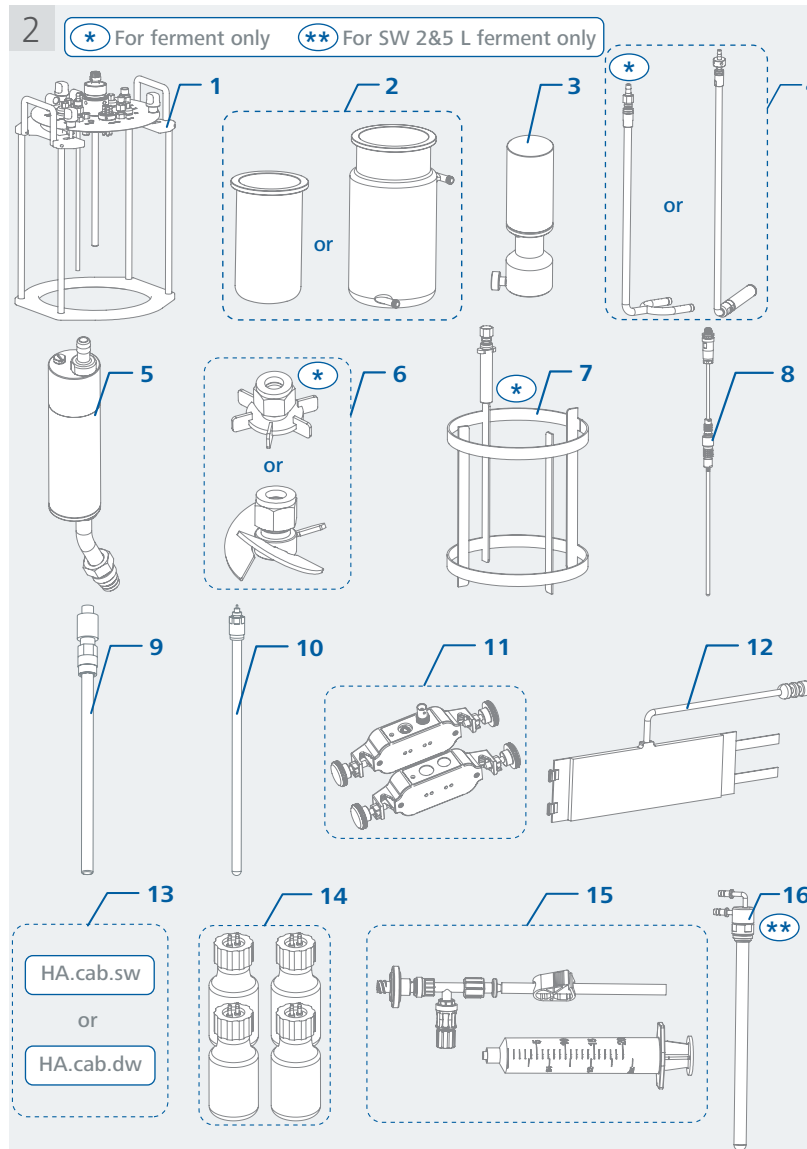
/// Unpacking

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

/// Scope of delivery

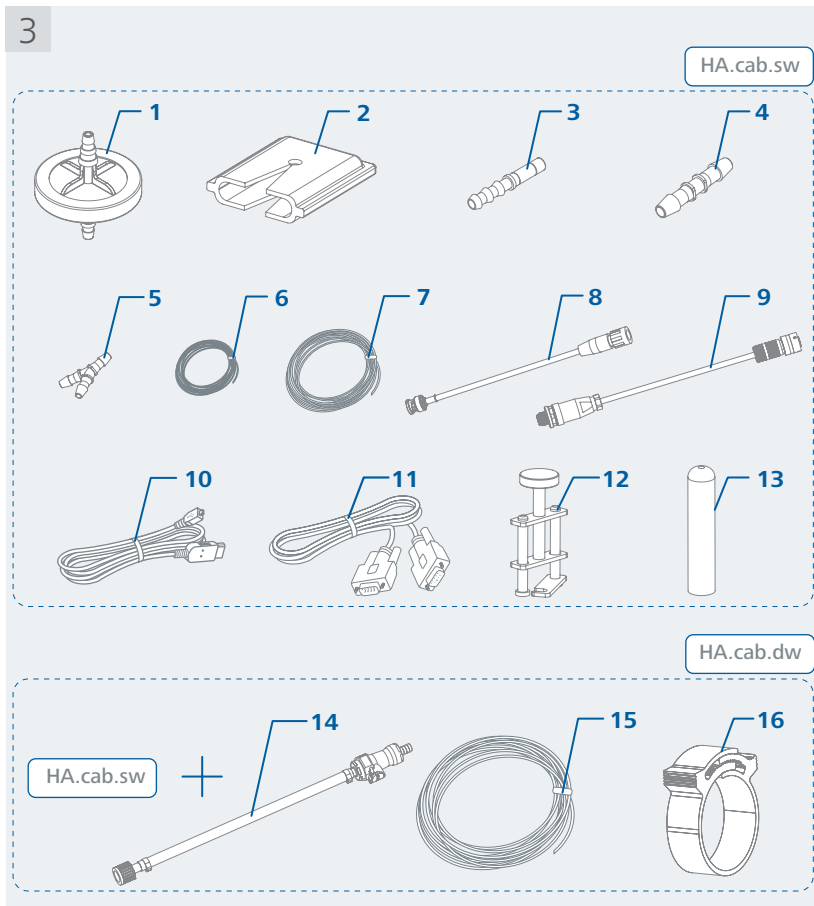


1	HABITAT cell / ferment	4	Power cord set H 11, 2x
2	Tablet PC	5	User guide
3	HA.pl Peltier cooling	6	Warranty card

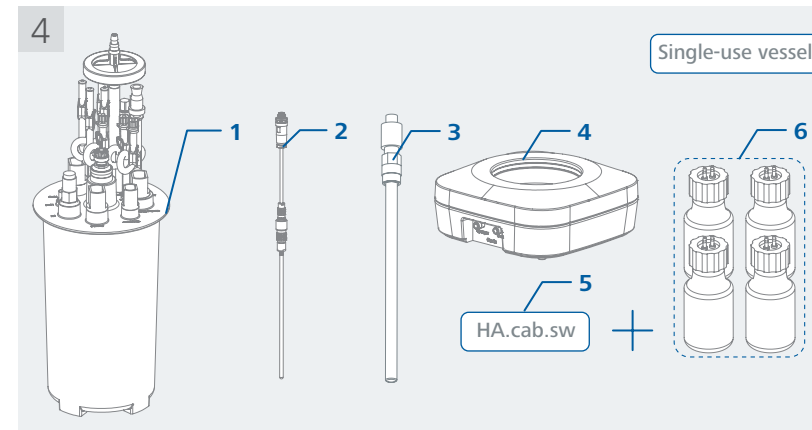


1	Stand	9	HA.s.ph.x (pH sensor)
2	HA.gv.sw.x (vessel single wall) or HA.gv.dw (vessel double wall)	10	HA.s.do.x (DO sensor)
3	HA.mt.s.x (Motor)	11	HA.s.fo (Foam sensor)
4	HA.sp.m.x (Micro sparger) or HA.sp.r.x* (Ring sparger)	12	HA.hbl.x (Heat blanket)
5	HA.cn (Condenser)	13	HA.cab.sw (cable set for single wall) or HA.cab.dw (cable set for double wall)
6	HA.ip.pi.x (Impeller 3-pitch blade) or HA.ip.b.x* (Impeller 6 blade)	14	HA.sf.250 (Bottle 250 ml x4)
7	HA.ba.x (Baffle)*	15	HA.sam (Syringe set)
8	HA.s.tm.x (Temperature sensor)	16	HA.cf.x (Cooling finger)**

Note: "x" refers to the number of the vessel size like 0.5, 1, 2, 5 or 10, e.g. 2 L « HA.gv.sw.2; 0.5 L « HA.gv.sw.0.5.



1	Filter	9	DO cable
2	Filter heater	10	USB cable
3	Plug in barb connector 6 mm x 5 mm	11	RS 232 cable
4	Hose reducer 6.4 mm x 3.9 mm	12	Tubing clamp
5	Y hose connector 3.2 mm	13	Silicone cap
6	Silicone tube 3.2 mm x 6.4 mm x 15 m	14	Hose with GL18 and quick coupling
7	Silicone tube 4.8 mm x 9.5 mm x 3 m	15	Silicone tube 8 mm x 12.7 mm x 5 m
8	pH cable	16	Hose clamp



1	Single-use vessel	4	SU holder
2	HA.s.tm.2 (Temperature sensor)	5	HA.cab.sw
3	HA.s.do.2 (DO sensor)	6	HA.sf.250 (Bottle 250 ml x4)

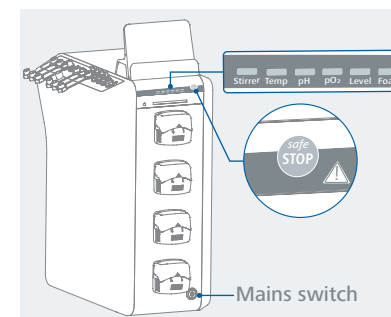
Useful information

- › The HABITAT is operated by an Android or iOS tablet PC, which is part of the delivery scope.
- › As an alternative the HABITAT Graphic-User Interface (GUI) software is also available for Windows based tablet PC / notebooks.
- › Wired and wireless operation is supported. Monitoring is also possible by using the Bioreactor App for Android and iOS mobile systems.
- › During operation the tablet PC / notebook can be removed from the device. The control tower is working independently from the GUI software. All data is saved in the control tower.
- › The main parameter status is shown by an LED light bar.
- › **Green light:** ok, within the range
- › **Red light:** not ok, out of the range
- › If the tablet PC / notebook is connected again, all data will be transferred from the control tower to the GUI to be displayed.
- › **Safe-STOP button:** To immediately pause all actuators device (Stirrer, Heater, Pumps, MFCs, Thermostat, Light)
- › **Safe-STOP:** Press the button at the control tower / or the button on GUI. All actuators stop.
- › **Exit Safe-STOP:** Press the button at the control tower only! All actuators resume back to

- › the setting before mode entry.
- › **Mains switch:** Power-ON / Power-OFF the device.
- › **Power-ON:** Control tower on, ready to use.
- › **Power-OFF:** Control tower off, no power.

⚠ Notice!

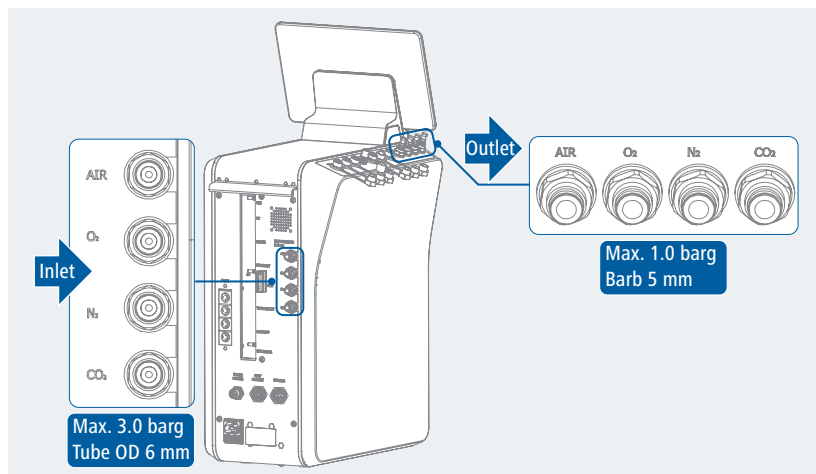
- › Data log file is created only when starting the "Experiment", and it records the data all the time, from the start to the stop of the Experiment, by pressing the PLAY button on the user interface software. Only one filename is created for one experiment (start-stop).
- › In safe-STOP mode, the data log continues recording. Log file will show all actuators that have been stopped during the period of time.





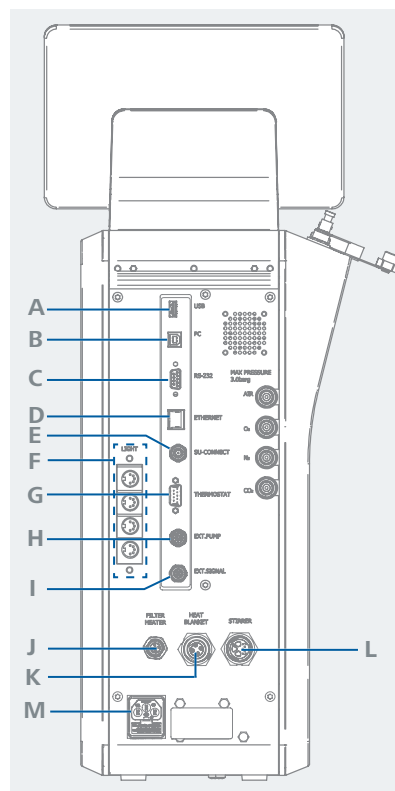
Installation

/// Gas

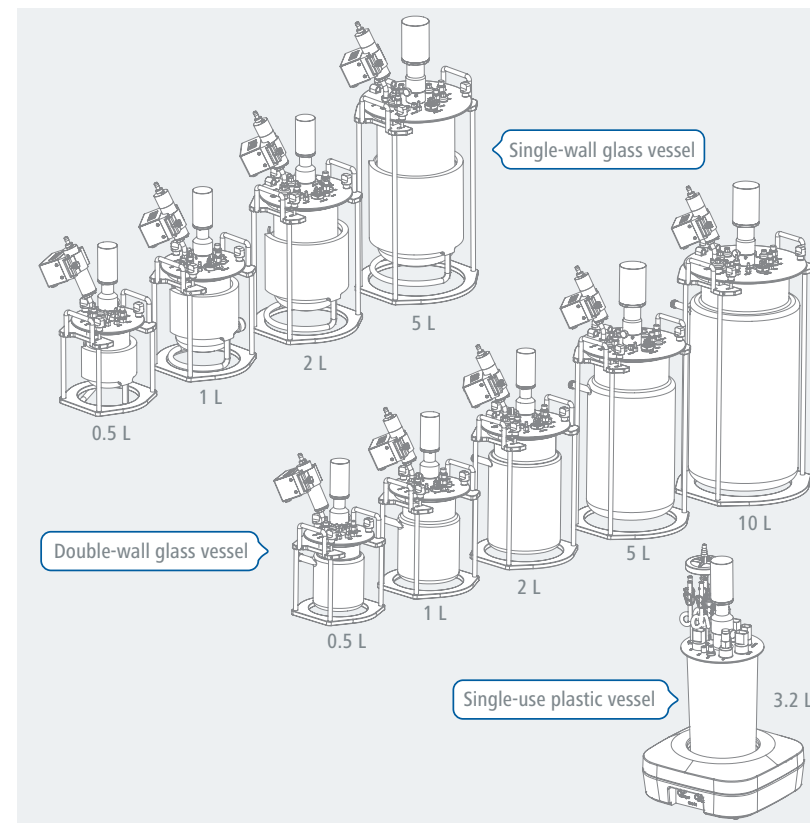


/// Interfaces

A	USB	save data
B	PC	communication with GUI software
C	RS-232	communication with GUI software
D	ETHERNET	communication with GUI software
E	SU-CONNECT	read optical sensor for single use
F	LIGHT	connect to light panel
G	THERMOSTAT	control thermostat
H	EXT. PUMP	control external pump
I	EXT. SIGNAL	receive 4 ... 20 mA Input to show in GUI software
J	FILTER HEATER	Connect to filter heater
K	HEAT BLANKET	Connect to heat blanket
L	STIRRER	connect to stirrer
M	POWER SOCKET	connect to power



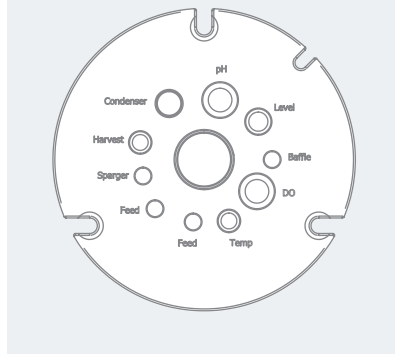
/// Vessel



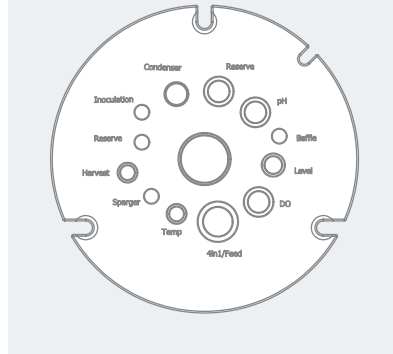
/// Lid

Ports	Port sizes				
	0.5 L	1 L	2 L	5 L	10 L
Temp	M10				
DO	Pg13.5				
Level	M12				
Baffle	11 mm				
pH	Pg13.5				
Exhaust cooler	M16				
Harvest	M10				
Sparger	11 mm				
Feed	11 mm (x2)	-	-	-	-
4in1/Feed	-	M27			
Cooling finger	-	-	M27		
Inoculation	-	11 mm (x1)	11 mm (x1)	11 mm (x1)	11 mm (x1)
Reserve Pg13.5	-	x1	x2	x3	x4
Reserve 11 mm	-	x2	x2	x2	x3
Reserve M27	-	-	-	-	x1

