H203-T-H-CO2/O2 [0-95]-ENCLOSURES

User Manual

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Index

1 PREFACE

Welcome to the H203-T-H-CO2/O2 [0-95]-Enclosures Manual.

This manual provides comprehensive guidance on the setup, operation, and maintenance of the Enclosure. It covers essential information to ensure efficient utilization and optimal environmental control within laboratory settings.

Key Features of Enclosure:

- **Embedded Temperature Sensors:** Continuous temperature feedback enhances control accuracy and stability.
- **User Interface:** Clear instructions cater to users at all levels, facilitating effective usage.
- **Support:** Our team is available to assist with inquiries or issues.

Components and Configuration: The H203-T-H-CO2/O2 [0-95]-Enclosure feature embedded heating devices located on the rear panel, which are controlled via the Temperature Control Unit. A Gas Control Unit is provided along with the Temperature control unit, which pairs with the vibration-free humidity module (HM-VF) to supply humid gas.

Temperature Range: The H203-T-H-CO2/O2 [0-95]-Enclosures control the temperature from 3°C above ambient temperature up to 45°C, ensuring precise environmental conditions for your samples.

Control Interface: The H203-T-H-CO2/O2 [0-95]-Enclosures are operated via the OKO-TOUCH touch screen control panel. OKO-TOUCH features on-board memory for data logging and a mini-USB port for data download. Data logging is also possible via SMART-BOX, Okolab DATA-LOG software, and compatible third-party imaging software such as LASX 2.0, NIS-Elements, SlideBook, MetaMorph, and MicroManager. A macro for ZEN Black software is available upon request.

We recommend carefully reading this manual to familiarize yourself with the functions and operation of the H203-T-H-CO2/O2 [0-95]-Enclosures before use. Our team is available to assist with any inquiries or issues you may encounter.

2 REGULATORY COMPLIANCE

2.1 Regulatory Statement

The product complies with the essential requirements of the LVD Directive 2014/35/EU and the EMC Directive 2014/30/EU. The product has been tested and it complies with the requirements of the following standards:

- European standard EN 61010-1: 2010 “Safety requirements for electrical equipment for measurement, control and laboratory use"
- European standard EN 61326-1: 2013 “Electrical equipment for measurement, control and laboratory use – EMC requirements"

The product meets the technical requirement of the Directive 2011/65/EU Restriction of the use of certain hazardous substances (RoHS). The product has been tested according to European Standard EN 50581: 2012 “Technical documentation for the assessment of the electrical and electronic products with respect to the restriction of hazardous substances".

2.2 Waste Electrical and Electronic Equipment Directive (WEEE Directive)

The product must not be disposed as a general household waste. At the end of the product's life, take the product to a collection point designed for recovering and recycling of electrical and electronic devices.

In case of doubt, please return the product to Okolab s.r.l. for proper treatment.

3 SYMBOL DESCRIPTION

This paragraph describes the symbols used in this manual and on the product label.

3.1 Symbols used in this Manual

The following symbols identify important information:

CAUTION or WARNING or IMPORTANT: This symbol warns of circumstances or practices that can affect the instrument's functionality. Please refer to accompanying documents.

Note ► *Supplies you with important information to successfully use the instrument.*

3.2 Symbols on the Product Label

CE MARKING: This symbol indicates the product's compliance with EU legislation.

PRODUCT DISPOSAL: this symbol indicates that this product must not be disposed as urban solid waste.

This symbol indicates the product production date.

This symbol indicates the Manufacturer data.

This symbol warns you to read the user manual before starting the device.

This symbol indicates the protection degree against ingress of solids or liquids inside the product.

4 SAFETY NOTES

In order to achieve maximum performance and to ensure proper operation of your new equipment, please read carefully the following safety notes and the instructions. If you have any question, please contact OKOLAB.

- The equipment must only be used as intended and as described in this Manual.
- Equipment should be operated only by technically qualified personnel.
- Do not start up the equipment if some of its parts are damaged.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Transport the equipment with care.
- Equipment and its internal parts can be damaged by dropping and by shock.
- Not following these instructions can result in damage or breakdown of the device and its accessories.
- The products labels can be found on the bottom panel of the Main Box.
- Do not disassemble any part of the system.
- Do not use a volatile solvent such as paint thinner to clean the instrument, because deformation or discoloration may occur.
- Use a soft, dry cloth to remove stains from the instrument.
- Do not exceed voltage indicated in this manual and on the product label.

- Avoid excessive induction noise, static electricity and magnetic fields.
- Do not expose this instrument to rain or moisture.
- Do NOT go in close contact with or breathe any gas stream whose composition is different from that of ambient air.
- Prevent throttling and kinking of tubing.
- Check tubing time to time for possible material usage.
- Check that all tubing are well inserted into the connectors so they cannot slip off
- This device is not designed for use for medical applications.
- Power cord of unit should be unplugged from electrical outlet when left unused for a long period of time.
- PRESSURIZED GAS. Secure all connections with hose clamps. Never exceed the input pressure limit of 5 barg (72.5 psig). Bleed all lines before disconnecting. Wear safety goggles if needed. If pressure regulators are not within sight and reach, make sure at least one shut off valve is within reach.
- CO2 must be available at 0.8 ±0.2 barg (12 ±3 psig), with a connector for 6mm OD rigid silicon tube. Gas source must be Standard Purity CO2 (coded as 4.5 that means 99.995 % of CO2) and humidity-free gas.
- When using the Compressed Air option, please ensure that the gas is available at 1.4 barg (20 psi)

- N2 must be available at 0.8 ±0.2 barg (12 ±3 psig), with a connector for 6mm OD rigid silicon tube. Gas source must be Standard Purity N2 (coded as 4.5 that means 99.995 % of N2) and humidity-free gas.
- O2 must be available at 0.8 ±0.2 barg (12 ±3 psig), with a connector for 6mm OD rigid silicon tube. Gas source must be Standard Purity O2 (coded as 4.5 that means 99.995 % of O2) and humidity-free gas.
- LOW OXYGEN ATMOSPHERES. Never enter a room or enclosure which has a low oxygen atmosphere because of severe danger of suffocation. Only operate in well-ventilated room. A small amount for carbon dioxide gas leaks continuously out of the instrument and should never be allowed to build up in the room.
- Unit should be situated away from heat sources such as open flames, radiators, heat registers, stoves, or other appliances or processes that produce heat.

- Do not start up the equipment if the supply cable is damaged.
- Connect the equipment only to grounded mains power socket.
- Do not disconnect cables while in operation.
- Do not open the unit. Do not remove cover or back.
- *Prevent metal fragments or lead* wire scraps from falling inside instrument to avoid electric shock, fire or malfunction.
- No user serviceable parts inside.
- Unit should never be used where it can fall or be pushed into water
- When removing the CO2-H-IN-CHAMBER-Sensor the device must be disconnected from the power supply and the Sensor must be handled using electrostatic Gloves.

International caution symbol marks this device. It is important to read the "Safety Notes" before installing, using and commissioning this device, as the notes contain important information relating to safety and EMC. Not following these instructions can result in damage or breakdown of the device and its accessories

We reserve the right to make technical variations.

IN NO EVENT SHALL OKOLAB S.R.L. BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE PRODUCT OR THE USE OF ANY PRODUCT

We reserve the right to make technical upgrades and changes.

IN NO EVENT, SHALL OKOLAB S.R.L. BE LIABLE FOR ANY DIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY NATURE – INCLUDING: LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE PRODUCT, OR THE USE OF ANY PRODUCT.

5 SUPPLIED EQUIPMENT & COMPONENTS COMPATIBILITY

Figure 1 illustrates the components and the different accessories for the Bold Line 3 Enclosure.

Figure 1. Enclosure Components & Accessories.

