



okolab

CO2-02-UNIT-BL [0-10; 0-1]

Gas Controller

Manual

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CO2-O2-UNIT-BL [0-10; 0-1] is a Digital CO₂/O₂ Controller that mixes CO₂, N₂ and Air to the desired concentration in the CO₂ range 0-10% and O₂ range 0-1%.

It features a long life Non Dispersive Infrared (NDIR) dual wave length CO₂ detector and a O₂ electrochemical sensor to ensure a high accuracy on the gas composition and a flow rate sensor to regulate output flow rate.

CO₂-O₂-UNIT-BL [0-10; 0-1] is operated via the OKO-TOUCH touch screen control panel (to be ordered separately). OKO-TOUCH features on-board memory for data logging and mini-USB port for data download.

In addition, data logging is possible via SMART-BOX, via DATA-LOG Okolab software and via following third-party Imaging software: LASX 2.0, NIS-Elements, SlideBook, MetaMorph and MicroManager. Macro for ZEN Black software is available upon request.

Okolab Bold Line controllers are also capable to receive TTL input (requires to order separately TTL-CABLE).

CO₂-O₂-UNIT-BL [0-10; 0-1] connects to any Okolab Bold Line T controller. In this case, a single OKO-TOUCH operates both, the Bold Line T controller and CO₂-O₂-UNIT-BL [0-10; 0-1].

CO₂-O₂-UNIT-BL [0-10; 0-1] is also compatible with Okolab Active Humidity Controller to control output gas Relative Humidity and with Okolab air pump OKO-PUMP-BL, which enables to use background air as a convenient alternative to the compressed air.

2 Symbol description

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

2.1 Symbols used in this manual

The following symbols identify important information to note:



CAUTION or WARNING: this symbol warns you about the risk of electrical shock.



CAUTION or WARNING or IMPORTANT: this symbol warns you of circumstances or practices that can affect the functionality of the instrument.

Tip ► *Supplies you with helpful suggestions.*

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

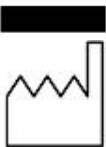
2.2 Symbols on the product label



CE MARKING: this symbol indicates product 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.

IP 30

3 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 ends are well inserted into the connectors so they cannot slip off
- This device is not designed for use for medical applications.
- Install safety valves and adequate pressure regulators on gas lines before CO2-O2-UNIT-BL [0-10; 0-1] input connectors.
- 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.
- 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.
- VENTILATION. Unit should be situated so that its location or position does not interfere with proper ventilation. Neither the gas mixer nor stream destinations should be in poorly ventilated areas.
- 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.
-



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.

4 Supplied equipment

1. **CO2-O2-UNIT-BL [0-10; 0-1]**, main box.
2. **TUBE-CB (x2)**. Silicon tube 20cm long 7mm OD with a PTFE filter in the middle. One to be installed on the rear of the Unit and one as spare replacement.
3. **TUBE-C (x1)**. Polyurethane 130cm long blue rigid tube 6mm OD with connected a 4mm ID Silicon transparent tube 150 cm long plus PTFE filter in the middle. Use TUBE C to connect the CO2/O2 Controller to your device or to the humidifier, if it is present.

Note ► If you purchased CO2-O2-UNIT-BL [0-10; 0-1] with H201-T-UNIT or H101-T-UNIT, you receive the **TUBE-B**, Polyurethane 120 cm long blue tube 6mm OD connected to a Silicon 40 cm long transparent tube 4mm ID plus PTFE filter in the middle, connected to a Polyurethane 120 cm long blue tube 6mm OD. Use TUBE-B to connect the CO2-O2-UNIT-BL [0-10; 0-1] to the cage incubator.

4. **TUBE-A (x3)**. Rigid tubes, Polyurethane 3m long 6mm OD each. Use TUBE-A to connect N2, Air and CO2 supply to the corresponding input ports (N2, Air and CO2) on the rear panel of the CO2-O2-UNIT-BL [0-10; 0-1].
5. **Pressure Gauge for CO2/N2 + regulator + assembly stirrup (x2)**. Install pressure gauge between the pure CO2 /N2 supply pressure regulator and the corresponding CO2/N2 input port on the rear panel of CO2-O2-UNIT-BL [0-10; 0-1].
6. **24V-DC Power Adapter (x1)**.
7. **Oxygen Analyzer Tube (x2)**. PTFE tube 135 mm long 4mm OD. Use Oxygen Analyzer Tube to connect the Oxygen Analyzer to the main box.

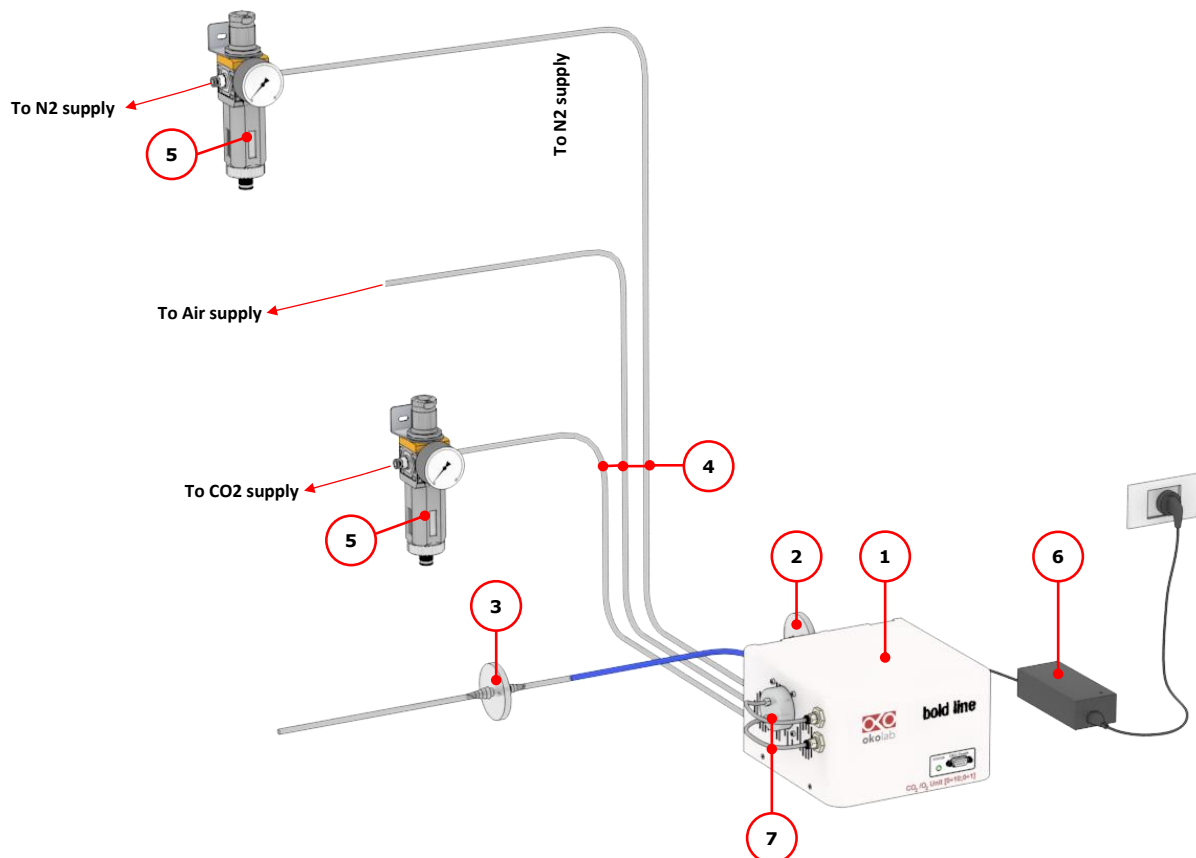


Figure 1. CO2-O2-UNIT-BL [0-10; 0-1] – components.

5 GAS supplied requirements

- **CO2.** CO2 must be available at **1.4 barg (20.3 psig)**, with a connector for 6mm OD rigid tube. Gas source must be Standard Purity CO2 (coded as 4.5 that means 99.995 % of CO2) and humidity-free gas.
- **N2.** N2 must be available within the pressure range at **1.4 barg (20.3 psig)**, with a connector for 6mm OD rigid tube. Gas source must be Standard Purity N2 (coded as 4.5 that means 99.995 % of N2) and humidity-free gas.
- **Air.** Air must be available at **1.4 barg (20.3 psig)**, with a connector for 6mm OD rigid tube.

Note ► An alternative to the compressed air, OKO-AIR-PUMP-BL allows to use background Air.

6 Compatibility

CO2-O2-UNIT-BL [0-10; 0-1] is compatible with:

- **OKO-TOUCH (required)**, including:
 - **Touch Screen Interface**
 - **#1 RS232 Serial cable.** To connect the Touch Screen to the unit.
 - **MINI-USB-OTG cable.** To connect a USB pen to the OKO-TOUCH for data download.
- **OKO-AIR-PUMP-BL** (only in case it is required to work in “CO2 in Air” mode)
- **H101-BASIC-BL**
- **H101-CRYO-BL**
- **H201-T-UNIT-BL**
- **H301-T-UNIT-BL-PLUS**
- **HM-ACTIVE**
- **H101-HM**
- **HM-VF**

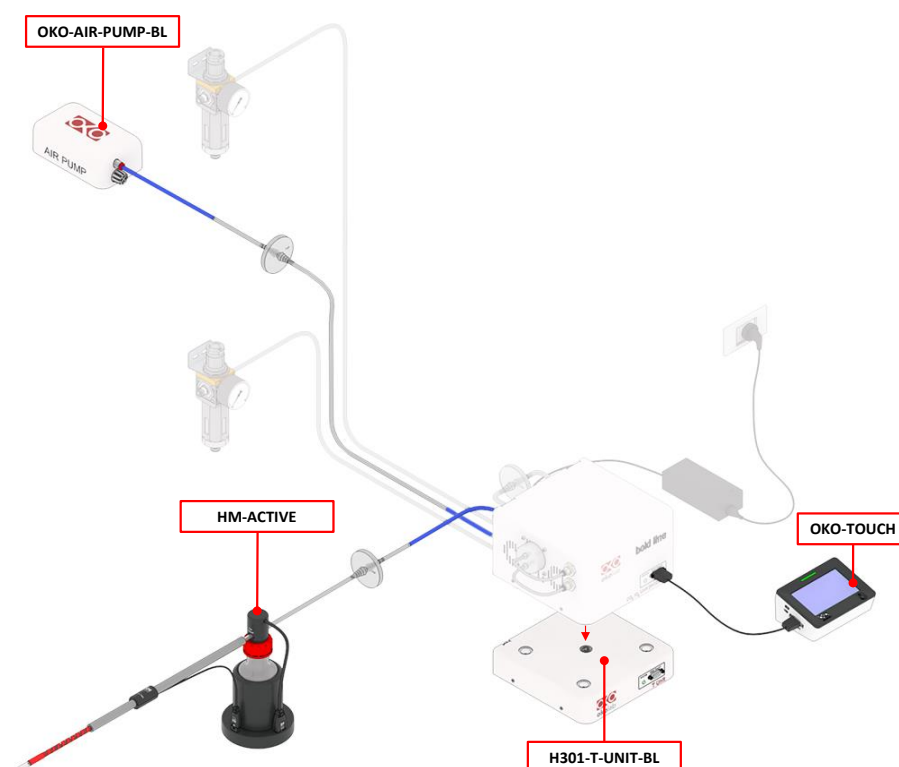


Figure 2. CO2-O2-UNIT BL [0-10; 0-1] within a typical H301 configuration.

- **DATA-LOG.** Software used to log, view, and store data from a PC. It may be used to change parameters of the controllers via PC. Data can be exported in .xlsx format.

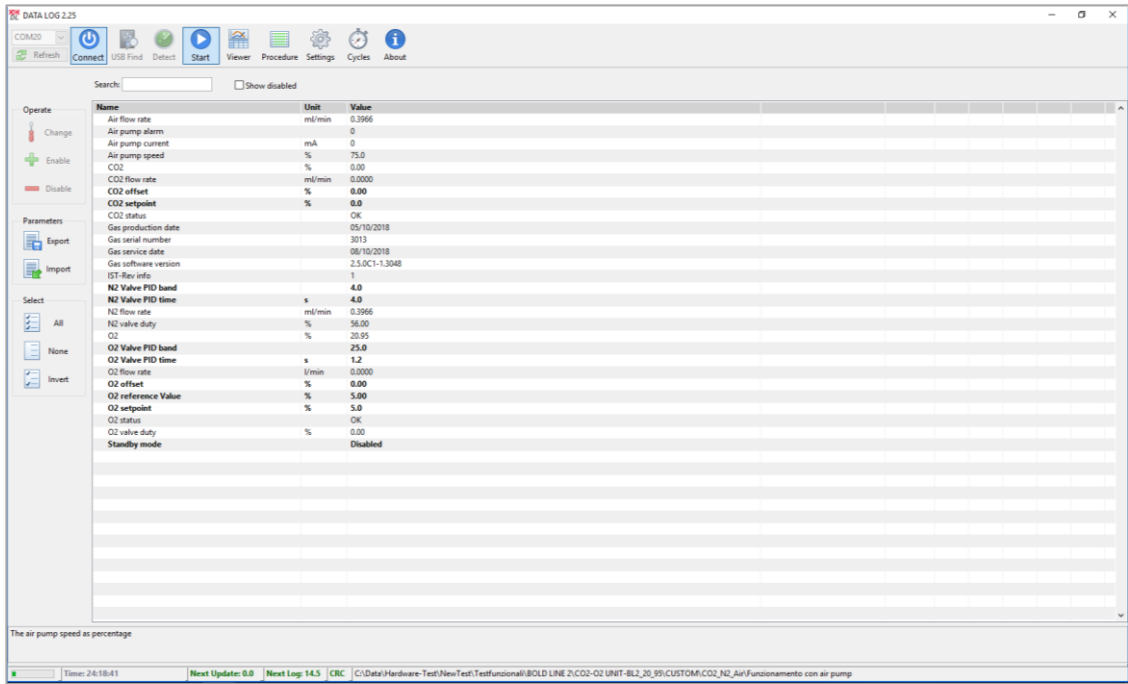


Figure 3. DATA LOG software.

- **SM-BL Smart Box.** To store data, to operate the controllers via web/smartphone/tablet and to allow remote assistance for service.

7 Equipment Description

Figure 4 illustrates CO2-O2-UNIT-BL [0-10; 0-1] front panel:

1. **Status Led.**
2. **RS232 connector.** Connector for OKO-TOUCH.

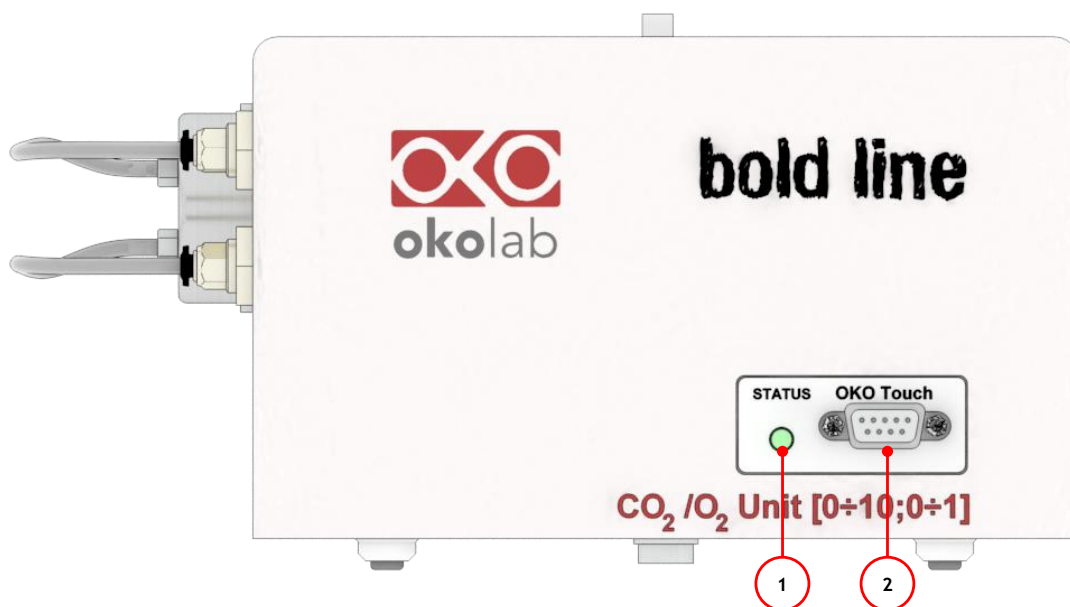


Figure 4. Gas Controller Front Panel Overview.

Figure 5 illustrates CO2-O2-UNIT-BL [0-10; 0-1] rear panel:

1. **Filter Out.** Connector for TUBE-CB.
2. **Filter In.** Connector for TUBE-CB.
3. **Gas Output.** Push to fit Input connector for 6 mm O.D. rigid tubing to supply mixed gas to the user system.
4. **Power Input.**
5. **OKO-AIR-PUMP-BL connector.** Leave unplugged if CO2-O2-UNIT-BL [0-10; 0-1] is not equipped with OKO-AIR-PUMP-BL.
6. **HM-ACTIVE connector.** Leave unplugged if CO2-O2-UNIT-BL [0-10; 0-1] is not equipped with HM-ACTIVE.
7. **GPIO (General Purpose Input Output) connector.**
8. **USB connector.**
9. **N2 Input.** Push to fit Input connector for 6 mm O.D. rigid tubing to supply N2 to the mixer.
10. **Air Input.** Push to fit Input connector for 6 mm O.D. rigid tubing to supply Air to the mixer.
11. **CO2 Input.** Push to fit Input connector for 6 mm O.D. rigid tubing to supply CO2 to the mixer.

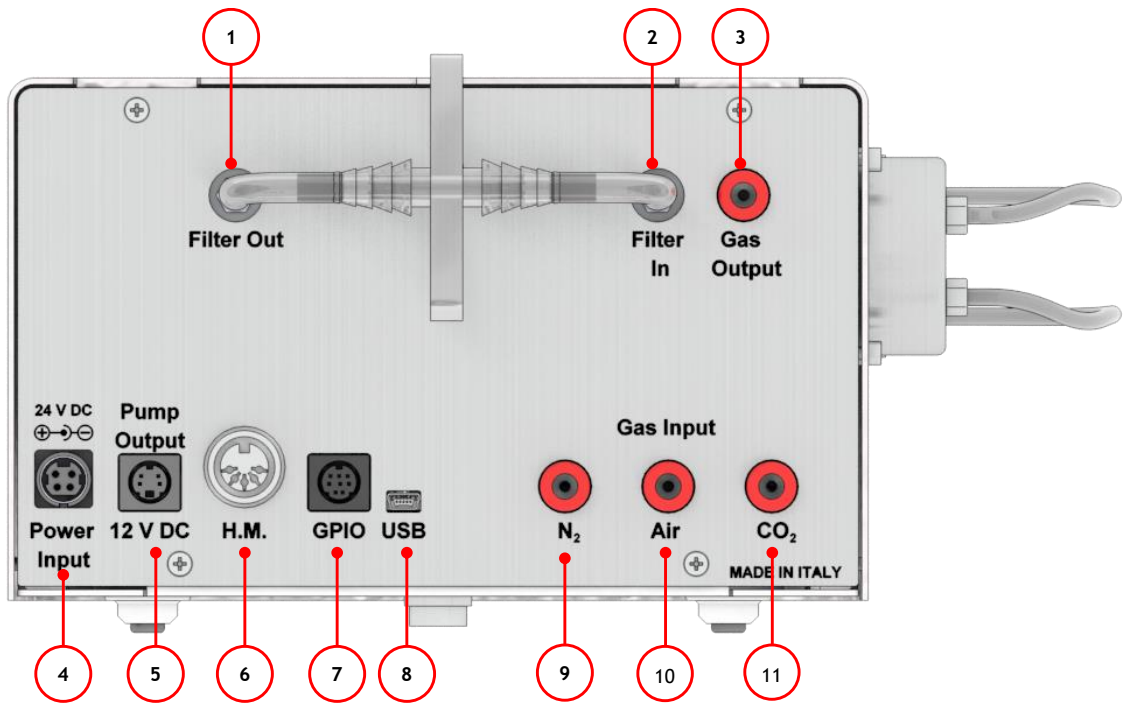


Figure 5. Gas Controller Rear Panel Overview.

Figure 6 illustrates CO2-O2-UNIT-BL [0-10; 0-1] left panel:

1. **Oxygen Analyzer** includes the O2 sensor.
2. **Oxygen Analyzer - Gas input connector.** Push to fit connector (4 mm OD rigid tube) for mixed gas input to O2 Sensor.
3. **Oxygen Analyzer- Gas output connector.** Push to fit connector (4 mm OD rigid tube) for mixed gas output from O2 Sensor.