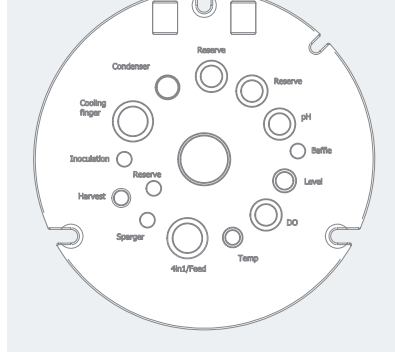
0.5 L



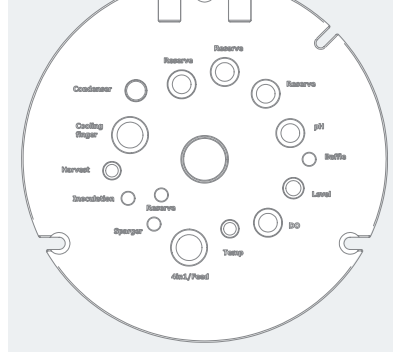
1 L



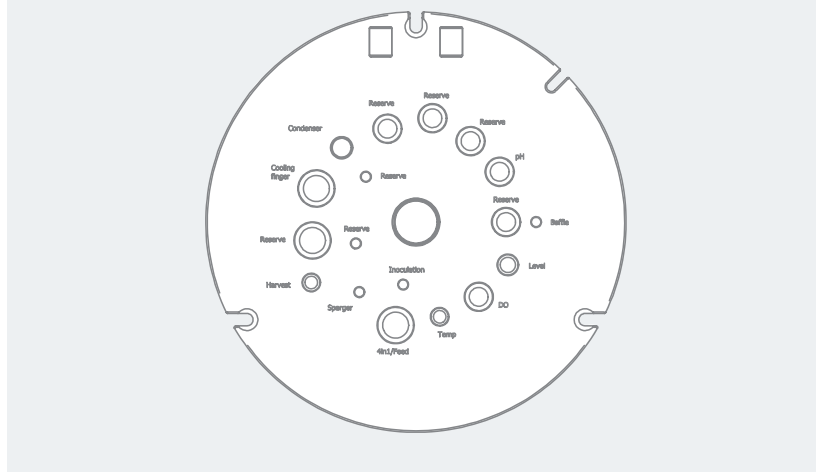
2 L



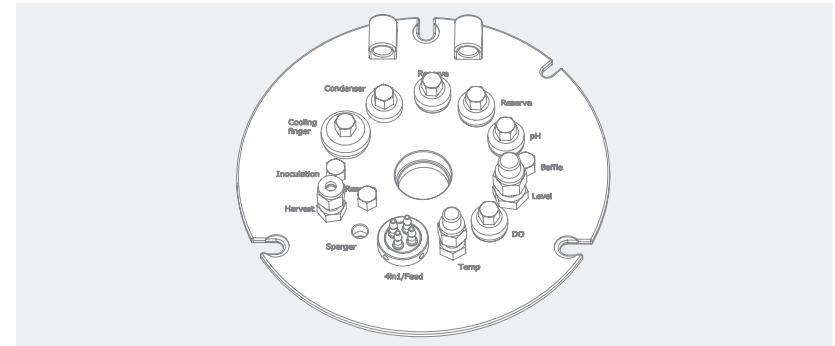
5 L



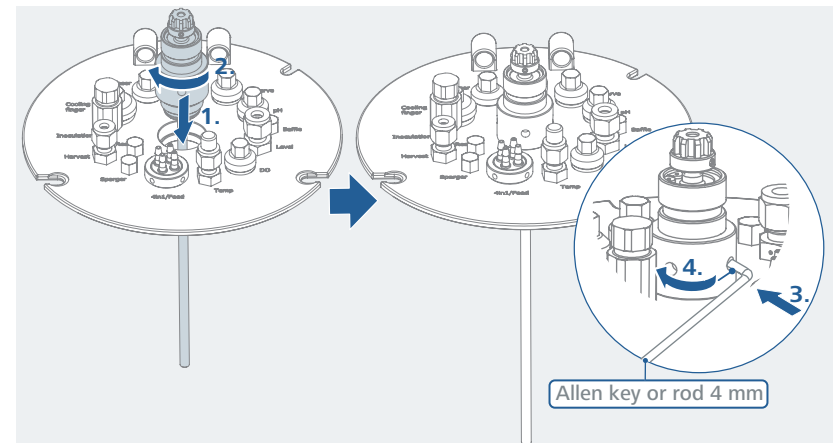
10 L



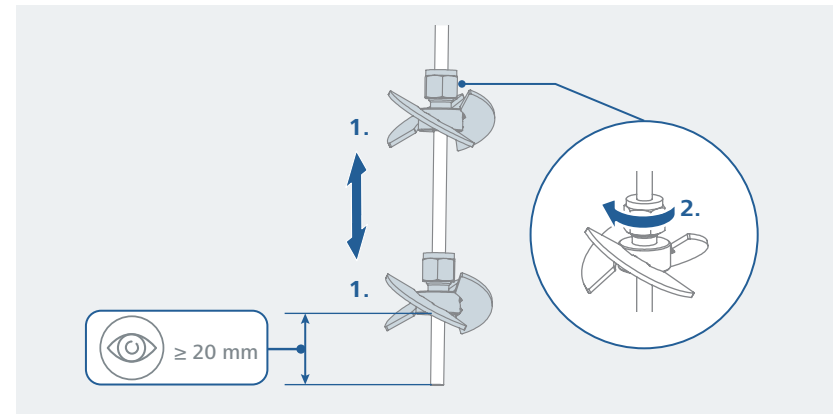
/// Lid with plugs and fittings



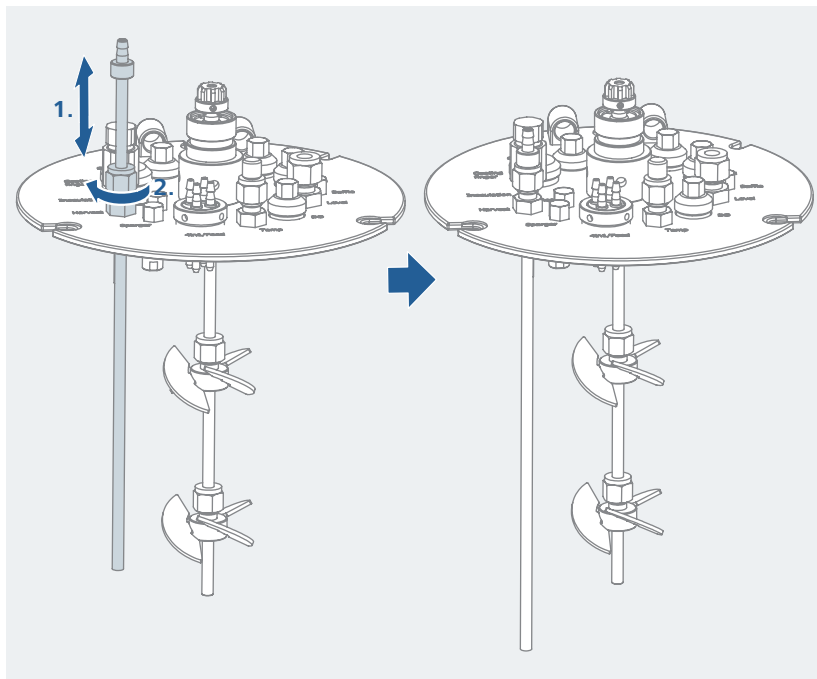
/// Drive shaft



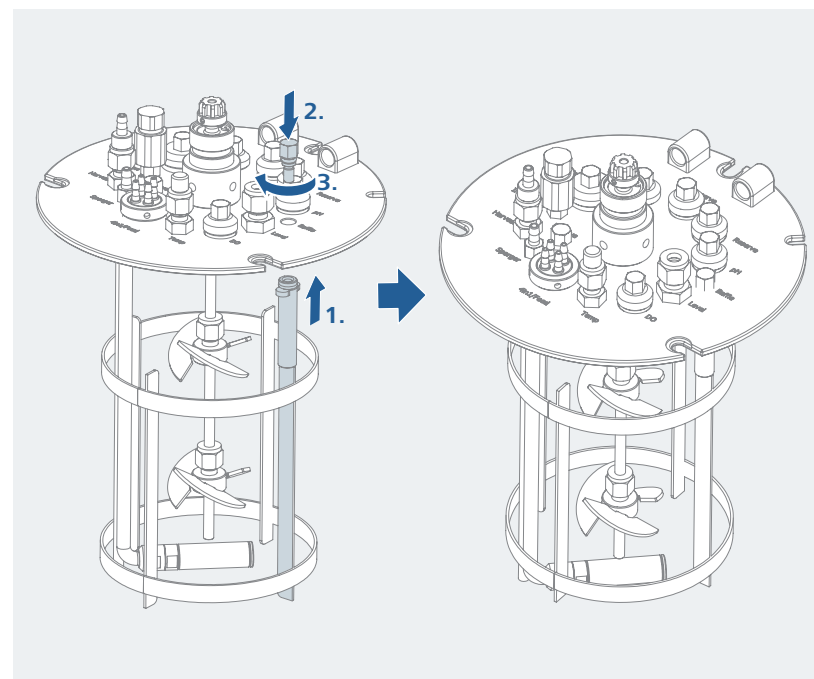
/// Impeller



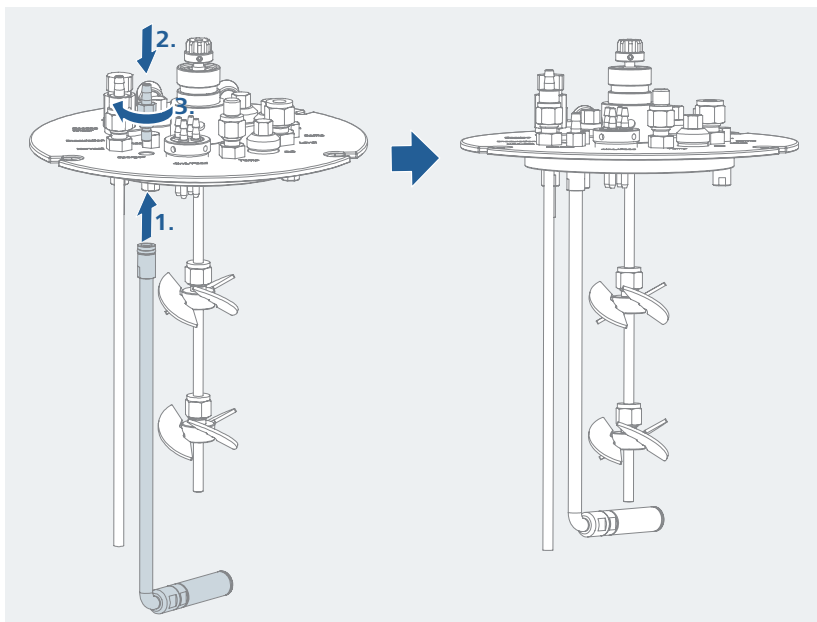
/// Harvest pipe



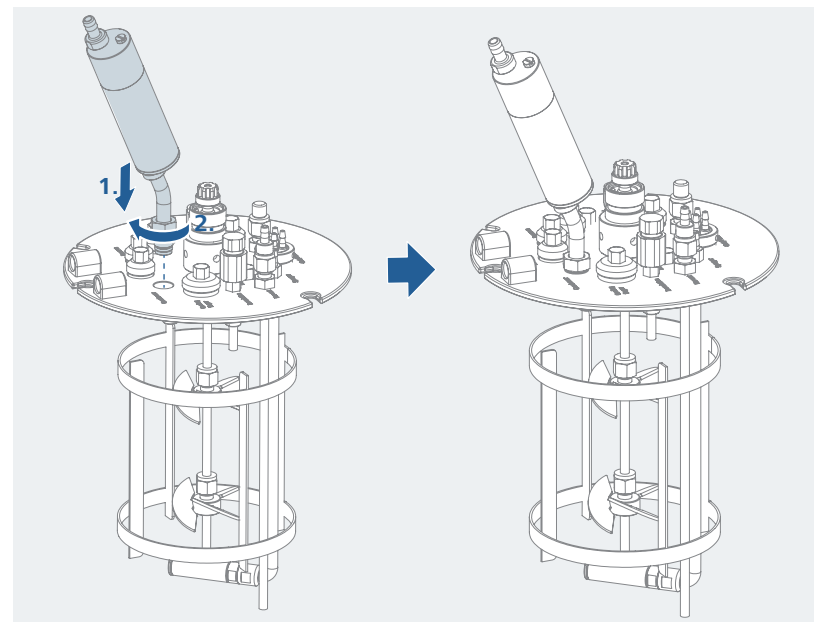
/// Baffle



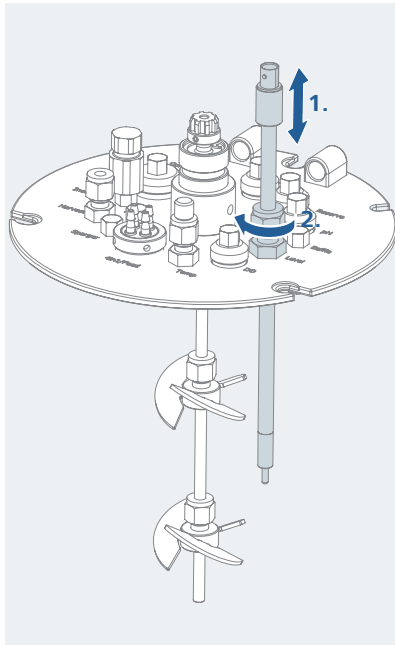
/// Ring or micro sparger



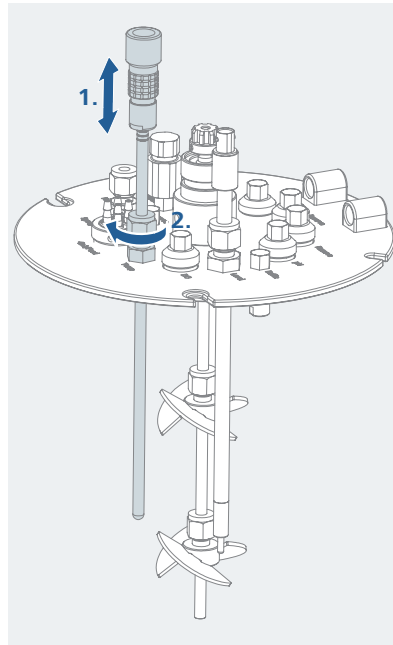
/// Condenser



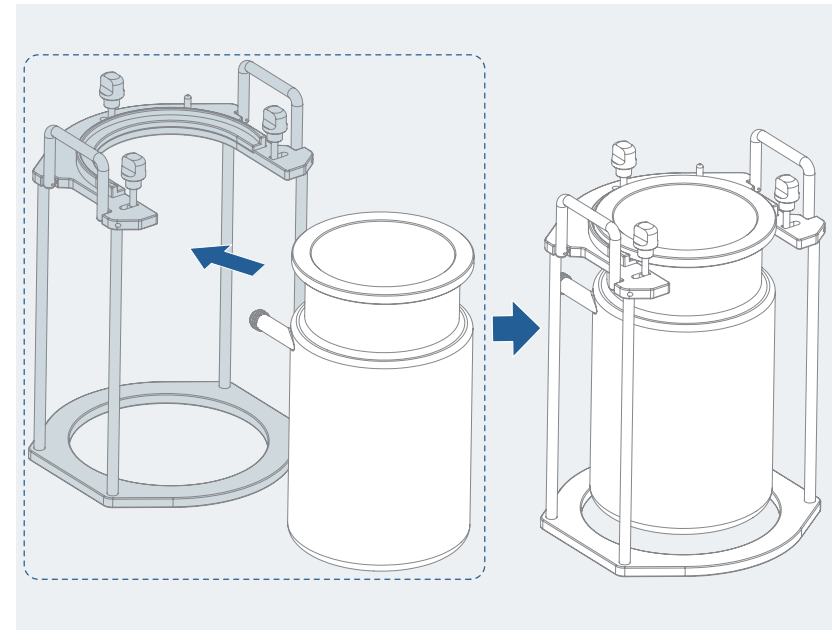
/// Level sensor



/// Temperature sensor



/// Vessel and stand



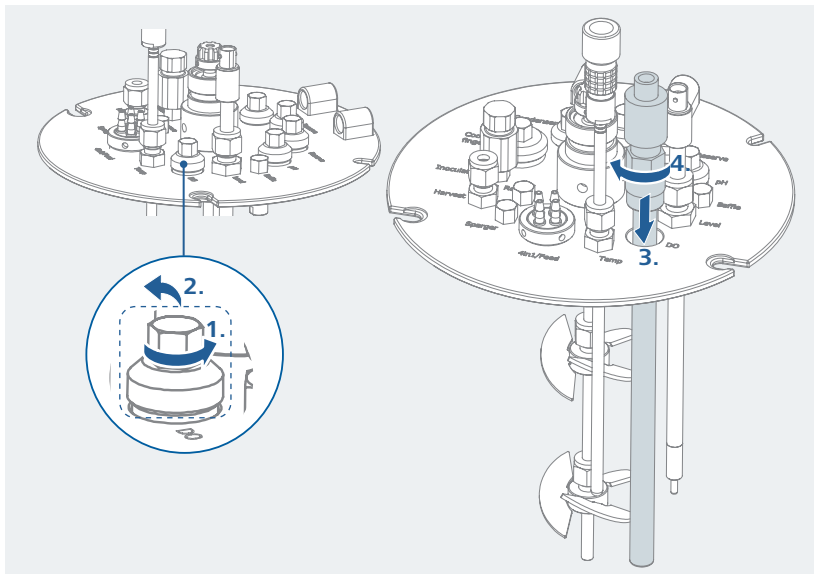
/// DO, pH, CO₂, conductivity or turbidity probe

Caution!

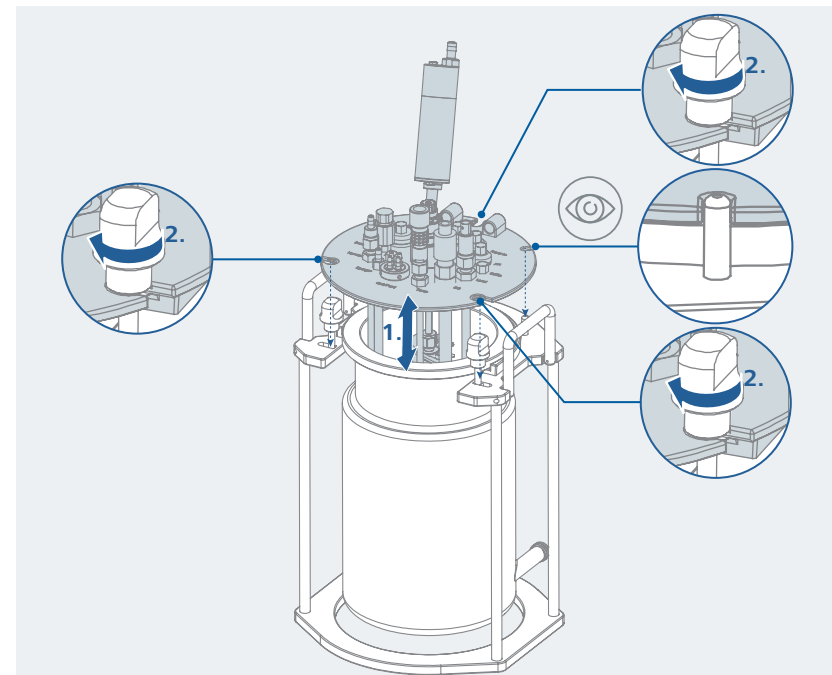
› Read the operating instructions for the probes carefully!

Notice!

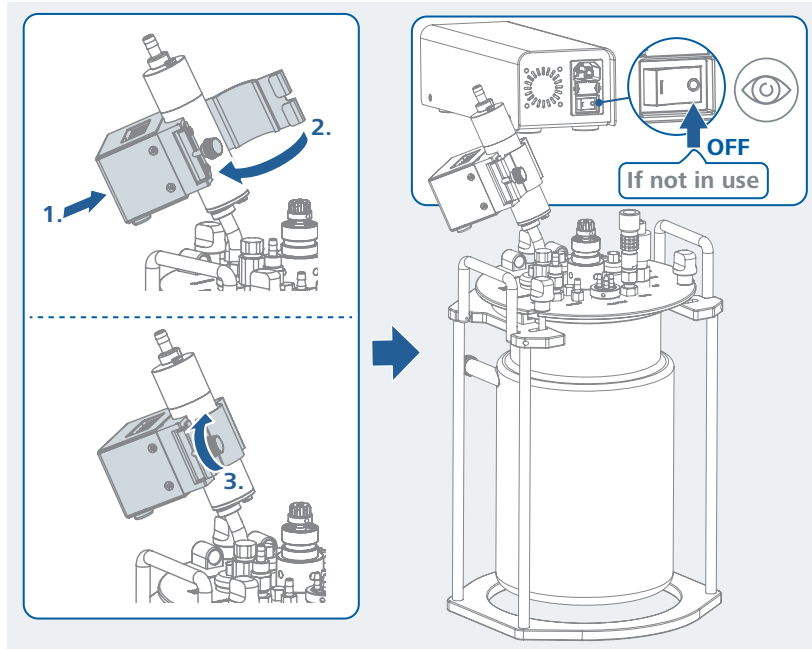
› Related on the lid size the ports may vary!



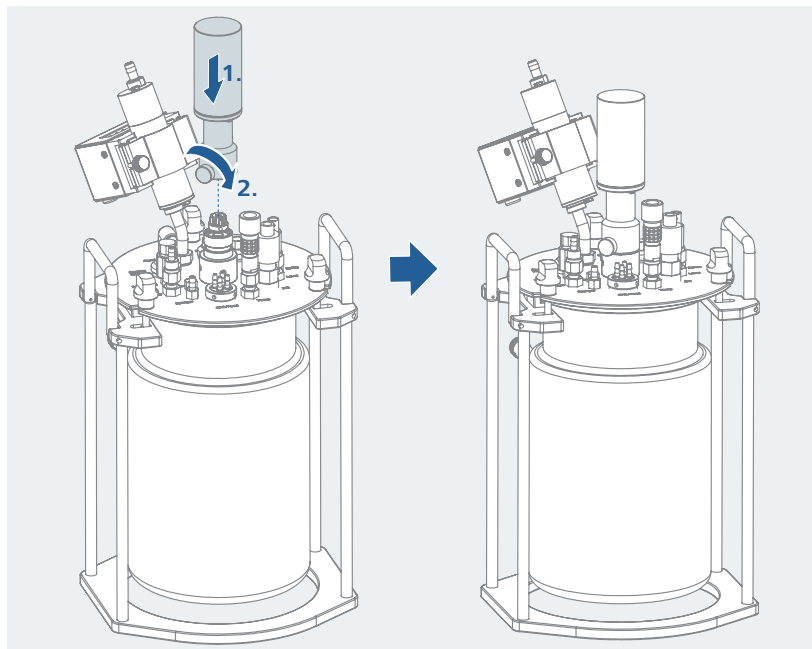
/// Lid and vessel



/// Peltier cooling

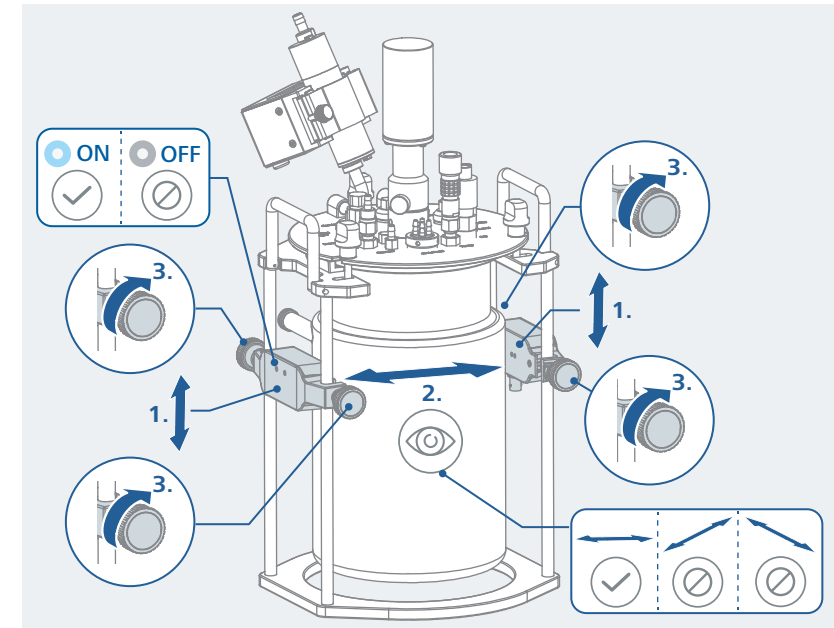


/// Motor



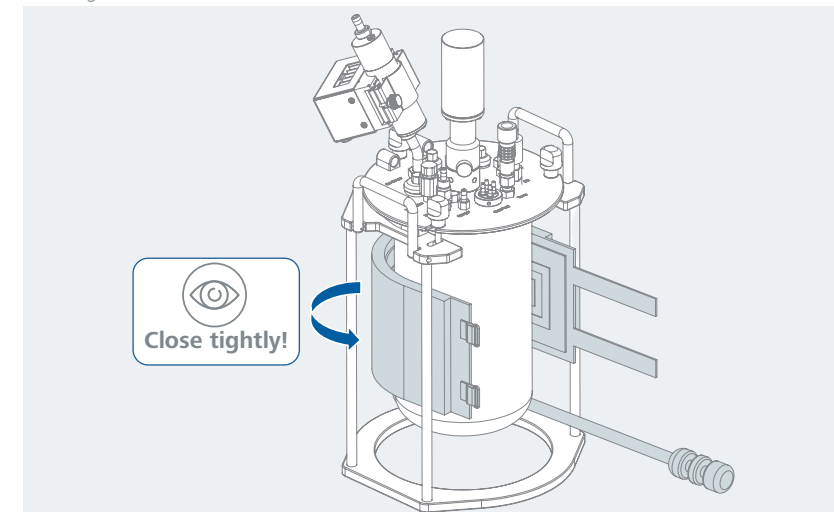
/// Foam sensor

- > Blue LED ON: Good alignment between the sensor boxes, and no foam in between.
- > Blue LED OFF: Bad position installed for the sensor boxes, or with obstruction in between.



/// Heat blanket

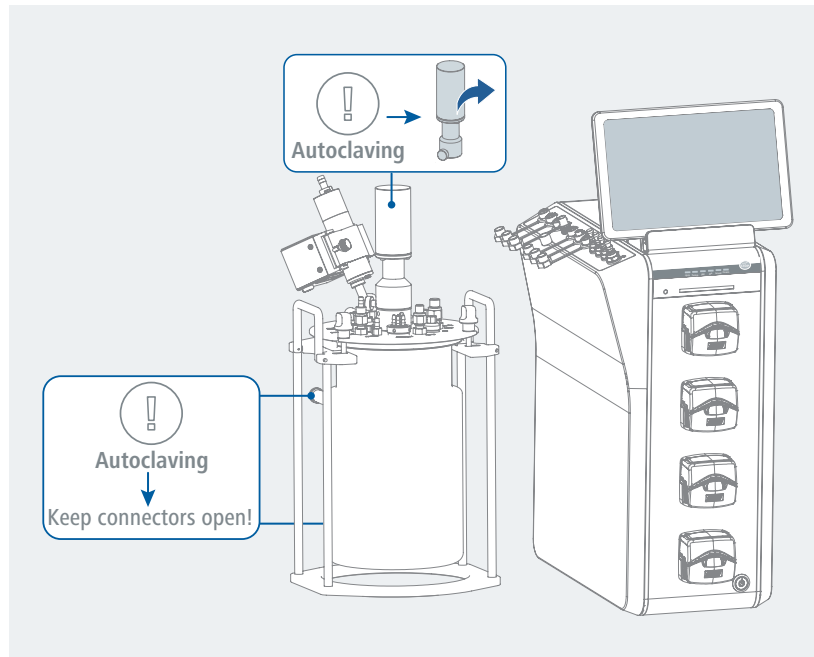
- ⚠ **Warning!**
- > Ensure that the electrical equipment is in good condition before use.
- > For long lifetime, please do not cut or fold it.
- > Storage in flat condition.