Components

1. **T-Enclosure**: A microscope enclosure that creates a large volume around the microscope in which temperature is controlled by recirculating warm air by the means of the Heating boxes. It includes H203-HB-SX & H203-HB-DX (referred to as Heating Box-1 & Heating Box-2), the H203-JUNCTION-BOX which is a connection port between the Heating Boxes and the H203-T-Unit.
2. **H203-T-UNIT**: A temperature control unit which controls the heating boxes present on the rear side of the enclosure to generate and maintain heat within the Enclosure.
3. **CO2-O2 [0-95] -BL3**: A gas control unit which allows you to control the CO2 concentration in the range of [0-20] % and O2 in the range of [0-95] %.
4. **OKO-TOUCH-BL3**: An intuitive and user-friendly touch screen interface which connects to the control unit.

8. **HM-VF**: A vibration-free gas humidifier which employees a semi-permeable membrane for humidifying the gas. The **Water Trap** is provided along with this module.

Accessories (Sold Separately)

4. **OKO-AIR-PUMP-BL**: A pump which enables you to use the background air. Used only when working in the ***'CO2 in Air'*** mode (section 7.3.2.1).

5. **TC**: This is a reference temperature probe that can be utilized for measuring temperatures within the sample and has a female connection port to be used along with the TC-XC.
6. **TC-XC**: This is an extension cable for the TC temperature probe.

9. **H203-Chamber**: A micro-environmental chamber with an embedded Temperature sensor, that fits in the XY stage of the microscope.
10. **Sample Holder Inserts**: Inserts designed to house different sample holders such as 35mm petri dishes, chamber slides etc.

Note ► *The T-Enclosure and the H203-Chamber, depicted in the image are generic models and the appearance my vary as the Enclosure and the chambers are designed to be Microscope Specific.*

Note ► *The TC and the TC-XC are collectively referred to as the T Sensor in this document.*

Included Accessories

The following list describes the accessories included along with the H203-T-H-CO2O2 [0-95]-ENCLOSURE and what they're used for:

1. OKO-TOUCH-CABLE: Cable for connecting OKO-TOUCH-BL3 to the H203-T-UNIT.
2. OTG-Cable: Cable for connecting a USB pen drive to the OKO-TOUCH-BL3.
3. Mini-USB Cable: Cable for connecting OKO-TOUCH-BL3 to the PC.
4. H203-HEATING-BOX-CABLE: Cable for connection between the H203-JUNCTION-BOX and the H203-T-UNIT.
5. Power Supply-Temperature Control Unit: Power adapter of H203-T-UNIT.
6. Power Supply-Gas Control Unit: Power adapter of CO2-O2 [0-95] -BL3.
7. ENCLOSURE POWER CORD: Cable for connecting the T-ENCLOSURE to the power supply.
8. GR-4-M (Gas regulator): A gas pressure regulator for regulate gas input from CO2 gas cylinder to the CO2-O2 [0-95] -BL3.
9. TUBE-A: Tube for gas connection between the GR-4-M to the CO2 gas cylinder; the GR-4-M to the CO2-O2 [0-95] -BL3; N2 gas supply to the CO2-O2 [0-95] -BL3 and; 'Gas Output' port on the gas control unit to the 'Gas Mixer' port on the Enclosure.
10. TUBE-AI: Tube for gas connection between CO2-O2 [0-95] -BL3 and the input port of the T-Enclosure.
11. TUBE-AF: Tube for gas connection between the O2 supply to the corresponding O2 input port on the rear panel of the CO2-O2 [0-95] -BL3.
12. TUBE-G: Tube for gas connection between one of the Water Trap tube connectors & H203-Chamber gas input.
13. TUBE-H: Tube for gas connection between HM-VF tube connector to one of the Water Trap tube connectors.

14. TUBE-I: Tube for gas connection between the 'Gas Mixer' port in the Enclosure & The 'Push-to-Fit' connector on the HM-VF.

Note ► *In order to properly assemble the system, please follow the steps as reported on the quick instructions guide provided along with your system.*

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6 SUPPLIED GAS REQUIREMENTS

Please ensure that the following Gas Supply Requirements are followed for the input to the Gas control Unit:

- CO2 must be available at 0.8 ±0.2 barg (12 ±3 psig), at the ***Gas Control Unit's Input Port***. Gas source must be Standard Purity CO2 (coded as 4.5 that means 99.995 % of CO2) and humidity-free gas with a push to fit connector for 6mm OD rigid polyurethane tube.
- N2 (for H203-T-H-CO2/O2 [0-21]-ENCLOSURE) must be available within the pressure range 0.8 ±0.2 barg (12 ±3 psig), at the ***Gas Control Unit's Input Port***. Gas source must be Standard Purity N2 (coded as 4.5 that means 99.995 % of N2) and humidity-free gas with a push to fit connector for 6mm OD rigid polyurethane tube.
- O2 must be available within the pressure range of 0.8 ±0.2 barg (12 ±3 psig), with a connector for 6mm OD rigid silicon tube, at the ***Gas Control Unit's Input Port***. Gas source must be Standard Purity O2 (coded as 4.5 that means 99.995 % of O2) and humidity-free gas.

Note ► *When using the HM-VF (Vibration free Humidity module) please use* ***Distilled Water*** *for filling the module.*

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7 SETUP CONFIGURATION & QUICK USAGE

To Once you've successfully assembled your enclosure by following the detailed instructions provided in the quick assembly guide, you're ready to proceed with configuring your setup and initiating the use of the Enclosure.

7.1 Homepage Icons Description

When you're using the OKO-TOUCH-BL3 controller the homepage will demonstrate the key measurements (relative to your enclosure type), Settings Option, System Overview option. Figure 2 illustrates a representation of the OKO-TOUCH-BL3 Homepages.

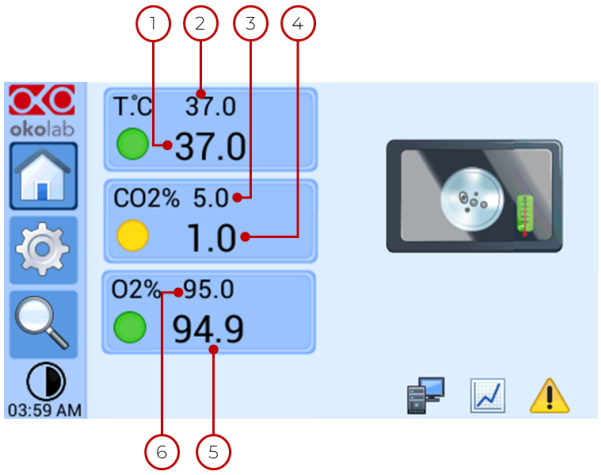


Figure 2. OKO-TOUCH-BL3 Homepage for the H203-T-H-CO2/O2 [0-95]-ENCLOSURE.

Table 1 provides the description of the different parameters present on the Homepage (parameters 1-6).

Parameter	Description
1	Temperature value read by the Temperature Sensor embedded in the H203-Chamber.
2	Temperature Set Point value.
3	CO2 Set Point value.
4	CO2 concentration at the Gas Control Unit output.
5	O2 concentration at the Gas Control Unit output.
6	O2 Set Point value.

Table 1. Description of different information displayed on the Homepage.

The following Figure 3 illustrates the various icons that can be seen on the OKO-TOUCH-BL3 homepage and their description.

ICON NAME	DESCRIPTION	VISIBILITY CONDITION
Status Indicator 	Indicator of the Status of the parameter it is found next to based on its color.	Always, unless the system is in Chamber feedback mode.
Temperature 	Temperature Status indicator based on its color.	Always.
Home 	Home Page icon.	Always.
Settings 	Settings Page Icon.	Always.
OKOLAB Icon 	Okolab Icon which displays the sytem's information such as release date, serial number, software version etc..	Always.
Overview 	Overview Page Icon.	Always.
Minimalislitic 	Minimalistic View Page Icon.	Always.
PC 	Connected to PC Icon.	When the OKO-TOUCH-BL3 is connected to PC.
View Data 	View Data Icon.	Always.
Alarm 	Alarm Icon.	When the system is in Alarm state

Figure 3. Icons Descriptions & Visibility Condition.