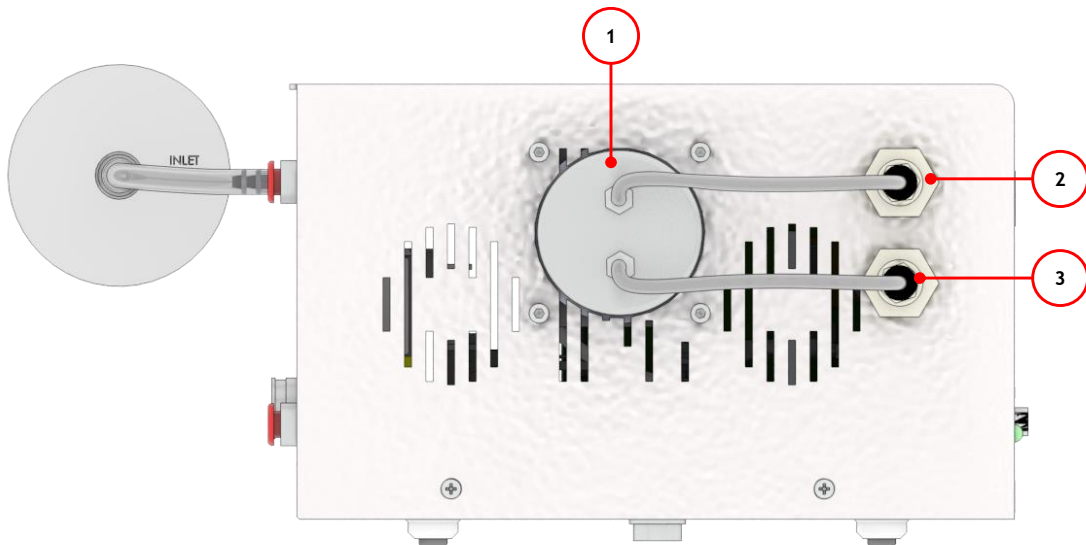


Figure 6. Gas Controller - Left Panel Overview

8 Installation

The following paragraph illustrates how to install and to use CO2-O2-UNIT-BL [0-10; 0-1].

8.1 Setting up CO2-O2-UNIT-BL [0-10; 0-1]



The following instructions shall give you the possibility to install the unit quickly. For safe operation of the unit it is absolutely necessary to read carefully all the instructions and safety notes.

1. Install the supplied pressure gauge between the CO2 supply and CO2-O2-UNIT-BL [0-10; 0-1]. Install the supplied pressure gauge between the N2 supply and CO2-O2-UNIT-BL [0-10; 0-1]. Follow the arrow on the rear of the pressure gauge for the correct Gas In-Out (see Figure 7).

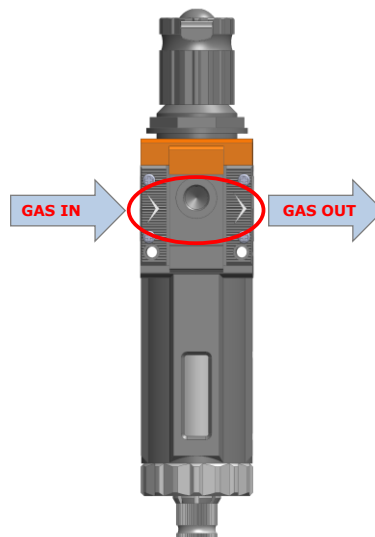


Figure 7. Input and Output gas ports. See symbol on the rear of pressure gauge.

On the bottom of the pressure gauge there is an automatic purging valve. Close it before operating the pressure gauge. To close the purging valve, looking at the regulator vertically from the top knob, pull it down and rotate it counterclockwise (see A and B in Figure 8). Now you can operate the pressure gauge.

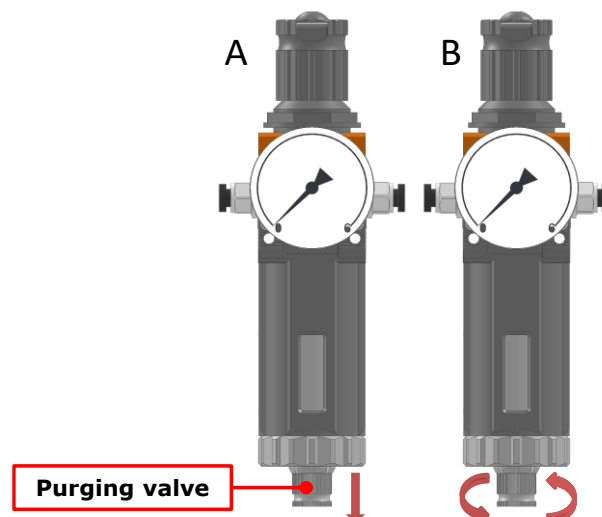


Figure 8. How to close the purging valve of the pressure gauge.

To close the gauge, pull the knob up and rotate it counterclockwise. Push the knob down to lock it. Open valve on the gas supply tank. Adjust Pressure Gauge by pulling the top knob up and rotating it clockwise until the pressure reaches the desired value (see Figure 9), then push the top knob down to lock it.

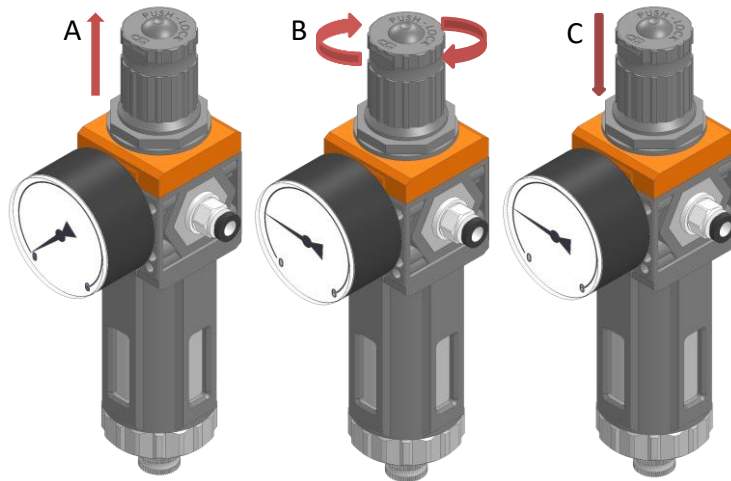


Figure 9. Pressure gauge using.

2. Install the **TUBE-CB** on the rear panel of CO2-O2-UNIT-BL [0-10; 0-1]. It filters the mixed gas before it enters in contact with CO2-O2-UNIT-BL [0-10; 0-1] gas sensors. Connect the TUBE-CB with the *Filter In* and *Filter Out* connectors on the rear panel of CO2-O2-UNIT-BL [0-10; 0-1] (1, 2 in Figure 5 and Figure 10). Make sure the *Filter In* label side of the filter is always connected to *Filter In* connector on the rear panel of CO2-O2-UNIT-BL [0-10; 0-1].

Note ► CO2-O2-UNIT-BL [0-10; 0-1] cannot operate if the TUBE-CB is not connected.

Note ► The improper installation of the TUBE-CB may cause gas sensors contamination.

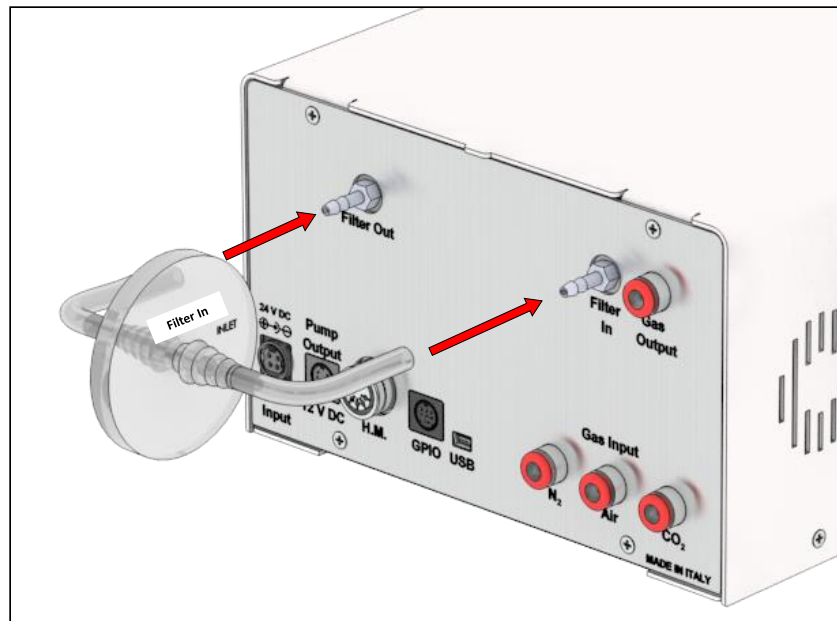


Figure 10. How to install TUBE-CB.

Tip ► Replace this filter each 2-3 months of continuous operation or if you see water in the inner part of the filter.



Do not remove the filter. This may damage the gas sensors.

3. Connect N₂, Air and CO₂ supply to the corresponding push to fit connectors on the rear panel of CO₂-O₂-UNIT-BL [0-10; 0-1] by using TUBE-A (see Figure 11 a). Set N₂, Air and CO₂ pressure at **1.4 barg** (20.3 psig).

Tip ► Make sure to push the tubes all the way into the connectors thus avoiding any gas leak.

Note ► Do not exceed 5 barg (72.5 psig) for CO₂ and N₂ supply.

To remove tubing from the connectors, push the red rubber ring while pulling the tubing (see Figure 11 b).

Tip ► If the tubing does not come out easily, do not force it, simply make sure the red ring is properly pushed.

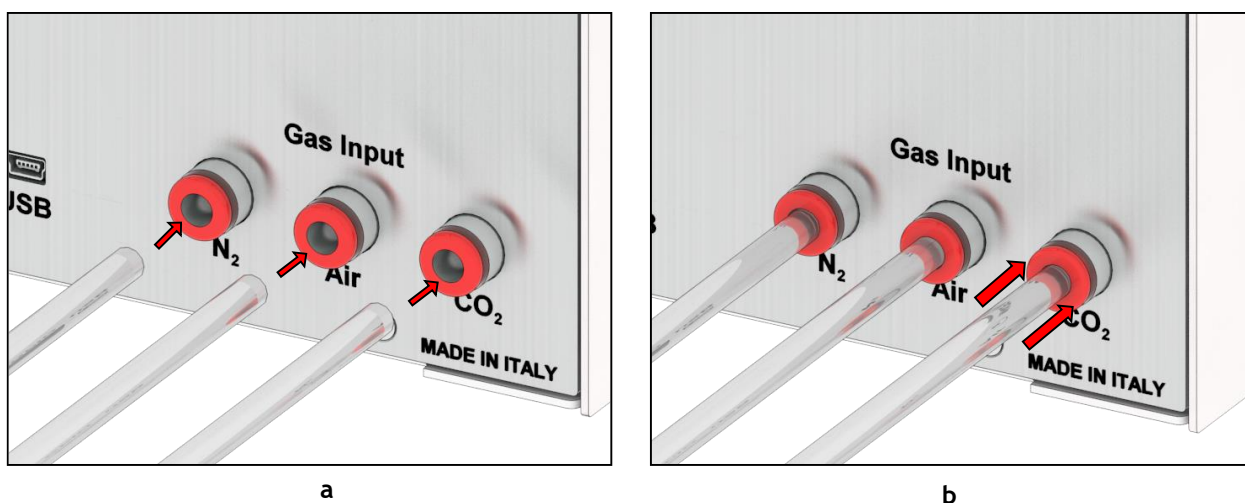


Figure 11. How to connect (a) and disconnect (b) tubings from push to fit connectors.



Before disconnecting any of tubing connected to CO₂-O₂-UNIT-BL [0-10; 0-1], make sure there is no residual pressure by adjusting the pressure gauges upstream of the system and the tanks.

4. To install the O₂ Sensor follow the instructions below:
 - Carefully open the bag of the O₂ Sensor using a pair of scissors or a knife. Make sure that there is no sign of any liquid in the bag, if so, do not proceed, you need a new sensor. Be careful that you don't poke anything such as a fingernail through the membrane.
 - Remove the plug or other device that acts as a shorting clip. This may be found on the connection plate on the back of the O₂ Sensor.
 - Slide the O₂-Sensor into the sensor unit (gold plated contact side of sensor should be facing up touching the sensor unit contacts. The membrane side is covered by a convex gold-plated mesh). Be careful not to touch the membrane while doing this - if the membrane is punctured the O₂ Sensor must be replaced (see image 1 in Figure 12)
 - Verify that the sealing O ring is in place in the cell cap groove (see image 2 in Figure 12)

- Carefully place the cap and turn it clockwise. Make sure that you do not cross thread it, and tighten firmly by hand. Do not over-tighten (see image 4 in Figure 12).
- Connect the Oxygen Analyzer tubes are connected to the Oxygen Analyzer – Gas input connector and Oxygen Analyzer – Gas output connector (see image 5 in Figure 12). Make sure that the Oxygen analyzer tubes are securely connected.

Tip ► Make sure to push the tubes all the way into the connectors thus avoiding any gas leak.

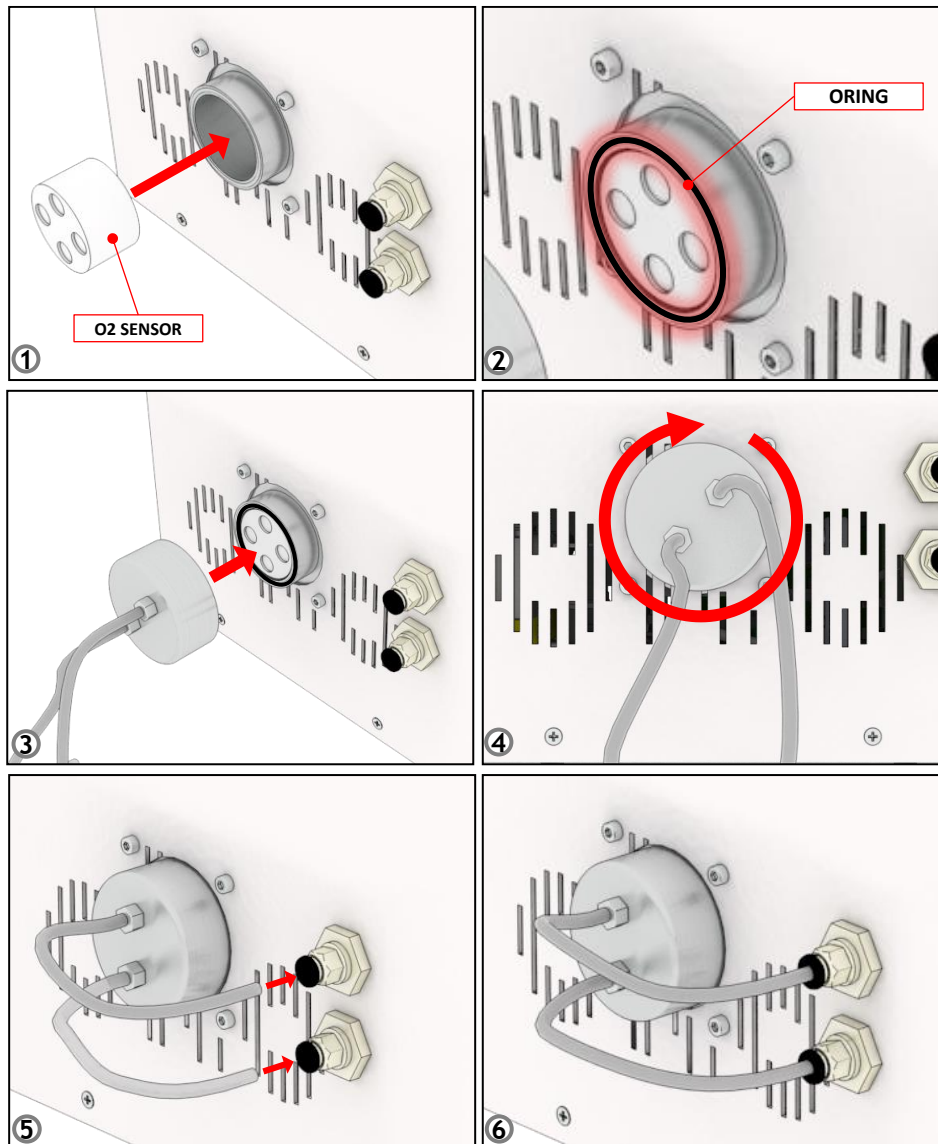


Figure 12. O2 Sensor installation.

5. Figure 13 shows the connections between the N₂, Air and CO₂ tanks and the respective connectors on the rear panel of CO₂-O₂-UNIT-BL [0-10; 0-1].

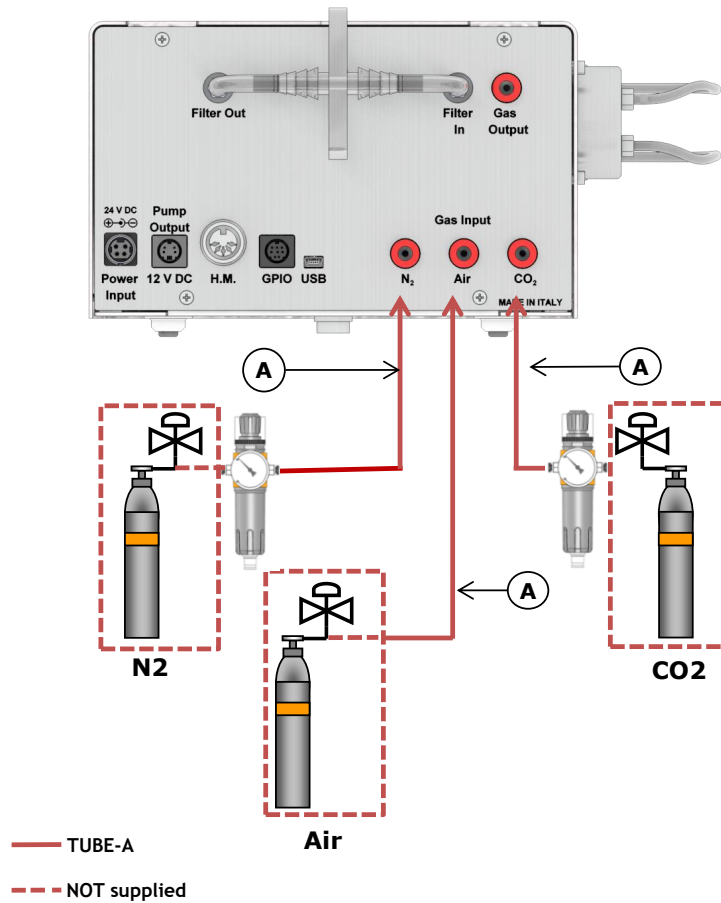


Figure 13. N₂, Air and CO₂ tanks connections to the back panel of CO₂-O₂-UNIT-BL [0-10; 0-1].

Tip ► If you have ordered OKO-AIR-PUMP-BL, connect TUBE-B between the OKO-AIR-PUMP-BL and the connector labeled Air on the rear panel of CO₂-O₂-UNIT-BL [0-10; 0-1] (see Figure 14).

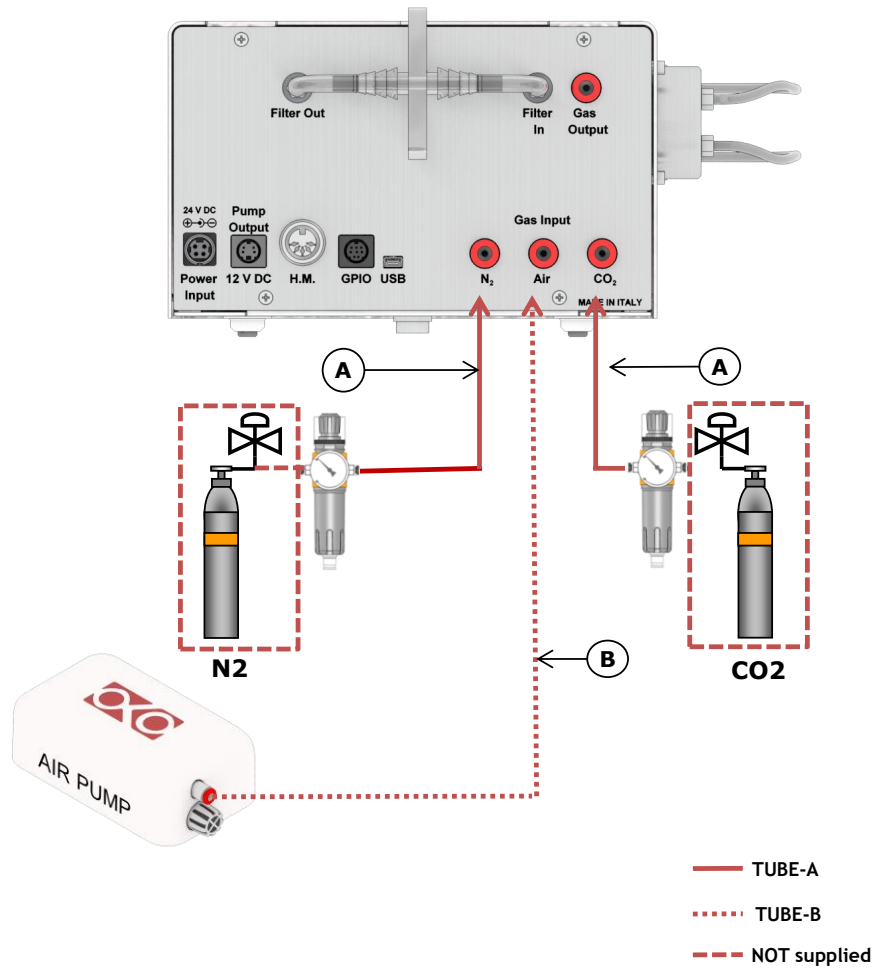
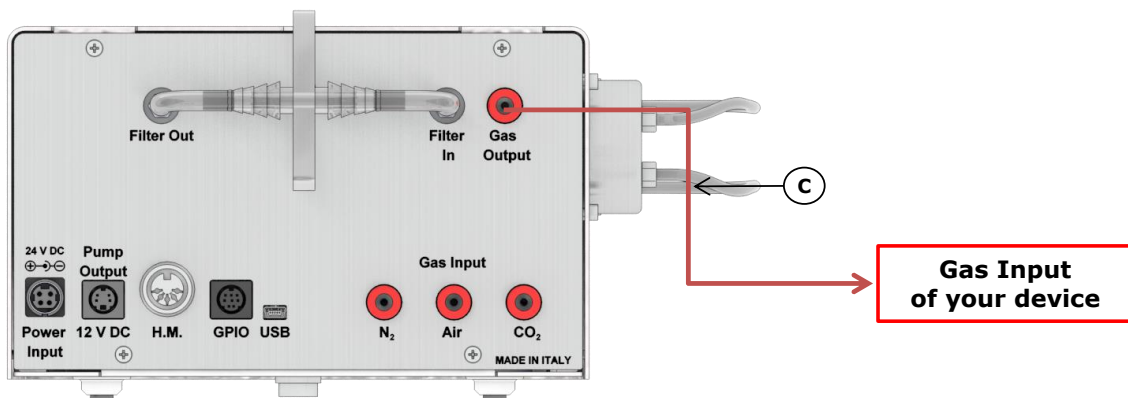


Figure 14. N₂, CO₂ and Air Pump connections to the rear panel of CO₂-O₂-UNIT-BL [0-10; 0-1].