/// Positioning

⚠ Warning!

- › For autoclave, please remove the motor and keep the connectors of double-wall glass vessel open!

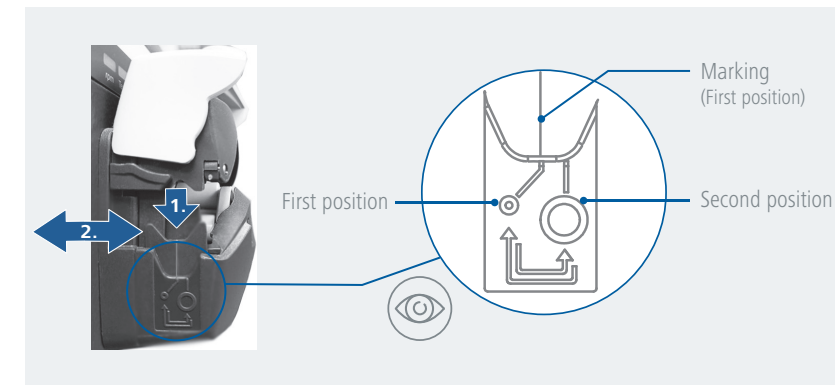


/// Pump tubing

- › Tube flow rate

Tube ID	Flow rate (ccm / min)		Pump head adjustment
	min	max	
0.5 mm	1	4	First position
0.8 mm	3	12	First position
1.2 mm	5	20	First position
1.6 mm	9	45	First position
2.4 mm	21	85	Second position
3.2 mm	40	140	Second position
4.8 mm	80	270	Second position

- › Adjust the pump head

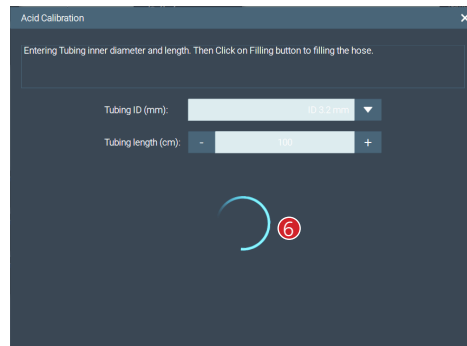
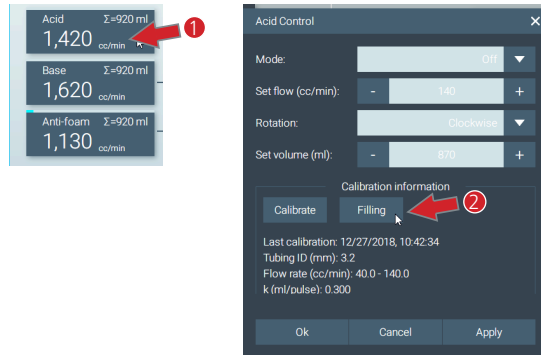


- › Insert the tube to the pump head

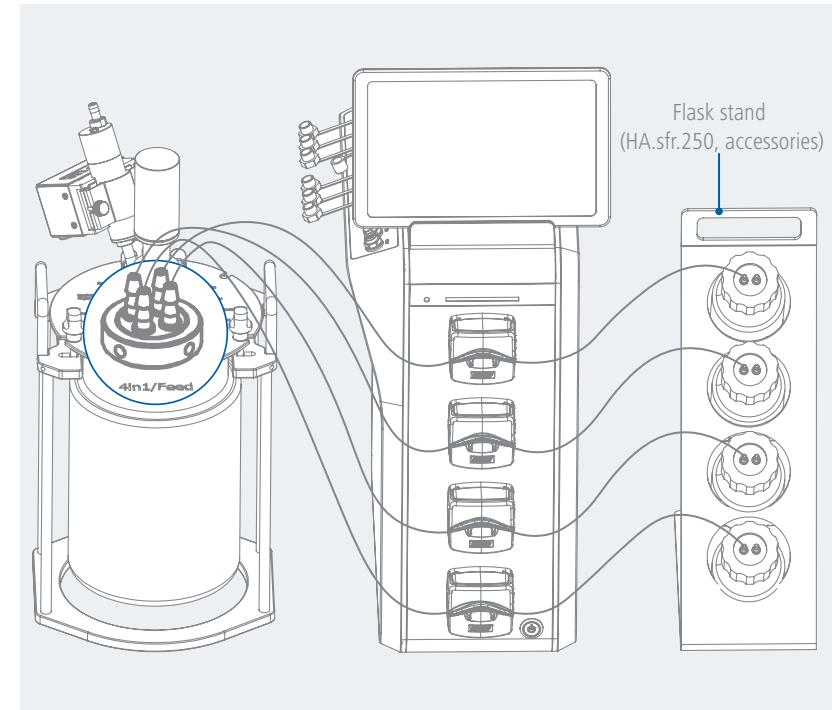


› Tubing filling

1. Before the calibration, select pump "Filling"
2. Click "Filling"
3. Choose "Tubing ID"
4. Input "Tubing length" in cm
5. Start "Filling"
6. Wait until "Filling" completed

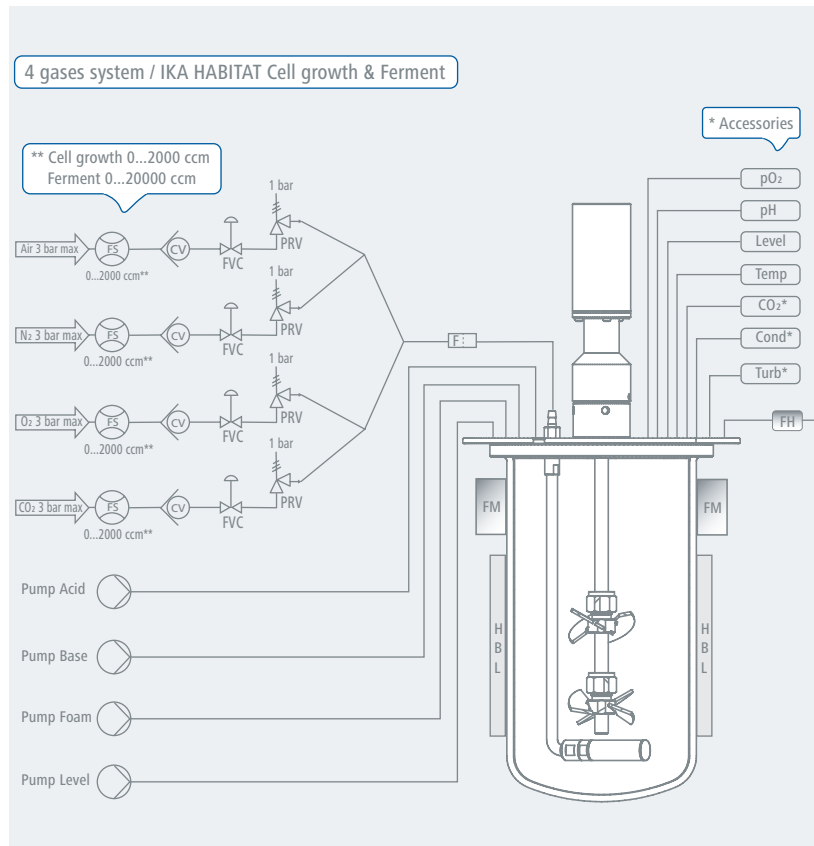


/// Hose connecting

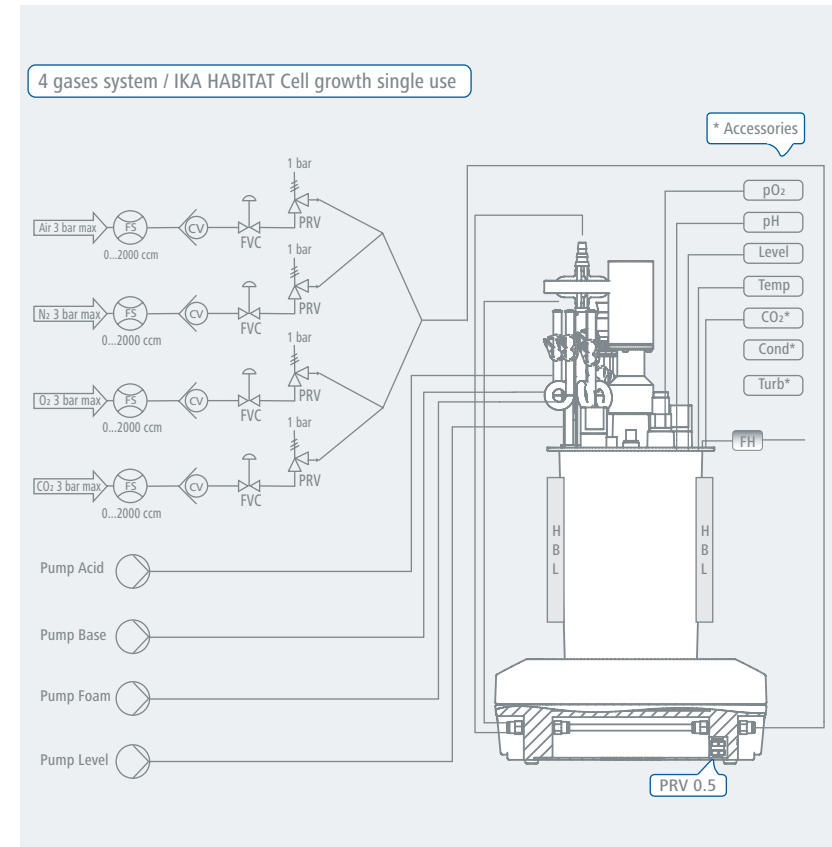


/// Schematic view - 4 gases system

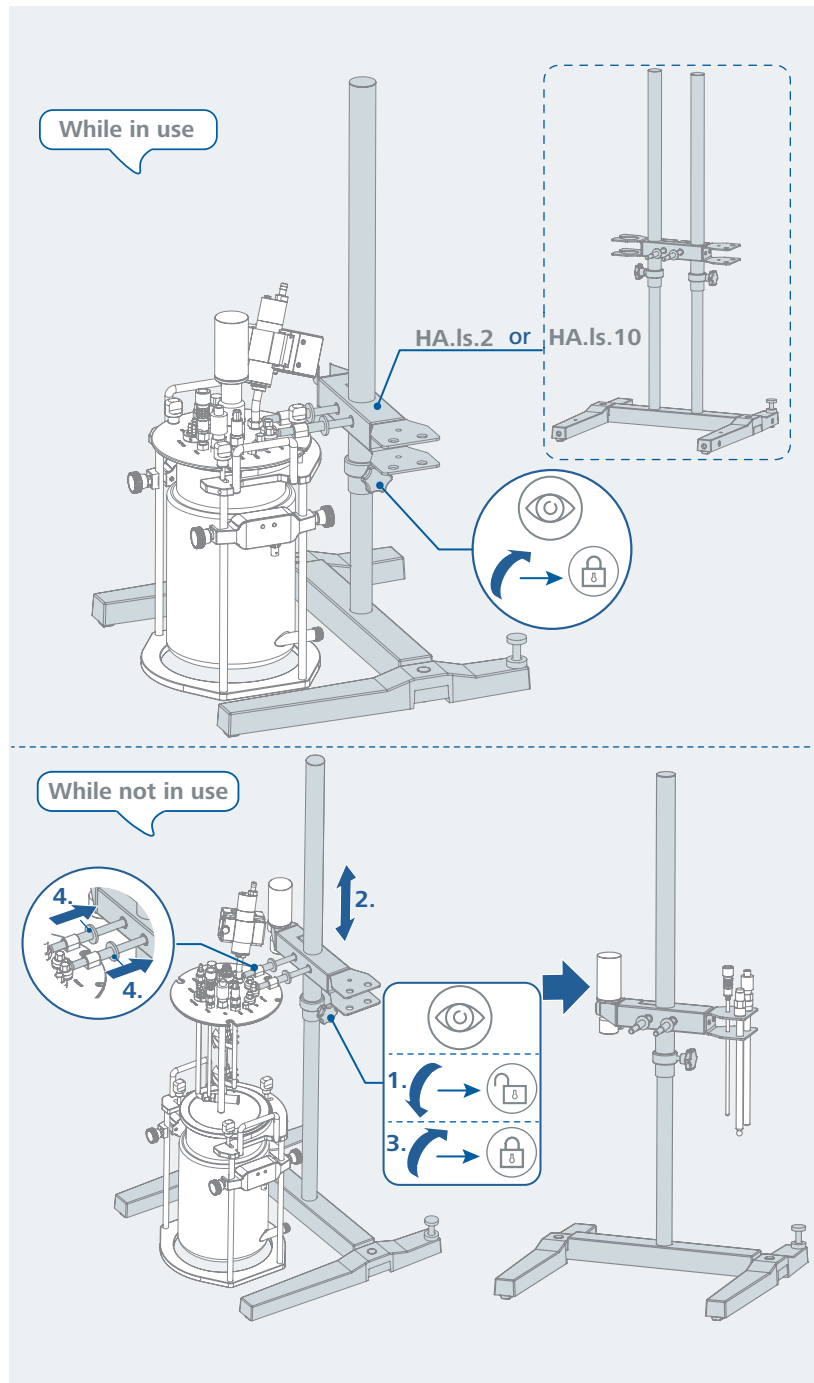
Abbreviation	Description	Abbreviation	Description
FS	Flow sensor	pH	pH sensor
CV	Check valve	Level	Level sensor
FVC	Flow control valve	Temp	Temperature sensor
PRV	Pressure relief valve	CO ₂ *	CO ₂ sensor
F	Filter	Cond*	Conductivity sensor
FM	Foam sensor	Turb*	Turbidity sensor
HBL	Heat blanket	FH	Filter heater
pO ₂	DO sensor		



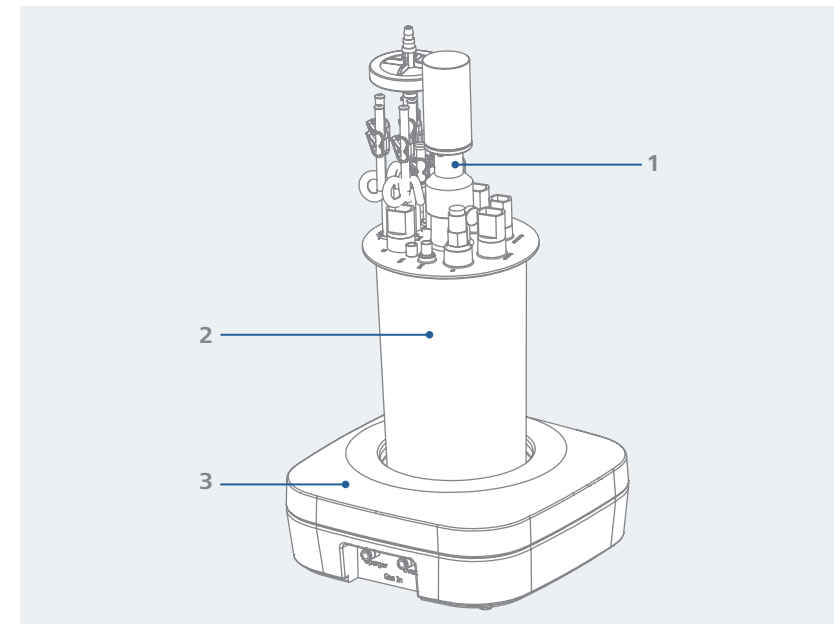
Abbreviation	Description	Abbreviation	Description
FS	Flow sensor	Level	Level sensor
CV	Check valve	Temp	Temperature sensor
FVC	Flow control valve	CO ₂ *	CO ₂ sensor
PRV	Pressure relief valve	Cond*	Conductivity sensor
PRV	Pressure relief valve 0.5 bar	Turb*	Turbidity sensor
HBL	Heat blanket	FH	Filter heater
pO ₂	DO sensor	SP	Sparger
pH	pH sensor	OV	Overlay



/// Lid stand (Accessories)



/// SU vessel and SU vessel holder



1	Motor
2	SU Vessel (with / without integrated single-use sensors)
3	SU Vessel Holder

Note: When using the SU vessel with the integrated single-use sensors, the calibration data have to be entered and the sensors calibrated before starting the process.



Operation

/// Switching on / off

1. Turn on the device by using the mains switch on the control tower.
2. Start tablet PC / laptop Bioreactor App.
3. Connect tablet PC / laptop via Ethernet, Wi-Fi or Serial port.

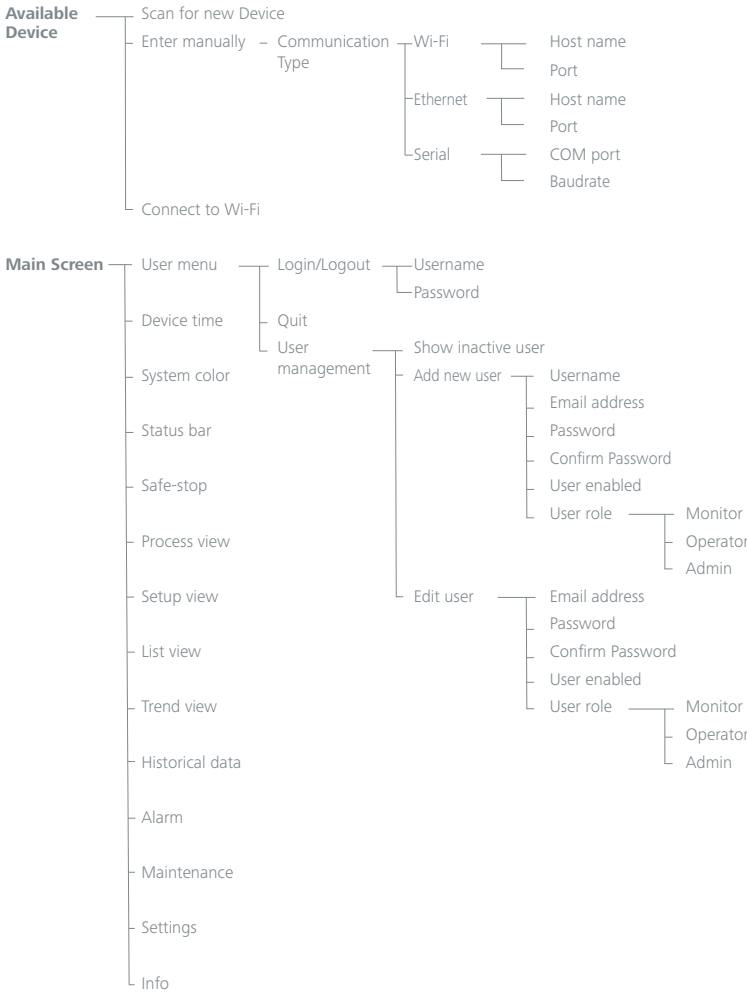
/// System start

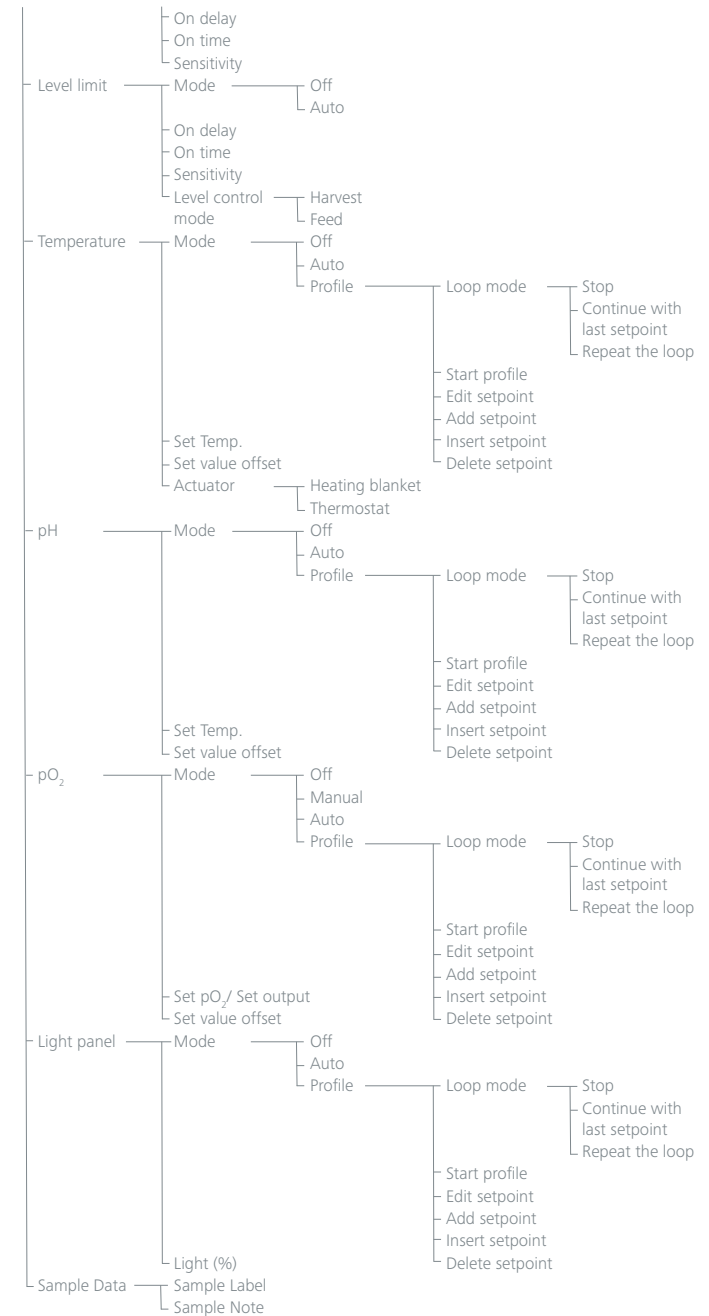
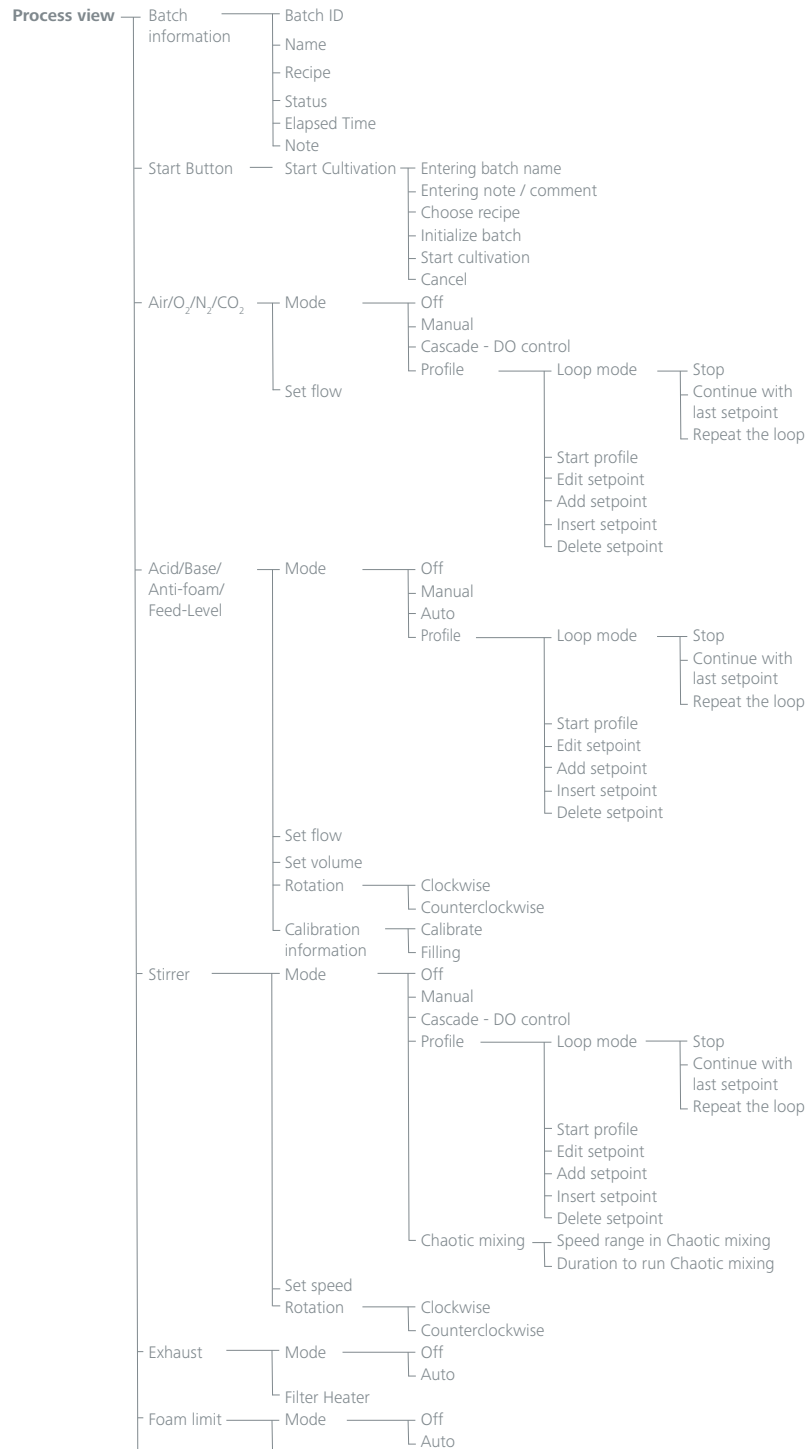
1. Set up hardware, vessel & medium, prepare for autoclaving.
For autoclaving, please refer to the section "Autoclaving" in this chapter.
2. After autoclaving, connect motor, tubes and cables, heating blanket etc. (See "Installation")
3. Set up "Recipe". Select and input necessary information, enable / disable module and cascade control, then save it with a new recipe name (no space between texts).
4. Back to "Process screen", start "Experiment" in "Initialization" by selecting the recipe name that you have saved.
5. Setup "Mode" and "Set point" for each modules: Stirrer, Air, ACID, BASE, Temperature-, pH- and DO control, etc.
6. When the medium is in good condition, feed the cell and nutrient into the vessel.
7. Start "Cultivation", and let HABITAT automatically control all environment following the user setting.