Note ► *The status LED present on the Control unit corresponds to the same colors as that of the* ***Status indicator icon***  *when the system is in Steady or Alarm state.*

The color relative to the Status indicator or the Temperature icon may represent a Steady state, Transient state or an Alarm state as described below (Figure 4).

GREEN	The GREEN color indicates that the Setpoint value has been reached and that the system is working properly. **Controller Status: NORMAL**
YELLOW	The YELLOW color indicates that the controller is in transient regime. The Yellow light will appear after the controller is turned on and after any Setpoint change. The system is working properly, it is not in alarm and no action is needed. **Controller Status: TRANSIENT**
ORANGE	The ORANGE color indicates that the current parameter value is not correct and is out of the set tolerance. **Controller Status: ALARM**
RED	The RED color indicates that there is a problem and the system is in Alarm State, this may be due to a broken sensor. Turn the system off, wait for 5 minutes, and turn it back on. If the color is still red, contact Okolab at www.oko-lab.com for support. **Controller Status: ALARM**

Figure 4. Significance of Icons Color during use.

7.2 Setting up Date & Time

In order to set the Date & Time on your system, please navigate to the settings as illustrated above. Setting these parameters will allow you to keep a track of your work when exporting recorded data.

7.3 Setting the Desired set Points

The following subsections indicate how to select the desired Temperature, CO2 & O2 set points.

7.3.1 Temperature (°C) Set Point

On the Homepage click on the Temperature being displayed and select the desired set point within the range of *25°C up to 45°C.*

Note ► *The minimum temperature set point value must be 3°C above the ambient temperature.*

7.3.2 Gas Concentration (%) Set Point

CO2 Concentration Set Point: On the Homepage click on the CO2 concentration being displayed and select the desired set point within the range of *0% up to 20%.*

O2 Concentration Set Point: In order to assign a set point value to the O2 concentration, from the Homepage click on the O2 concentration being displayed and select the desired set point within the range of 0% up to 95%.

Note ► *The system has two working modes that is, working with all the three input gases or working just with the CO2 and air. Details relative to the control modes are explained in the section 7.3.2.1*

7.3.2.1 Control Modes selection for the optimal Gas usage

When using the H203-T-H-CO2/O2 [0-95]-ENLCLOSURE, depending on the gas requirement for your experiments, you can work in two alternative modes:

- **O2/N2/CO2 mode:** In this control mode CO2-O2 [0-95] -BL3 is supplied with Nitrogen, Oxygen and CO2 from respective tanks and you can regulate CO2 in the range 0-20% and Oxygen in the range 0-95%;
- **CO2 in Air mode:** You can use this control mode when you need to simply have Air/CO2 mixtures and you don't need to regulate Oxygen as well.

You can switch from the standard ***'O2/N2/CO2 mode'*** to the ***'CO2 in Air mode'*** and back by simply navigating to the ***Control Modes*** page, selecting the desired mode and pressing '***Save'***.

Note ► *The O2/N2/CO2 mode is already set by default.*

Note ► *When you work in CO2 in Air mode nothing needs to be connected to O2 Input on CO2-O2 [0-95] -BL3 rear panel. If an Oxygen tank was previously attached, no need to disconnect it because in this working mode, the Oxygen valve is automatically closed. Air has to be connected to the N2 Input, from an Air tank/compressed line, and a CO2 tank has to be connected to CO2 Input.*

If you want to use OKO-AIR-PUMP-BL, make sure it is connected to the system by ensuring the air output is connected to the N2 input port and the pump is electrically connected to the ***'Pump Output'*** port on the rear panel of the CO2-O2 [0-95] -BL3. After connecting the pump to the system, select the ***'CO2 in Air mode'***, and enable the air pump and select ***'OK'*** to confirm.

On clicking on the ***'Air Pump'*** option on the ***Control Modes*** page (Figure 5), you can add an offset (positive or negative) to the default air pump speed in order to increase or decrease the pump speed respectively.

Note ► *On the* **'Air Pump'** *page you have the option to Enable/Disable the air pump at any time. This can be useful when you need to disconnect the pump from the system.*

Note ► *The Pump usage can be also viewed on the* **'Air Pump'** *page. Press the Reset button to reset the usage of the Air Pump if a new Air Pump is installed*

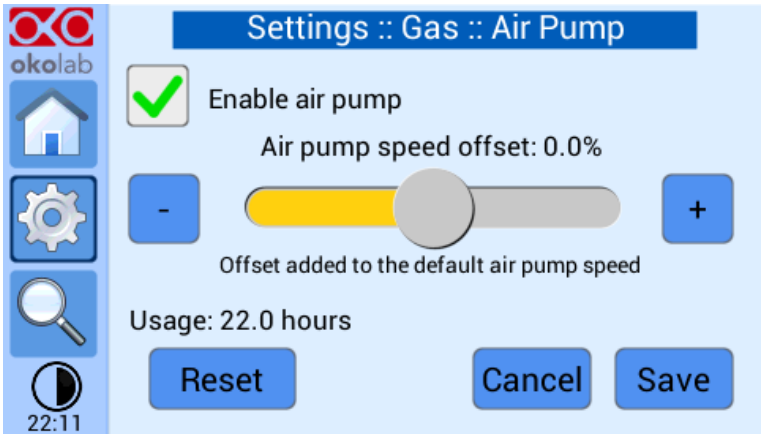


Figure 5. Air Pump Page.

Please note that the pump can be turned on/off only via the OKO-TOUCH-BL3. Thus, it is essential that you hereby set the correct Air source.

Note ► *Reducing the air pump speed will lead to a lower emitted noise from the air pump, while rising the air pump speed will help if you cannot reach your desired flow rate Setpoint.*

When running the system in *CO2 in Air* Mode, the Homepage will appear as in Figure 6Figure 6.

Figure 6. Homepage when working in CO2 in Air mode.

7.4 Opening & Closing the Chamber

When operating the Enclosure, you may need to open the enclosure and eventually the chamber to access the sample for either changing or micro manipulating it. When one opens the chamber, the system **needs** to be informed about the chamber being opened, doing so will ensure that the system pauses its control and doesn't overheat the enclosure to recover from the heat loss being read by the chamber's sensor due to an open chamber.

Before opening the chamber, you may simply click on the chamber being displayed and a pop-up message will ask you if would like to open the chamber, to which respond by selecting ***'OK'.*** After you've closed the chamber and would like the system to resume its functioning, please click the Open chamber being

displayed and select ***'OK'*** from the following pop-up message which'll be confirming the closing of the chamber. The Figure 7 illustrates the Chamber Open and Chamber closed images.

Figure 7. Chamber Open & Chamber Closed representation.

Note ► *We advise you to avoid opening the chamber during the transient state as this may slow the system's rate of reaching a stable state.*

7.5 Viewing Data

From the Homepage, if you click on the ***chart icon*** , you can view the graph pertinent to the parameters being worked with your Enclosure. The following image (Figure 8) illustrates the view charts page, the different graphs of the values of Temperature, CO2, or O2 (as in this example) can be viewed by clicking on the parameter on the right.

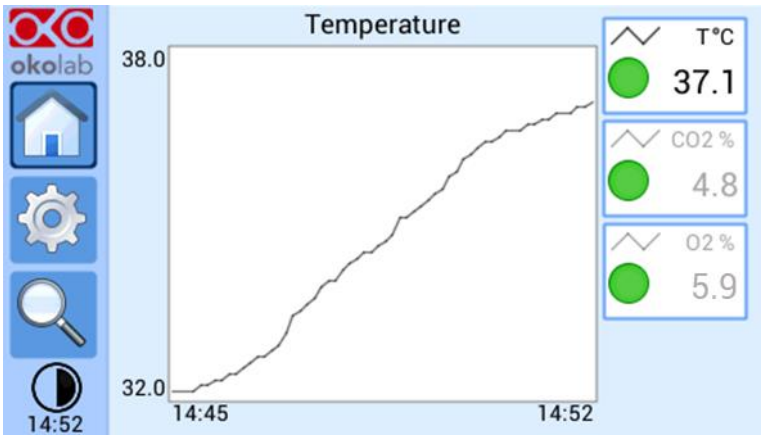


Figure 8. View Charts page.