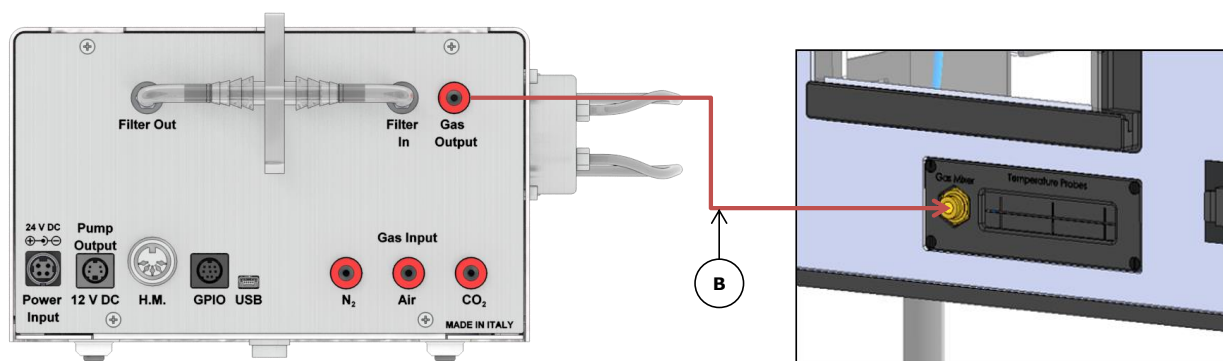
- Connect one end of the TUBE-C to the push to fit connector of the port labeled “Gas output” on the rear panel of CO₂-O₂-UNIT-BL [0-10; 0-1] and the other side of the TUBE-C to your device, as shown in Figure 15.



— TUBE-C

Figure 15. Gas Output connections.

Note ► If you purchased CO2-O2-UNIT-BL [0-10; 0-1] with H201-T-UNIT-BL or H101-T-UNIT-BL, use the TUBE-B supplied to connect the CO2-O2-UNIT-BL [0-10; 0-1] gas output to the cage incubator (see Figure 16).



— TUBE-B

Figure 16. Gas Output connections with a Cage Incubator.

Note ► If you purchased CO2-O2-UNIT-BL [0-10; 0-1] with H301-T-UNIT-BL-PLUS and HM-ACTIVE use the supplied TUBE-C to connect the CO2-O2-UNIT-BL [0-10; 0-1] gas output to the to the port labeled “Gas Input” on the Humidity Sensor Lid of HM-ACTIVE (see Figure 17). Connect the Heated Based cable of HM-ACTIVE to the port labeled “H.M.” on the rear panel of CO2-O2-UNIT-BL [0-10; 0-1] (see Figure 17).

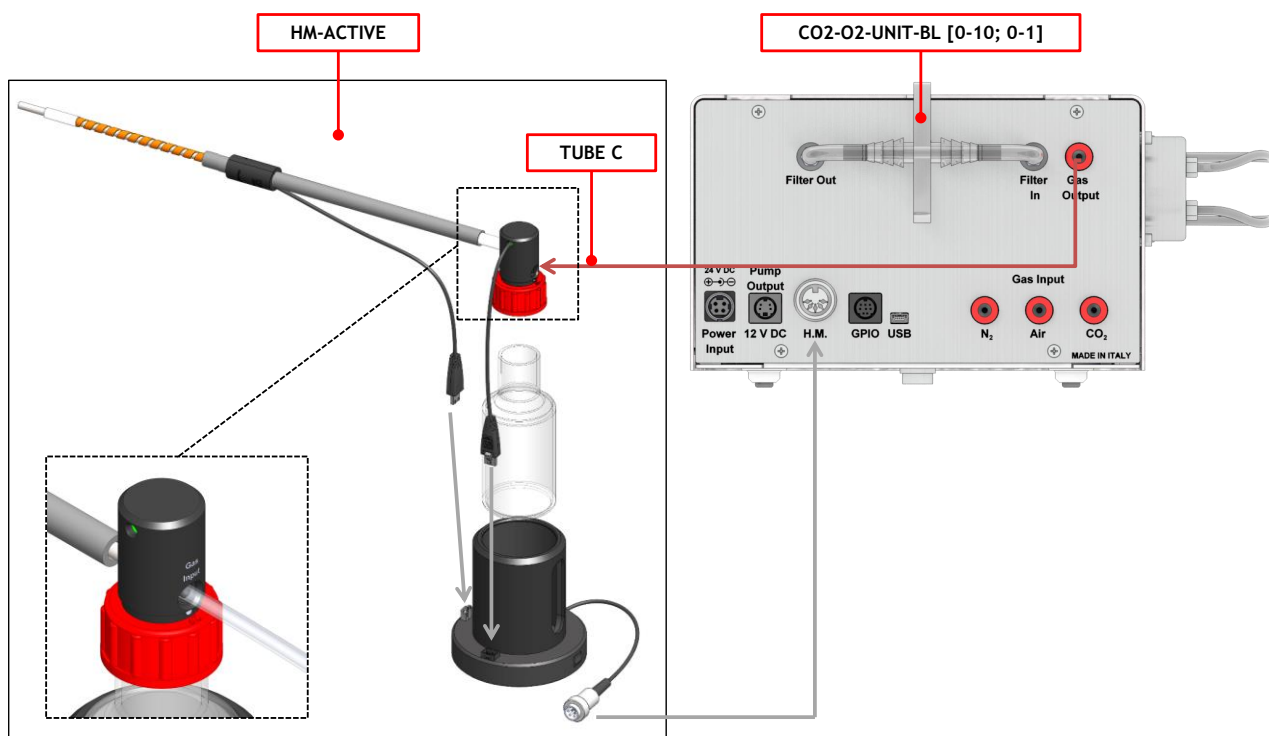


Figure 17. Gas Output connections with HM-ACTIVE.

Note ► If you purchased CO2-O2-UNIT-BL [0-10; 0-1] with H101-T-UNIT-BL- use the supplied TUBE-C to connect the CO2-O2-UNIT-BL [0-10; 0-1] gas output to the push in fitting connection on the cover of the thermostat (see Figure 18).

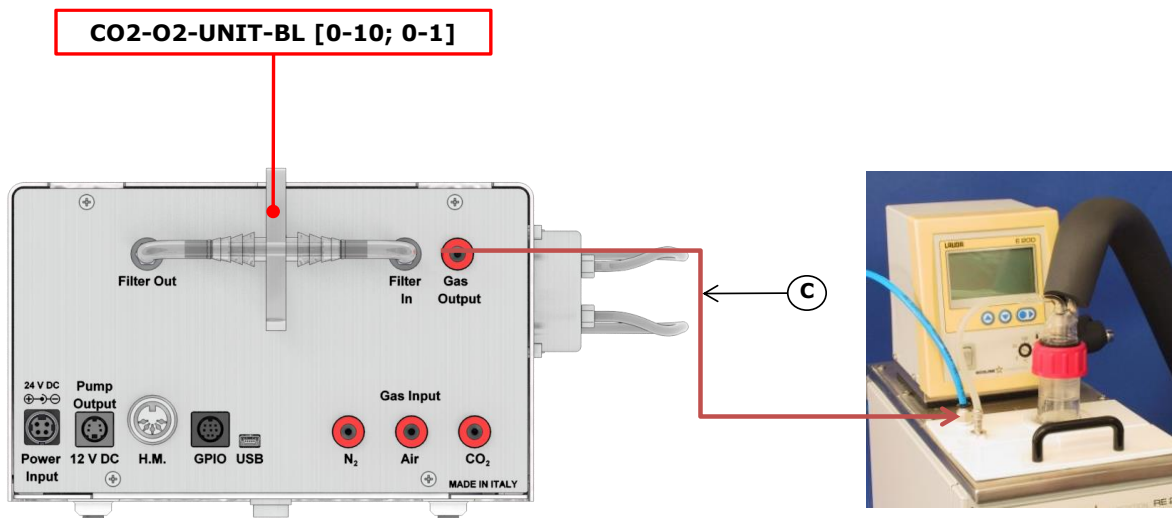


Figure 18. Gas Output connections with thermostat.

7. Connect the touch screen interface OKO-TOUCH to CO2-O2-UNIT-BL [0-10; 0-1] with the RS232 serial cable as illustrated in Figure 19.

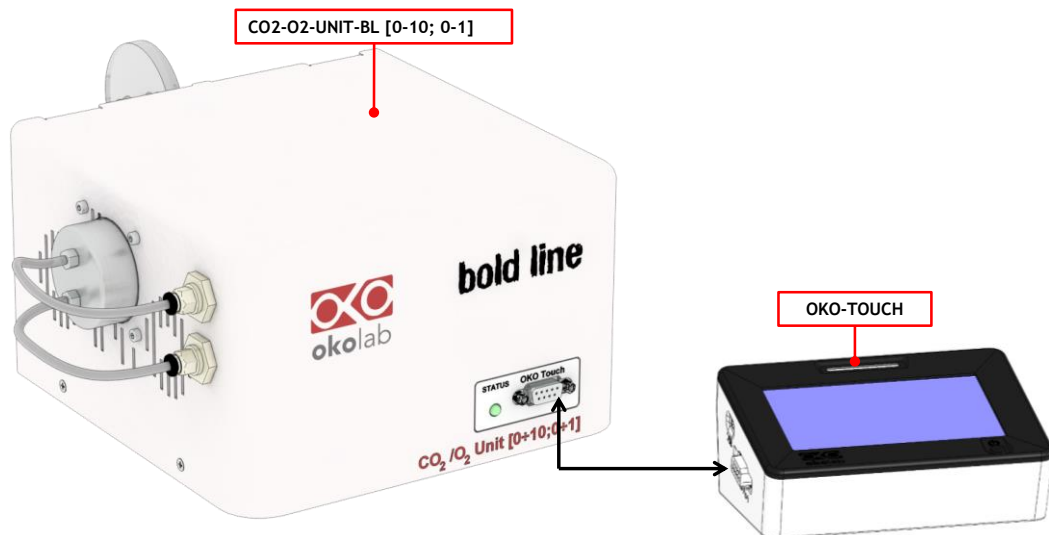


Figure 19. OKO-TOUCH Connection.

8. Connect the power adapter to CO2-O2-UNIT-BL [0-10; 0-1] (7 in Figure 1).
9. To switch CO2-O2-UNIT-BL [0-10; 0-1] on use the power button on OKO-TOUCH. The Status LED (1 in Figure 4) on the front of CO2-O2-UNIT-BL [0-10; 0-1] will turn green.
10. Once the system has been initialized the Status LED on the front of CO2-O2-UNIT-BL [0-10; 0-1] will stop blinking and will turn steadily on. The Homepage will appear on the touch screen, the color of the Status Indicator (see 1 in Figure 22 and Figure 25) on the gas tab will be yellow at the start.
11. Select the Setpoint gas composition from the touch screen Home page (see Paragraph 9.1.1).

12. The light indicator on the Home page becomes green when the Setpoint compositions are reached and are stable.

8.2 How to assemble CO2-O2-UNIT-BL [0-10; 0-1] with a Bold Line T controller

CO2-O2-UNIT-BL [0-10; 0-1] can be used as a stand-alone device or in combination with any one of the Bold Line T controllers.

Figure 20 shows how to assemble CO2-O2-UNIT-BL [0-10; 0-1], for example, with a H301-T UNIT-BL-PLUS.

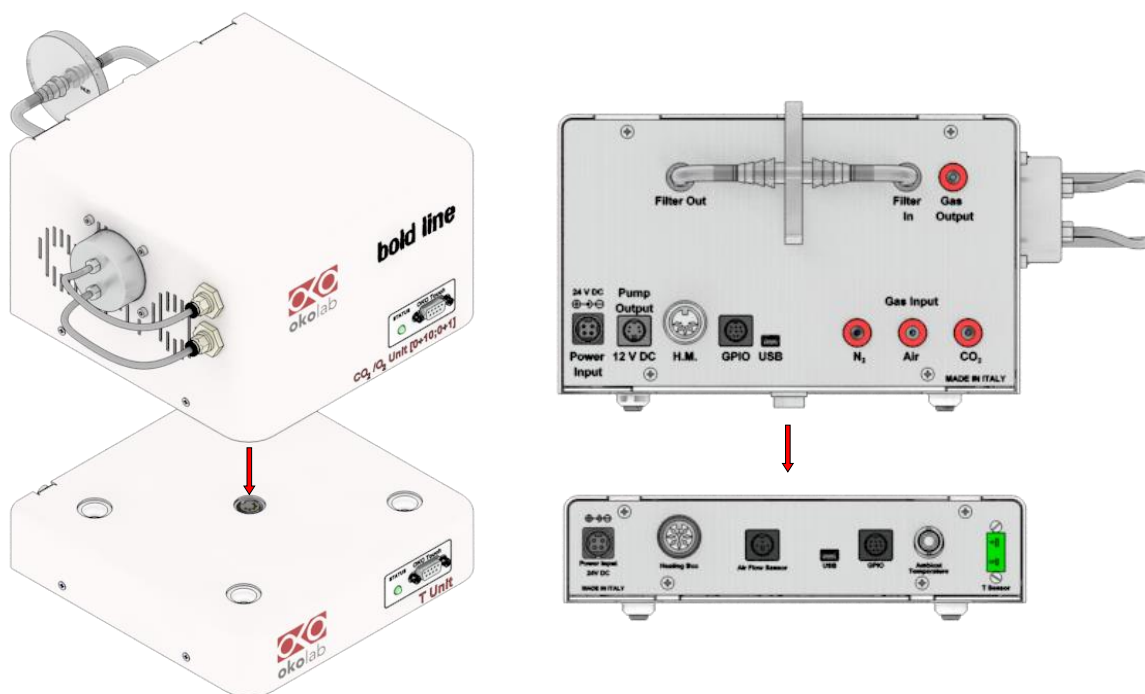


Figure 20. CO2-O2-UNIT-BL [0-10; 0-1] and H301-T-UNIT-BL-PLUS.

CO2-O2-UNIT-BL [0-10; 0-1] must stack on top of the Bold Line T controller by lining up the bus ports located on the top and bottom surface of each unit. When the units are properly connected the Temperature and CO2/O2 parameters will appear on the OKO-TOUCH Touch Screen interface Home page.

Tip ► If not all the parameters appear on OKO-TOUCH Home Page then the Control Units are not properly connected. Please check that the bus ports are properly aligned (see Figure 21).



Figure 21. CO2-O2-UNIT-BL [0-10; 0-1] and H301-T-UNIT-BL PLUS on stock.



If you have CO2-O2-UNIT-BL [0-10; 0-1] and a Bold Line T controller, it is essential to read both this manual and the Bold Line T controller User Manual to familiarize yourself with the functions and the operation of the devices before use.

9 User Interface

This chapter describes the user interface of CO2-O2-UNIT-BL [0-10; 0-1].

9.1 Home page

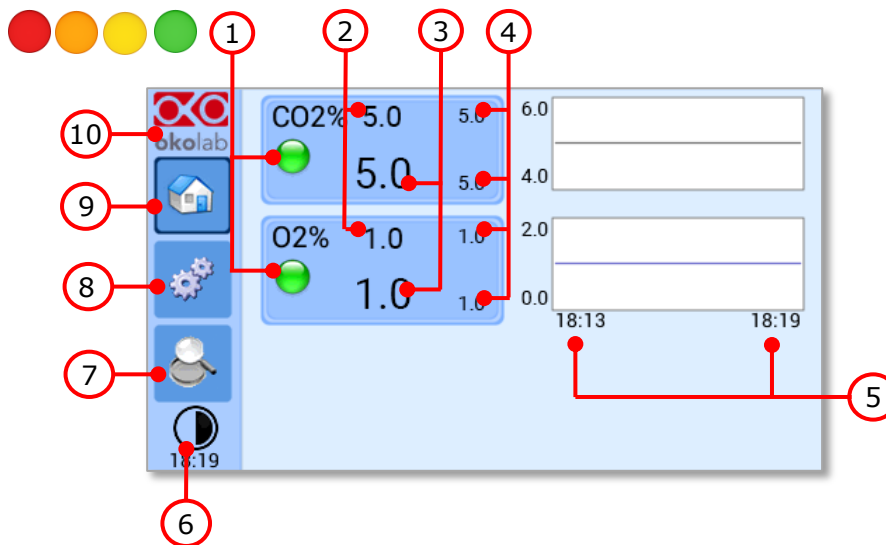


Figure 22. Homepage of CO2-O2-UNIT-BL [0-10; 0-1] Touch Screen Display.

1. Status Indicator.
2. CO2 and O2 Setpoint (see 9.1.1 to learn how to change the Setpoint value).
3. CO2 and O2 current value.
4. Min/max CO2 and O2 values within the time-frame set in the *Options subpage* (see paragraph 9.2.2.1).
5. Chart history length set at 5 minutes.
6. Display mode. Touch here to switch display mode.
7. Overview page.
8. Settings. Press here to access system options and settings.
9. Home. To open the homepage.
10. Product info. Press here to know generic info about CO2-O2-UNIT-BL [0-20; 1-95] and running time.

Tip ► The OKO-TOUCH is pre-set at 6% CO₂ and 1% O₂.

9.1.1 How to enter the Setpoint

To input a new CO2 or O2 Setpoint, touch the corresponding tab, as indicated in Figure 23 a and Figure 24

a.

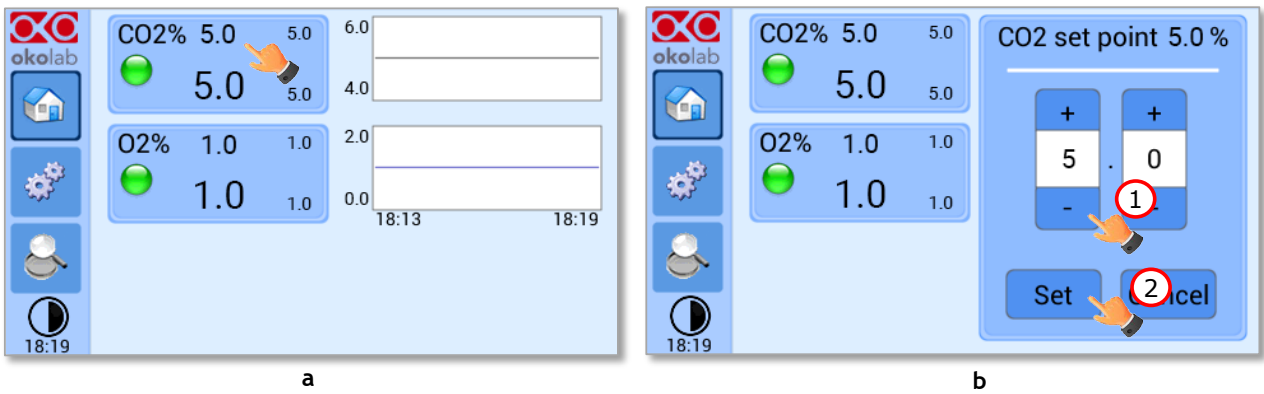


Figure 23. How to change the CO2 Setpoint (a - b).