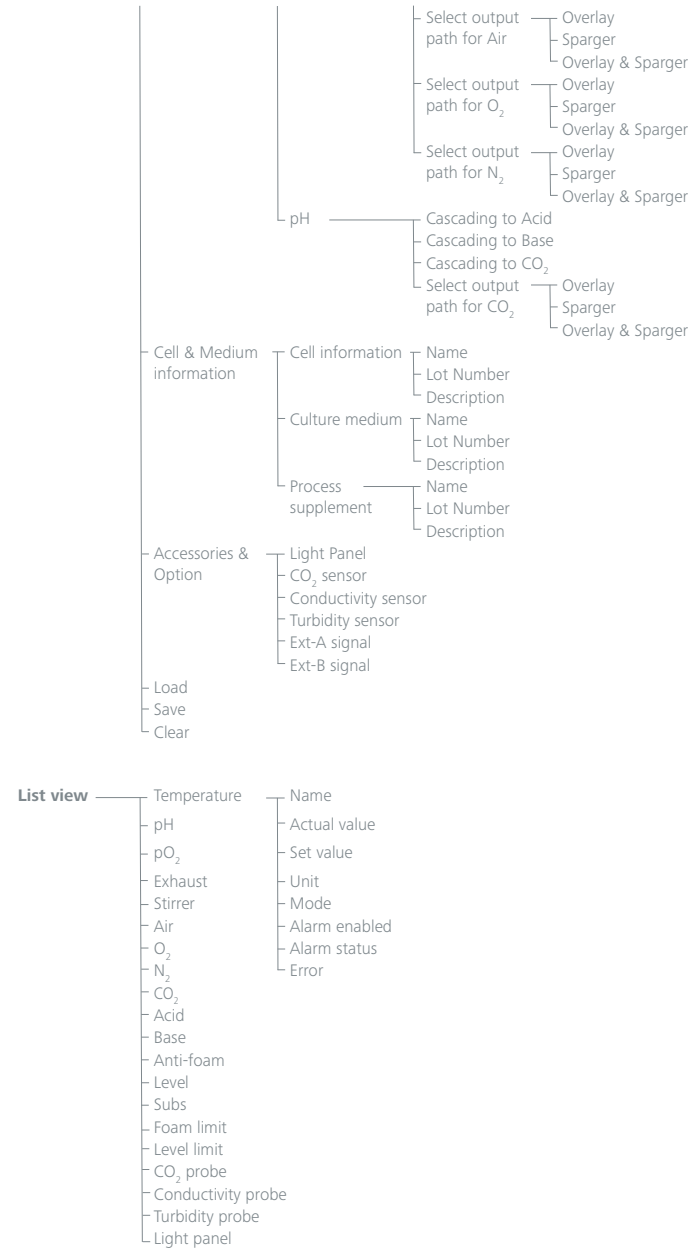
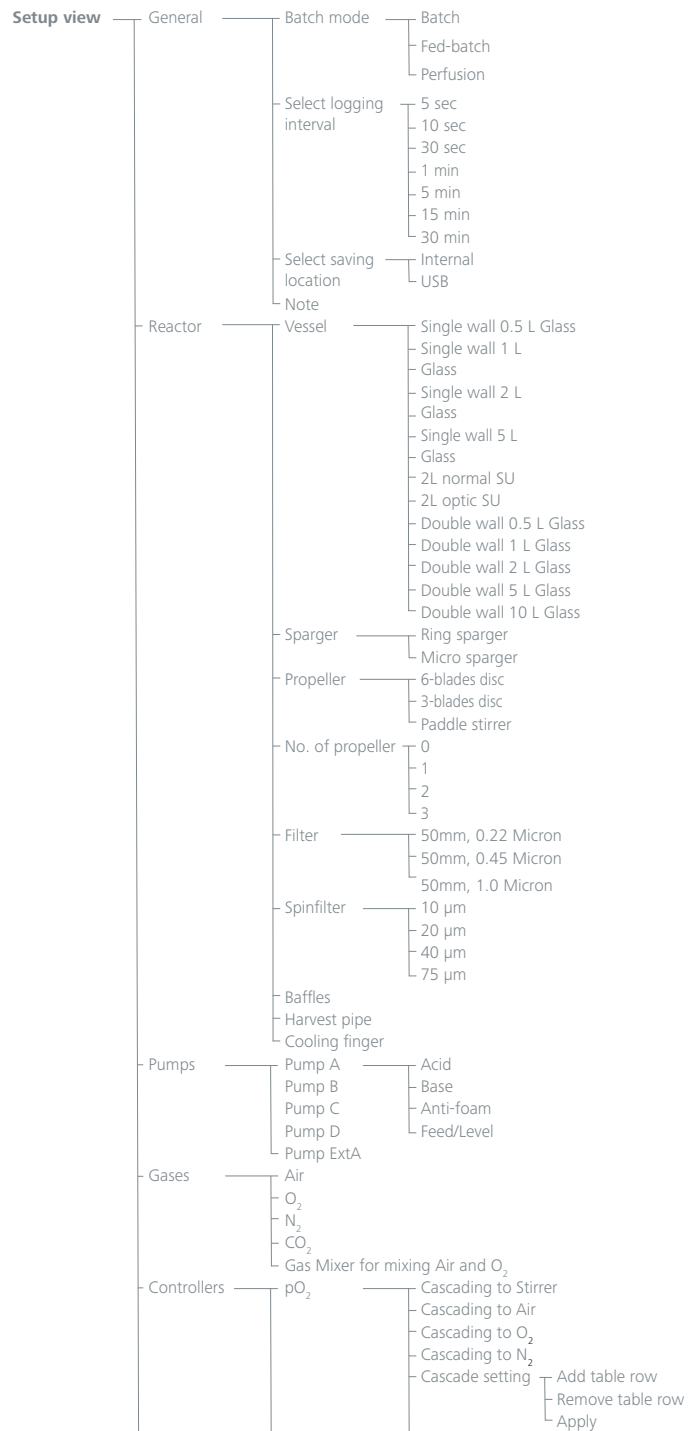
/// Connection capability

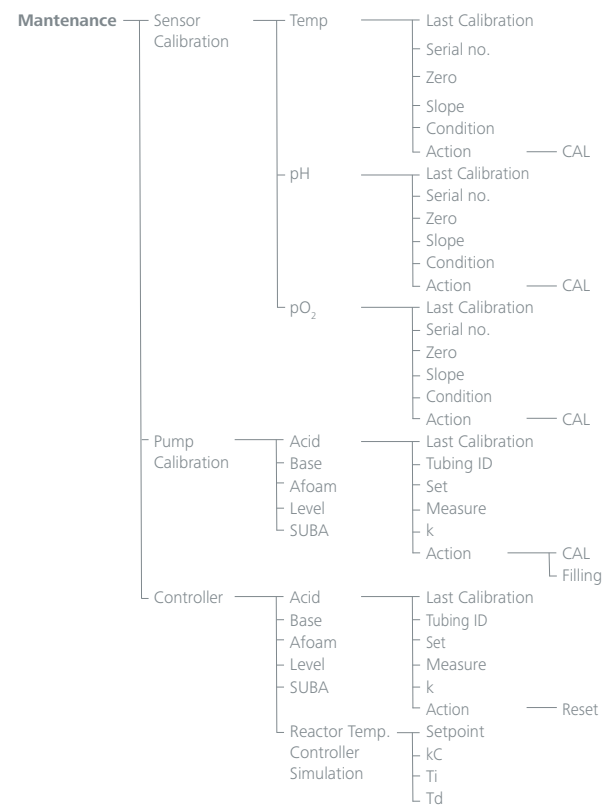
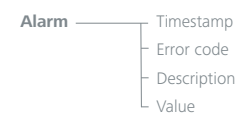
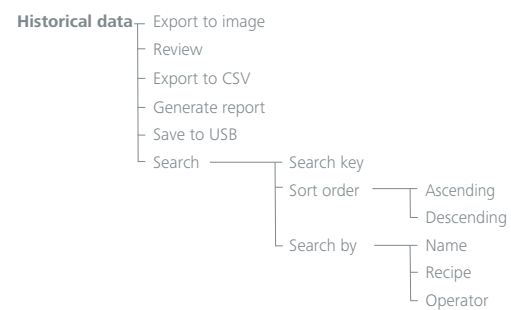
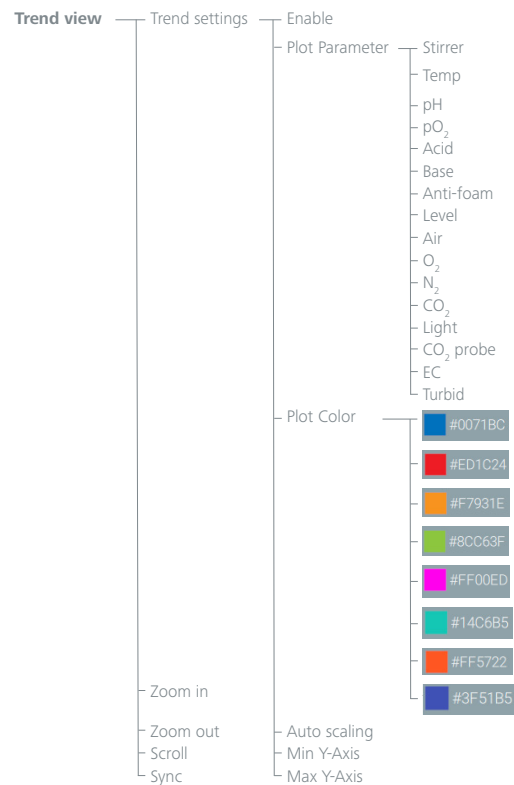
- › For the connection capability please see chapter "Interfaces and outputs".

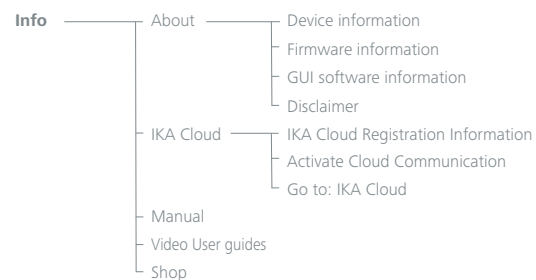
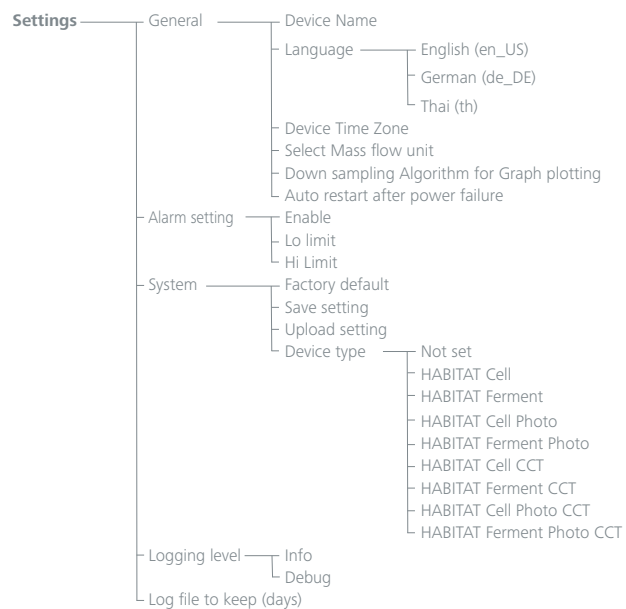
/// Menu structure







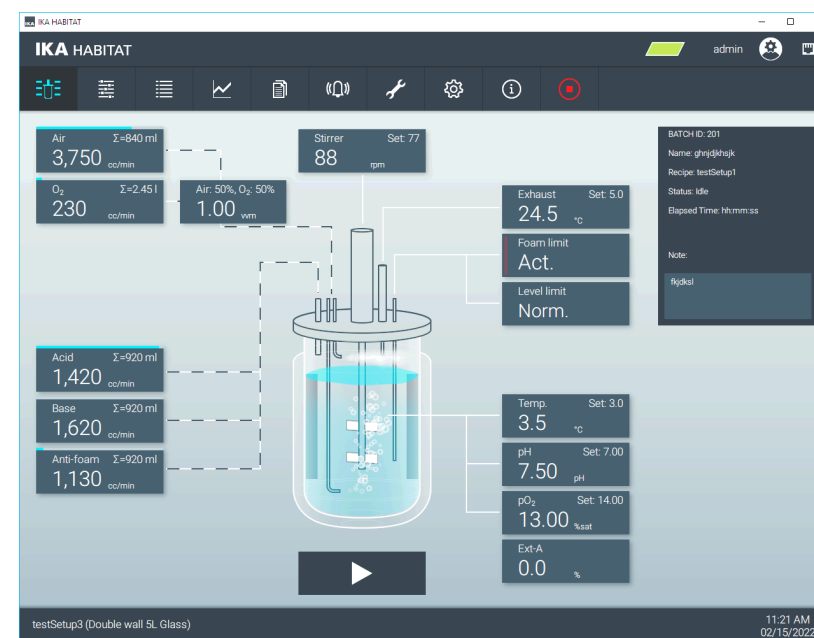
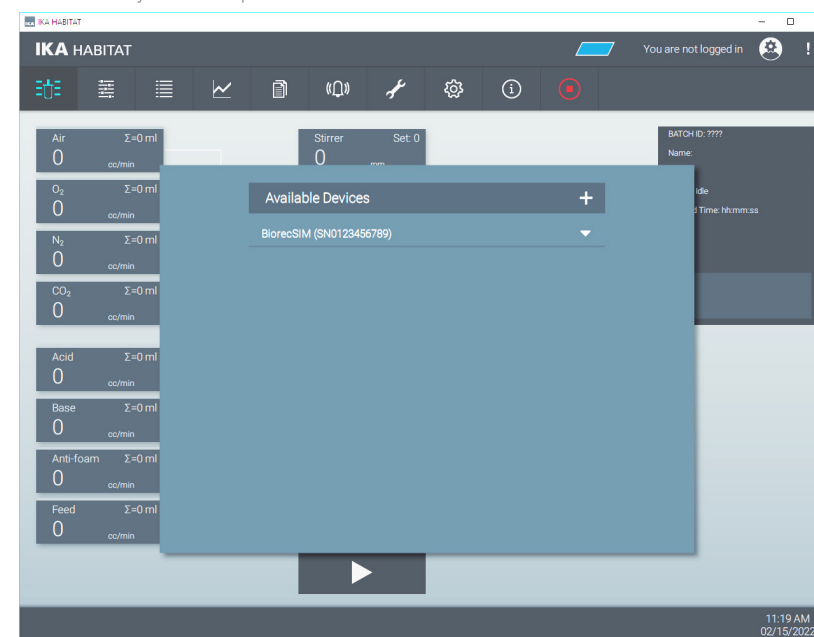




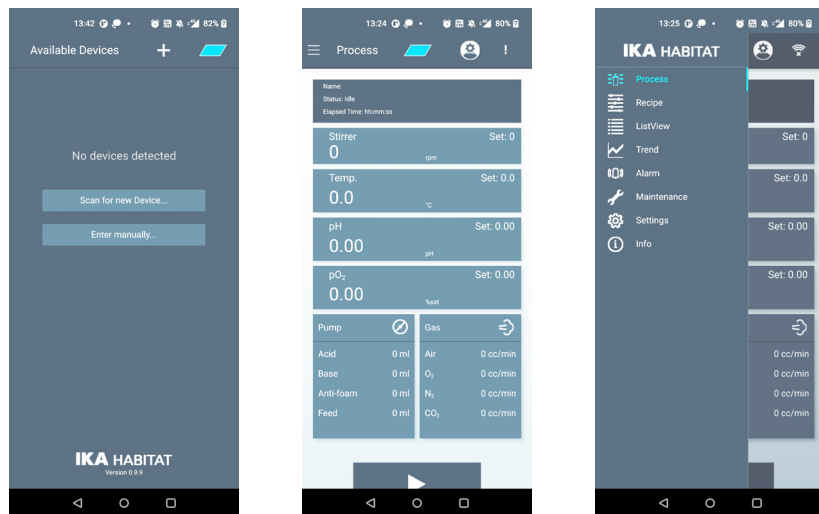
/// Menu navigation

1. Screen Format

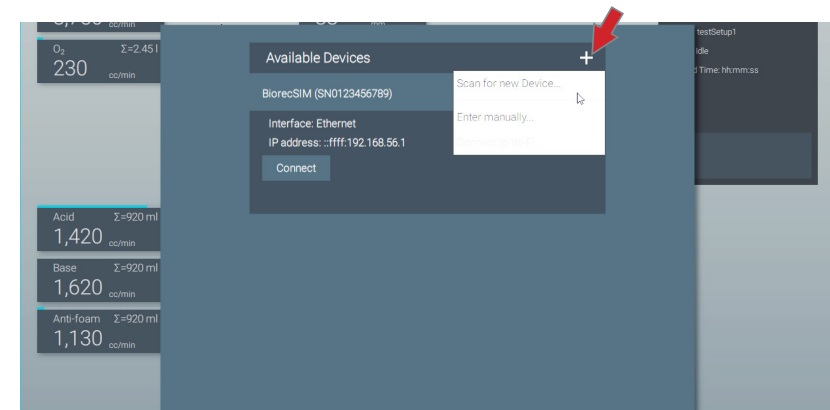
1.1 Screen Layout Desktop / Tablet



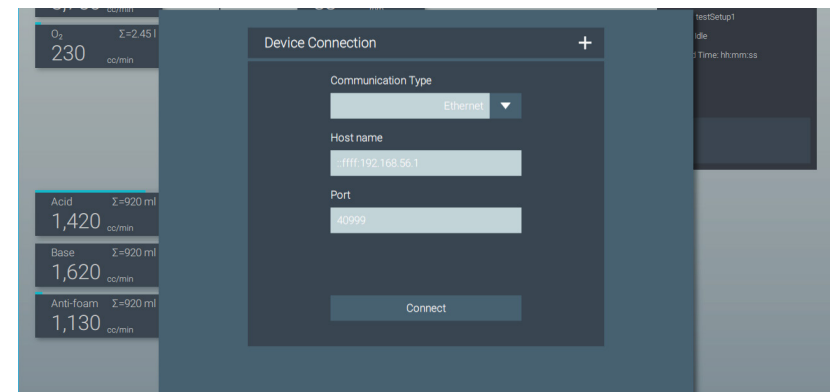
1.2 Screen Layout Mobile



Click on the plus sign (+) to open menu for re-scanning of new devices or entering the information to connect the device manually if it's not discovered by the software.



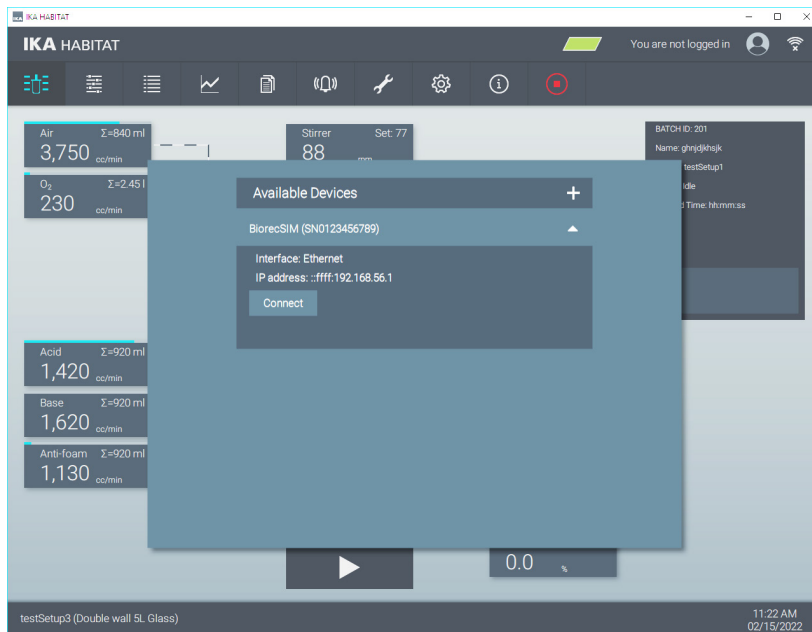
If the device is turned on, but not discovered by the software, the user is able to enter the information manually to connect the device.