7.6 System Overview

The Following Figure 9 illustrates the system Overview page which gives you the panorama of systems components and their readings. In order to see the Overview page, from the home screen click on

the ***'Overview'*** icon. Please note that only the parameters that are a part of your enclosure will be the only ones visible to you during use.

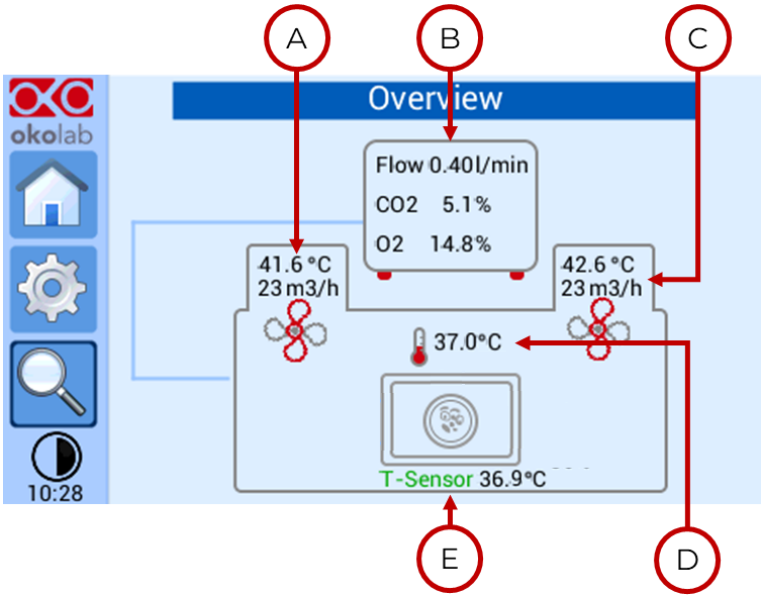


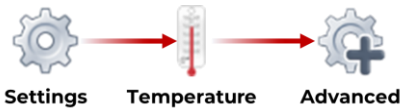
Figure 9. Generic System Overview Page.

The parameters illustrated in the Figure 9 are explained along with their display condition in Table 2.

#	Icon	Display Conditions
A	Heating Box 2- Temperature & Air Flowrate.	Displayed **at all times.**
B	CO2-O2 [0-95] -BL3 - Gas concentration(s) and Flow Rate.	Displayed **at all times.**
C	Heating Box 1- Temperature & Air Flowrate.	Displayed **at all times.**
D	Temperature read by the Temperature Sensor embedded in the H203-Chamber.	Displayed **at all times.**
E	Temperature read by the T Sensor.	Displayed **only if the T sensor is connected**.

Table 2. Display Conditions for different Icons.

8 TEMPERATURE SETTINGS (ADVANCED)



This section outlines the advanced temperature settings when operating the Enclosure.

8.1 Calibration

This section offers detailed instructions for calibrating the Temperature read by the embedded sensor within the H203-Chamber using an external sensor or the T Sensor accessory. You can also find the option for calibrating T Sensor accessory. The calibration of the above-mentioned options may be suggested to you by the Okolab Technical support team if needed.

8.1.1 Cage Offset

This subheading explains the procedure for performing the calibration of the embedded Temperature sensor within the Chamber.

This procedure is carried out with respect to the temperature measured on the sample. In order to proceed with the Cage-Offset calibration you will first need to attach the tip of the External Sensor or the T Sensor (accessory) to the bottom of a petri dish, making sure that it is placed as centrally as possible (see Figure 10)

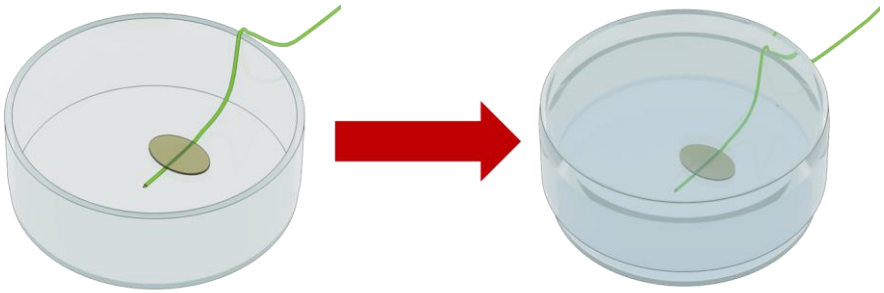


Figure 10. Petri Dish with T sensor placed centrally, filled with water and lid closed.

After placing the T sensor with in the petri dish, fill it with water and place it within the chamber (where the sample will be placed). Wait for the OKO-TOUCH-BL3 to display stable temperature values for both the ***'Temperature °C'*** and the ***'Sample °C'*** readings before clicking on ***'Adjust'*** and following the on-screen instructions.

Note ► *If you use an External Sensor to perform the **Cage Offset Calibration**, please ensure that you use a Fine Gauge Temperature Sensor.*

Note ► *If you have the* ***T sensor*** *it should be connected to the port labelled '****T Sensor****' behind the H203-T*-UNIT as in the Figure 11 below.*

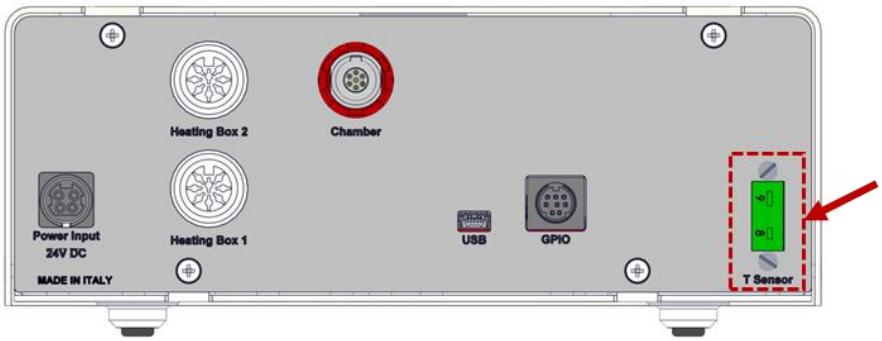


Figure 11. T Sensor connection port on the rear panel of the H203-T-UNIT.

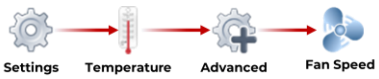
8.1.2 T Sensor Offset

Note ► *This feature is only available if you have purchased the T Sensor accessory and is connected to the control unit.*

You can perform the T-Sensor Temperature calibration with the help of an External meter (to be used as a reference for calibrating the T-Sensor).

Proceed with the calibration process by clicking on the T Sensor icon, place the External meter's Sensor in vicinity of the T-Sensor and wait until the temperature being recorded by the External meter as well as the T-sensor temperature displayed by OKO-TOUCH-BL3, read a stable value. Once the stability has been achieved, insert the ***'External Probe °C'*** value by clicking on the modify icon followed by clicking on ***'Adjust'***. The system will automatically calculate the Offset value to ensure the calibration completion.

8.2 Fan Speed Modification



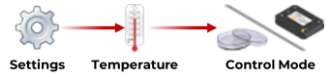
By clicking on this option, you can choose the desired Fan Speed for the Enclosure, the selection can be made in the range of 40 - 70 m^3/h. The default Fan Speed is set to 60 m^3/h.