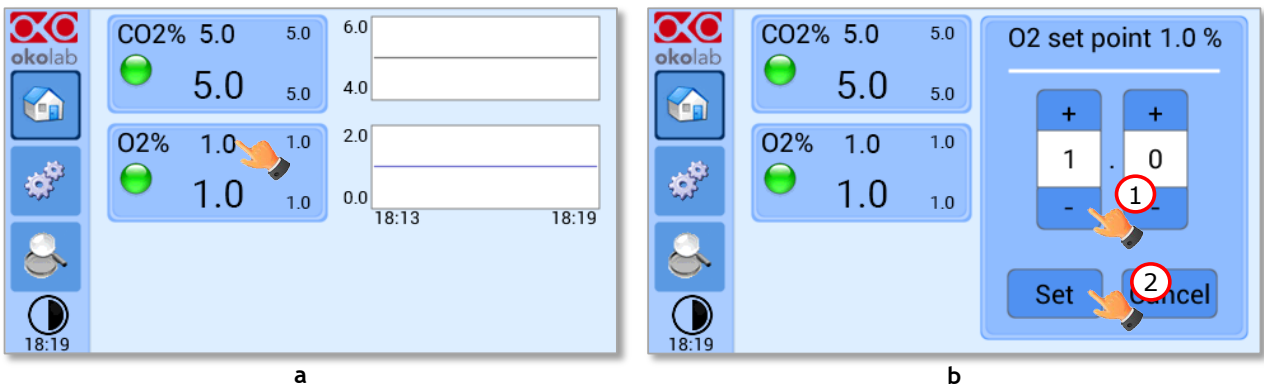






Figure 24. How to change the O2 Setpoint (a - b).

The Setpoint regulation page will appear as in the Figure 23 b and Figure 24 b. You can modify the Setpoint by clicking on + and -. Once you have input the new CO2 or O2 Setpoint, press Set (2 in Figure 23 b and 2 Figure 24 b) to save or Cancel to undo.

Tip ► After any change in the Setpoint value, CO2-O2-UNIT-BL [0-10; 0-1] enters into a transient regime, the Status Indicator and the TOP LED (see Figure 25) turn yellow (see paragraph 9.1.2). During the transient regime, CO2-O2-UNIT-BL [0-10; 0-1] will not trigger on alarm.

9.1.2 Controller Status: colours led and meaning

CO2-O2-UNIT-BL [0-10; 0-1] can assume four different status, which are represented by the colors assumed by the Status Indicator and by the TOP LED (see Figure 25):

	<p>The GREEN color indicates that the Setpoint value has been reached (within the tolerance defined in the alarm subpage, see paragraph 9.2.2.5) and that the system is working properly.</p> <p>Controller Status: NORMAL</p>
	<p>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. As soon as CO2-O2-UNIT-BL [0-10; 0-10] reaches the CO2 and/or O2 composition, CO2-O2-UNIT-BL [0-10; 0-1] Status changes to NORMAL and the color turns GREEN. If CO2-O2-UNIT-BL [0-10; 0-1] cannot reach the set composition values within the maximum time defined by the operator (see paragraph 9.2.2.5), the Gas Controller Status changes to ALARM and the color turns ORANGE.</p> <p>Controller Status: TRANSIENT</p>
	<p>The ORANGE color indicates that the current gas concentration is not correct and its value is out of the set tolerance (see section <i>ALARMS</i> in paragraph 9.2.2.5). Most commonly this is related to gas leaks or gas source(s) running low. Verify that all cables are correctly connected. Check all tubing for gas leaks and pressure in gas supply tanks.</p> <p>Controller Status: ALARM</p>
	<p>The RED color indicates that there is a problem with the unit itself (for example the sensor is broken). The system is on alarm. 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.</p> <p>Controller Status: ALARM</p>

Tip ► The TOP LED follows the same color code as the Status Indicator (see Figure 25). To enable/disable the TOP LED follow the instruction reported in paragraph 9.2.2.3.

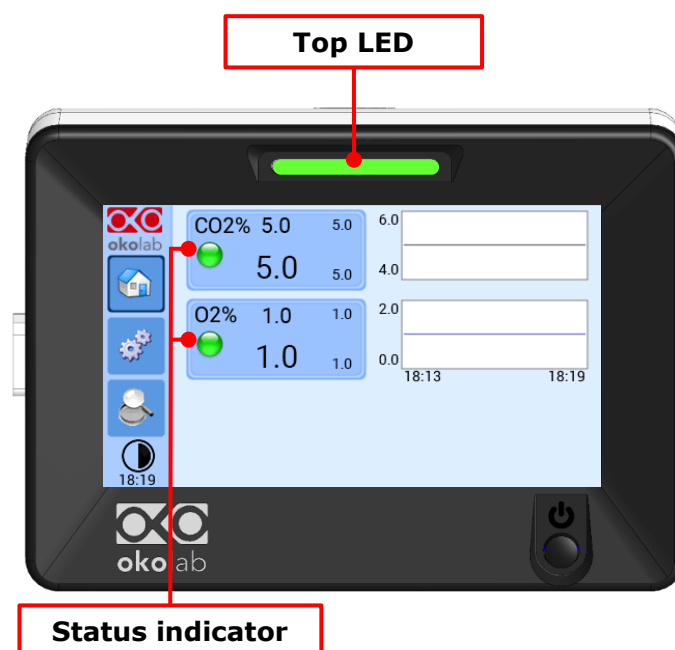


Figure 25. Status Indicator and TOP LED.

9.2 Settings

9.2.1 Gas

Press on *Settings* icon  to enter the *Settings* menu, as shown in the Figure 26 a.

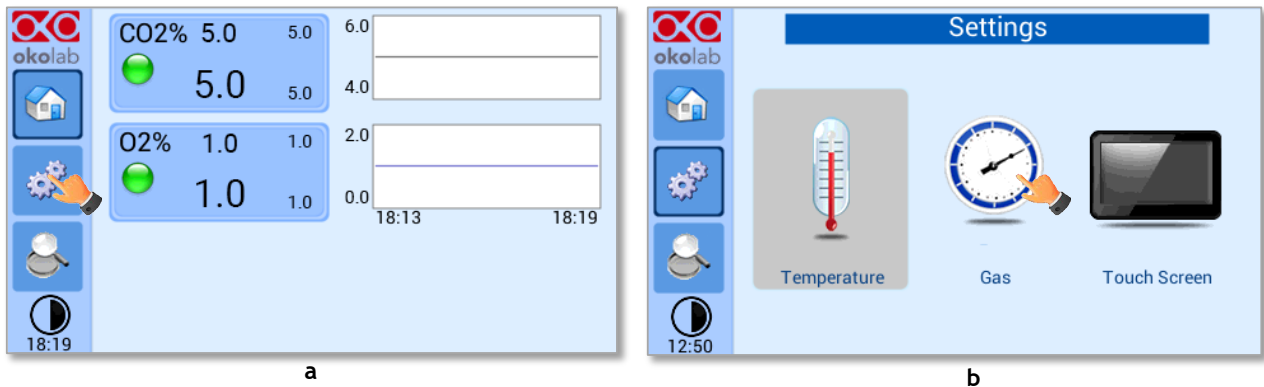



Figure 26. Gas Settings (a - b).

To enter the Gas Settings Submenu, press the Gas Icon  (see Figure 26 b). Then the page shown in Figure 27 appears.

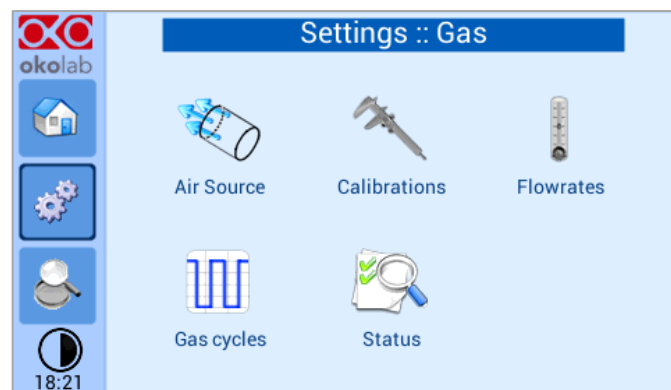



Figure 27. Gas Settings submenu.

9.2.1.1 Air Source

Press the icon  to set which *Air Source* you are using (see Figure 28 a). If this is an external Air tank or compressed Air line (*Compressed Air*) or if you are instead using OKO-AIR-PUMP-BL (*Air Pump*) (See Figure 28 b).

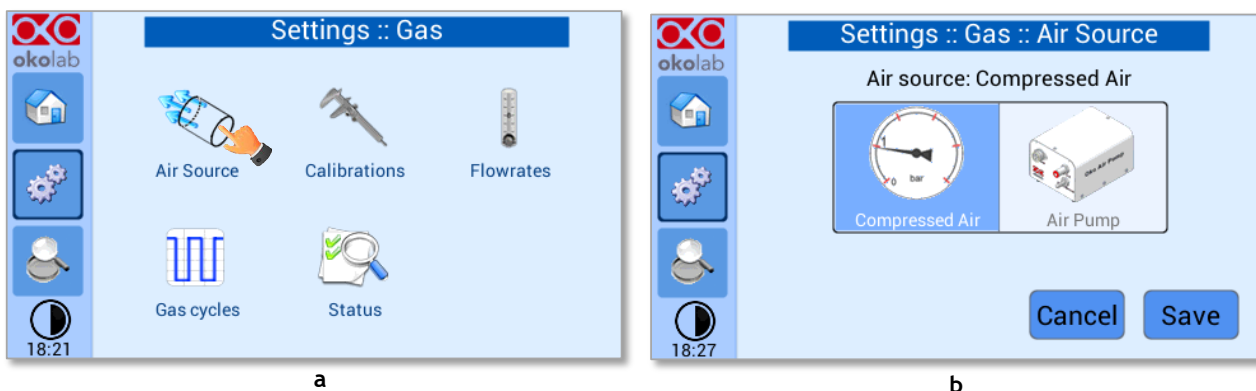


Figure 28. Air Source page (a - b).

Note ► The Compressed Air is already set by default.

If you want to use OKO-AIR-PUMP-BL (Air Pump), flag on *Air Pump* checkbox (1 in Figure 29 b), then press *Save* to confirm (2 in Figure 29 b).

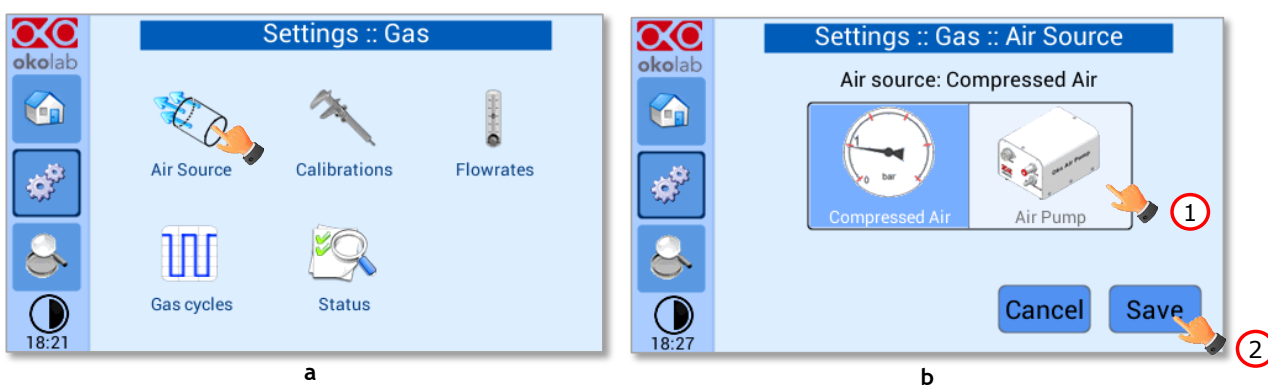



Figure 29. How to select Air Pump (a - b).

Note ► When using *Air Pump*, the maximum total flow is limited to 0.4 l/min.



To connect the Air Pump (OKO-AIR-PUMP-BL) to CO2-O2-UNIT-BL [0-10; 0-1], see Figure 14. In the case you are using OKO-AIR-PUMP-BL please note that it can be turned on/off only via the Touch Screen interface (OKO-TOUCH). Thus, it is essential that you hereby set the correct Air source.

9.2.1.2 Calibration

Press on Calibration icon  to enter in the Calibration Menu, as shown in Figure 30.

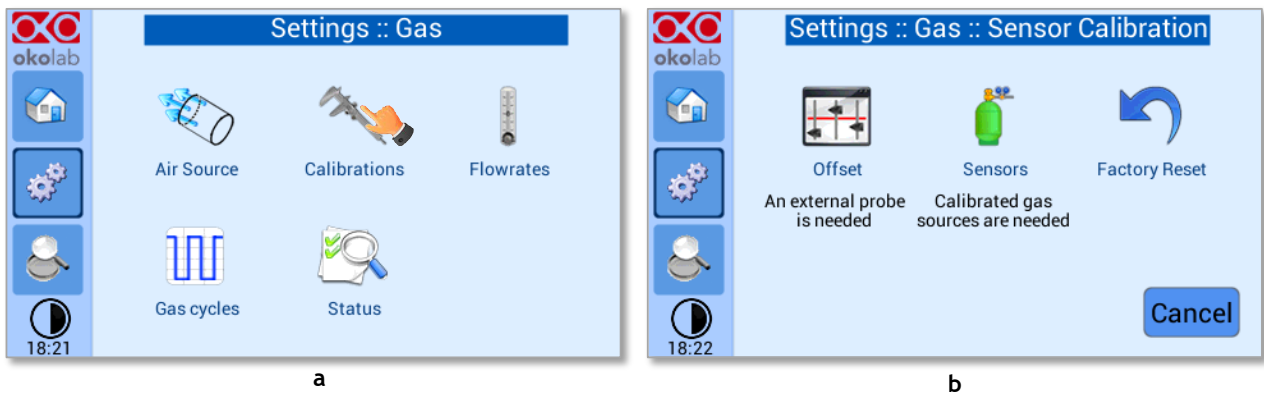


Figure 30. How to reach the Sensor Calibration Submenu (a – b).

Note ► Okolab recommends the calibration of O₂ Sensor every three weeks.

Note ► Okolab recommends the calibration of CO₂ Sensor every year.

9.2.1.2.1 Offset (with external meter)


Press on *Offset* icon  to calibrate the instrument by an external CO₂/O₂ meter (NOT provided).



Figure 31. How to enter a gas offset calibration.



Please make sure that the external Gas meter used is accurate and calibrated in the range near your desired setpoint.

To run the gas sensor calibration using an external gas meter, follow the indications below:

1. It is necessary to attach the external gas meter to the connector “Gas Output” on the rear of the CO₂-O₂ Unit-BL [0-10; 0-1] (see Figure 30). If the TUBE-C is not suitable for the external meter you use, disconnect it from the “Gas Output” connector, remove it by keeping pushed the red ring of this connector.

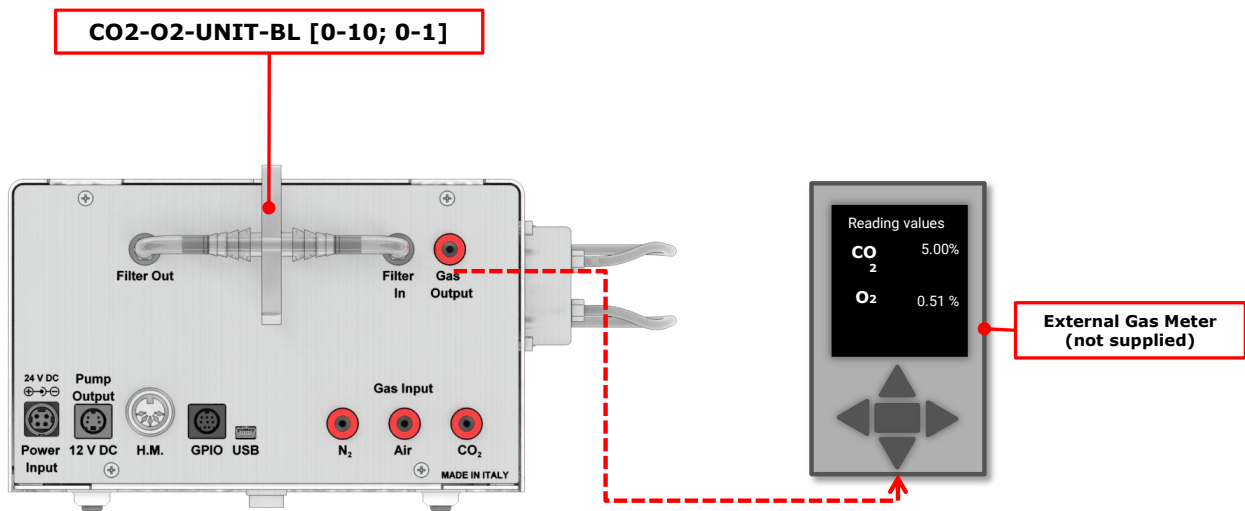


Figure 32. External Gas Meter Connection.

Once you have connected the external gas meter to CO2-O2 Unit-BL [0-10; 0-1], wait until it steadily reads CO2 and O2 values and make sure that the system remains stable over time.

2. Press on the *External Probe* Tab (as shown in Figure 33, a) in *Offset* page on the OKO-TOUCH display. Press on +/- icons to input the CO2 (1 in Figure 33, b) and O2 (2 in Figure 33, b) levels read by the external meter (i.e. 5.0% for CO2 and 0.51% for O2), then press *Save* to continue (3 in Figure 33, b).

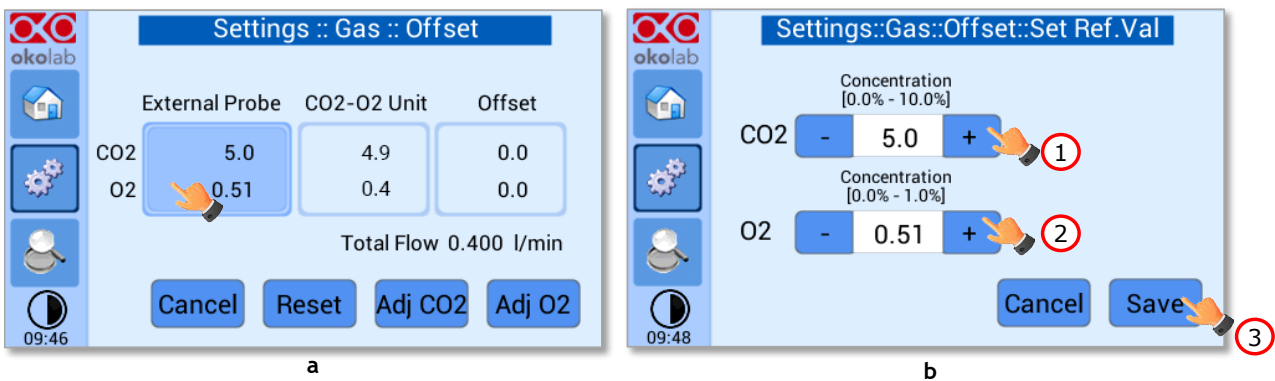


Figure 33. Offset Calibration – start (a – b).

Note ► The Touch Screen will go back to the previous screen. It will display on the left (*External Probe* tab) the CO2 and O2 levels read by the external Gas meter, as just input. The value in CO2-O2 Unit tab is the value read by CO2-O2-UNITL-BL [0-10; 0-1] (see Figure 34).

3. Press *Adj CO2* (see Figure 34) and/or *Adj O2* to make a calibration using the input value from the external gas meter as a reference.

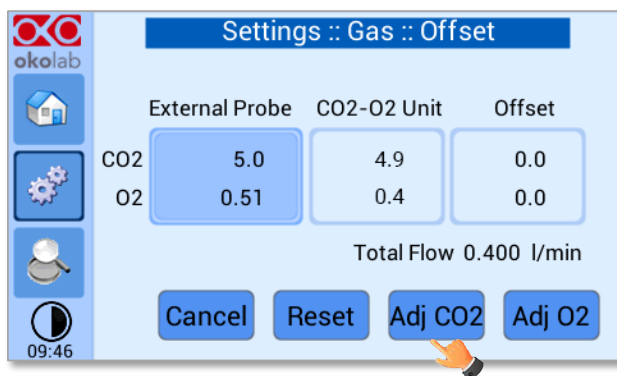


Figure 34. Offset Calibration - Correction.

Note ► By pressing Adj CO2 / Adj O2, the system will perform a calibration using the External Probe as a reference. The offset resulting from the calibration will be displayed in the Offset tab (see Figure 35).

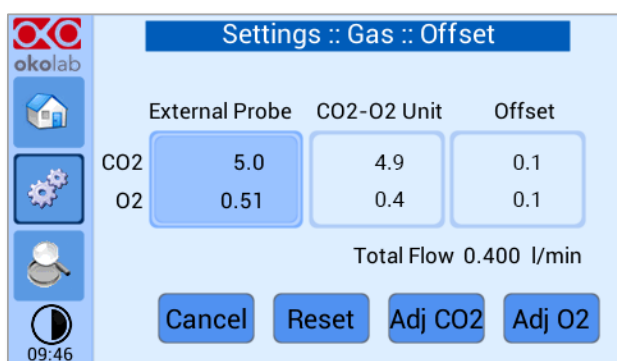


Figure 35. Offset Calibration End.