2. Screen List

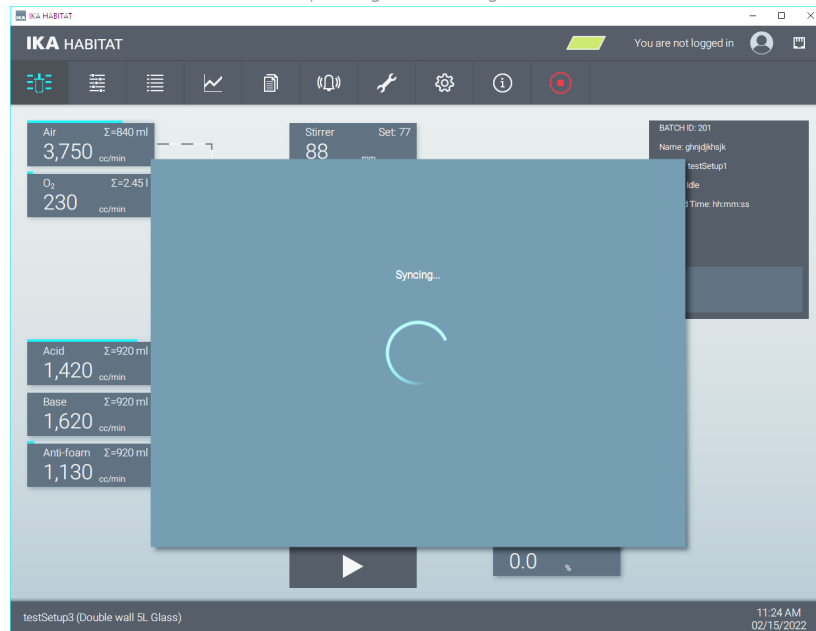
2.1 Screen of available devices screen

To display all available devices that are discovered by the software via Networks (Ethernet, Wi-Fi Serial port and Bluetooth).

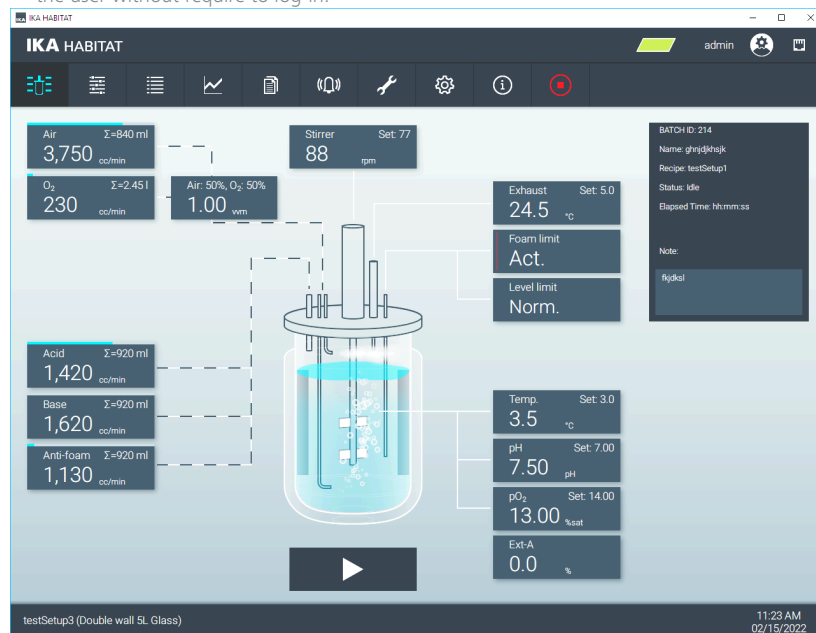


2.2 Connecting to device screen

Software will establish connection to the device and sync all required data from the device. During data sync operation the connection or data sync maybe failing due to not stable connection or corrupted data transfer from the device. The software will show a corresponding error message.



After sync is done the Main Screen Process view will show the current status of the device to the user without require to log-in.



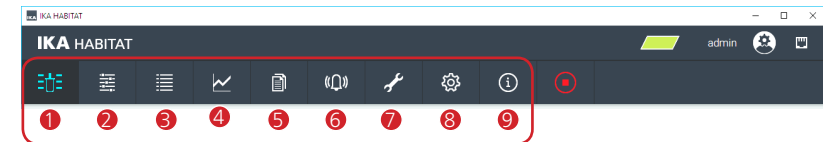
2.3 Application Header Menu

2.3.1 Header TAB Button

Using to navigate to the screens.

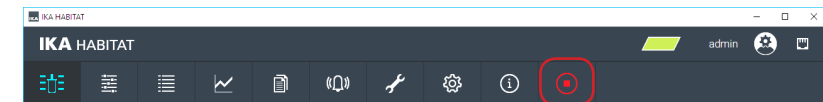
- ① Process view
- ② Setup view
- ③ List view
- ④ Trend view

- ⑤ Historical data view
- ⑥ Alarm view
- ⑦ Maintenance view
- ⑧ Settings view
- ⑨ Info view



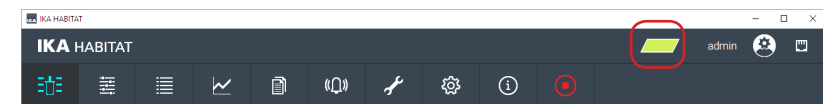
2.3.2 Safe-Stop

The Safe-stop (or Emergency button) use to stop all functions of the device that are running. The button will blink if device is in Safe-stop mode then GUI will disconnect from the device in a few seconds and display Available Devices screen (2.1). To restart the operation the user need to press Safe-stop button on the control tower.



2.3.3 System color

The color indicator indicates which device is connected and controlled by GUI software. The system color on the GUI will be synced with system color of the device LED at the front of control tower. The user is able to click on the system color and choose another color from the list.



2.4 Application Bottom Menu

- ① Display current use setup.
- ② Current device time. The user is able to click for doing time-sync (Sync current PC time to the Device).

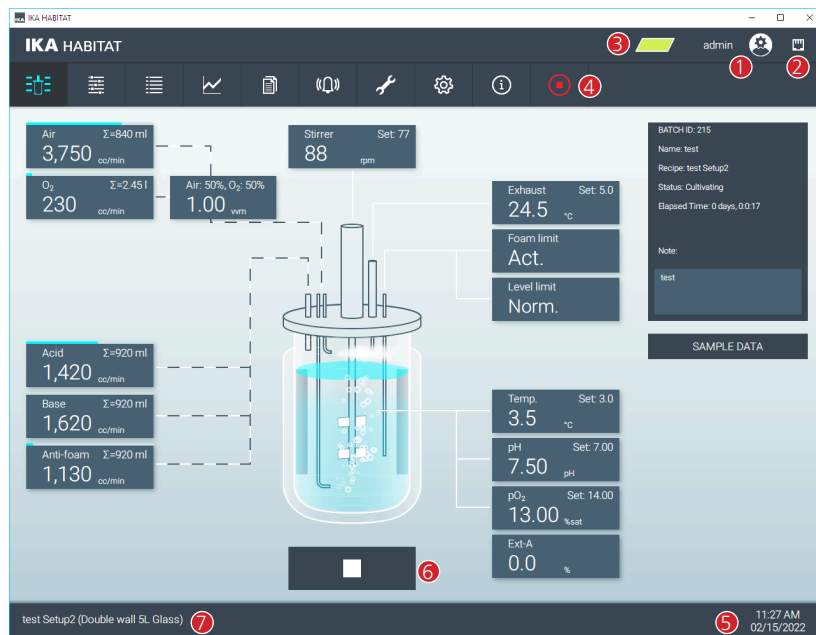


2.5 Process view

Start screen with schematic illustration of the controlled culture vessel:

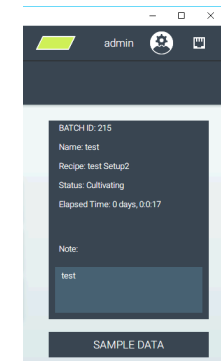
- › Display of components of the current configuration
- › Overview of measured values and process parameters
- › Open the controller menus for components

- 1 User menu to log-in and manage user account (Add, Edit and Delete)
- 2 Connection indicator to indicate current connection status and interface (Ethernet, Wi-Fi, or Serial port)
- 3 Device color indicator
- 4 Safe-Stop
- 5 Device date time
- 6 Start Experiment button (Start data logger together with module that set to auto mode)
- 7 Indicate current recipe use



2.5.1 Batch information panel

The panel shows information for the current / last batch i.e. ID, Name, and Recipe in use, status, Elapsed time and Note that user entered while starting the experiment.



2.5.2 Login

Before the user is able to change any parameters value or configuration, the user is required to log in to the device first.

Entering the username and password.

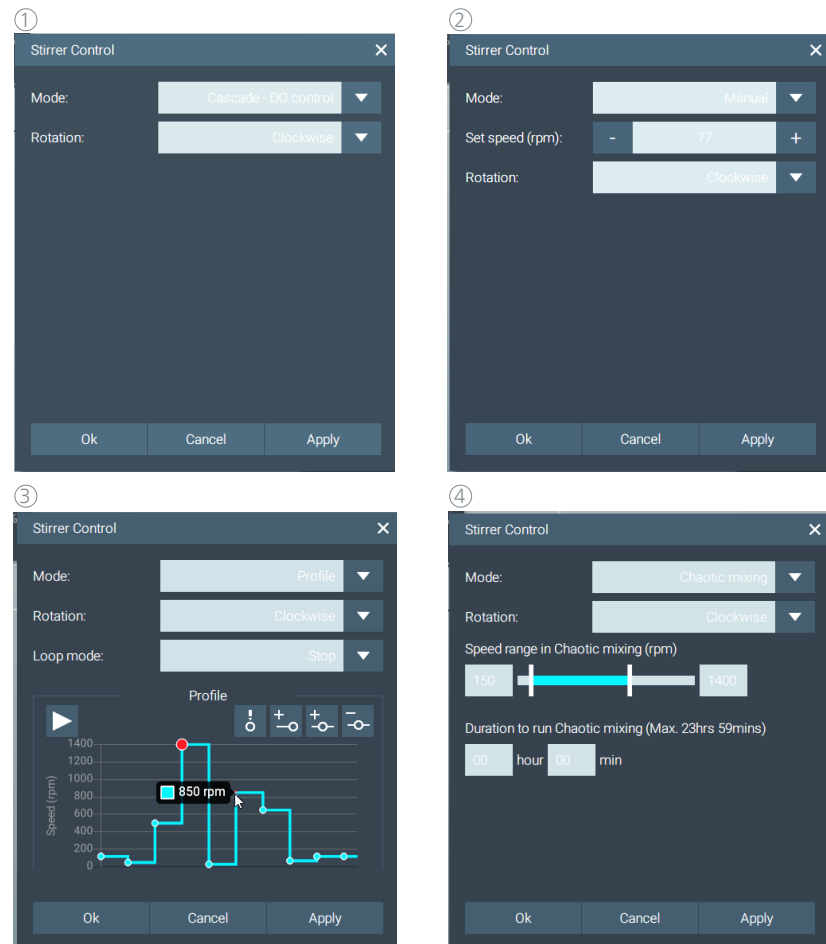
After logged in the user name will show and the user icon will change to reflect the user role.



2.5.3 Stirrer Control

Mode:

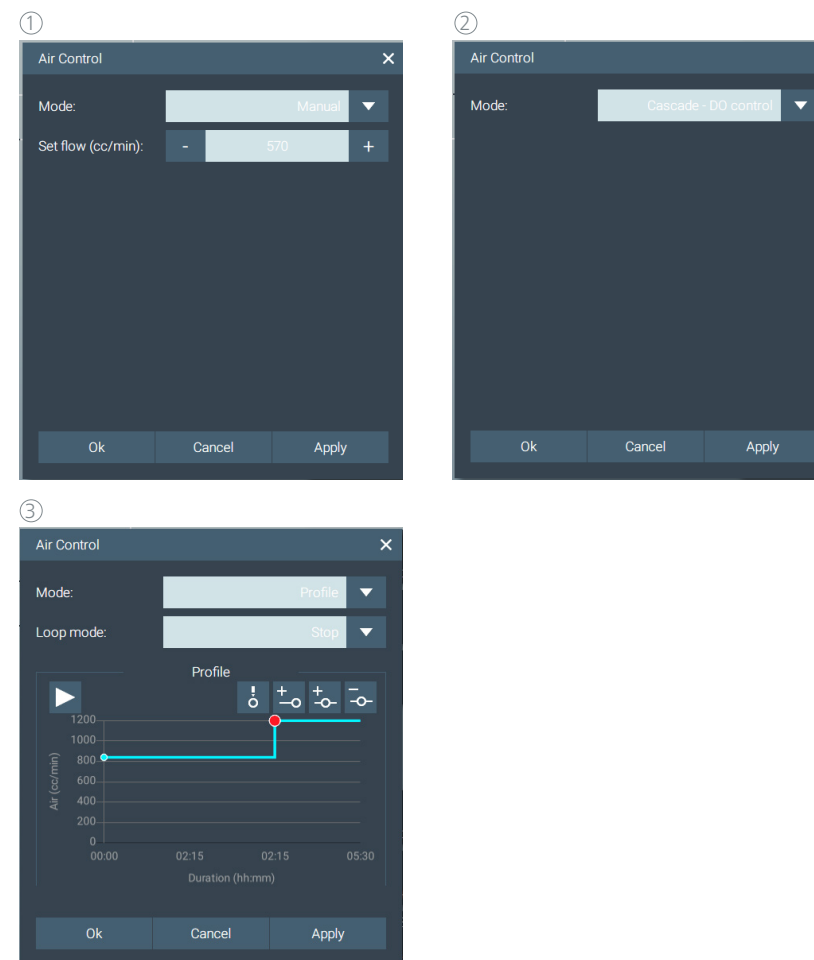
- › Off: Turn off the stirrer
- › Manual: Set speed of the stirrer manually (freely), not depending on other parameter.
- › Cascade – DO control: Stirrer control by DO cascade controller. Only rotation direction can be set for this mode.
- › Profile: Set pre-defined group of set values (up to 10) to be executed in the period of pre-defined time.
- › Chaotic: Set the lower and upper limit speeds and duration for the chaotic mixing. It's based on an algorithm that generates the speed of stirrer randomly (in specified range). The algorithm intends to help speed up the mixing time.



2.5.4 Gas Control (Air, O₂, N₂, CO₂)

Mode:

- › Off: Turn off the gas module
- › Manual: Set the gas flow rate manually (freely), not depending on other parameter.
- › Cascade – DO control: Gas control by DO cascade controller.
- › Profile: Set pre-defined group of set value (up to 10) to be executed in the period of pre-defined time.



2.5.5 Gas Mixer (Air, O₂)

- › Gas Mixer: Set Air and O₂ control mode to Manual mode.
- › If the Gas Mixer is enabled the set point input from Air and O₂ control will be disabled.
- › **Set flow:** Entering flow rate in vvm (Volume Vessel per Minute), up to 2 vvm.
- › **Set ratio (Slider):** Change ratio for mixing Air and O₂.

2.5.6 Pump Control

Mode:

- › Off: Turn off
- › Manual: set flow rate, volume and direction of the pump manually.
- › Auto – pH control: Pump fill in volume will be controlled by pH controller. Set pump speed and direction can be controlled in this mode.
- › Profile: Set pre-defined group of set value (up to 10) which will be executed in a period of pre-defined time.

Calibration information:

Show calibration information: if the parameter (i.e. Tube in use) does not match the pump must be calibrated.

- › Calibrate: see Pump Calibration
- › Filling: see Pump Calibration

①

②

③

2.5.7 Exhaust Control

Mode:

- › Off: Turn off
- › Auto: The controller will automatically control the filter heater temperature according to set value.

2.5.8 Foam limit Control

Mode:

- › Off: The sensor will detect the foam level but not take any action.
- › Auto: If foam is detected the controller will control the Anti-foam pump to fill in Anti-foam.

On delay: The time delay after the foam is detected (Activate status) before the Anti-foam fill-in.

On time: Pump duration on time.

Sensitivity: To adjust the sensitivity of the foam detection sensor.

Status Indicator: To indicate the status of the sensor (Normal/Activate).

Foam limit Control

Mode: Auto

On delay (sec): 1.0

On time (sec): 0.3

Sensitivity (%): 42

Low High

Activate

Ok Cancel Apply

2.5.9 Level limit Control

Mode:

- › Off: The sensor will detect the level but not take any action.
- › Auto: If the level is active the controller will control the Level pump to feed / harvest.

On delay: The time delay after the level sensor is active before the Level pump feed / harvest.

On time: Pump duration on time.

Sensitivity: To adjust the sensitivity of the level detection sensor.

Status Indicator: To indicate status of the sensor (Normal / Activate).

Level control mode: To control the direction of the pump: Harvest = suck out / Feed = Fill-in.

Level limit Control

Mode: Auto

On delay (sec): 1.0

On time (sec): 0.3

Sensitivity (%): 46

Low High

Normal

Level control mode: Harvest Feed

Ok Cancel Apply

2.5.10 Temperature Control

Mode:

- › Off: Turn off
- › Auto – Control: Vessel temperature is following the user set point.
- › Profile: To set pre-defined group of set value (up to 10) which will be executed in a period of pre-defined time.

Set value offset: To set the temperature offset from the set point.

Actuator: Select Heating blanket / Thermostat (HRC 2) to control the vessel temperature.

Temp. Control

Mode: Auto

Set Temp. (°C): 5.0

Set value offset +/-: 1.0

Actuator: Thermostat

Ok Cancel Apply

Temp. Control

Mode: Profile

Actuator: Thermostat

Loop mode: Stop

Profile

Temp. (°C)

Duration (hh:mm)

Ok Cancel Apply

2.5.11 pH Control

Mode:

- › Off: Turn off
- › Auto: Control process pH value is following user set point (feedback control).
- › Profile: To set pre-defined group of set value (up to 10) which will be executed in a period of pre-defined time.

Set value offset: To set the pH offset from the set point.

pH Control

Mode: Auto

Set pH: 7.00

Set value offset +/-: 1.00

Ok Cancel Apply

pH Control

Mode: Profile

Loop mode: Stop

Profile

pH

Duration (hh:mm)

Ok Cancel Apply

2.5.12 pO₂ Control

Mode:

- › Off: Turn off
- › Manual: To control the output power (%) of the pO₂ controller directly with Cascade control table from the setup.
- › Auto: To enter pO₂ value (% saturate) with Cascade control table from the setup.
- › Profile: To set pre-defined group of set values (up to 10) which will be executed in a period of pre-defined time.

pO₂ Cascading: Visualize the set value from Cascade table in the graph



2.6 Setup (Recipe) Menu

To create, save and restore the setup:

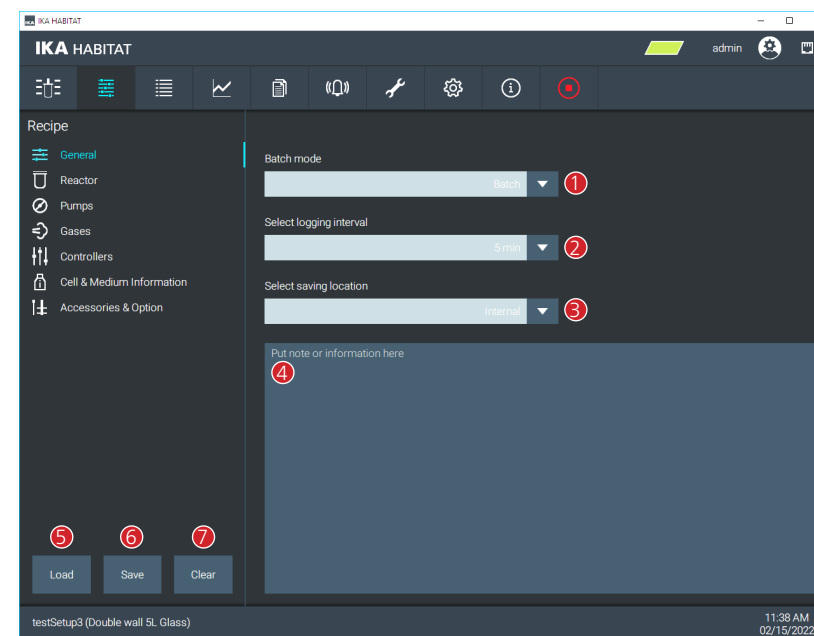
- › Re-use previous configuration of the component use in the experiment.
- › Information to generate experiment report when the experiment is done.
- › Reflect to visualize the process view (i.e. Vessel type, Gas, Pump and accessories).

IMPORTANT:

One of the saved setups must be assigned to every experiment before start!