Note ► *This function maybe useful to you only if suggested specifically by the Okolab Technical Support team during an assistance session, alternatively please adhere to using the Default Fan Speed at all times.*

9 GAS SETTINGS

This chapter details some of the settings related to gas usage such as Control Modes, Flowrates, Gas cycles and other related Settings. The following subheadings provide details on these settings.

9.1 Control Modes



As previously detailed in section 7.3.2.1**Error! Reference source not found.** this option allows you to c hoose between working in the CO2/O2/N2 mode or the CO2 in Air mode.

9.2 Flowrates Setting

By navigating to this menu, you can modify the total flowrates of the gas output, the flowrates of CO2, O2 & N2 (or CO2, O2 & Air when working in the CO2 in Air mode i.e., when air is connected to the N2 inlet port) regulate automatically in correspondence to the setpoint values of each of the gases.

Note ► *The flowrate can be set in the range of 0.2 – 0.4 l/min.*

9.3 Gas Cycles Setting

In this menu, you can choose to load an existing gas cycle or setup a new one Figure 12 (a).

A gas cycle is assigning two gas set points to the system with a duration of time for which the set points will be adhered to before switching to the other set point. In order to setup a new gas cycle, click on ***'New'***, this will navigate you to the page for selecting the CO2 SP1 and SP2 (Set Point 1 & Set Point 2 Figure 12 (b)), after which on clicking the ***'Next'*** option you can select the duration of each Set Point and the number of cycles you would like to impose (Figure 12 (c)). The page following this shows the summary of the gas cycle setup page (Figure 12 (d)) with an option to either save the gas cycle or proceed directly to the next step. The page allows you to save the gas cycle as one of the configurations, the options greyed are empty configurations can be selected to save this new gas cycle (Figure 12 (e)). The final page displays the option to select the time at which the gas cycle should begin (Figure 12 (f)).

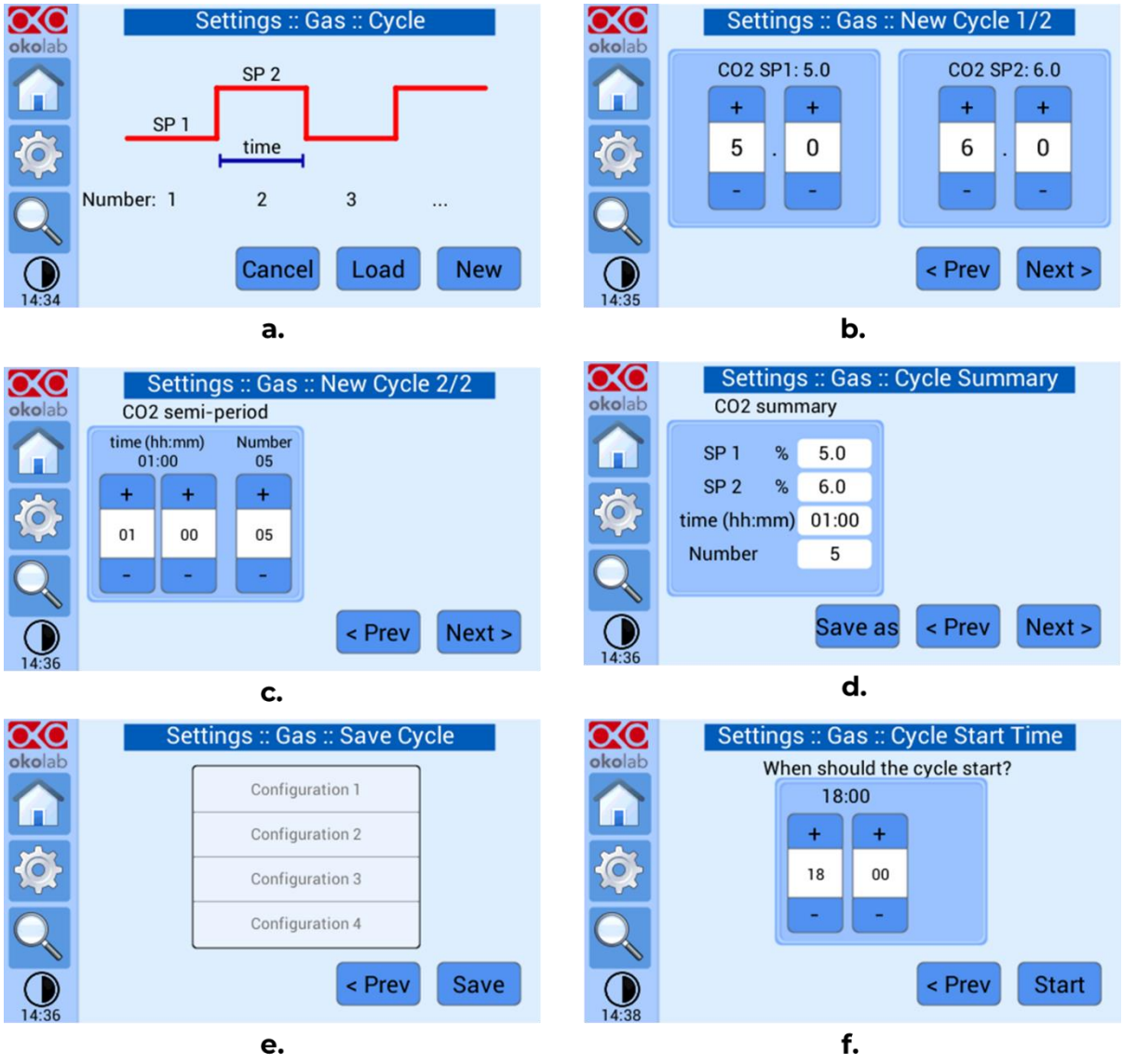


Figure 12. Gas Cycles Setup (a-f).

9.4 Gas Status

For quick visualization of the system's gas status, you can navigate to this menu and view the details pertinent to the gas parameters and the system's functioning relative to these. Figure 13 illustrates the status page with parameters values such as the flow, humidity control etc.

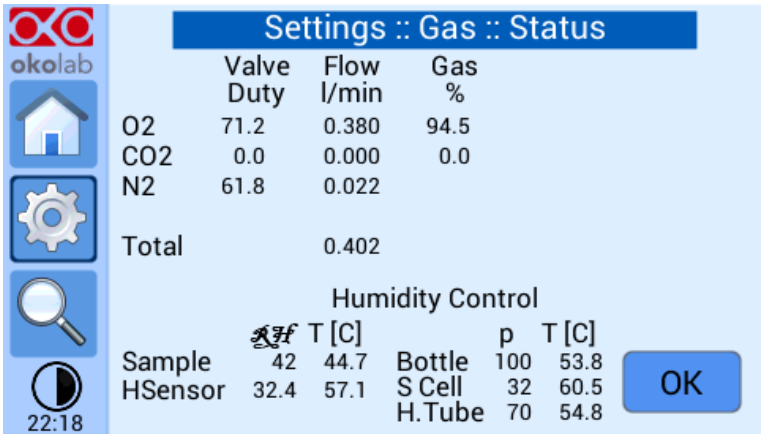


Figure 13. Gas Status page.

9.5 Gas Offset Correction

In this section, you can perform an Offset Correction of the Gas concentration from the Unit's output by utilizing an external meter. In order to proceed with the Offset calibration, please connect the gas controller's output tube (TUBE-A) to the inlet port of the external gas measurement meter. When the readings from the external meter reach a stable value, please click on the ***'Adj CO2'*** and manually enter the value measured by the external meter, once done, the system will automatically the offset which will be imposed to calibrate the unit sensor (Figure 14). Similarly, the same steps can be performed for the Offset correction of O2 by clicking on ***'Adj O2'*** after measuring the O2 concentration by an external meter.