Note ► By pressing on Reset the system will delete all custom calibration and restore the factory values (see Figure 35).

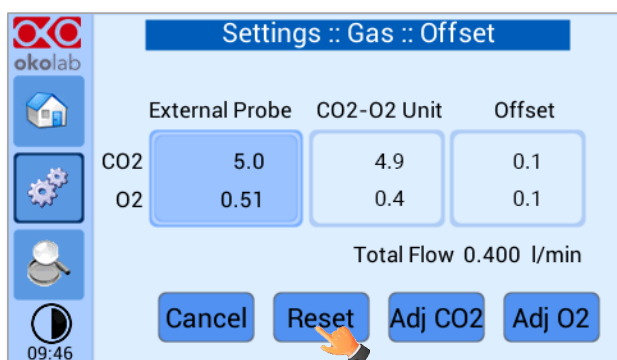



Figure 36. Restore the factory values.

9.2.1.2.2 Sensors (with calibration gas)

This function allows performing a calibration using a Span Gas or pure N2 Tank. Before starting the instrument calibration, make sure you have the Gas Tank (Span Gas or N2 tank) connected to the port labeled “N2”

on the rear panel of CO2-O2-UNIT-BL [0-10; 0-1], then press the *Sensors* icon , as shown in Figure 37 a. At this point several options are available (see Figure 37 b).

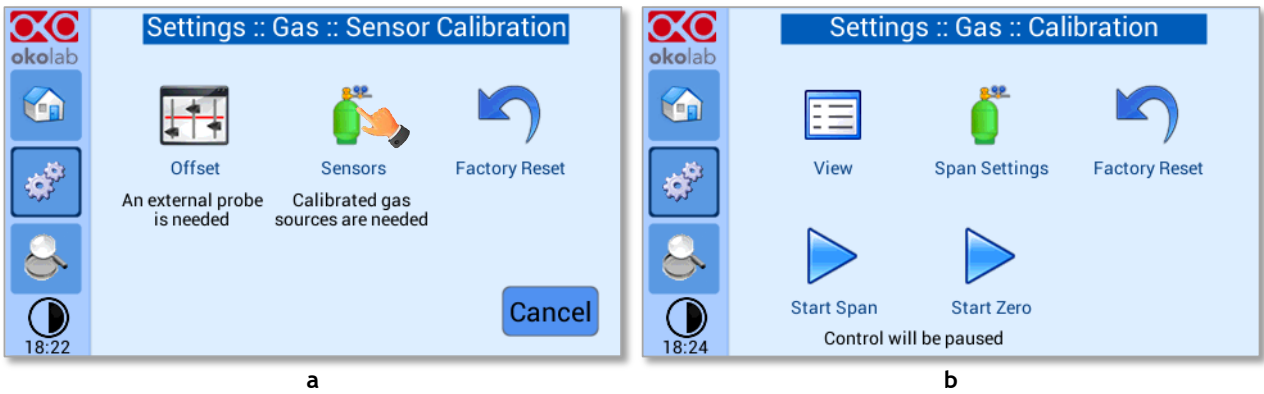



Figure 37. How to insert the Span Gas Calibration parameters (a – b).

9.2.1.2.2.1 View

Press on *View* icon  to visualize the latest calibration.

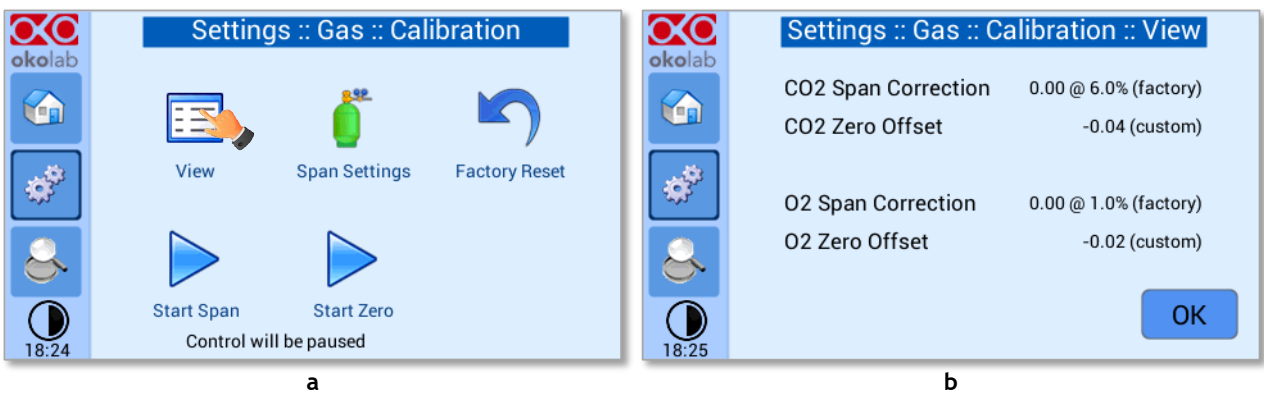



Figure 38. View Sensor calibration status (a – b).

9.2.1.2.2.2 Span Settings

Press on *Span Settings* icon  to access to the span gas settings (see Figure 39, a). Press on +/- icons to input the Concentration (see 1 in Figure 39, b) and the Deviation (see 2 in Figure 39, b) of your span gas tank as reported in span gas tank's certificate. Press *Save* to confirm (see 3 in Figure 39, b),

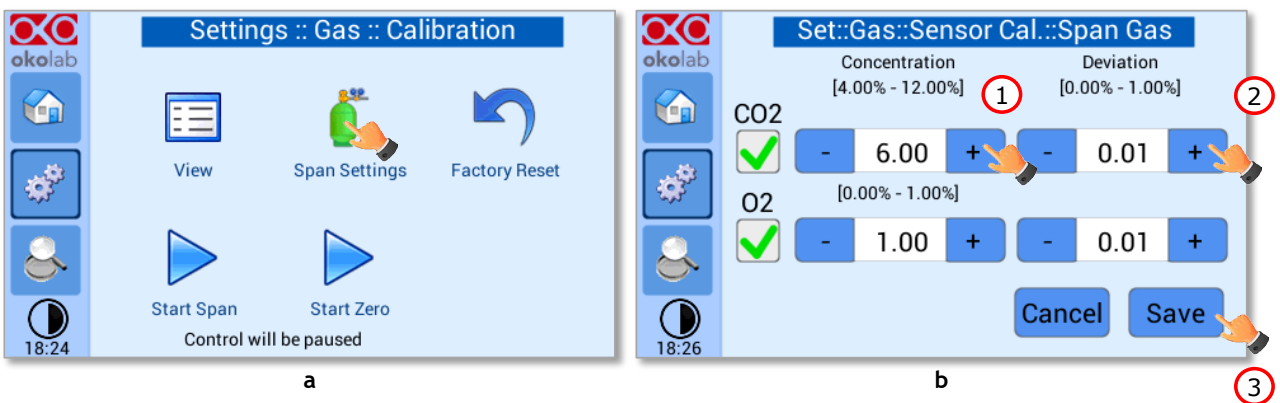



Figure 39. Span Settings Menu (a – b).

9.2.1.2.2.3 Factory Reset

Press on *Factory Reset* icon  (see Figure 40 a) to reset the Gas Calibration to the factory calibration. After clicking, a pop-up message will appear. If you are sure to proceed and restore factory values, press “Reset”, as shown in the Figure 40 b.

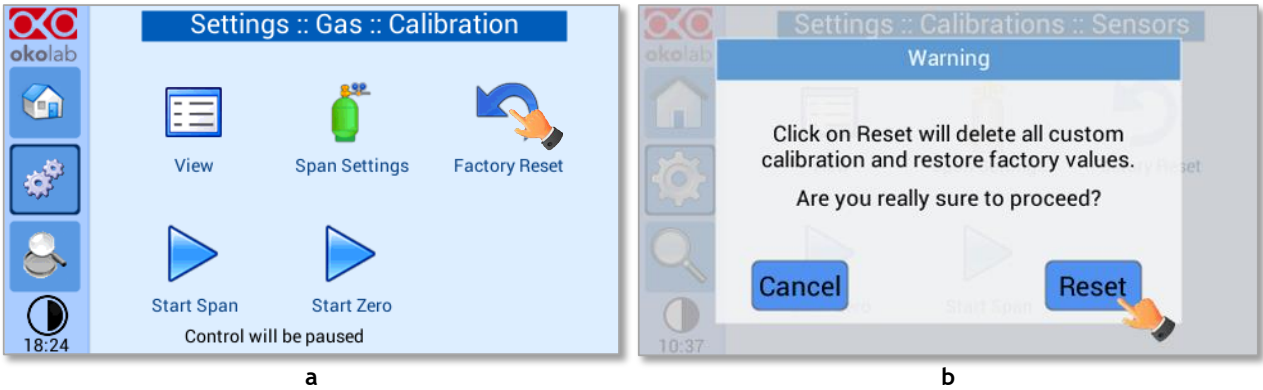



Figure 40. Factory Reset Menu (a - b)

9.2.1.2.2.4 Start Span

Press the *Start Span* icon  and the controller will perform a new Gas Calibration for the CO2 and O2 using a span gas (see Figure 41 a).

After clicking, a pop-up message will appear warning about the pause of the control during the calibration routine (see Figure 41 b). The controller will ask for connecting the span tank at 1.4 barg to the N2 Input, located on the rear panel of the Unit (see Figure 42).

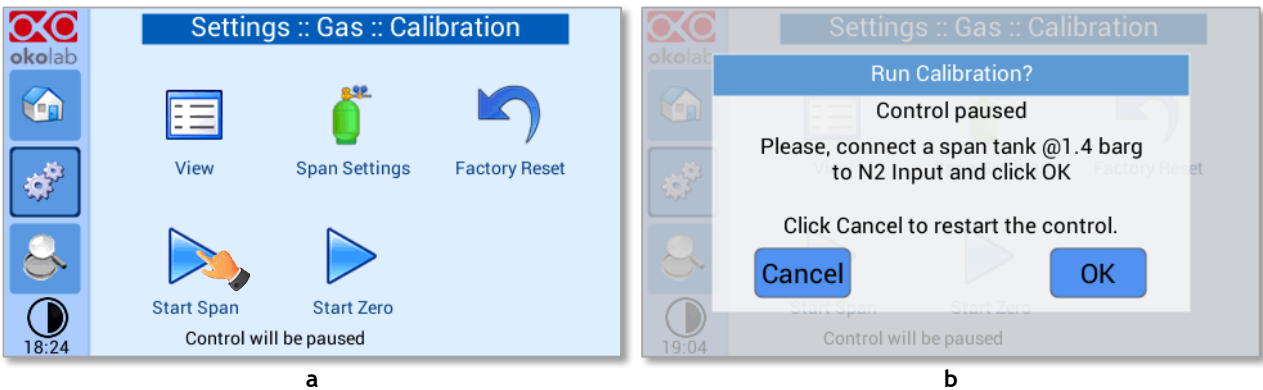


Figure 41. Start Span calibration (a - b)

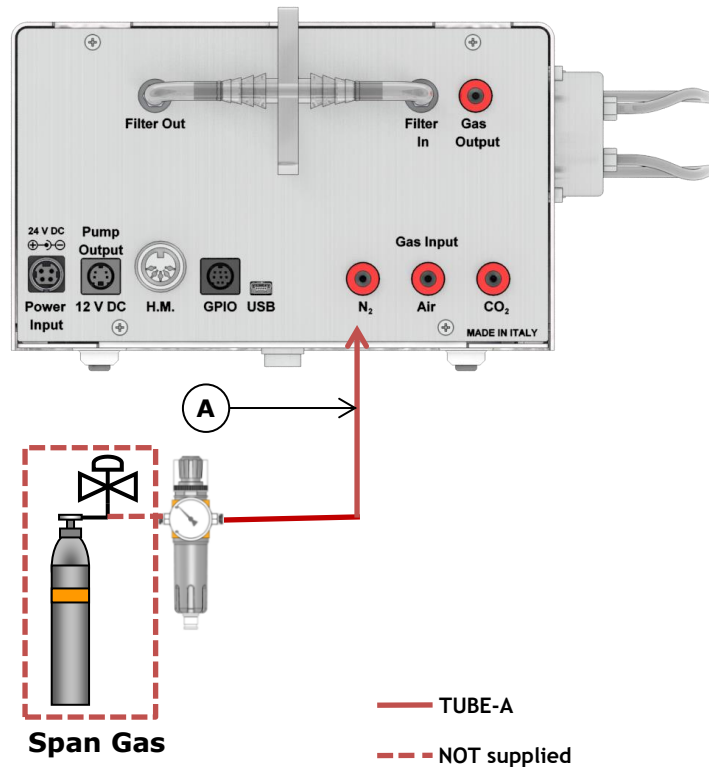



Figure 42. Span Gas Tank connection.

Click “OK” to start the calibration (see Figure 43 a) and the progress bar will appear, as shown in Figure 43 b.



Figure 43. Span calibration running (a – b)

9.2.1.2.2.5 Start Zero

Press the *Start Zero* icon  to perform a new Zero Calibration (see Figure 44 a).

Note ► *Okolab recommends to use N2 with Standard Purity (coded as 5.0).*

After clicking a pop-up message will appear warning about the pause of the control during the calibration routine (see Figure 44 b).

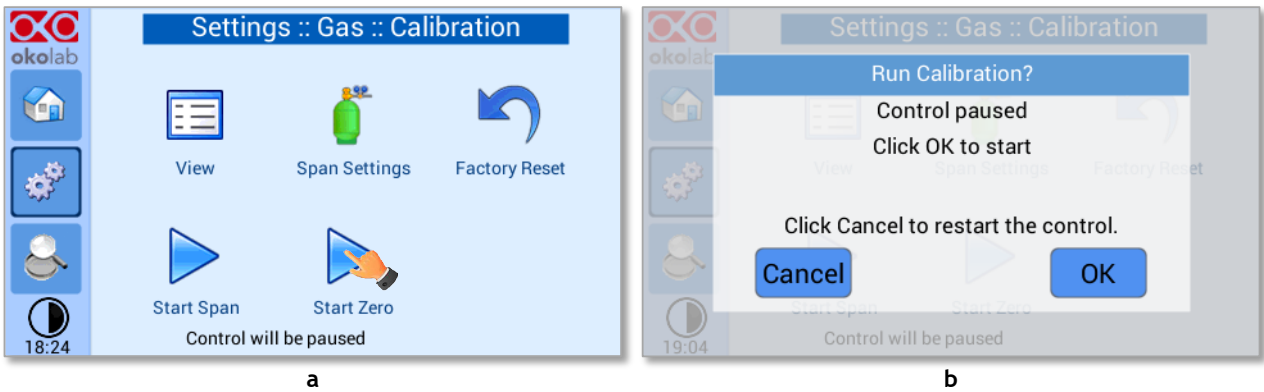


Figure 44. Start Zero calibration (a - b)

The Zero Calibration will start after pressing “OK” and the progress bar will appear (see Figure 45 b).

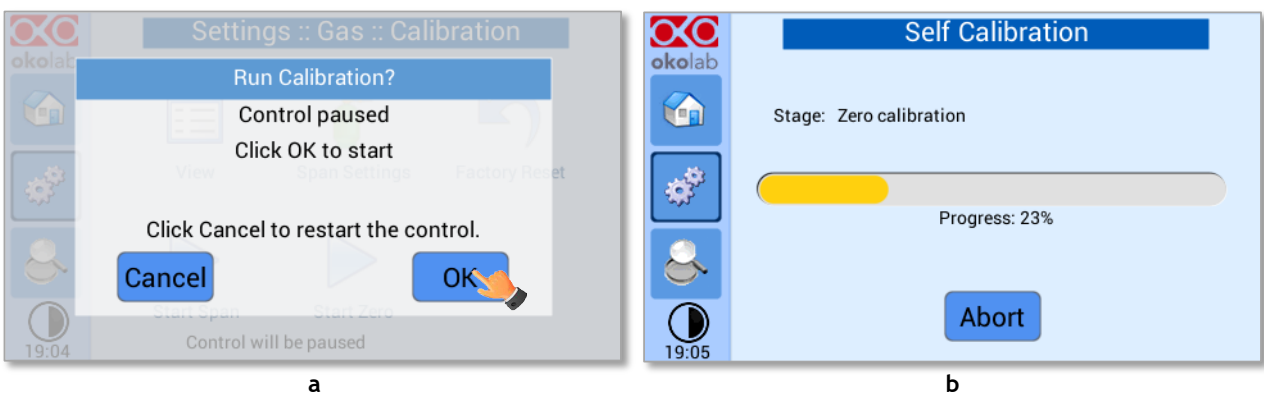


Figure 45. Zero calibration running (a - b)


9.2.1.2.3 Factory Reset

If you are unsure about the calibration you have just performed or if for any reason you want to reset to the factory calibration, press on *Factory Reset* icon (see Figure 46 a). A pop-up message appears (see Figure 46 b). Press *Reset* to proceed or *Cancel* to undo.



Figure 46. Sensor calibration factory reset (a - b).

9.2.1.3 Flowrates

Press the Flowrates icon  to check how many liters per minute of N₂, CO₂ and Air the system is consuming (see Figure 47 a). Additionally, this panel allows you to select the flowrate of the gas mixture you want

to send to your incubator/device. Press the *Total* flowmeter to set the gas flowrate in the range 0.2÷1.0 l/min using the slider, as shown in Figure 48.

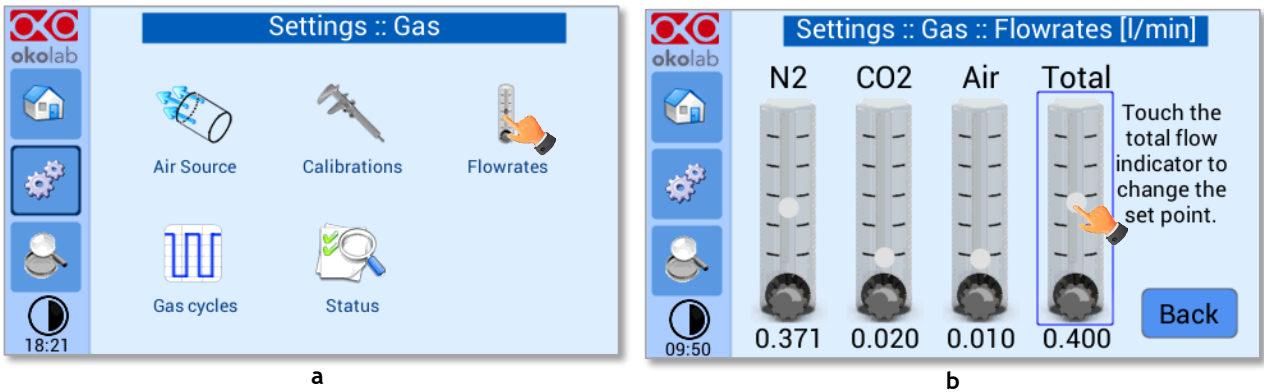


Figure 47. Flowrates View (a - b)

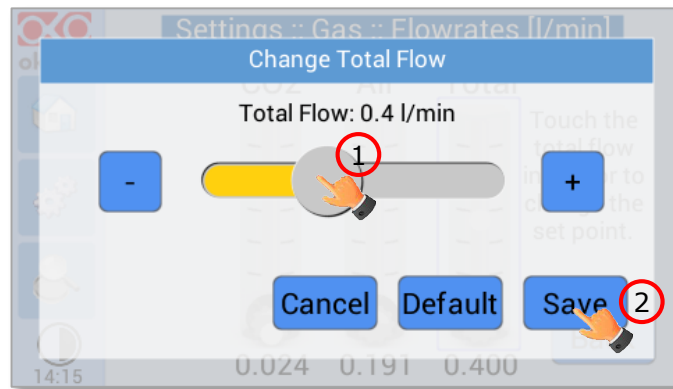


Figure 48. How to change the total flow rate.

When setting the flowrate for values below 0.2 l/min, the warning message “Total Flow not allowed” appears (see Figure 49).

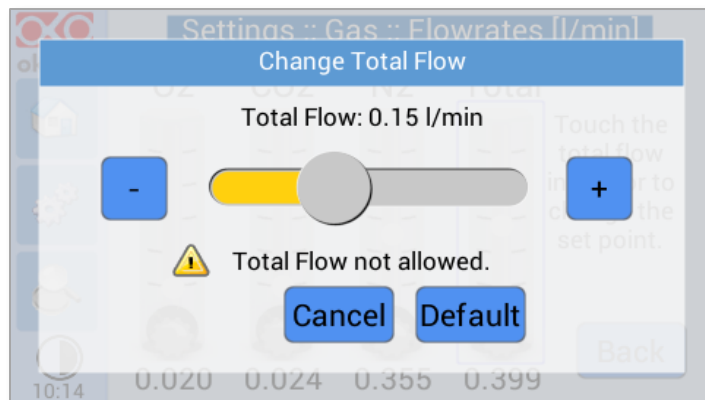


Figure 49. Flowrates for values below 0.2 l/min.