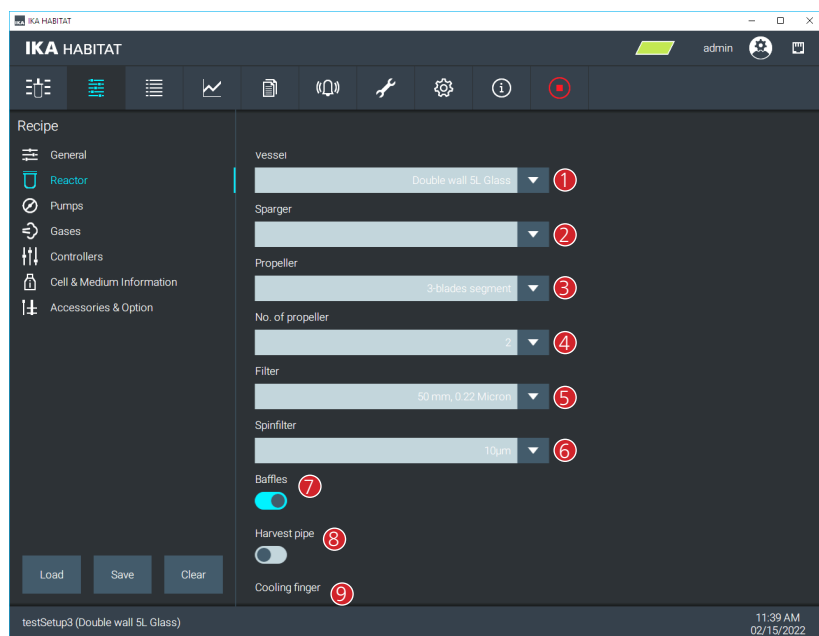
2.6.1 General

- ① To select experiment mode (Batch, Fed-batch and Continuous)
- ② Selecting data logging interval
- ③ Select data saving location: internal control tower, internal memory or external, i.e. USB stick
- ④ Note: to enter note or information for the setup.
- ⑤ Load the setup from the device
- ⑥ Save the current setup into the device
- ⑦ Clear all setup in the UI to default value



2.6.2 Reactor

- ① Vessel type and size
(To effect min/max limits of parameter such as Gas flow rate and vessel visualization)
- ② Sparger type (for report only)
- ③ Propeller type (for report only)
- ④ No. of propeller (for visualization and report)
- ⑤ Filter size (for report only)
- ⑥ Spinfilter size (for report only)
- ⑦ Baffles enable / disable (for visualization and report)
- ⑧ Harvest pipe enable / disable (for visualization and report)
- ⑨ Cooling finger enable / disable (for visualization and report)

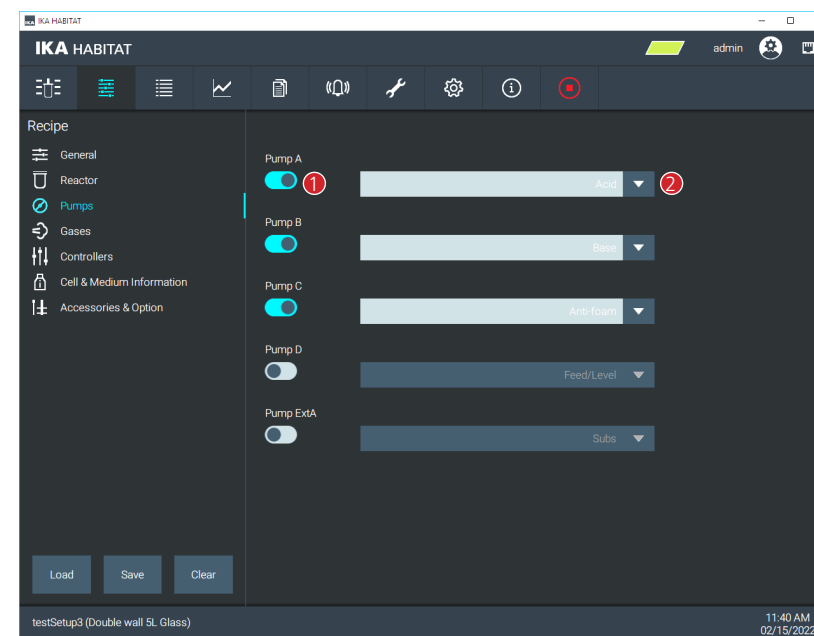


2.6.3 Pumps

The control tower consist of 4 built-in pumps called Pump A (top) to Pump D (bottom).

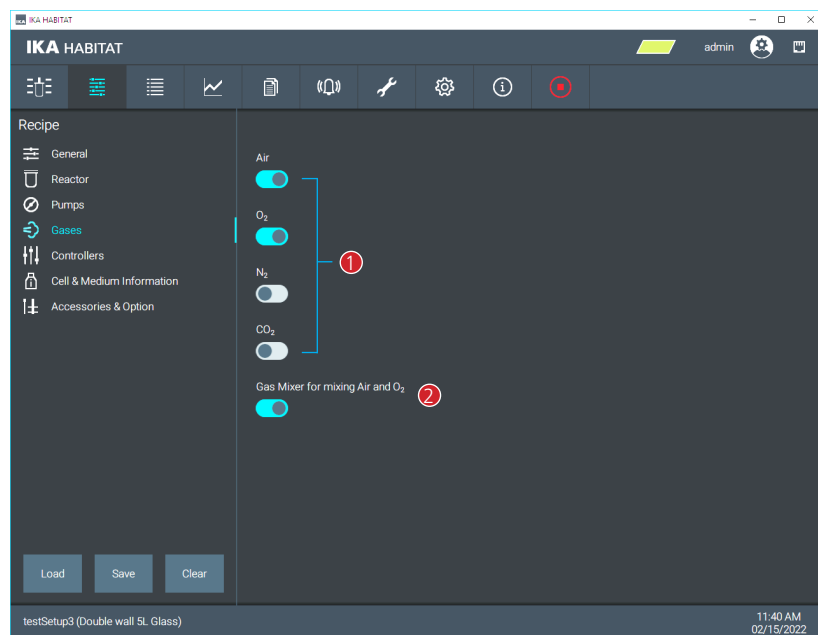
It is also possible to add an external pump called Ext A.

- ① To enable / disable the pump. Disabled pump will not be shown and not be able to be controlled from the process view.
- ② Combo box is using to assign the parameter to the pump (Acid, Base, Anti-foam, Level and Substrate / Feed)



2.6.4 Gases

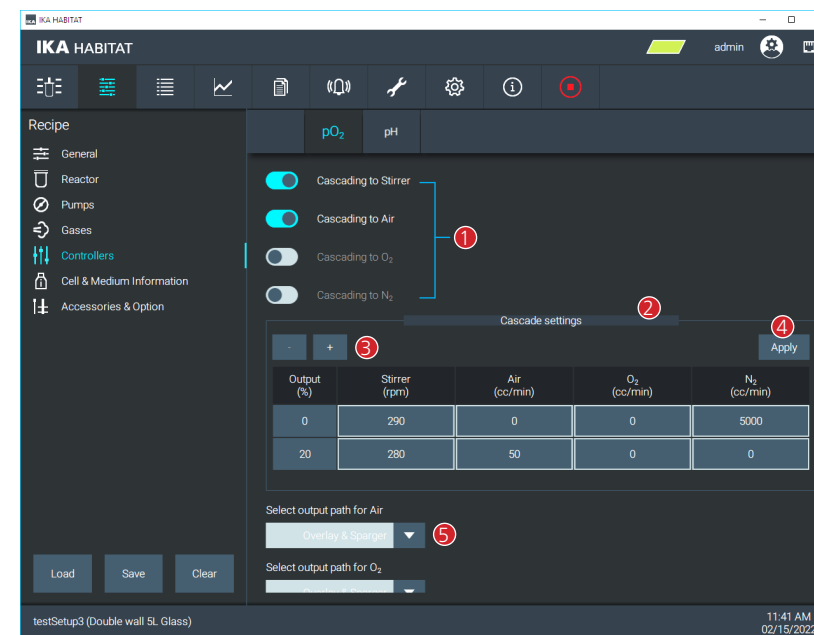
- ① To enable / disable up to 4 gas modules for using in the experiment.
- ② To enable / disable the Gas Mixer (Air, O₂). When the Gas mixer is enabled the flow rate of Air and O₂ is controlled by the Gas mixer.



2.6.5 Controllers

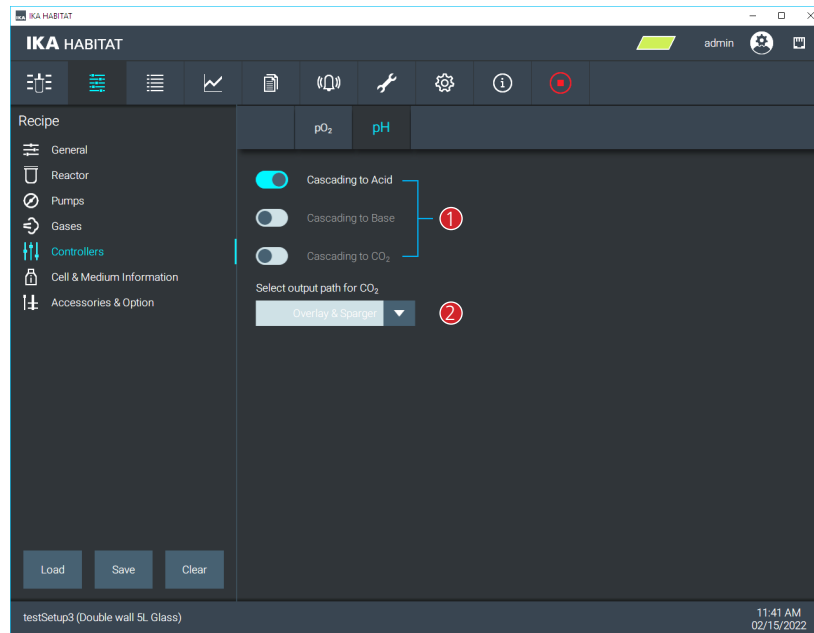
pO₂ controller

- ① Enable / Disable parameter use to control pO₂ value
 - ② Cascading table to control the pO₂ value
 - ③ Plus / Minus button to add / remove row of the table (min. 2 / max. 6)
 - ④ Apply button to update the edited table to the device. (This is useful during experiment running if the user would like to update to new control strategy or to find the proper strategy before putting into the recipe.)
 - ⑤ Select output path
- (Information for the report: How is the gas supply to the vessel.)



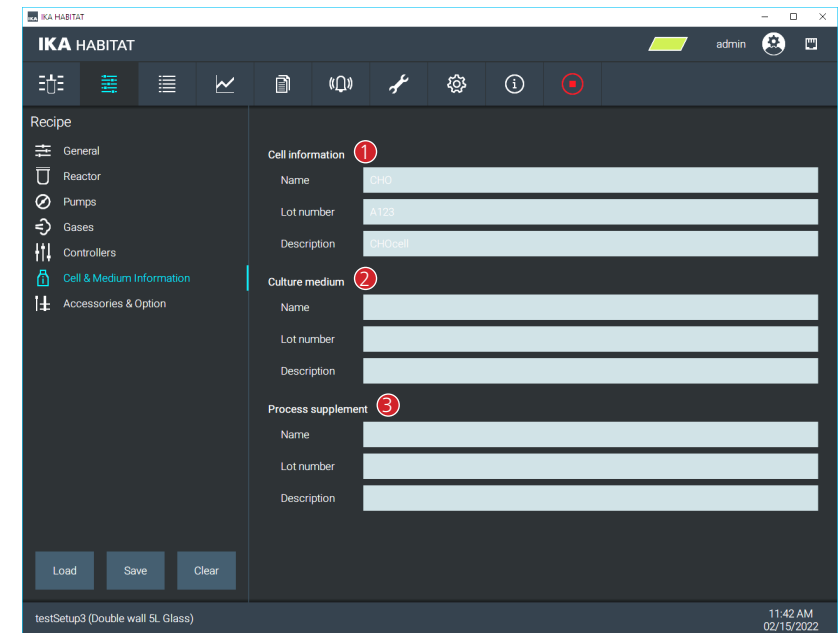
pH controller

- ① Enable / Disable parameter to control pH value
- ② Select output path



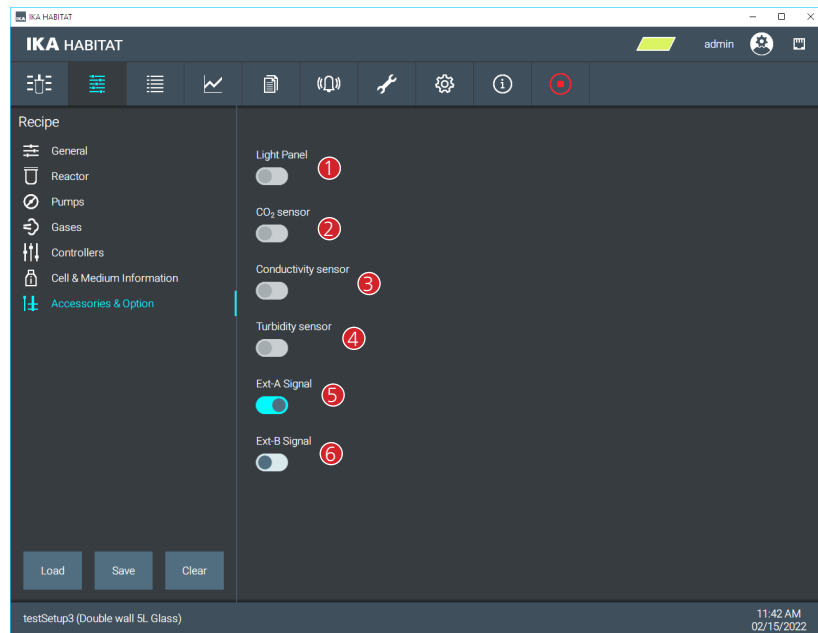
2.6.6 Cell & Medium information

- ① To fill in cell / product information
- ② To fill in culture medium information
- ③ To fill in supplement information



2.6.7 Accessories & Option

- ① To enable / disable Light panel
- ② To enable / disable CO₂ sensor
- ③ To enable / disable Conductivity sensor
- ④ To enable / disable Turbidity sensor
- ⑤ To enable / disable External signal module
- ⑥ To enable / disable External signal module



2.7 List View Menu

The screen display overall parameter in the table:

- › Actual value
- › Set value
- › Unit
- › Mode of operation
- › Alarm condition
- › Alarm status
- › Error code

The screenshot shows the 'List View Menu' table in the IKA HABITAT software. The table displays various parameters and their current status. The columns are: Name, Actual value, Set value, Unit, Mode, Alarm enabled, Alarm status, and Error.

Name	Actual value	Set value	Unit	Mode	Alarm enabled	Alarm status	Error
Temp.	8.5	3.0	°C	Off	Disabled	Cleared	0
pH	7.50	7.00	pH	Off	Disabled	Cleared	0
pO ₂	13.00	14.00	%sat	Off	Disabled	Cleared	0
Exhaust	24.5	5.0	°C	Off	Disabled	Cleared	0
Stirrer	88	77	rpm	Off	Disabled	Cleared	0
Air	3.750	5.00	cc/min	Off	Disabled	Cleared	0
O ₂	230	170	cc/min	Off	Disabled	Cleared	0
N ₂	450	280	cc/min	Off	Disabled	Cleared	0
CO ₂	470	100	cc/min	Off	Disabled	Cleared	0
Acid	1.420	1.000	cc/min	Off	Disabled	Cleared	0
Base	1.620	1.070	cc/min	Off	Disabled	Cleared	0
Anti-foam	1.130	1.720	cc/min	Off	Disabled	Cleared	0
Feed	1.350	1.260	cc/min	Off	Disabled	Cleared	0
Subs	1.425	1.260	cc/min	Off	Disabled	Cleared	0
Foam limit	2	0	-	On	Disabled	Cleared	0
Level limit	1	0	-	Off	Disabled	Cleared	0
CO ₂ probe	0	0	-	Off	Disabled	Cleared	0
Conductivity probe	24.81	0	nS/cm	Off	Disabled	Cleared	0
Turbidity probe	120	0	NTU	Off	Disabled	Cleared	0
Light panel	0	50	%	Off	Disabled	Cleared	0

At the bottom, the status bar indicates 'testSetup3 (Double wall SL Glass)' and the time '11:42 AM 02/15/2022'.

2.8 Trend View Menu

To plot real-time data to the graph.

The plot data is refreshed every time when the GUI is connected to the device or the device time is changed.

To get all data from data logger, click on Sync. Button.

(Only if the experiment is running! No data available if the experiment is not running!)

① To display current value of the parameter

(Click to setup parameter to display with desired color and scale)

② To change Graph plotting duration

③ To freeze the graph plotting

(To pan / scroll the data, no new data is added to the graph)

④ Graph sync button

To transfer all plotting data from the device to the GUI software due to the device can operate without the GUI.

BE AWARE: It might take some time, depending on the data size of the experiment.

⑤ To click anywhere in plot area to display horizontal cursor line

(display values of all plotted parameters at the location)



① To enable / disable Trend plotting channel

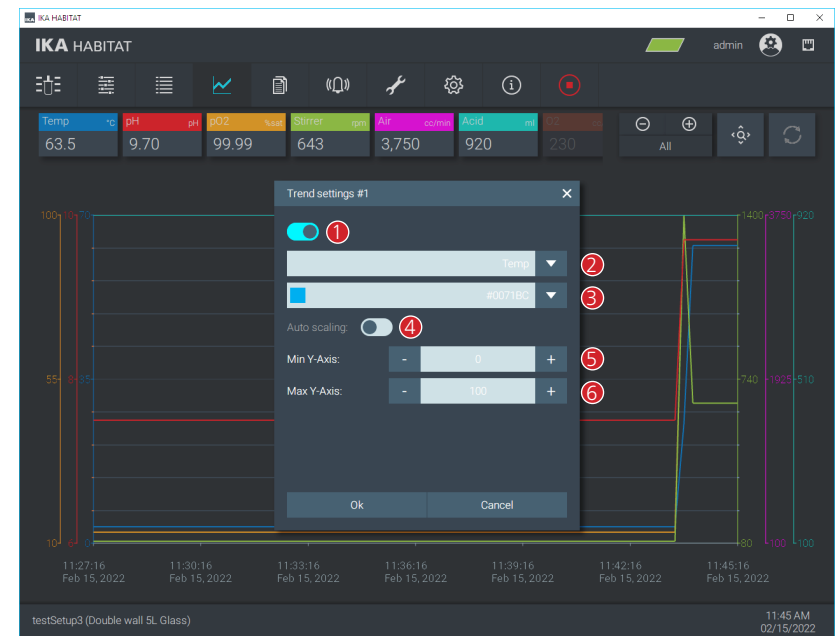
② To choose parameter to plot

③ To choose plotting color

④ To enable / disable auto scaling

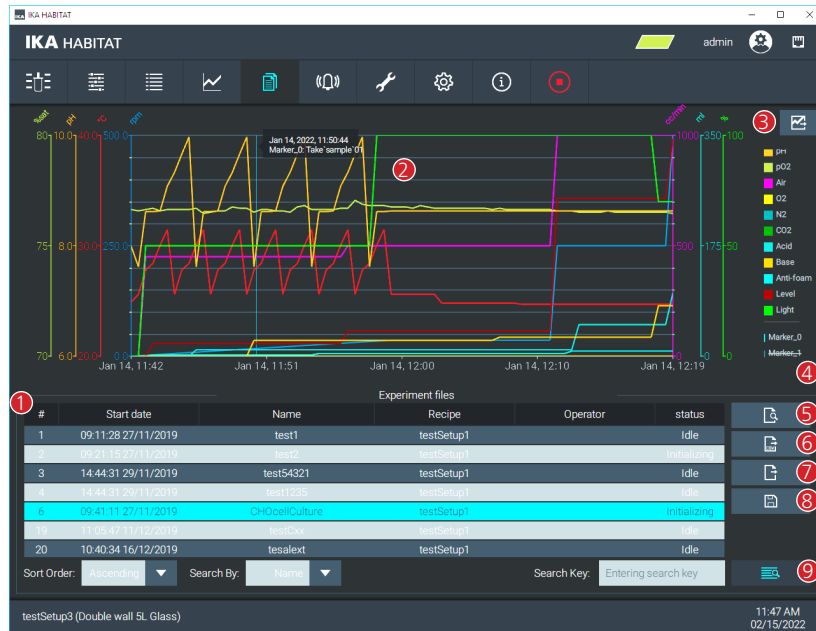
⑤ Set minimum Y-Axis scale

⑥ Set maximum Y-Axis scale



2.9 Historical data

- ① Table to display all historical experiment from the device
- ② Historical Graph plot area to review data
- ③ Button to export Historical graph to image (PNG format)
- ④ Graph legend, to hide / show each parameter by clicking on the legend
- ⑤ Button to plot data to the graph
- ⑥ Button to export data as CSV file
- ⑦ Button to generate report in PDF format
- ⑧ Button to save data to USB drive that connected to the control tower
- ⑨ Button to open search menu for searching or sorting the list of experiment



2.10 Alarm view

The screen will display alarm for the active running experiment. If the experiment is not running the alarm will not be recorded.

The alarm for each experiment will be saved and exported together when a report file is generated.

The screenshot shows the IKA HABITAT software interface in the alarm view. The top part displays a table of alarms. The bottom part shows the current experiment setup and status.

#	Timestamp	Error code	Description	Value
1	28/2/20 17:23:55	01030115	Communication BLE disconnected	0
2	28/2/20 17:23:55	01290009	Power Supply shutdown	0
3	28/2/20 17:23:55	01362915	Temperature Sensor disconnected	0
4	28/2/20 17:23:55	01393805	Temperature Temperature set value not reached	0

testSetup3 (Double wall 5L Glass) 11:47 AM 02/15/2022

2.11 Maintenance Menu

2.11.1 Sensor Calibration

- ① Latest date and time that calibration has been conducted.
- ② Probe serial number.
- ③ Raw probe value when doing zero calibration.
- ④ Raw probe value when doing Slope calibration.
- ⑤ Probe condition: Minus sign means the probe is not suitable for doing the next experiment and needs to be replaced.
- ⑥ **CAL** button to start conducting the probe calibration.

	① Last calibration	② serial no.	③ Zero	④ Slope	⑤ Condition	⑥ Action
Temp	12/27/2018, 10:42:34		0.0	0.0/°C	⊖	CAL
pH	12/27/2018, 10:42:34	C5483095H4TZ	0 mV	0 mV (@0 pH)	⊖	CAL
pO ₂	12/27/2018, 10:42:34		0 nA	0 nA/%	⊖	CAL

testSetup3 (Double wall 5L Glass) 11:48 AM 02/15/2022

2.11.2 Pump Calibration

- ① Latest date and time that calibration has been conducted.
- ② Tubing inner diameter.
- ③ Set value that used to calibrate pump in the last calibration.
- ④ The value that is able to measured by the device when the user gives a set point.
- ⑤ Calibration constant (Use internally to adjust pump accuracy).
- ⑥ **CAL** button to start conducting the probe calibration. **Filling** button is used to fill an empty tube with liquid to help increase calibration accuracy and even useful to fill and empty tube before starting every experiment.

	① Last calibration	② Tubing ID (mm)	③ Set (ml)	④ Measure (ml)	⑤ k (ml/pulse)	⑥ Action
Acid	12/27/2018, 10:42:34	3.2	50	100	0.300	CAL, Filling
Base	12/27/2018, 10:42:34	3.2	50	100	0.300	CAL, Filling
Afoam	12/27/2018, 10:42:34	3.2	50	100	0.300	CAL, Filling
Feed	12/27/2018, 10:42:34	3.2	50	100	0.300	CAL, Filling
SUBA	12/27/2018, 10:42:34	3.2	50	100	0.300	CAL, Filling

testSetup3 (Double wall 5L Glass) 11:48 AM 02/15/2022

2.11.3 Controller

The screen is mostly for the experienced user with knowledge of a Control system to do PID controller tuning. For mostly of the user there is no need to adjust any parameters on the screen.

① **kp** constant of PID controller.