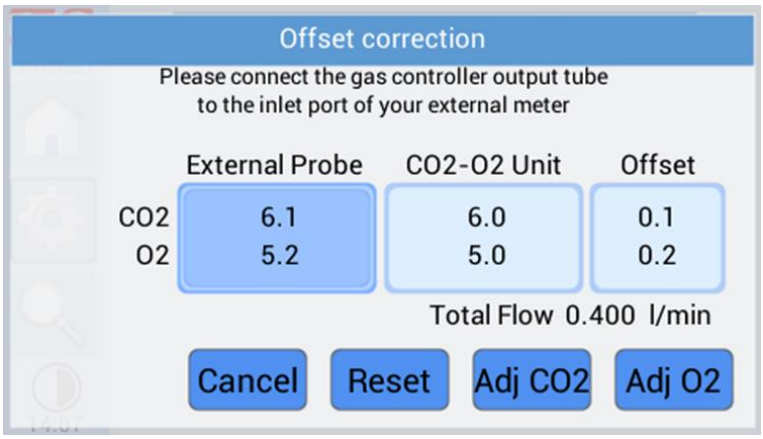


Figure 14. Gas Offset Correction.

10 ALARM SETUP

This section details the Alarm setting for different variable being worked with. When the system goes into an Alarm state the **homepage** of the OKO-TOUCH-BL3 displays the '***Alarm***' icon ⚠ on the bottom left. The Status LED of the OKO-TOUCH-BL3 as illustrated in Figure 15 (a) starts **to change color.** On the other hand, the Status LED of the Control unit, as illustrated in Figure 15 (b), starts to **blink** corresponding to the Status indicator on the home page.

Figure 15. Status LED: (a) On the OKO-TOUCH-BL3; (b) On the Gas Control Unit.

Figure 16 (a & b) shows an example of an alarm Message that is displayed on clicking the '***Alarm***' icon ⚠ on the bottom left homepage.

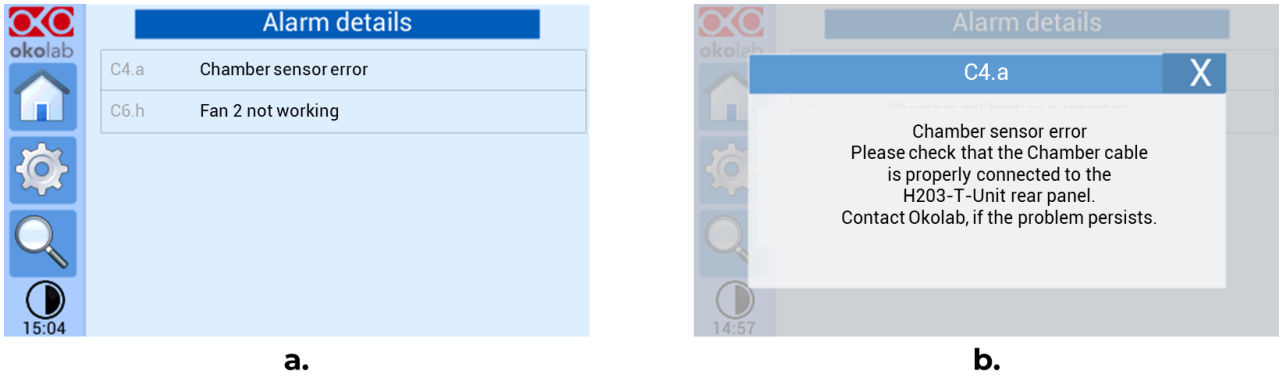


Figure 16. Alarm Message.

The following sub headings detail the alarm setup procedures for the Temperature and Gas.

10.1 Temperature Alarm

In this section, you can setup the value of the deviation (tolerance), in °C, from the temperature set point and the time for which the system has to read the measurement out of tolerance value, before going into an alarm state (Figure 17).

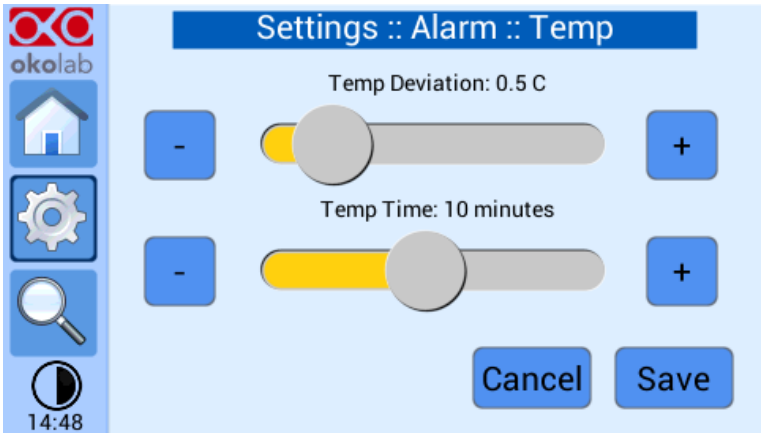


Figure 17. Temperature Alarm Settings Page.

10.2 Gas Alarm

The Gas alarm settings not available for H203-T-Enclosures. In this section, you can setup the value of the deviation (tolerance), in % of concentration, from the gas set point and the time for which the system has to read the measurement out of tolerance value, before going into an alarm state (Figure 18).

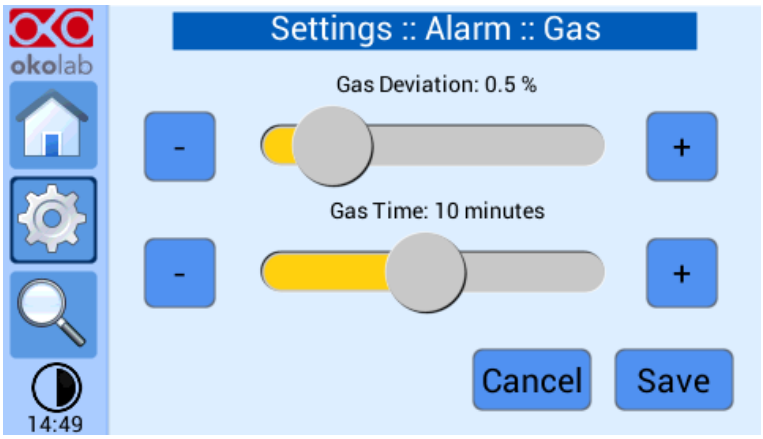
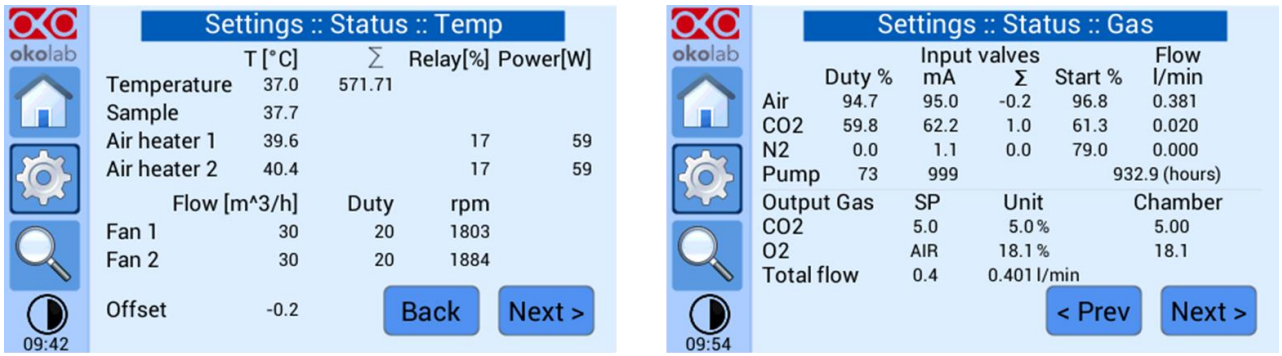


Figure 18. Gas Alarm Settings Page.