Note ► You can set the flowrate at 0.0 l/min, in this case the gas flowrate will be paused and output flow will be interrupted (see Figure 50). In this working mode three dots will appear in Homepage instead of CO2% and O2% current value and the indicator will turn yellow.

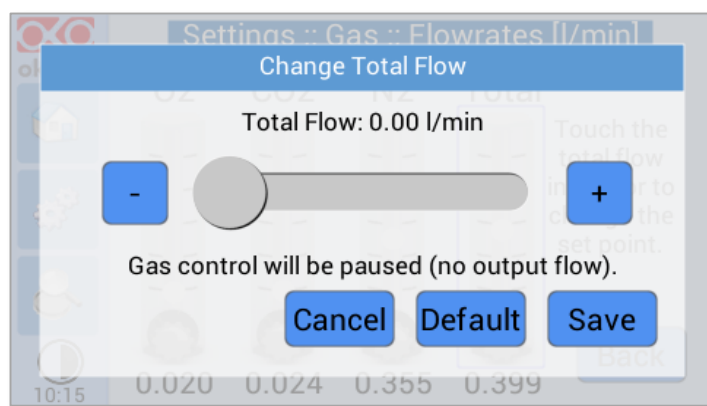


Figure 50. Setting the flowrate at 0.0 l/min.

Note ► When using the Air Pump, the gas flowrate is available in the range 0.2÷0.4 l/min.

9.2.1.4 Gas cycles

This function allows switching between two different CO₂/O₂ concentrations. Press the *Gas cycle* icon



to set a gas concentration cycle (see Figure 51 a).

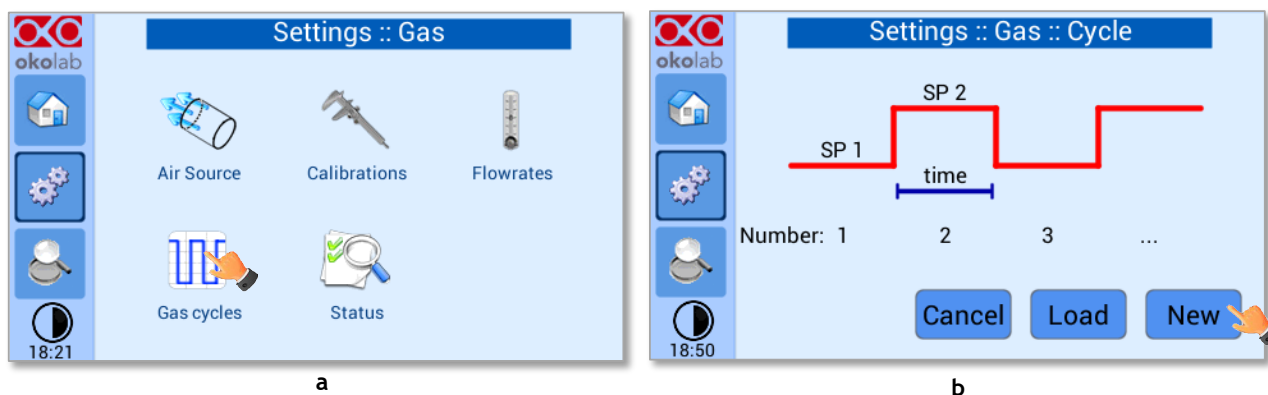


Figure 51. Gas Cycles Subpage (a - b)

You can decide whether setting a new gas cycle (*New*, as shown in Figure 51 b) or load a previously saved one (*Load*). To set a new CO₂ and O₂ concentrations cycle, follow the indications below:

4. Choose the two CO₂ and O₂ concentrations between which you want to switch (*SP1*: Setpoint 1 and *SP2*: Setpoint 2, as shown in Figure 52).
5. Set the duration in hours and minutes you want the system to dwell on each concentration (1 in Figure 53).
6. Set the number of cycles (*Number*) you want the system performs (2 in Figure 53). Finally press *Next*> (3 Figure 53).

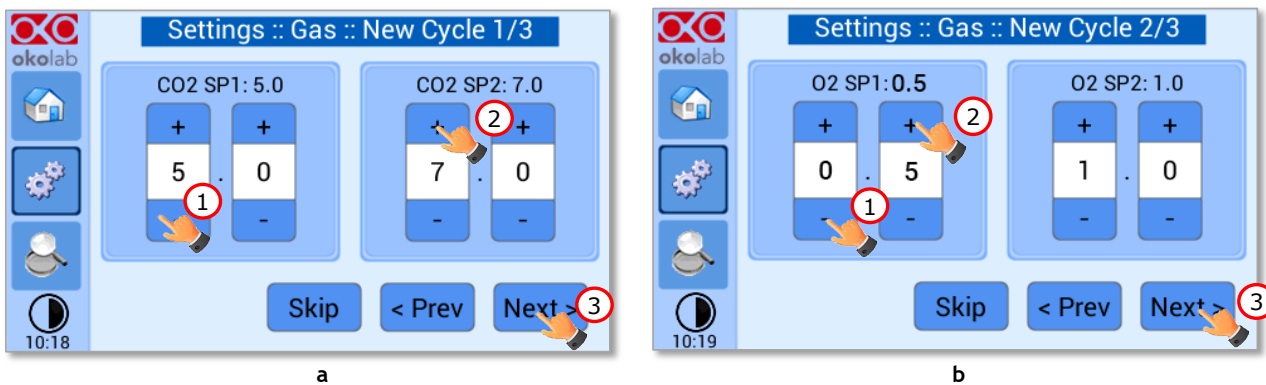


Figure 52. CO2 and O2 Concentrations cycles settings (a - b).

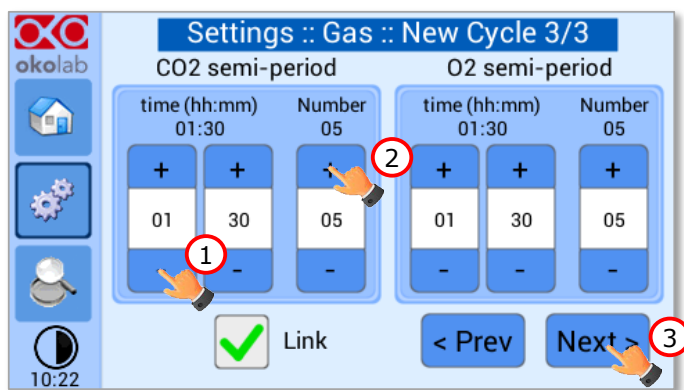


Figure 53. Set the duration of the Gas Cycle.

- Once you have adjusted the settings, the *Cycle Summary* page will be displayed (see Figure 54 a). Press *Save As* if you want to save the CO2/O2 Cycle program to be recalled for future experiments.

Note ► You can save up to 4 different CO2/O2 Cycles programs. Saving a 5th one will overwrite the first one.

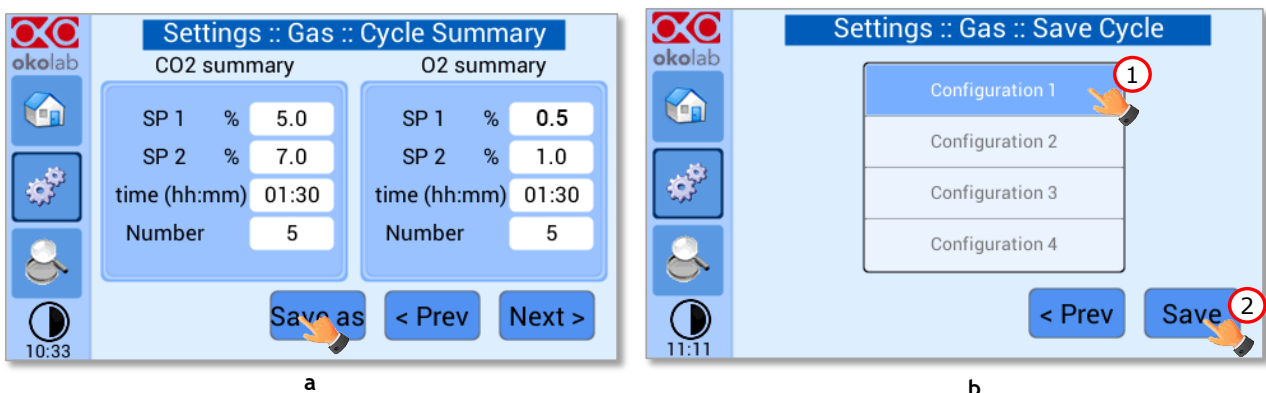


Figure 54. Cycle Summary and Configuration Saving (a - b).

- Schedule the time for the concentration cycle to start (see Figure 55).

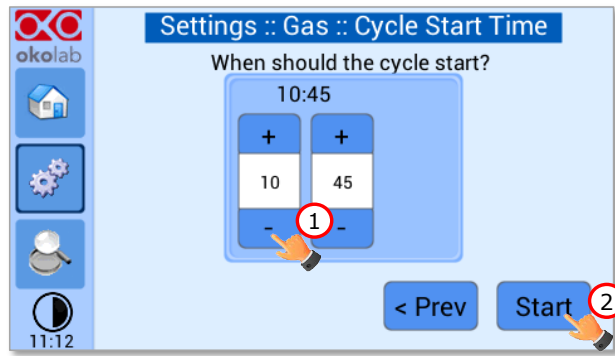


Figure 55. Cycle Start.


The cycle will start at the time set. A concentration cycling icon  will be displayed on the Homepage as a reminder (see Figure 56).



Figure 56. Icon in Homepage during a CO2/O2% cycle.

Note ► Trying to change Setpoint or starting a new cycle while a cycle is still running will open the window in Figure 57. You can press Abort to abort the cycle. Pressing “View” will open the current cycle settings. Press Home to undo.

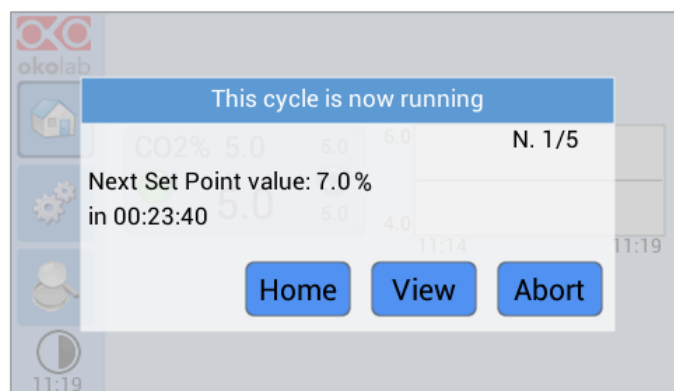


Figure 57. Warning shown if you try to change Setpoint during a gas cycle.

Note ► The images shown in this paragraph are for illustrative purpose only. They are not intended to reflect the touch screen interface appropriately.

9.2.1.5 Status

Press the Status icon  to check CO2-O2-UNIT-BL [0-10; 0-1] performance (see Figure 58 a).

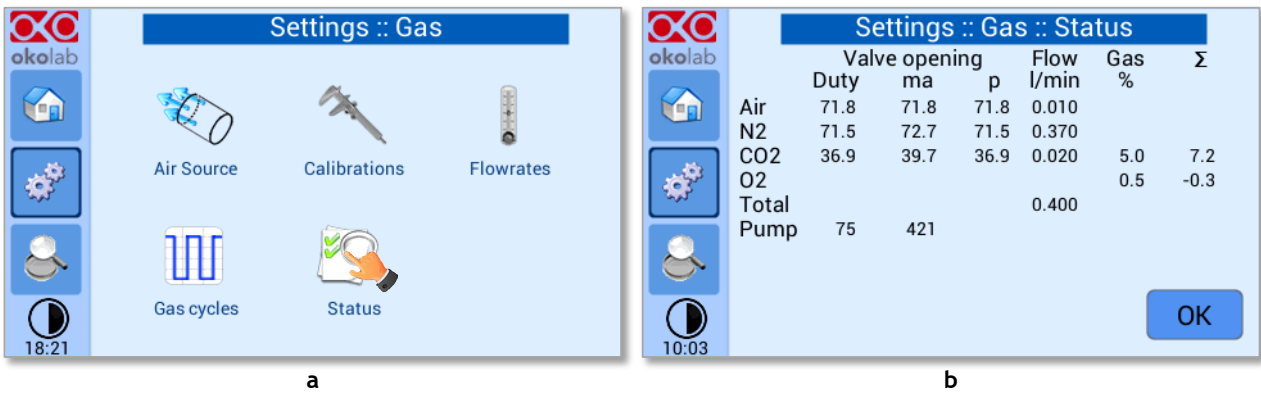




Figure 58. Status page (a - b).

Note ► The Status page contains advanced technical data. You may be asked to read these data in case of technical assistance with Okolab engineers.

9.2.2 Touch Screen configuration

Press on *Settings* icon  to enter the *Settings* menu, as shown in the Figure 59 a. To enter the Touch Screen configuration menu, press on the icon , as shown in Figure 59 b.

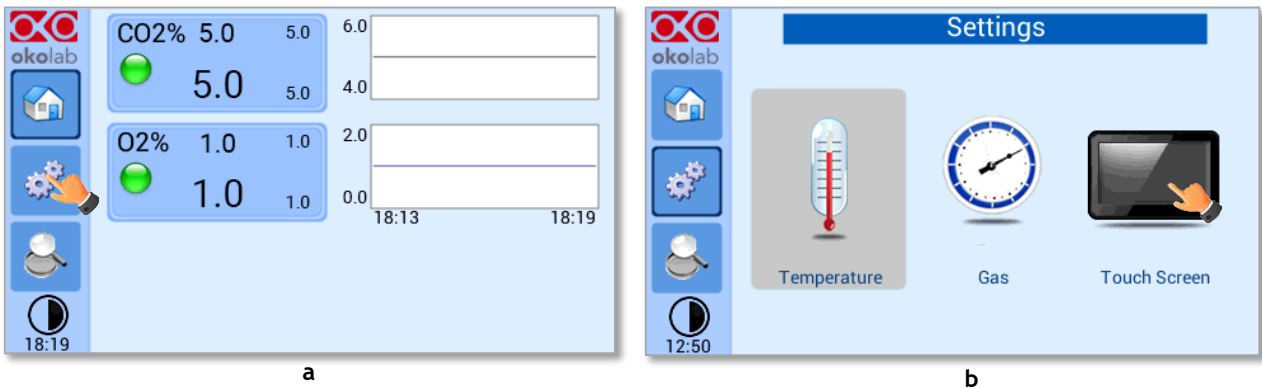



Figure 59. Touch screen settings (a - b).

9.2.2.1 Touch Screen Options

Press the *Options* icon  (see Figure 60 a) to enter the Touch Screen Options page. The Display Options menu allows to set the time frame in which the minimum and maximum CO₂/O₂ values are collected.

To insert the time frame, press the + / - icons or scroll the *Chart history length* bar (1 in Figure 60 b).

Note ► The chart history value length is pre-set at 5 minutes.

Note ► Recommended value for the chart history length is 60 or 120 minutes.

To change the sound frequency press the + / - icons or scroll the *Buzzer frequency* bar (2 in Figure 60 b), then press *Save* (4 in Figure 60 b) to confirm.

Note ► To activate a sound at each touch, flag the *Touch Buzzer* checkbox (3 in Figure 60 b).

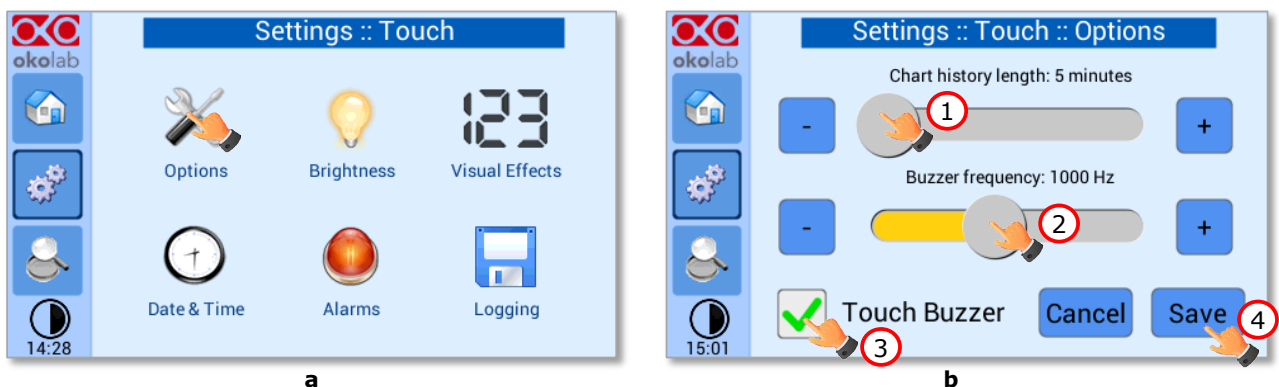



Figure 60. Touch Options (a - b).

9.2.2.2 Touch Screen Brightness

Press the icon  (see Figure 61 a) and scroll the bar (1 in Figure 61 b) or press the + / - icons in the page that opens to modify display *Brightness*. Set the required configuration and press *Save* (2 in Figure 61 b) to confirm.

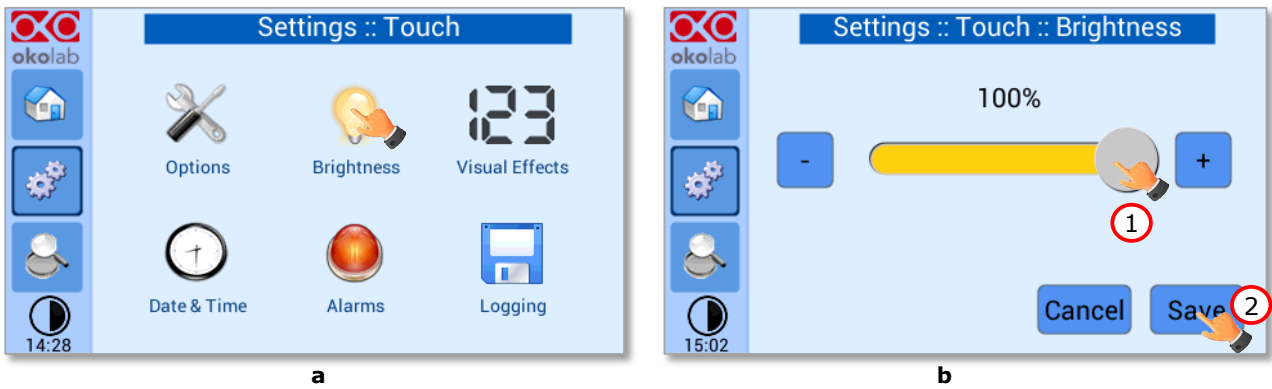


Figure 61. Brightness display page (a - b).

9.2.2.3 Touch Screen Visual Effects – icon and glance mode.

Press on the icon to enter the Display visual effects menu, see Figure 62 a.

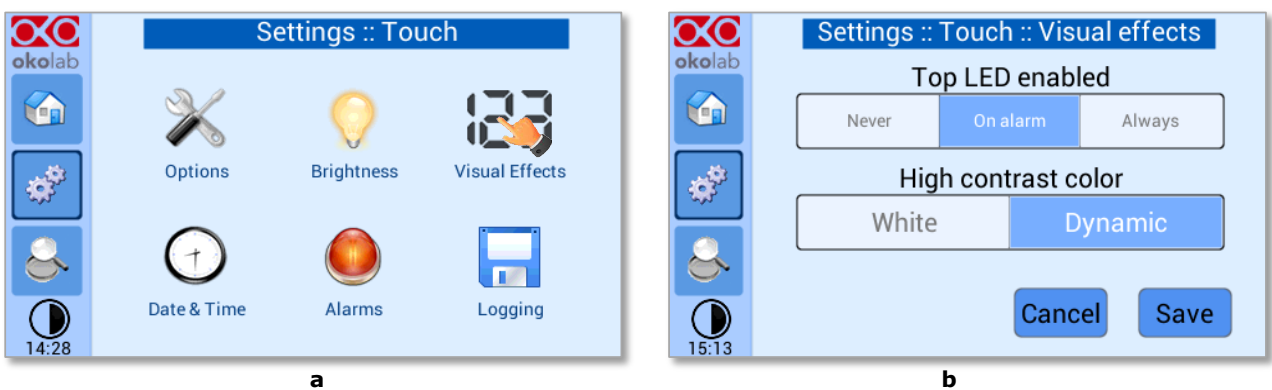


Figure 62. Visual Effects (a - b).

- **TOP LED Settings.** The TOP LED settings allows you to establish when the TOP LED should be illuminated: if you select *Never*, the Top LED will never illuminate, if you select *On Alarm*, the TOP LED will illuminate only when CO2-O2-UNIT-BL [0-10; 0-1] is in Alarm Status (see paragraph 9.1.2), if you select *Always*, the TOP LED will always illuminate.
- **Glance Mode Setting** (see also paragraph 9.4). The Glance mode setting defines the colour of the TOP LED and of the digits displayed in Glance Mode. If you select *White*, the TOP LED illuminates in white colour (according to the criterion selected in TOP LED setting) and the digits displayed in Glance Mode are white. If you select *Dynamic* the colour of the TOP LED and the colour of the digits in Glance Mode follow the colour coding reported in 9.1.2.