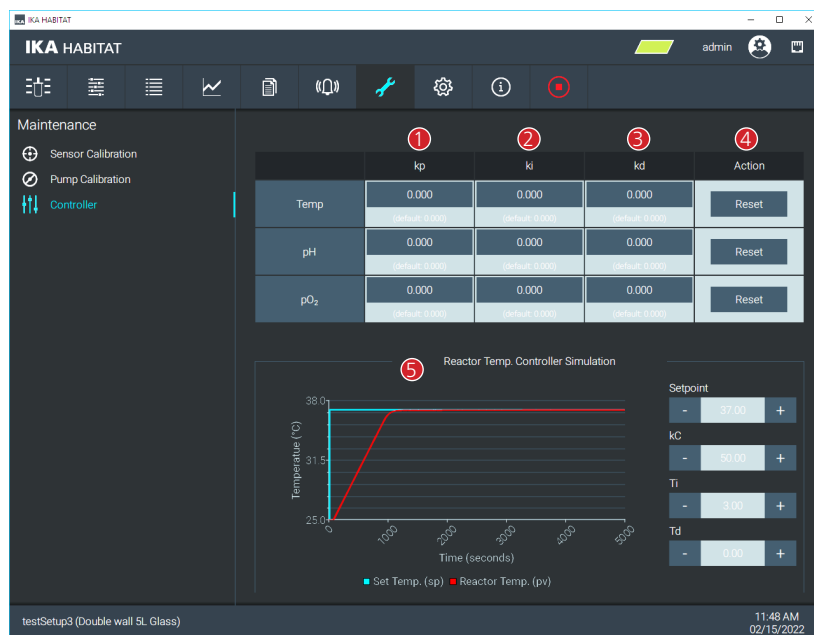
② **ki** constant of PID controller.

③ **kd** constant of PID controller.

⑤ Button to reset the PID parameter to default value.

⑥ Temperature controller simulation:

To simulate PID control with the modified **kp**, **ki** and **kd** values.



2.12 Settings Menu

2.12.1 General

① To change the device name.

② Select User interface language.

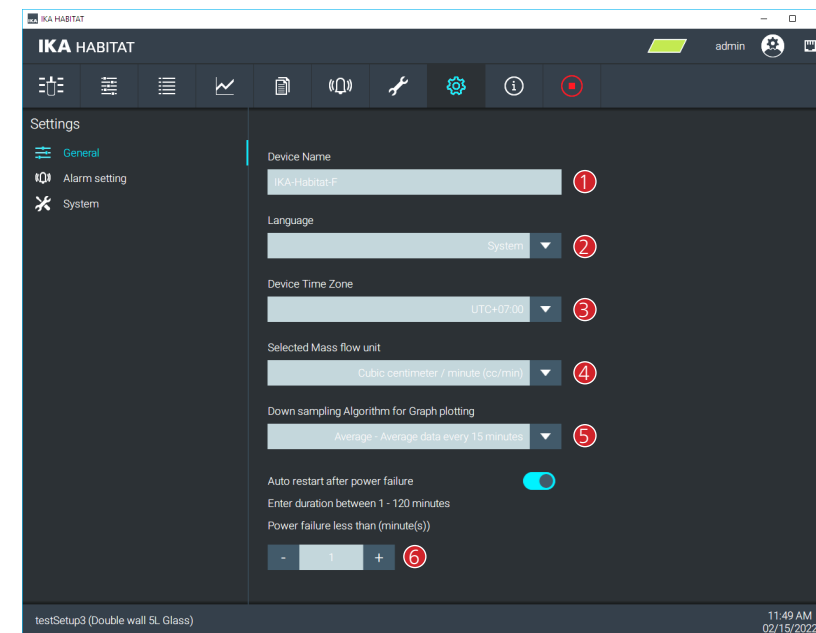
③ Select device time zone.

④ Set unit of flow rate.

⑤ Data down sampling algorithm.

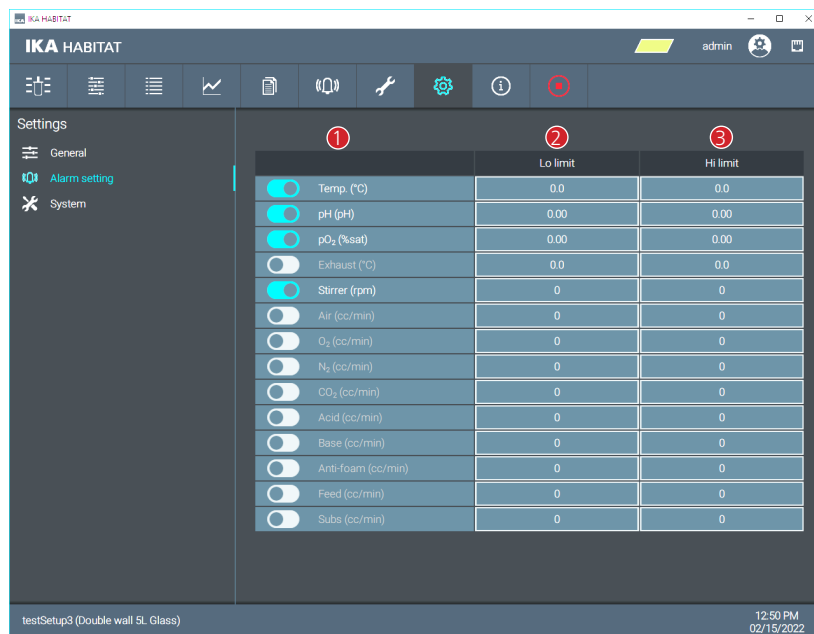
- Average: All data points in every 15 minutes block will average and plot as single point.
- LTTB: The algorithm will keep all peak and valley of the graph and try to plot graph with the same shape of original data point before down sampling as possible.

⑥ To enable / disable auto restart when short power failure happen. Power failure duration can be specified for auto restart.



2.12.2 Alarm setting

- ① To enable / disable limit alarm.
- ② Lower limit: If the actual value is lower than the lower limit, an alarm signal will be triggered.
- ③ Higher limit: If the actual value is higher than the higher limit, an alarm will be triggered.



2.12.3 System

⚠ Notice!

This section should be used carefully!

The menu allows to change the system parameter, delete or restore configuration which may not be compatible with the device!

Only admin level user can access some menu on the screen.

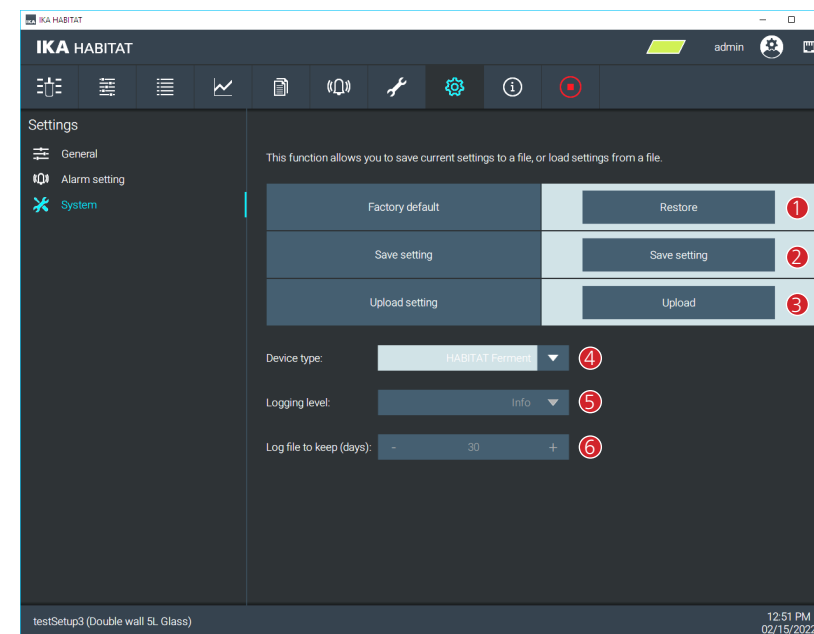
However some menu will need IKA services with service level password to access and change the parameter.

- ① Restore factory default configuration.
- ② Export current to JSON file.
- ③ Import JSON file to upload the new configuration to the device
- ④ Change device type.

IKA service only!

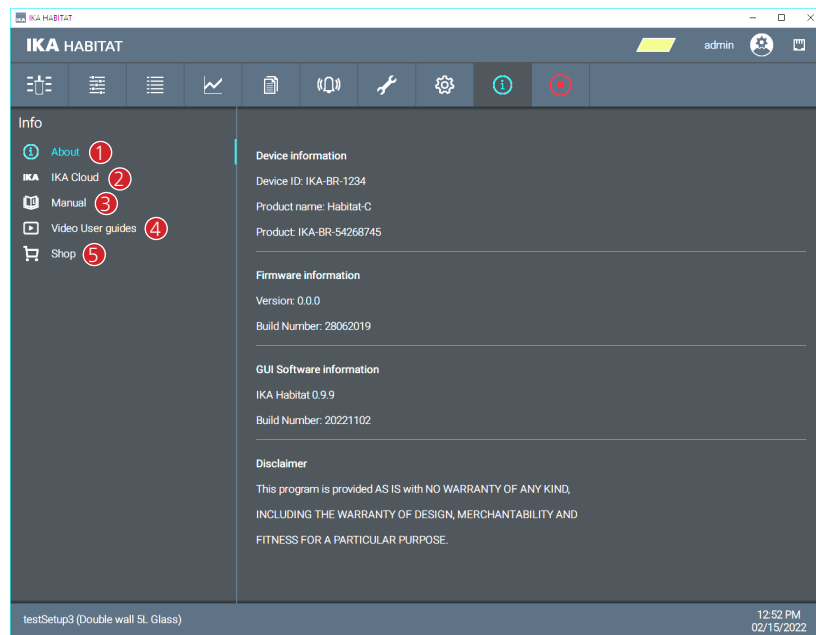
The type of the device may change when an upgrade with add-on component or the changing of some PCBA is made!

- ⑤ The function intended use for IKA service only.
- ⑥ The function intended use for IKA service only.



2.13 Info Menu

- ① About: HABITAT device information.
- ② IKA Cloud: Registration information for the IKA cloud.
- ③ Manual: Open HABITAT operating instructions.
- ④ Video Users guides: Link tutorial videos YouTube playlist.
- ⑤ Shop: Link to HABITAT product page on the IKA website.



/// Autoclaving



Danger!

- › After autoclaving: Be aware of the hot surfaces!

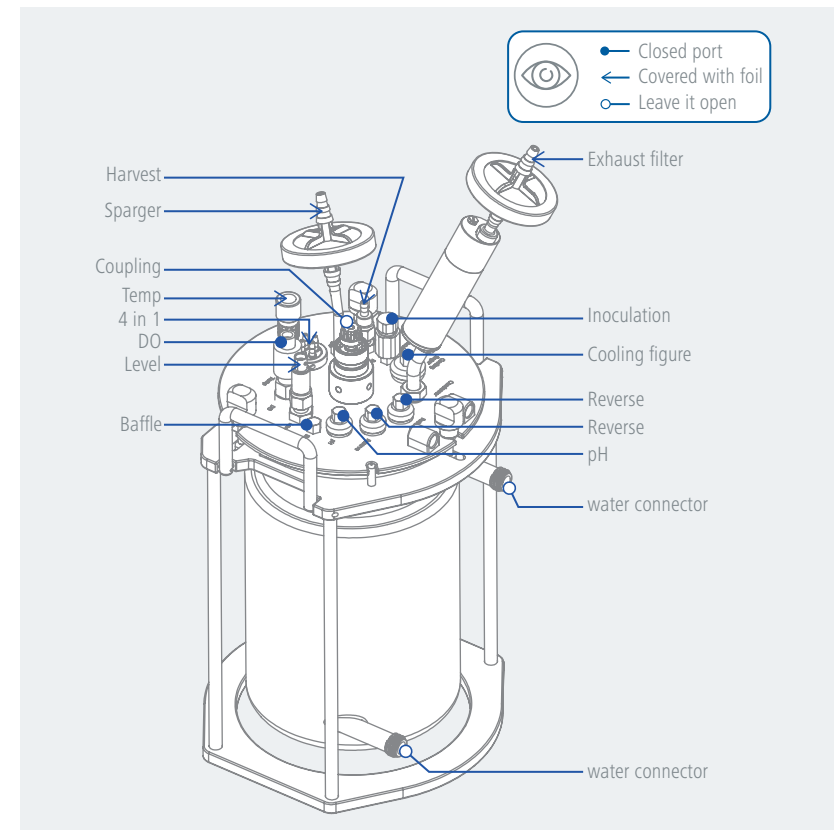


Caution!

- › Check that the vessel fits the autoclave device!
- › Avoid pressure while autoclaving!
- › Keep at least one lid port open during autoclaving for pressure release!
- › Keep the exhausting filter open.
- › For double wall vessel, keep the double wall water connectors open!

Steps for autoclaving

- › Place the vessel in the vessel stand, and then close the lid.
- › Assemble the components / sensors with the vessel.
- › Fill the media into the vessel (if the double-wall vessel is used, please do not fill water into the water jacket).
- › Remove the sensor cables.
- › Close the caps to protect the sensor connectors.
- › Use the caps, clamps or aluminium foil to cover the ports.
- › Carry the vessel by the handles on the vessel stand.
- › Put the vessel in the autoclave (e.g. 25 ... 30 minutes at 121 °C, liquid cycle).
- › After autoclaving, wait until it cools down.



/// Inoculation

There are different options for the inoculation:

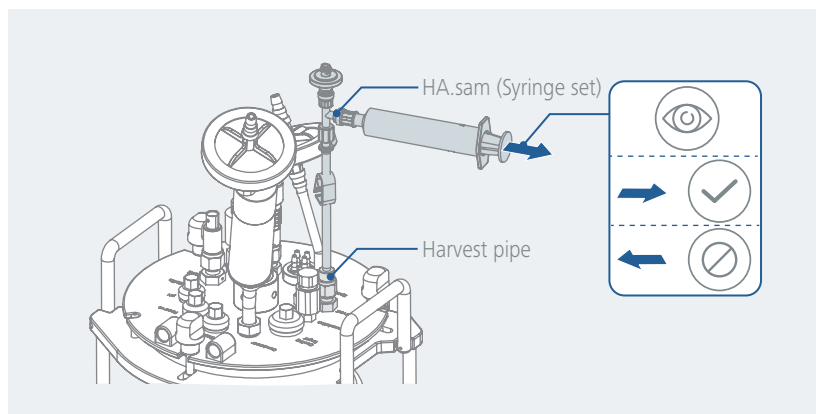
1. Use the sterilize coupling with the silicone tube that is connected to the overlay port. Blow torch flame over the coupling to sterilize again before opening it for inoculation.
2. Use the syringe via the septum port.
3. Pierce the syringe with the needle through the septum port.
4. Open the port without the septum and add the liquid directly under the laminar flow hood.

/// Harvesting

There are different methods for harvesting or emptying the vessels:

1. Directly pouring to empty vessel or transfer to another vessel under the laminar flow hood.
2. Connect the sterilized silicone tube to the harvest tube and pump out via the peristaltic pump to a prepared container. This method is recommended for the viscous cell.
3. Apply overpressure to the vessel. This option can be used when the harvest tube is used.
Firstly, clamp the tube to block the exit gas. Then, turn on the gas flow system (max pressure 1.5 bar) and adjust the flow rate slowly.

/// Sampling



Interfaces and outputs

The device can be operated by computer via an RS 232 or USB port using labworldsoft® laboratory software.

The device software can also be updated with a PC via the RS 232 or USB port.

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. The USB port can also be used to update firmware.

/// USB device drivers

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

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

Install the driver by running the setup file. Connect the IKA device through the USB data cable to the PC. The data communication runs through a virtual COM port.

Note: The USB driver is unnecessary for Windows 10 system. Don't install it for Windows 10 system!

/// RS 232 interface

Configuration

- › The functions of the interface connections between the device 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 device to the computer takes place only at the computer's request.

/// Command syntax and format

The following applies to the command set:

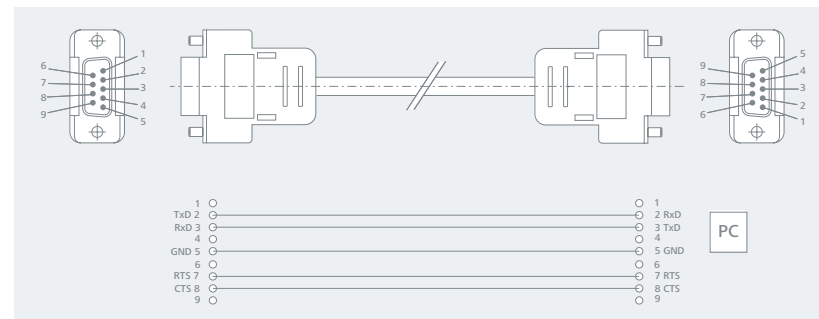
- › Commands are generally sent from the computer (Leader) to the device (Follower).
- › The device sends only at the computer's request. Even fault indications cannot be sent spontaneously from the device to the computer (automation system).
- › Commands are transmitted in capital letters.
- › Commands 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 0x0d 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 commissioning serve only as low level commands for communication between the device and the PC. With a suitable terminal or communications program these commands can be transmitted directly to the device. The IKA software package, Labworldsoft®, provides a convenient tool for controlling device and collecting data under MS Windows, and includes graphical entry features, for motor speed ramps for example.

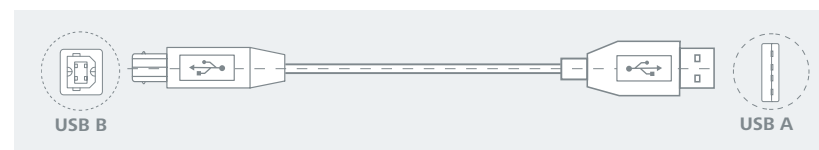
Commands	Function
IN_NAME	Read device name
IN_PV_4	Read the actual speed (rpm)
IN_SP_4	Display actual speed
OUT_SP_4	Setting the speed
START_4	Start the motor
STOP_4	Stop the motor
START_2	Start heating
STOP_2	Stop heating
IN_VERSION	Read Software version
IN_SOFTWARE_ID	Read software ID and version
IN_IAP_ID	Displays IAP ID
IN_PCB_ID	Displays PCB ID
IN_FLASH_SIZE	Displays controller flash size

/// Connection between the device and the external devices

› PC 1.1 Cable: This cable is required to connect RS 232 port to a PC.

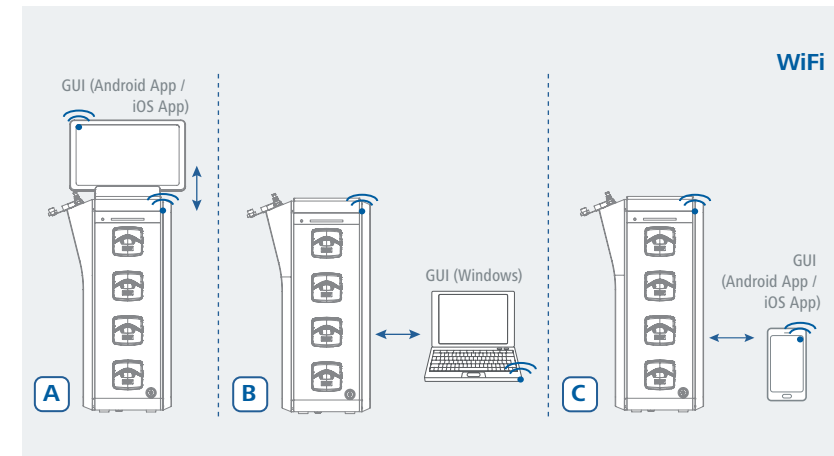


› USB Cable A – B: This cable is required to connect USB port to a PC.