11 SYSTEM STATUS

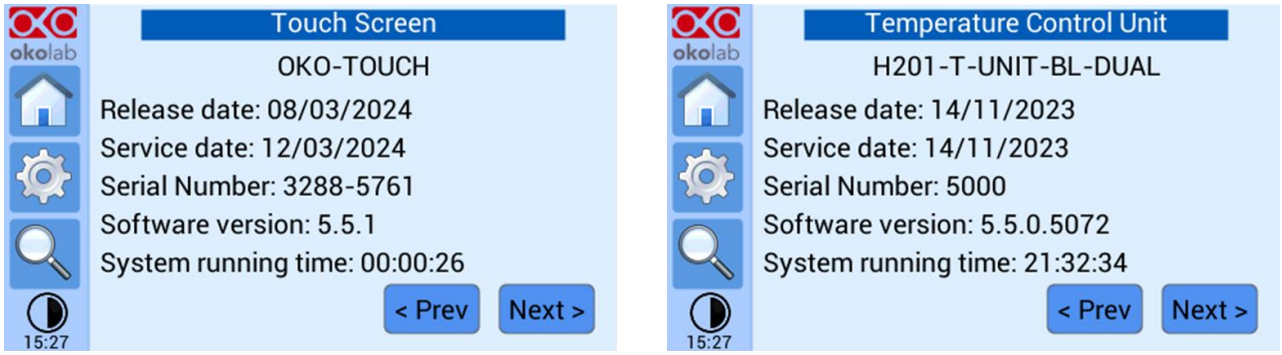
For quick visualization of the system's status, you can navigate to this menu and view the details pertinent to the system's functioning. The figure below illustrates the status pages for Temperature (Figure 19 (a) and Gas Figure 19 (b).



a. **b.**

Figure 19. Status Pages for different parameters (a-b).

On the homepage, clicking on the ***OKOLAB*** icon on the top left of the screen will allow you to view system details such as the release date, serial number, software version etc. as illustrated in Figure 20.



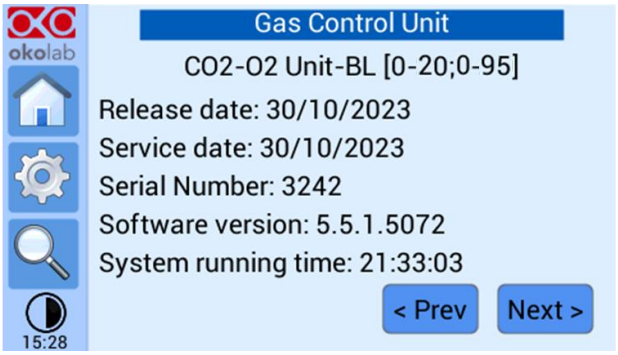


Figure 20. System Information for different devices of the Enclosure

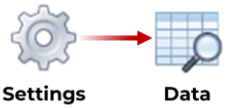
Note ► *These details such as the serial number, status pages, will be requested by the OKOLAB Technical Support team during assistance sessions. If you find yourself in need for a technical assistance, please attach images of the Status page for each of the parameters available to you relative to the Top Stage system that you possess.*

12 SYSTEM SETTINGS

In this menu the following system settings are available:

- **Visual Effects :** From this page you can set the Top LED to be enabled as per your requirement, and select between setting the High contrast color as 'White' or 'Dynamic'.
- **Brightness :** From this page you can set the brightness of the OKO-TOUCH-BL3's screen.
- **Date & Time :** From this page you can set the Date & Time on the OKO-TOUCH-BL3. Please note that we suggest to do this during the first setup of your enclosure.
- **Touch Options :** From this page you can set the Touch Sound as enabled/disabled and also manipulate the buzzer frequency as you prefer.

13 DATA SETTINGS



This section covers the settings pertinent to the Data being worked with using the system. In this menu you will be able to access the following settings:

Data Logging Settings

In the data Logging settings menu, you can choose between logging the data directly on to an external USB Pen Drive or to the device's internal memory.

Saving data to External USB Drive: To start logging the data directly to your external USB Pen Drive and check the box to enable the ***'USB Drive'*** option. The USB Pen Drive must be connected to the OKO-TOUCH-BL3 via the provided OTG cable (as shown in Figure 21).

Figure 21. OTG Cable port on the OKO-TOUCH-BL3 for attaching the USB Pen Drive.

Saving data to Internal Memory: To start logging the data to the device's internal memory, enable the ***'Internal Memory'*** option. By clicking on the screwdriver icon , you can view the **start date** from which the logging has been active, the **Available Memory** and the **Latest Download date**. Besides you can also choose to ***'ERASE'*** the data in the device or download it to a USB Pen Drive by clicking on ***'To USB'*** option and transfer data to a USB Pen Drive connected to OKO-TOUCH-BL3.

On this page you also have access to the following functions:

- Set the Time Interval for data logging, this can be done by clicking on the ***edit*** icon and manually entering the time interval on the pop-up menu.
- Select whether you'd like your data to be grouped by ***'Day', 'Week' or 'Month'.***
- Lastly, select the ***'File name suffix'*** that you'd like to set to the logged data by clicking on the ***keyboard*** icon.

Data Chart Settings

In the data Chart settings menu, you can set the length (in terms of time duration) of the chart history.

14 TOUCH SCREEN CALIBRATION

Keep pressed the ON/OFF button on OKO TOUCH for 7 seconds to start the Touch Screen Calibration. While holding the button, the pop-up message 'Keep the button pressed for 8 seconds to calibrate the touch. Once the calibration starts, tap blue calibration dots until the calibration is complete.

Figure 22. Performing the Touch Calibration.

15 TROUBLESHOOTING

When in the Alarm state the Status LED of the Control unit will change its color and the Alarm icon ⚠ will be displayed on the Homepage of the OKO-TOUCH-BL3. Please refer to the following Alarms list for the troubleshooting.

Alarm Code & Message	Alarm Name	Remedy
Temperature Alarms		
C1.a	**Temperature far from setpoint**	Please ensure that chamber and enclosure are closed and sample insert is placed correctly; Please ensure that the heating boxes are also connected properly to the enclosure; If the problem persists, contact OKOLAB Technical Support team for further assistance.
C4.a	**Chamber sensor error**	Please ensure that the Chamber cable is properly connected to the H203-T-Unit rear panel; If the problem persists, contact OKOLAB Technical Support team for further assistance.
C4.c	**Heating Box 1 sensor error**	Please ensure that the Heating box 1 cables are properly connected to the H203-JUCNTION-BOX on the rear panel of the Enclosure; Please ensure that the H203-JUCNTION-BOX cable (Heating Box 1) are properly connected to the H203-T-Unit rear panel; If the problem persists, please contact OKOLAB Technical Support team for further assistance.
C4.d	**Heating Box 2 sensor error**	Please ensure that the H203-JUCNTION-BOX cable (Heating box 2) is properly connected to the communication panel on the rear panel of the Enclosure; Please ensure that the Heating Box 2 cable is properly connected to the H203-T-Unit rear panel;

		If the problem persists, please contact OKOLAB Technical Support team for further assistance.
C6.c	**Heater 1 relay not working**	Please ensure that the Heating box 1 cables are properly connected to the H203-JUNCTION-BOX on the rear panel of the Enclosure; Please ensure that the H203-JUNCTION-BOX cable (Heating Box 1) are properly connected to the H203-T-Unit rear panel; Contact OKOLAB Technical Support team for further assistance.
C6.d	**Heater 2 relay not working**	Please ensure that the Heating box 1 cables are properly connected to the H203-JUNCTION-BOX on the rear panel of the Enclosure; Please ensure that the H203-JUNCTION-BOX cable (Heating Box 1) are properly connected to the H203-T-Unit rear panel; Contact OKOLAB Technical Support team for further assistance.
C6.g	**Fan 1 not working**	Contact OKOLAB Technical Support team for further assistance.
C6.h	**Fan 2 not working**	Contact OKOLAB Technical Support team for further assistance.
C7.a	**Heater temp divergence**	Please ensure that the Heating box 1 and 2 cables are properly connected to the H203-JUNCTION-BOX on the rear panel of the Enclosure; Please ensure that the H203-JUNCTION-BOX cable (Heating Box 1 and 2) are properly connected to the H203-T-Unit rear panel; Contact OKOLAB Technical Support team for further assistance.