Tip ► To swap between Icon and Glance mode press on the icon (see paragraph 9.4).

9.2.2.4 Date & Time

To set Date & Time, follow the instructions below:

1. Press the *Date & Time* icon (see Figure 63 a).
2. Set the values by using the +/- icons (1 and 2 in Figure 63 b).

Tip ► Flag the 24 hours box, if you want to use the hour format based on 24 hours (3 in Figure 63 b).

3. Click on *Save* to confirm (4 in Figure 63 b) or *Cancel* to undo.

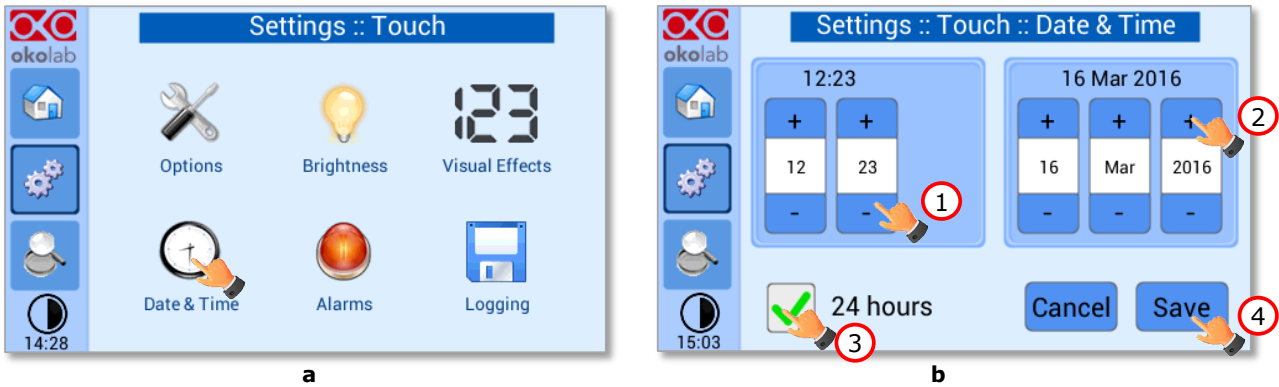




Figure 63. Touch screen settings. Date and Time (a - b).

9.2.2.5 Alarms

CO2-O2-UNIT-BL [0-10; 0-1] also allows activating visual and audible alarms.

To set the alarms specifications, press the *Alarms* icon  (see Figure 64 a), then follow the indications below:

1. Click on the Gas icon  to set the gas deviation for a period of time then the system triggers on Alarms, as shown in the Figure 64 b.

Tip ► Flag the *Buzzer* checkbox if you want the Alarm to be acoustical as well rather than just being displayed.

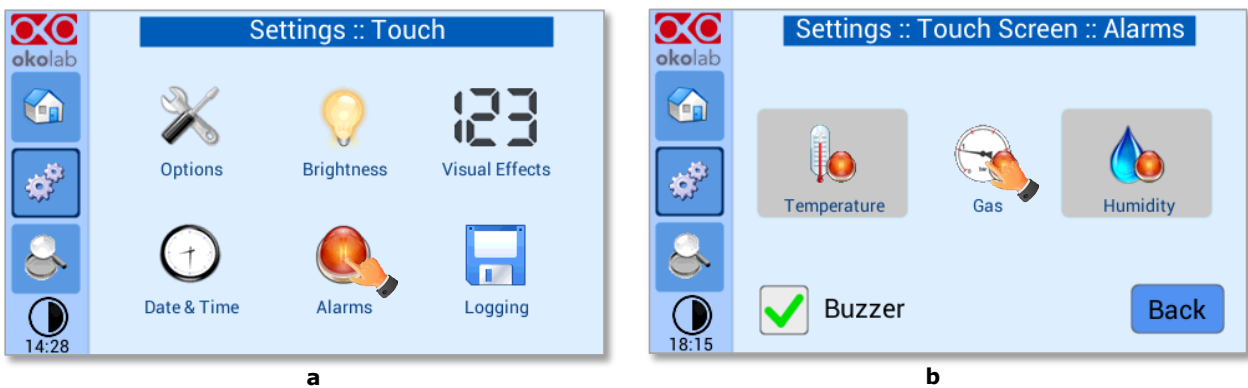


Figure 64. How to enter in Alarms page (a - b).

2. Insert the Gas Deviation by scrolling the bar (1 in Figure 65) or pressing the +/- icons.

Note ► The Gas Deviation value defines the tolerance from the Setpoint.

Note ► The gas deviation value range is 0.1-2.0 %.

3. Insert the Gas Time by scrolling the bar (2 in Figure 65) or pressing the +/- icons.

Note ► The Gas Time value defines the time for which the CO₂ / O₂ composition may remain outside the allowed tolerance before CO₂-O₂-UNIT-BL [0-10; 0-1] triggers in alarm.

Note ► The alarm time range is 5-20 minutes.

4. Press *Save* (3 in Figure 65) to confirm.

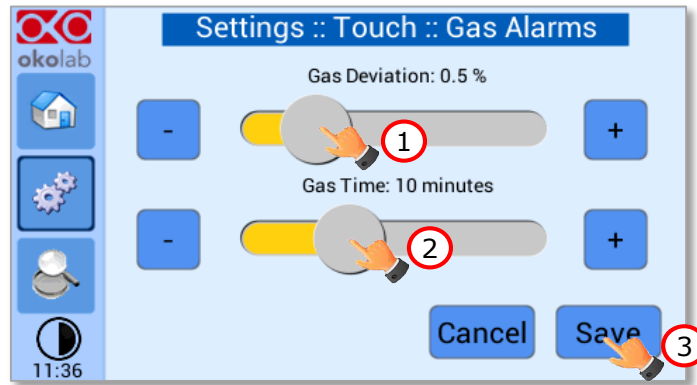


Figure 65. How to set the Deviation and Time Alarm.

Figure 65. In this example the following settings are displayed (valid only after the system has reached its stationary state): if the *Gas Deviation* from Setpoint is 0.5% or greater (i.e. if Setpoint gas is 5.0% and the composition reaches a value equal or less than 4.5% or equal or more than 5.5%) for a period of time equal or longer than 10 minutes (*Gas Time* set in this example) then the system triggers an Alarm.

Tip ► After any change in the Setpoint value the device enters into a transient regime.

9.2.2.6 Data Logging



CO2-O2-UNIT-BL [0-10; 0-1] touch screen interface, OKO-TOUCH (see Figure 2), is equipped with on-board memory for data logging and storage. A simple routine allows downloading data to USB drive or to PC.

In order to log and then download the logged data, connect a USB drive (not supplied) to OKO-TOUCH, using MINI-USB-OTG cable (provided), as shown in Figure 66.



Figure 66. USB drive connection.

To activate the logging, follow the steps indicated below:

1. Press on *Settings* icon  (see Figure 67 a) and press on *Touch screen* icon  on the window that opens next (see Figure 67 b).

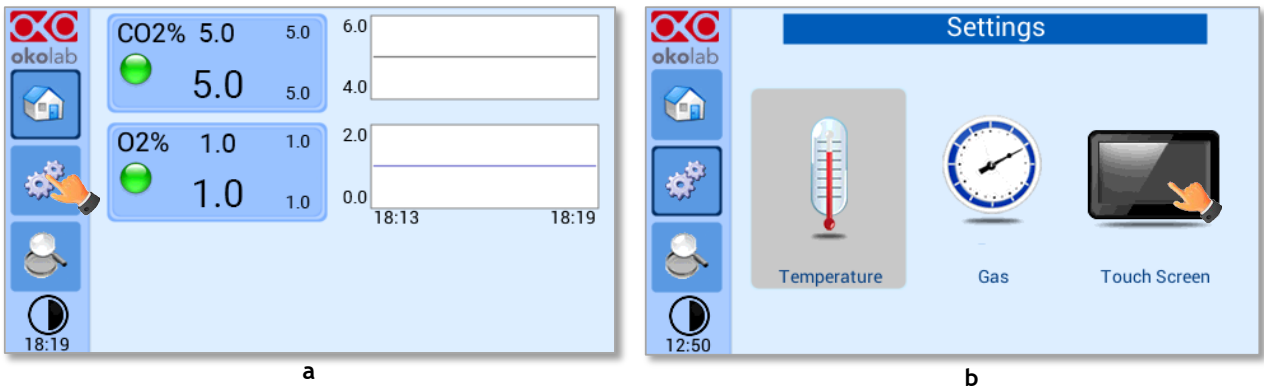




Figure 67 (a) How to enter the setting menu; (b) how to enter the Touch Screen menu.

- Press on Logging icon  (see Figure 68 a) and flag *Internal memory* in the page that appears (see Figure 68 b).

Tip ► When activating the logging on the internal memory, you can access the Logging page also by pressing the activated logging icon  on the Homepage, as shown in Figure 69

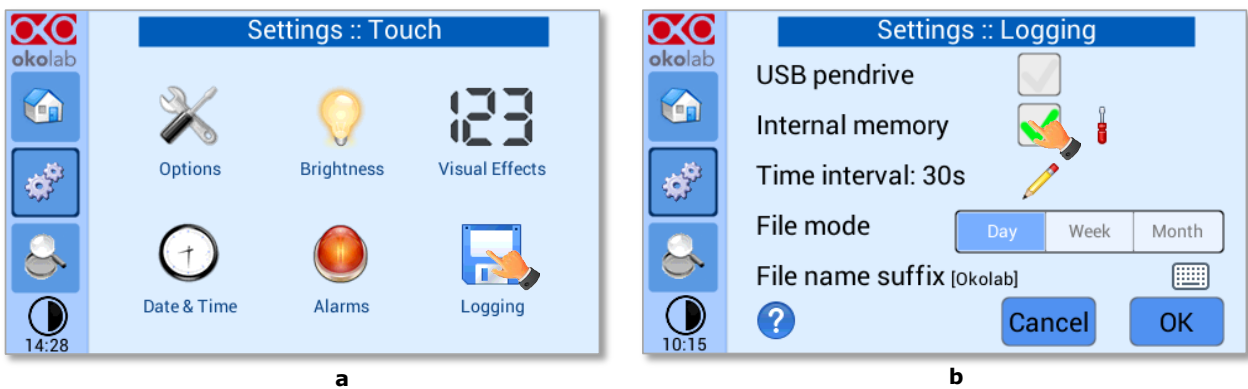


Figure 68. Logging. (a) How to enter in the logging menu; (b) logging in internal memory.

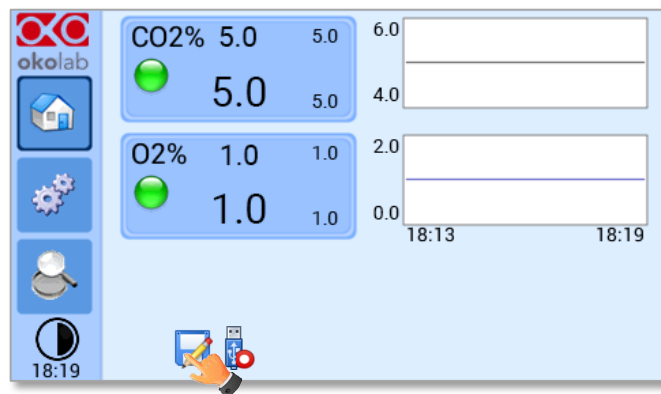



Figure 69. How to access the Logging page from the Homepage.

- Press on the icon  to insert the *Time Interval* i.e. the frequency with which you want to record a data point, as shown in Figure 70. In this example a data point is logged every 30 seconds, you can change *Time Interval* in the range 1-60 seconds.

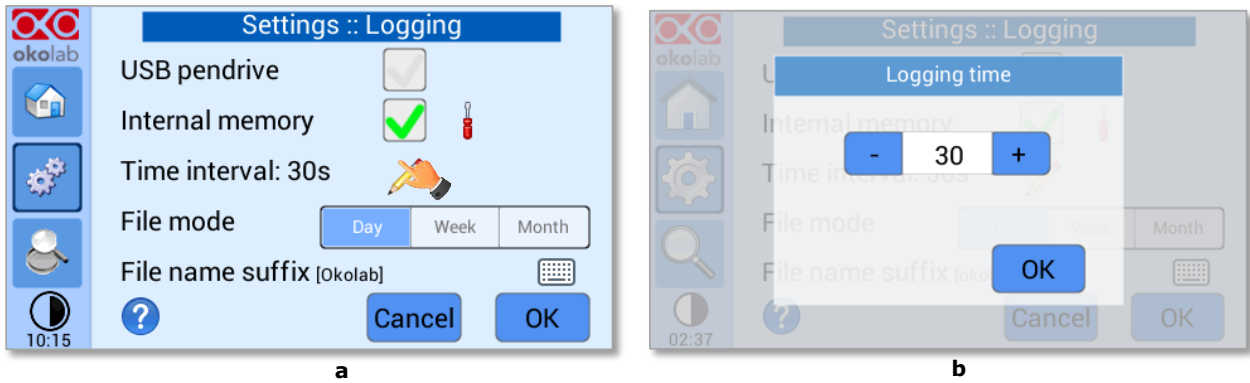



Figure 70. How to set the logging time (a – b).

- Choose how you want to organize the data when downloaded, by pressing on Day, Week or Month, see Figure 70 a.

Tip ► If you select Day, the data will be split in files, each one containing the data of one day. If you select Week, the data will be split in files, each one containing the data of one week.

- Write the file name suffix to be reported in the downloaded files by pressing on the keyboard icon , see Figure 71 a.
- Press Save, see Figure 71 b.

Tip ► With the selections as in Figure 70 and in Figure 71, the data will be downloaded on the USB drive as shown in Figure 72.

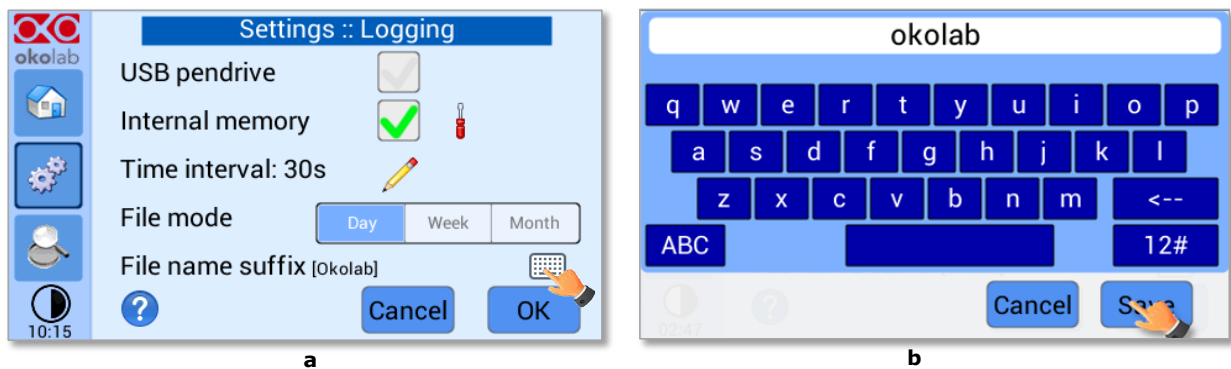


Figure 71. Data Logging. How to define the suffix for the downloaded files (a – b).

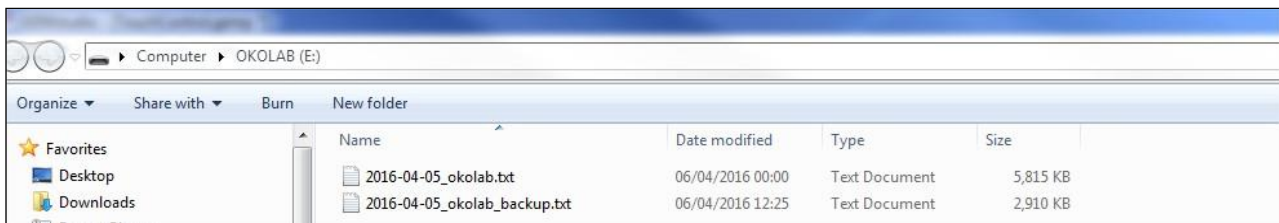



Figure 72. Downloaded files on the pen drive.

Note ► If you press on the screwdriver icon  (see Figure 73 a) you can view the logging starting date, the available memory and the latest download, see Figure 73 b.

Note ► The available memory depends on the time interval you have inserted in the Logging page. The default logging Time Interval is 30 seconds.

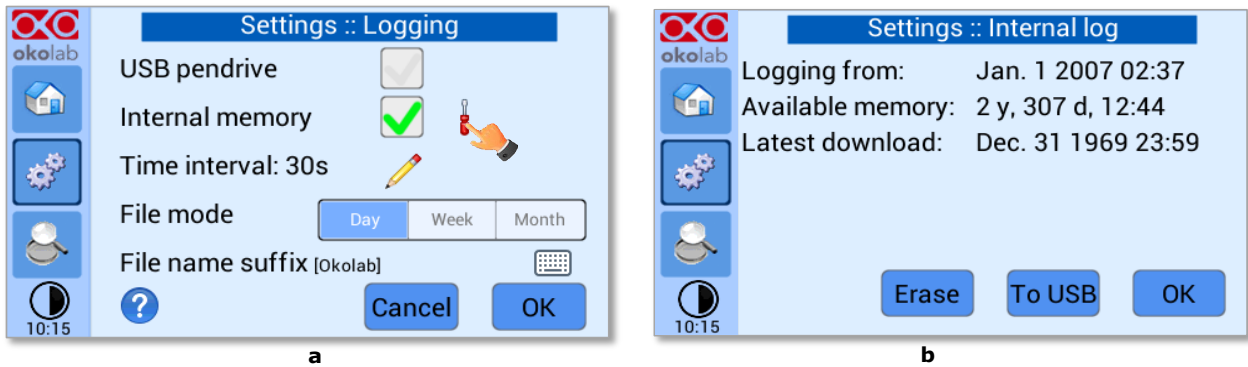


Figure 73. Internal memory status. (a) Logging page settings; (b) Internal log page settings.

To download the data, press on *To USB* or on *Erase* if you want to delete the data, see Figure 73 b.

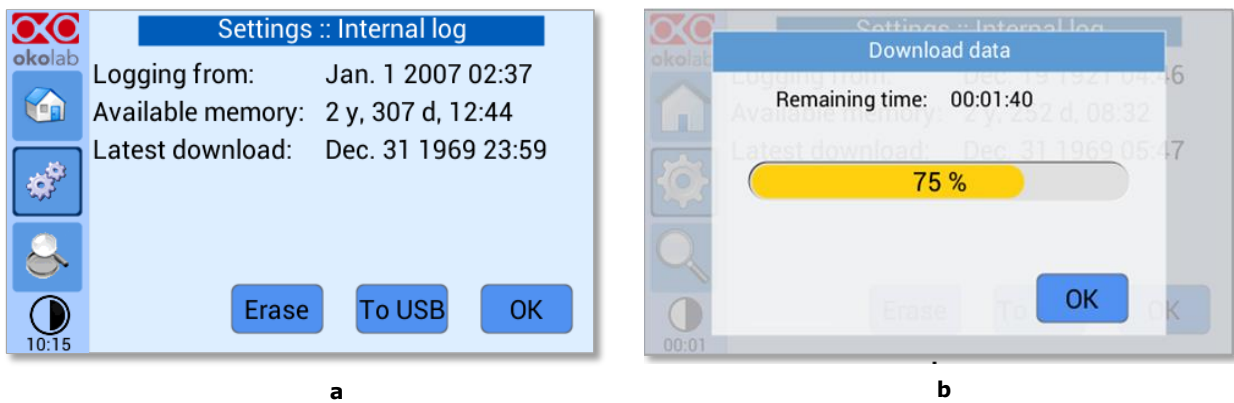


Figure 74. Download to USB.

You can activate the logging also on the *USB drive*, by flagging on *USB drive*, see Figure 75 a.

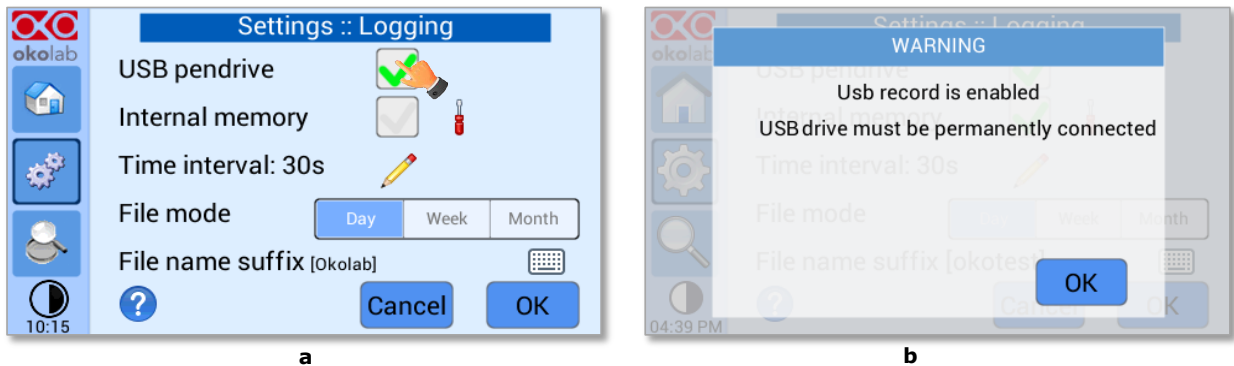


Figure 75. Logging on USB flash drive. (a) USB drive selection; (b) Reminder to connect the USB drive.