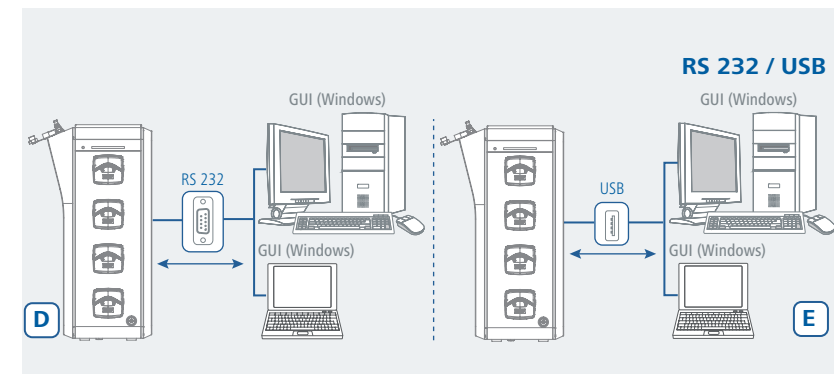


/// Connection capability

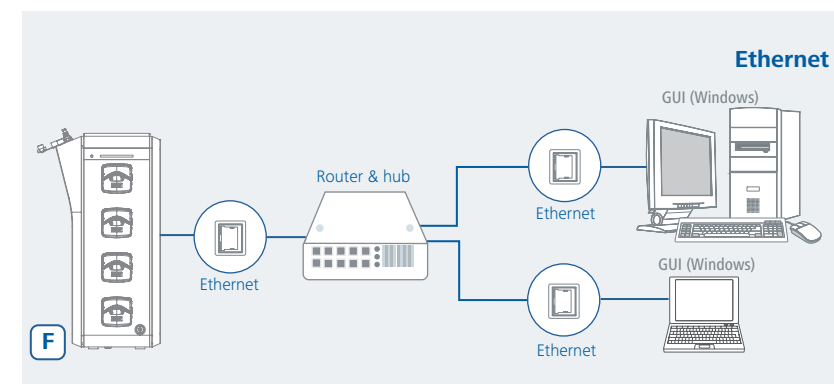
› WiFi



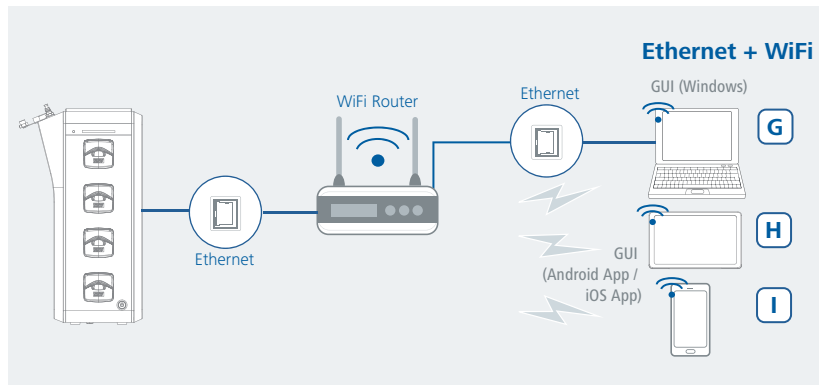
› RS 232 / USB



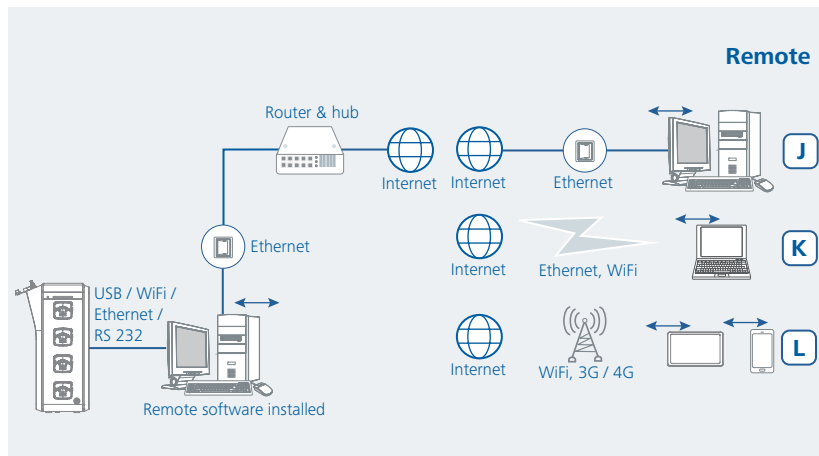
› Ethernet



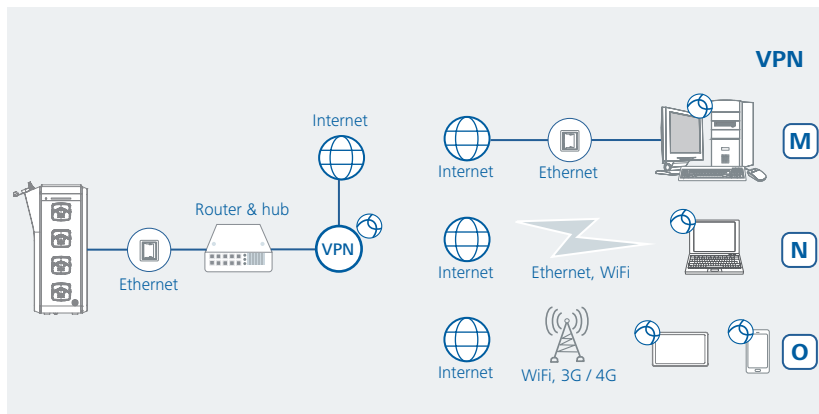
› Ethernet + WiFi



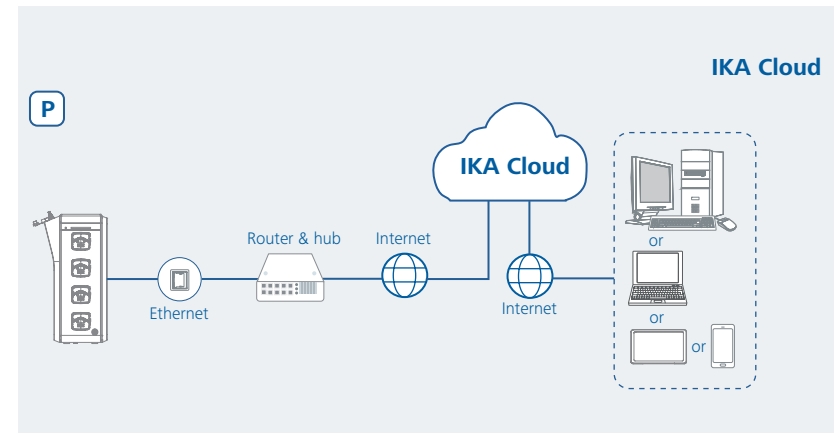
› Remote



› VPN



› IKA Cloud



Maintenance and cleaning

/// Maintenance Checklist

Component	Check	Before use	Note
Vessel	Visual inspection	X	› Don't use if there are any visible cracks or damages › Replace if necessary
Hoses (gas & liquids)	Visual inspection	X	› Don't use if there are any visible cracks or damages › Replace if necessary
Electrical connection (Motor, Heating jacket, Sensors...)	Visual inspection	X	› Don't use if there are any visible cracks or damages › Replace if necessary
Sealings, O-Rings (connectors and stirrer shaft coupling)	Visual inspection	X	› Don't use if there are any visible cracks or damages › Replace if necessary
Filter	Visual inspection	X	› Don't use if there are any visible cracks or damages › Replace if necessary
Other components made of glass	Visual inspection	X	› Don't use if there are any visible cracks or damages › Replace if necessary
pH- and DO- probes	Visual inspection Calibration	X	› Don't use if there are any visible cracks or damages › Replace if necessary › Refer to software, use calibration guide
Foam- and Level- Probes	Adjust sensitivity	X	
.....			

/// Cleaning

- › For cleaning disconnect the mains plug!
- › Use only cleaning agents which have been approved by IKA to clean IKA devices: Water containing surfactant / isopropyl alcohol.
- › Wear protective gloves during cleaning the devices.
- › Electrical devices may not be placed in the cleansing agent for the purpose of cleaning.
- › Do not allow moisture to get into the device when cleaning.
- › Before using another than the recommended method for cleaning or decontamination, the user must ascertain with IKA that this method does not destroy the device.
- › For parts in contact with media, please take them for the autoclaving after the cleaning!

/// Spare parts order

- › When ordering spare parts, please give:
 - device type.
 - serial number, see type plate.
 - position number and description of spare part, see www.ika.com.
 - software version.

/// Repair

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

Accessories

- › For accessories see www.ika.com.

Error codes

› The fault is shown by an error code on the display as following if the error occurs.

Proceed as follows in such cases:

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

Error code	Error message	Causes	Effect	Solutions
01030115	Communication BLE disconnected	No data communication between GUI and device	Popup can't connect to the device.	1. Check cable or WIFI connection 2. Power cycle device 3. Contact customer service
01290009	Power Supply shutdown	AC Power failure	Device stop working	1. Check main AC input power 2. Check the fuse 3. Contact customer service
01392915	Temperature Sensor disconnected	Voltage from sensor circuit > 2 V	No value display Temperature control inactive	1. Check cable connection 2. Check sensor 3. Contact customer service
01380615	Stirring contact disconnected	All hall sensors = logic high	Motor off	1. Check motor cable 2. Check motor 3. Contact customer service
01383610	Stirring Speed blocked	Actual speed = 0 for 30 secs	Motor off	1. Check motor cable 2. Check motor shaft 3. Contact customer service
01382708	Stirring Safety Circuit safety circuit cut-off	Motor current > current limit for 100 ms	Motor off	1. Check motor cable 2. Check motor shaft 3. Contact customer service
01140615	Heater contact disconnected	Heater detection pin = logic high	Heater off	1. Visual check heater and cable 2. Contact customer service
01142708	Heater Safety Circuit safety circuit cut-off	Short circuit detection pin = logic high	Heater off	1. Visual check heater and cable 2. Contact customer service
01294220	Power Supply Voltage fault	Power supply > 48 V $\pm$ 20 %	Device stop working	› Contact customer service
01270615	PCB contact disconnected	No communication between PCB	Device stop working	› Contact customer service
01202708	Light Panel Safety Circuit safety circuit cut-off	short circuit detection pin = logic high	Light panel off	1. Visual check cable and light panel 2. Contact customer service
01282905	pH Sensor set value not reached	SP < > PV $\pm$ 1 pH for 60 mins	Warning display	1. Visual check sensor and cable 2. Check buffer (acid and base) 3. Visual check pump ACID, BASE 4. Contact customer service

Error code	Error message	Causes	Effect	Solutions
01011315	Air Flow disconnected	Flow = 0 for 3 mins	Warning display	1. Check gas supply and tube 2. Contact customer service
01021315	Carbon dioxide (CO ₂) Flow disconnected			
01251315	Nitrogen (N ₂) Flow disconnected			
01261315	Oxygen (O ₂) Flow disconnected			
01011305	Air Flow set value not reached	SP < > PV $\pm$ 10% for 60 mins	Warning display	1. Check gas supply 2. Contact customer service
01021305	Carbon dioxide (CO ₂) Flow set value not reached			
01251305	Nitrogen (N ₂) Flow set value not reached			
01261305	Oxygen (O ₂) Flow set value not reached			
01072915	Dissolved Oxygen (DO) Sensor disconnected	0 nA	Warning display	1. Visual check sensor and cable 2. Contact customer service
01090615	Exhaust (Filter Heater) contact disconnected	Heater detection pin = logic high	Heater off	1. Visual check heater and cable 2. Contact customer service
01222820	Memory SD card fault	Can't read / write file	Warning display. Can't start the experiment. No data log.	› Contact customer service
01563605	Pump A Speed set value not reached	SP ∇ PV $\pm$ 100 rpm 1 min	Warning display	1. Check tube size 2. Calibrate pump after the change tubing size
01573605	Pump B Speed set value not reached			
01583605	Pump C Speed set value not reached			
01973605	Pump D Speed set value not reached			
01613605	Pump external Speed set value not reached	PV = 0 rpm for 3 sec	Motor off	1. Visual check pump head 2. Open pump head and test run 3. Contact customer service
01563610	Pump A Speed blocked			
01573610	Pump B Speed blocked			
01583610	Pump C Speed blocked			
01973610	Pump D Speed blocked			
01613605	Pump external Speed blocked			

› If the actions described fails to resolve the fault or another error code is displayed then take one of the following steps:

- Contact the service department.
- Send the device for repair, including a short description of the fault.



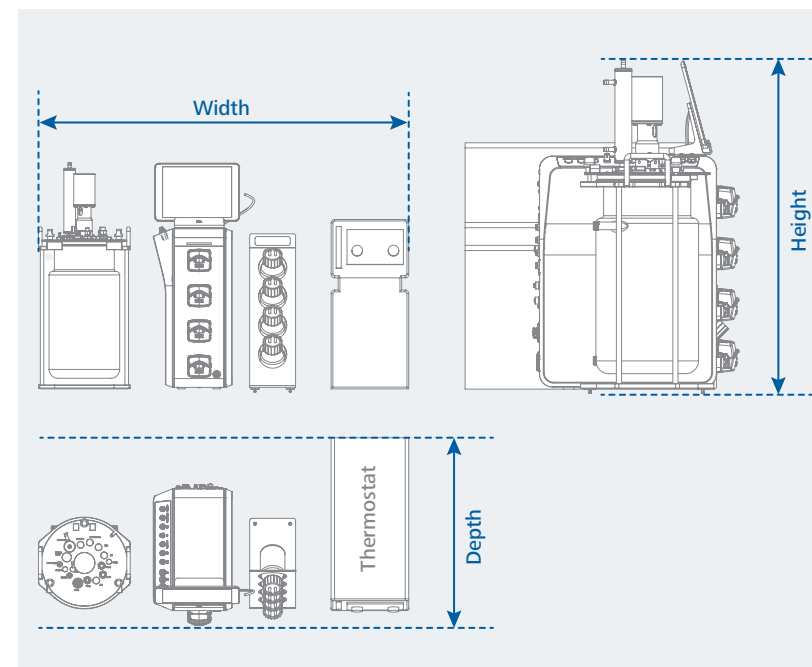
Technical data

Environment	
Permissible ambient temperature	+ 5 ... + 40 °C
Permissible relative humidity	55%
Permitted on-time	100 %
Protection class	I
Contamination level	2
Overtoltage category	II
Operation at a terrestrial altitude	max. 2000 m
Control tower	
Nominal voltage	115 ... 230 VAC
Frequency	50 / 60 Hz
Max. rated power	1100W
Nominal input power	310 W
Dimensions (W x D x H)	223 x 402 x 450 mm
Foot print (W x D)	189 x 345 mm
Material of housing	Metal housing and PUR coated
Weight	14 kg
Protection class according to DIN EN 60529	IP 21
Motor direct coupling	0.5 L glass: 1 ... 1400 rpm 1 L glass: 1 ... 2000 rpm 2 L glass: 1 ... 2200 rpm 5 L glass: 1 ... 1500 rpm 10 L glass: 1 ... 800 rpm 3.2 L SU: 1 ... 500 rpm
System requirement	Window 10 or higher iOS 7 or higher Android 4 or higher
Interface	USB PC connect RS 232 Ethernet SU connect Thermostat Ext. pump Ext. signal input 4 ... 20 mA

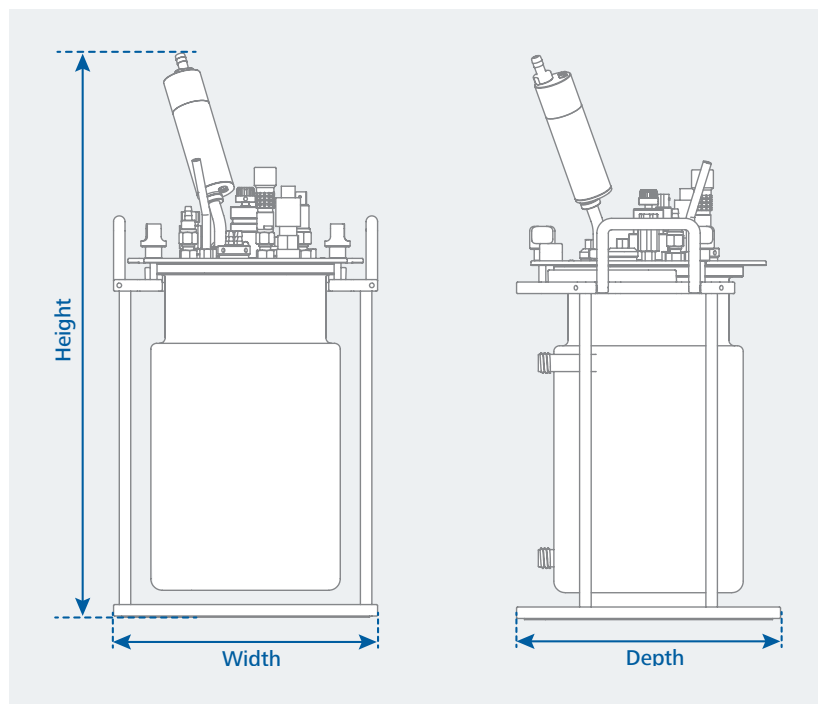
Pump Module	
Quantity	4 PC
Controller	Variable speed (CW / CCW)
Flow rate (Tube wall thickness 1.6 mm)	ID 0.5 mm: 1 ... 4 ccm/min ID 0.8 mm: 3 ... 12 ccm/min ID 1.2 mm: 5 ... 20 ccm/min ID 1.6 mm: 9 ... 45 ccm/min ID 2.4 mm: 21 ... 85 ccm/min ID 3.2 mm: 40 ... 140 ccm/min ID 4.8 mm: 80 ... 270 ccm/min
Probe and controllers * is optional	
Temperature	0 ... 100 °C Display resolution: 0.1 °C
DO probe (Brand Hamilton)	Range 0 ... 100 % Display resolution: 0.01 %
pH probe (Brand Hamilton)	Range 0 ... 14 pH Display resolution: 0.01 pH
Foam	Display: OK or not OK
Level	Display: OK or not OK
*CO ₂	Range 0 ... 100 % Display resolution: 0.01 %
*Conductivity	Range 0.2 ... 400 ms/cm Accuracy ± 5%
*Turbidity	Range 0 ... 250 g/L Range 10 ... 4000 FTU
Aeration Module	
Gas inlet	- Dry and oil free gases - Maximum pressure 3.0 barg ±10 %
Gas outlet	- Maximum pressure 1.0 barg With safety relief valve 1.0 bar
Four gases system (Air, O ₂ , N ₂ & CO ₂) for Cell culture	
Automatic aeration control	
Cell culture flow rate	0 ... 2 lpm
Fermentation flow rate	0 ... 20 lpm
Accuracy	±2% full scale
Temp control module	
Heating jacket	Room temp ... 75 °C
Chiller	5 ... 85 °C
LED light panel	
Type	Flexible LED panel system
Number of light panel	Up to 4
	Day & night simulation can be programmed

Vessel information							
	Unit	SU 3.0 L	Glass vessel 0.5 L	Glass vessel 1 L	Glass vessel 2 L	Glass vessel 5 L	Glass vessel 10 L
Total volume	l	3.0	0.8	1.6	3.00	6.7	12.9
Max. working volume	l	0.5	0.5	1	2	5	10
Min. working volume	l	2.5	0.12	0.30	0.50	0.70	1.2
Vessel inner diameter d_v	mm	133 Slope 1.5	90	110	130	160	190
Vessel height h	mm	240	150	190	260	370	470
Ratio h/d_v	mm	1.80	1.67	1.73	2.00	2.31	2.47
Liquid height h_L	mm	203	85	110	160	265	370
Ratio h_L/d_v	mm	1.52	0.94	1.0	1.23	1.66	1.95
Diameter 6-blade impeller d_{i6}	mm	-	33	40	48	57	68
Diameter 3-pitch blade impeller d_{i3}	mm	60	34	41	49	59	69
Ratio d_{i6} / d_v (6-blade)	mm	-	0.37	0.36	0.37	0.36	0.36
Ratio d_{i3} / d_v (3-pitch blade)	mm	0.45	0.38	0.37	0.38	0.37	0.36
Net weight assembled without media & accssories single wall	kg	-	6.4	7.87	9.11	13.29	-
Net weight assembled without media & accssories double wall	kg	-	6.77	8.09	10.55	15.66	21.9
Weight SU 2 L without holder	kg	1.5	-	-	-	-	-
Weight SU 2 L with holder	kg	15	-	-	-	-	-

Overall dimension (mm)			
Vessel size	Width	Height	Depth
Glass vessel 0.5 L	875	630	530
Glass vessel 1L	900	630	530
Glass vessel 2L	920	630	530
Glass vessel 5L	950	675	530
Glass vessel 10L	990	810	530



Space requirement for autoclaving (mm)			
Vessel size	Width	Height	Depth
Glass vessel 0.5 L	185	365	185
Glass vessel 1L	210	415	210
Glass vessel 2L	230	490	230
Glass vessel 5L	260	605	260
Glass vessel 10L	300	710	300



Multiuse vessel	
Material	
Vessel	Borosilicate glass 3.3
Components contact to medium	Stainless steel 316
Components not contact to medium	Stainless steel 304
Gasket	EPDM
O-ring	Silicone USP class VI
Hose for peristaltic pump	
Material	Silicone USP Class VI
Size (ID x wall THK)	3.2 x 1.6 mm
Tube for air / gases	
Material	Silicone tube USP class VI
Size (ID x OD)	3.2 x 6.4 mm
Impeller type	
Type	6-blades or 3-pitched blades
Flow characteristic	Down or up flow
Sparger type	
Micro sparger	5 micron
Ring sparger	Hole diameter 0.5 mm

Single use vessel	
Material	
Vessel & components	Polycarbonate
Tubing	Silicone USP class VI
O-ring	Silicone USP class VI
Vessel dimension	
Inner diameter from top	133 mm slope 1.5
Vessel height	240 mm
Weight without medium	1.5 kg
Vessel bottom design	Flat
Volume	
Total	3.2 L
Max. working volume	2.5 L
Min. working volume	0.5 L
Impeller type	
Type	Pitched-blade impeller 30° angled
Number of impeller	2
Flow characteristic	Down flow
Diameter	60 mm
Lower impeller distance to bottom	30 mm
Distance between impeller	60 mm
Sparger	
Hole diameter	L-Sparger 0.5
Thermowell	
Inner diameter	8 mm
Wall thickness	1 mm
Gas filter	
Membrane filter	Mildsart 0.2
Working condition	
Max. operating temp	50 °C
Min. operating temp	0.5 bar
Sterilization	
Gamma radiation	Dose exceeding 25 kGy

SU holder integrated with pressure relief unit	
SU Holder Standard	
Dimensions (W x L x H)	260 x 260 x 100 mm
Weight	10.8 kg
Pressure relief unit	0.5 bar
Number of relief valve	2
SU Holder Optical sensor	
Dimensions (W x L x H)	260 x 260 x 100 mm
Weight	10.8 kg
Pressure relief unit	0.5 bar
Number of relief valve	2
Interface holder optical sensor	
Digital RS 485	M12
Temperature	M12
ECS pH	K8
ECS DO	T82
Optical DO measurement	
Measurement range	0 ... 100 % air saturation (a.s.)
ECS sensor signal (37 °C)	0 ... 300 nA 0 ... 76 ± 6 nA = 0 ... 100 % a.s.
Resolution	0.1 % a.s.
Accuracy (37 °C)	± 1 % a.s.
Temperature range	5 ... 50 °C
Drift (1min. Sampling interval)	< 0.5 % a.s. per day
Optical pH measurement	
Measurement range	6.0 ... 8.0
ECS sensor signal	- 500 ... 500 mV
Resolution	0.01
Accuracy (± 1.0 pH range centered Around pH of 1-point-cal)	0.1
Temperature range	5 ... 50 °C
Drift (1 min. Sampling interval)	< 0.05 per day
Air pump	
Specification	
Voltage	115 ... 230 VAC
Rated pressure	0.15 bar
Flow rate	80 liters/min
Noise level	40 dB

PC requirements		
	Minimum	Recommended
Operating system	Windows 10, 32/64 bits	Windows 10, 64 bits
Processor	Intel® Core i3 8th generation (8109U) or above	Intel® Core i5 4th generation (or an equivalent AMD processor)
Graphics card	Video adapter compatible with DirectX 9, WDDM driver support and minimum 128 MB RAM	Video adapter compatible with DirectX 10, WDDM driver support and minimum 1 GB RAM
RAM	4 GB	8 GB
Storage	HDD, minimum 15 GB free disk space	SSD, minimum 50 GB free disk space
Display	1024 x 768 (XGA)	1920 x 1080 (FHD)
Peripherals		
Ethernet	10BASE-T	Gigabit Ethernet
WiFi	802.11a/b/g/n/ac	802.11a/b/g/n/ac
Bluetooth	4.2	4.2
USB	USB 2.0	USB 3.0
Serial port (optional)	DB-9 connector	DB-9 connector
Tablet requirements		
	Minimum	Recommended
Operating system	Running Android Version 8.0 or later / iOS 11 or later	Running Android Version 10.0 or later / iOS 12 or later
Processor	ARM: ARMv7-A or higher	ARM: ARMv8-A or higher
RAM	2 GB	4 GB
Storage	32 GB	64 GB
Display	7 inch in diagonal, viewport ≥ 768 x 1024	10 inch in diagonal, viewport ≥ 768 x 1024
Peripherals		
WiFi	802.11a/b/g/n/ac	802.11a/b/g/n/ac
Bluetooth	4.2	4.2
Smart Phone requirements		
	Minimum	Recommended
Operating system	Running Android Version 8.0 or later / iOS 11 or later	Running Android Version 10.0 or later / iOS 12 or later
Processor	ARM: ARMv7-A or higher	ARM: ARMv8-A or higher
RAM	2 GB	4 GB
Storage	32 GB	64 GB
Display	5.5 inch in diagonal, viewport ≥ 380 x 640	6.0 inch in diagonal, viewport ≥ 412 x 732
Peripherals		
WiFi	802.11a/b/g/n/ac	802.11a/b/g/n/ac
Bluetooth	4.2	4.2

Subject to technical changes!

Warranty

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



designed for scientists

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