C11	**Chamber open for a long time**	Please ensure that the chamber lid is properly closed and click on the chamber icon on the homepage to select closing it.
C14	**Low Humidity detected**	Please verify that the HM-VF module is filled with sufficient water; Please verify the tube connections.
Gas Alarms		
G1.a	**CO2 far from setpoint**	Please ensure that the gas tubes are properly connected; Please ensure that the CO2 supply cylinder isn't empty and the inlet pressure is properly set.
G1.b	**O2 far from setpoint**	Please ensure that the gas tubes are properly connected; Please ensure that the N2 supply cylinder isn't empty and the inlet pressure is properly set; Please ensure that the air pump is connected properly to the gas control unit;
G1e	**Air Flow far from setpoint**	Please try increasing the air pump duty offset or check the pressure of the air cylinder If the problem persists, please contact OKOLAB Technical Support team for further assistance.
G8	**Air pump lifetime expired**	Please OKOLAB Technical Support team for a replacement of the pump.

16 CLEANING & MAINTENANCE

16.1 Cleaning

The following subheadings explain the cleaning of the different components.

16.1.1 Control Units Cleaning

- Use a polishing cloth or dry cloth to wipe off dust and dirt.
- Never use thinners, benzene, solvents on or near the devices, since these could corrode their surfaces.
- To polish the Stage Incubator and the Humidifying Module, if it is present, you can use distilled water or alcohol
- Verify the status of all cables and if some cable is damaged, contact Okolab to receive assistance

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Before cleaning the unit, disconnect all the electrical connections.
Water must not enter in the system.

16.1.2 Enclosure Cleaning & Maintenance

In order to keep the Cage clean, please follow the steps below:

1. Turn the system off and pull the main plugs out of the socket.
2. Use a clean soft and dry sterilized cloth to wipe the outer body.
3. Spray the **Disinfectant** on the cleaning cloth and rub the selected area gently.
4. If some halos are present on the enclosure body (this may be the case of **Acrylic**), dampen the cloth again and immediately wipe the area gently with the Wipe.

16.1.3 HM-VF Module Cleaning & Maintenance

In order to clean the HM-VF module please follow the steps below:

1. Disconnect the gas tubes connected to the HM-VF module.
2. Empty the water if present form the module.
3. Unscrew the upper transparent part of the Module from the lower black part.
4. Use a cleaning cloth dampened with a 70% alcohol cleaning solution and clean the internal part of the module.

Please avoid any contact physical or with alcohol with the Selemion tube present in black part of the HM-VF Module as this will cause damage to it and eventually hinder the proper functioning of the HM-VF Module.

16.1.4 Chamber Cleaning

In order to keep the Chamber clean, please follow the steps below:

1. Turn the system off and pull the mains plug out the socket
2. Wait the chamber cools down.
3. To clean the body of the chamber, wipe with a soft micro-fiber cloth. For stubborn smudges, you can damp the soft micro-fiber cloth with ethyl alcohol (product code UN1170). Do not put any liquid directly on the chamber. While cleaning the glass lid, do not apply strong force to the surface of the glass lid because it can be damaged.

16.1.5 OKO-AIR-PUMP-BL Cleaning

The OKO-AIR-PUMP-BL has a lifetime of 6000 hours. When the maintenance of the embedded pump is due the system will display the alarm code **G8- "Please contact Okolab to replace OKO-AIR-PUMP-BL."** On the homepage advising you to change the pump. Contact Okolab Technical Support Team for instructions on the pump replacement procedure.

Note ► *After replacing the pump, please navigate to* 

*, select the '**CO2 in Air**' mode, click on **'Pump'** and lastly click on **'Reset'**.*

16.2 Maintenance

The following table reports the list of the spare parts and when they should be replaced.

Spare Parts List	Suggested Replacment Time
Pump	At end of its Lifetime (6000h). (when you see the alarm code G8)
CO2 Valve	If suggested by Okolab Technical Support Team.
Air Valve Mass flow sensor	If suggested by Okolab Technical Support Team.
VF-Membrane (for HM-VF Module)	If Damaged.
Hydrophobic PTFE (for OKO-AIR-PUMP-BL)	Every 12 months.

17 TECHNICAL SPECIFICATIONS

H203-T-H-CO2/O2 [0-95] -ENCLOSURE - Technical Specifications	
Temperature Control	
Measurement Range	3°C above ambient temperature to 45°C
Accuracy	± 0.1°C
Step size	0.1 °C
CO2/O2 Control	
CO2 Range	0-20%
CO2 Accuracy	± 0.2% [1]
CO2 Step size	0.1%
O2 Range	0-95%
O2 Accuracy	± 0.3% [1]
[1] At 5% CO2 & 5% O2	
Gas Input Requirements	
CO2 Inlet Pressure	0.8 ±0.2 barg (12 ±3 psig)
CO2 Gas Purity	99.995%
N2 Inlet Pressure	0.8 ±0.2 barg (12 ±3 psig)
N2 Gas Purity	99.995%
O2 Inlet Pressure	0.8 ±0.2 barg (12 ±3 psig)
O2 Gas Purity	99.995%
Gas Connectors	6.0 OD Push to fit connector
Expected Lifetime	
OKO-AIR -PUMP-BL Lifetime	6000h
Power Consumption	
Control Unit – Supply Voltage	24 VDC
T-Enclosure – Supply Voltage	230V AC or 120 VAC
Power Consumption	870 W max
External Environment Requirements – Indoor Use	
Temperature Range	18 – 30 °C (23 °C suggested)
Storage Temperature	-5 – 60 °C
Relative Humidity Range	0 - 70%

18 FIGURES LIST

19 TABLES LIST

20 SUPPORT

To contact one of our engineers please send an email to the technical support address listed below or contact us through the live chat on www.oko-lab.com. You can request a remote support session anytime.

Please, do not hesitate to contact Okolab for any further commercial information or technical support.

For TECHNICAL SUPPORT: support@oko-lab.com
Mobile 1: +39 328 611 3451
Mobile 2: +39 347 400 2201

For COMMERCIAL SUPPORT WORLDWIDE: lanzaro@oko-lab.com
Phone +39 081 806 2624
Fax: +39 081 876 4410
Mobile: +39 348 968 0717

For COMMERCIAL SUPPORT US&CANADA: usa@oko-lab.com

For COMMERCIAL SUPPORT CHINA: tong@oko-lab.cn

WARRANTY

Okolab S.r.l. warrants “Bold Line 3 Enclosures” to be free of defects in materials and workmanship for a period of three years starting from invoice date. If the units malfunction, they must be returned to the factory for evaluation. If the equipment has to be returned to the factory, please ensure that is carefully and properly packed. Okolab S.r.l. accepts no responsibility for damage due to unsatisfactory packing. If the unit is found to be defective, it will be repaired or replaced at no charge. This warranty does not apply to defects resulting from any actions of the purchaser. Components which wear are not warranted. Okolab S.r.l. neither assumes responsibility for any omissions or errors nor assumes liability for any damage that may results from improper use of its products in accordance with information provided by Okolab S.r.l. Okolab S.r.l. warrants only the parts manufactured by Okolab S.r.l to be free of defects. Okolab S.r.l. makes no other warranties or representations of any kind whatsoever, express or implied, except that of title, and all implied warranties including any warranty of merchantability and fitness for a particular purpose are hereby disclaimed. LIMITATION OF LIABILITY: the total liability of Okolab S.r.l. shall not exceed the purchase price of the component upon which liability is based. In NO event shall Okolab S.r.l. be liable for consequential, incidental or special damage.