In this case, OKO-TOUCH warns you that a USB drive must be connected to the USB port, see Figure 75 b, and will store the data on the USB drive.

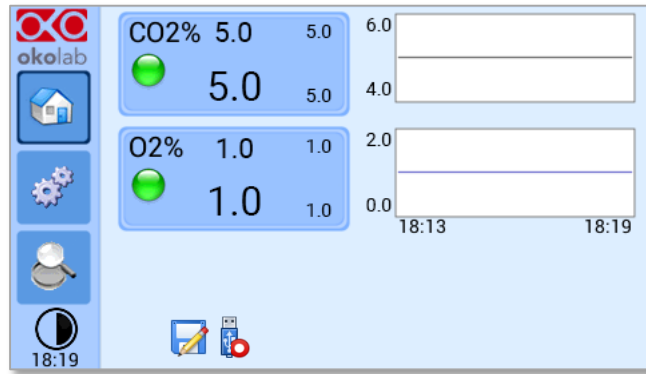




Figure 76. Logging to USB drive.

Note ► When connecting the USB drive to OKO-TOUCH, a USB drive icon  appears on the Homepage. If you activate the logging on USB drive, a red dot appears on the USB drive, to remind that the USB drive should not be disconnected while data logging is ongoing see Figure 76.

9.3 Overview

Press on the icon  to open the Overview page as show in Figure 77 a.

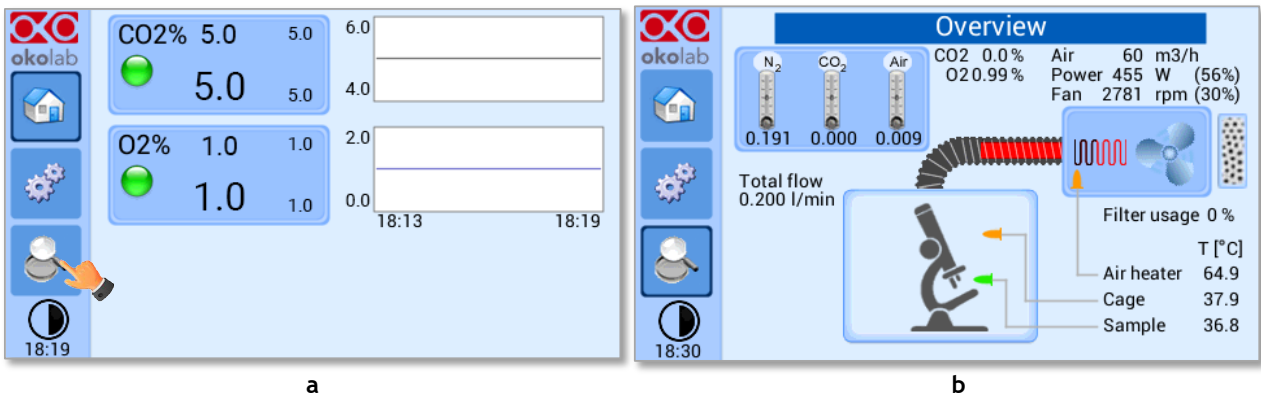



Figure 77. Overview Status page. (a) How to enter in the Overview Page (b) Overview Status Page.

Note ► This page contains data useful for technical/control reasons. In case you requested support from one of Okolab engineers you may be asked for some of these data

9.4 Icon and Glance Mode View

CO2-O2-UNIT-BL [0-10; 0-1] features two display modalities: *Icon mode* and *Glance Mode*, as shown in Figure 78 a and b. You can swap between the two display modalities by pressing on icon .

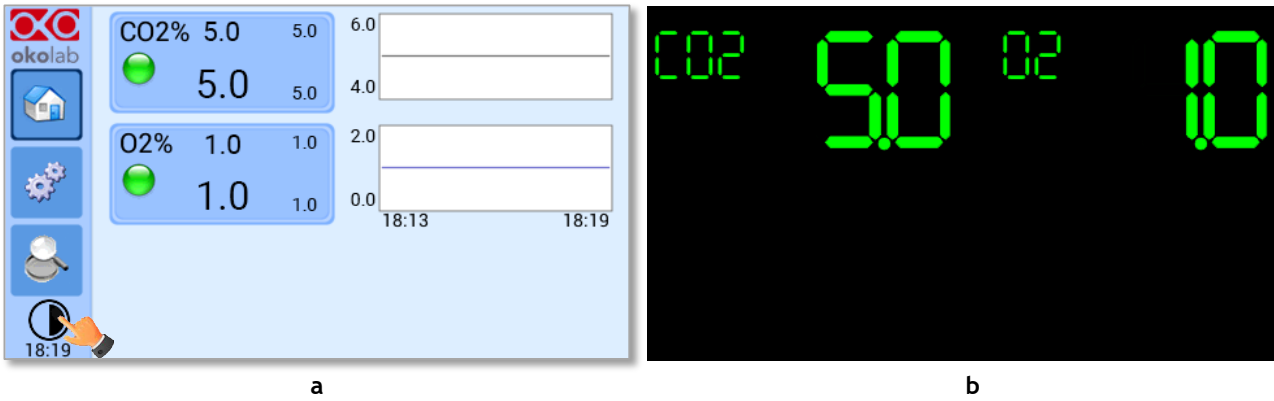


Figure 78. Display modalities. (a) Icon Mode; (b) Glance Mode.

9.5 Info page



Press the icon **okolab** to access the Info Page, as shown in Figure 79. This page contains the information related to the OKO-TOUCH (as shown in Figure 80 a) and to CO2-O2-UNIT-BL [0-10; 0-1] version (as shown in Figure 80 b).

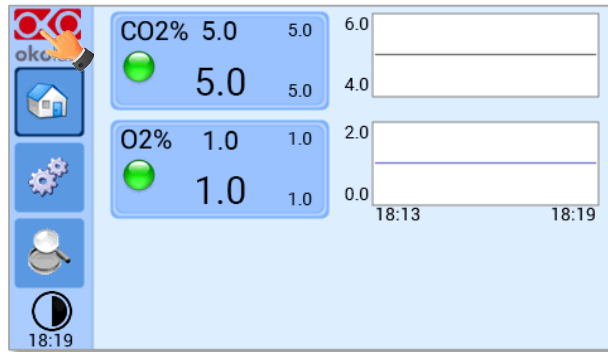


Figure 79. Info page selection.

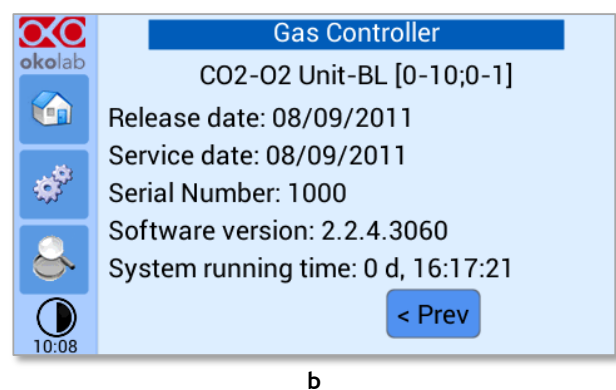
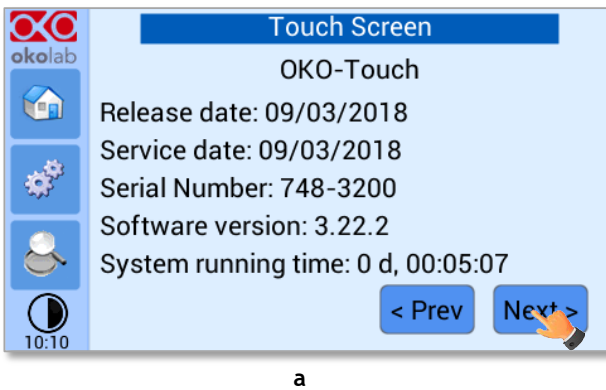


Figure 80. Info page OKO-Touch (a) and CO2-O2-UNIT-BL [0-10; 0-1] (a - b).

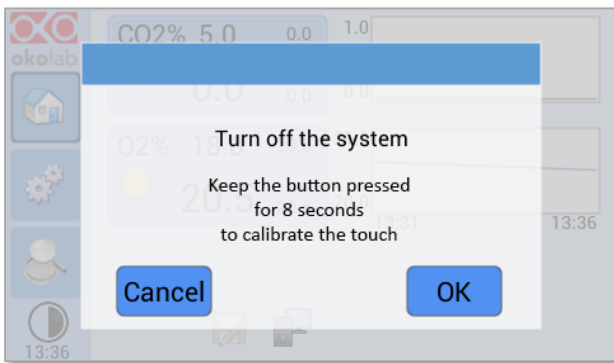
Tip ► Please have this information handy when contacting Okolab for support

10 Touch Screen Calibration

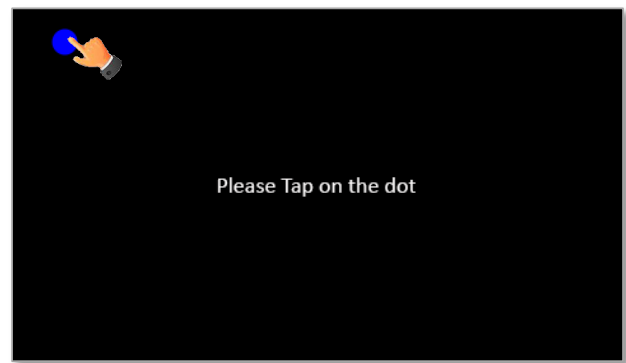
Keep pressed the *ON/OFF* button on OKO TOUCH for 7 seconds to start the Touch Screen Calibration (see Figure 81). While holding the button, the pop-up message shown in Figure 82 a appears. Then tap blue calibration dots until the calibration is complete (see Figure 82 b).



Figure 81. How to enter in Touch Screen Calibration.



a



b

Figure 82. Start Touch Screen Calibration (a – b).

11 Cleaning & Maintenance

Cleaning

Please, follow the instructions below to clean CO2-O2-UNIT-BL [0-10; 0-1]:

- Use a polishing cloth or dry cloth to wipe off dust and dirt.
- Before cleaning the unit, pull out the main plug.
- Liquids should not be entered inside CO2-O2-UNIT-BL [0-10; 0-1].

Maintenance

- Verify periodically the status of all hoses/tubing. If some hoses/tubing is damaged, contact Okolab to receive assistance.
- After 2 years, disconnect all polyurethane tubing, cut the last 1 cm of the tubing and reconnect them.
- Replace the PTFE filter (on the rear panel of the unit and along the tubes) each 2-3 months of continuous use or when it is present water in the inner part of the filter.
- Okolab Air pumps have to be replaced every 18-24 months
- Okolab recommends the calibration of O2 Sensor every three weeks.
- Okolab recommends the calibration of CO2 Sensor every year

12 Appendix: Oxygen Analyzer

The Oxygen Analyzer is designed to be mounted on a suitable clip in a general purpose area. It is not suitable for installation in a hazardous area though it may be mounted outdoors if the temperature range does not exceed the 5-45°C for which it is rated.

Do not mount it close to sources of electrical interference such as large transformers, motor start contactors, relays etc. Also avoid subjecting it to significant vibration.

Avoid mounting it in such a way that it will be subject to rapid temperature changes. For example, do not mount it close to an outside door or air conditioning duct that will allow a sudden draft of cold or hot air to blow on it.

12.1 Maintenance

The oxygen probe is virtually maintenance free other than for periodic calibration and periodical sensor replacement.

12.2 Periodic Calibration

The probe system should be calibrated about once every three weeks to obtain the best accuracy. The sensor typically declines in sensitivity by about 1% per month, so a three weekly calibration is usually satisfactory. Use in a particularly aggressive environment may degrade the sensor faster: in this case calibrate more often.

12.3 O₂ Sensor Replacement - Cautions

Electrochemical O₂ sensor's replacement should be done on a regular schedule, every 9 months, rather than as a response to a dead sensor.

If using compressed air for cleaning, proper eye protection must be worn.

The sensor contains a caustic liquid. Do not allow this to come into contact with your skin. If it does, immediately flush the affected area with water for a period of at least 15 minutes. Refer to the Material Safety Data Sheet provided.



Dispose of leaking or used sensors in accordance with local regulations. Sensors usually contain lead which is toxic, and should generally not be thrown into ordinary trash. Refer to the MSDS to learn about potential hazards and corrective actions in case of any accident.



Figure 83. O2 Sensor

12.4 O2 Sensor Replacement - Procedure

The O2 Sensor is provided in a special sealed bag. Do not open this until you are totally ready to install the sensor.

1. Disconnect the two tubes from the Oxygen Analyzer – Gas input connector and Oxygen Analyzer – has output connector on the left side of CO2-O2-UNIT-BL [0-10; 0-1] (see image 2 in Figure 84),
2. Unscrew the sensor unit cap (see image 3 in Figure 84) being careful not to lose the O ring (see image 4 in Figure 84).
3. Carefully remove old cell (see image 6 in Figure 84).

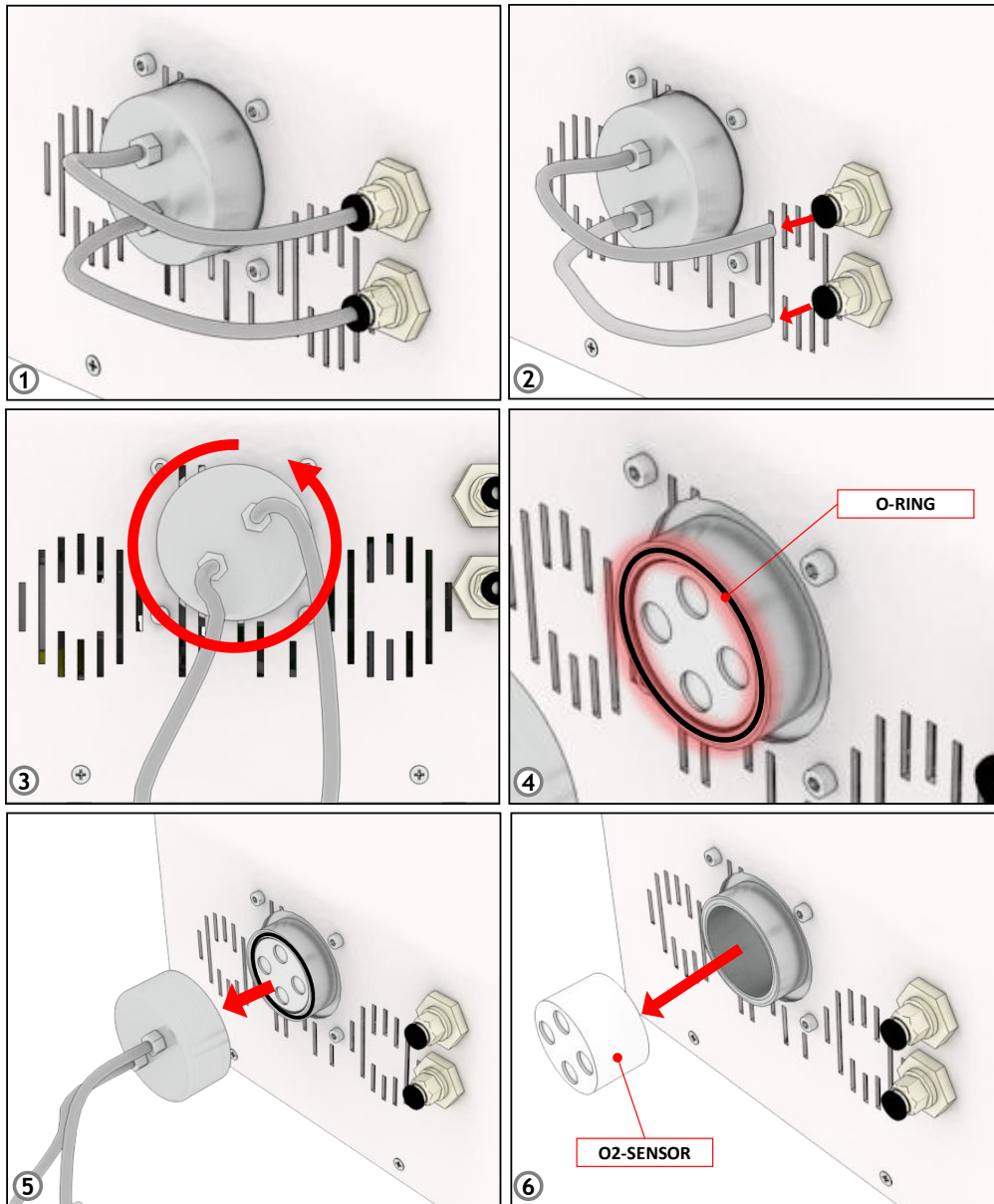


Figure 84. O2 Sensor replacement

4. Inspect the sensor unit cavity, and if any sign of moisture clean it out with a Q tip or similar. Make sure that the contact springs inside the sensor unit are intact. Be careful not to snag them with the Q tip.
5. Carefully open the bag using a pair of scissors or a knife. Make sure you don't cut yourself or stab the sensor! Make sure that there is no sign of any liquid in the bag, if so do not proceed, you need a new sensor. Be careful that you don't poke anything such as a fingernail through the membrane.
6. Remove the plug or other device that acts as a shorting clip. This may be found on the connection plate on the back of the sensor.
7. Slide the sensor into the sensor unit (gold plated contact side of sensor should be facing up touching the sensor unit contacts. The membrane side is covered by a convex gold plated mesh). Be careful not to touch the membrane while doing this - if the membrane is punctured the sensor must be replaced.
8. Verify that the sealing O ring is in place in the cell cap groove. Verify that the O ring and the cap are clean and free of any particulate deposits (dirt).

9. Carefully replace the cap, making sure that you do not cross thread it, and tighten firmly by hand. Do not over-tighten.
10. Allow the sensor to stabilize for a few minutes and then calibrate it preferably using known fresh air as the calibration gas.

13 Support

To contact one of our engineers please write to support@oko-lab.com or contact us through the live chat in www.oko-lab.com. You can request a remote support session anytime.

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

For HARDWARE SUPPORT: sibillo@oko-lab.com
Phone +39 081 806 3470
Fax: +39 081 876 4410
Mobile: +39 348 96807 18

For COMMERCIAL SUPPORT WORLDWIDE: lanzaro@oko-lab.com
Phone +39 081 806 2624
Fax: +39 081 876 4410
Mobile: +39 348 96807 17

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

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

14 Technical Specifications

CO2-O2-UNIT-BL [0-10; 0-1] – Technical Specifications	
CO2	Range: 0-10% Step size: 0.1% Accuracy: $\pm 0.1\%$ Sensor: 10 year-life, Non Dispersive InfraRed (NDIR) dual wave length detector Recommended Calibration Interval: 1 year
O2	Range: 0 - 1% Step size: 0.1% Accuracy: $\pm 0.02\% @ 1.0\%$ Sensor: 1 year-life, electrochemical sensor Recommended Calibration Interval: three weeks
Input Gas	CO2, N2 and Air
Total Flow rate	0.2-1 l/min
Operating Temperature	0°C ~ +55°C (23°C suggested)
Storage Temperature	-5°C ~ +60°C
Operating Humidity	0-70%
Power Input	Input 24 V DC 35 W max (85 W max if used together with HM-ACTIVE)
Dimensions [LxWxH] in mm	200x200x121.50
Weight	3.8 Kg

Table 1. Technical specifications.

15 Troubleshooting

We have collected in the table below some frequently asked questions, please contact Okolab if you need support.

Symptom	Probable cause	Remedy
No power supplied to Unit	Power plug is disconnected	Connect plug securely
No Gas flow rate stability	Pressure drop	Check gas tanks and/or compressed lines
		Change the PTFE filter with degree of filtration 0.2 micron
No CO ₂ or O ₂ read	The Unit is off	Switch the Touch Screen on
	The PTFE filter with degree of filtration 0.2 micron is dirty	Change the PTFE filter with degree of filtration 0.2 micron
Gas leak on the rear of the control box	Not properly inserted tubes	Strongly push the tube into the push to fit connector
No Gas arrives to the incubating chamber	Missing connection	Make sure you have attached the TUBE-CB on the rear panel of the unit.
	Gas source closed	Open gas tanks regulators
Fast sample drying	No Gas arrives to the incubating chamber	See above
	Humidifying Module empty	Fill it with distilled water until 50 mm below the top of glass column.
	Humidifying Module not heated	Correctly connect the heater of the Humidifying Module

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17 Manual Revision Table

Revision Number	Additions or changes	Date
01	First Emission	July 2020
02	Minor changes	August 2020
03	Update of OKO-AIR PUMP-BL	November 2020

WARRANTY

Okolab S.r.l. warrants "CO2-O2-UNIT-BL [0-10; 0-1]" to be free of defects in materials and workmanship for a period of one year starting from invoice date. If the unit malfunctions, it 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.