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IVF

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LEO is a hand-held meter for IVF Applications, allowing measurement of CO2-O2 gas composition, temperature, relative humidity, and gas flow of the high-top and bench-top incubators, by using multiple sensor modules.

The CO2-O2-MODULE is embedded into LEO, and it is included standard. The CO2-O2-MODULE can be easily extracted and sent to Okolab for re-calibration.
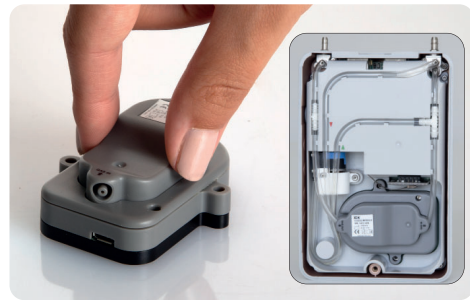
Other (external) sensor modules can be connected to LEO's connection ports.

DATA STORAGE

LEO can perform both single measurement and extended time logging, storing the data in its local memory.

LEO allows organization of the stored data, associating a label to each device. You can store up to 40 devices labels. The stored data can be displayed on LEO's screen, organized by date and device.

LEO allows stored data to be downloaded through the micro USB port, and analyzed by using the free *LEO DATA IMPORT* Excel Macro.

GAS SAMPLING METHODS

Diffusion Mode: gas flows into LEO through the dedicated diffusion port with icon **IN**. The minimum operating flow rate is 30 ml/min.

Aspiration Mode: gas is actively pulled in via LEO's internal pump through the dedicated aspiration port with icon **IN**. The pump flow rate can be set in the range 60-260 ml/min.

The Moisture Trap (included with LEO) is used when the measured gas is wet, in order to retain water molecules.

LEO can improve the CO2 and O2 reading accounting for the water content of your incubator by use Wet Mode. The temperature and relative humidity (RH) values of your incubator must be entered.

The sensor modules are calibrated by using traceable standards, and store the calibration data in the internal memory. The sensor modules can be delivered with traceable or accredited calibration certificate, and sent to Okolab for re-calibration. Moreover, sensor calibration can be performed by using LEO though intuitive user calibration routines.

INCLUDED

CO2-O2-MODULE

The CO2-O2-MODULE measures the CO2-O2 volume concentration in the unit of %, and CO2-O2 partial pressure in the units of mbar, psi or KPa. CO2-O2-MODULE is temperature and pressure compensated. The CO2-O2-MODULE lifetime is 5 years.

Features - CO2
- Sensor: Non Dispersive InfraRed detector (NDIR)
- Measurement range: 0-20%
- Accuracy (in the range 0-10%): ±(1% of Full Scale +2% reading)

Features - O2
- Sensor: Fluorescence-based optical sensor
- Measurement range: 0-22%
- Accuracy (in the range 0-10%*): ±(1% of Full Scale +2% reading)

*Measurement range 0-10% is guaranteed for 5 years

T1-MODULE

Small, flexible, calibrated, and immersible thermocouple. Ideal for measurements in liquids, such as culture media in a dish. T1-MODULE has a negligible diameter (0.13mm) and it can be directly introduced into an incubator, even if it lacks a dedicated temperature measurement port.

Features
- Sensor: K-type thermocouple
- Measurement range: 0-60°C
- Accuracy: ± 0.1°C from 20 to 50°C
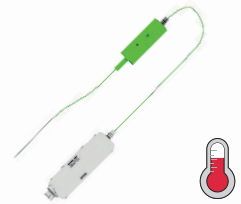
T2-MODULE

Temperature probe, ideal for measurements of incubator temperature when sampling port access is available. T2-MODULE has an external diameter of 2 mm and is suitable for temperature measurements of bench-top and high-top incubators where the temperature monitoring port has a diameter larger than 2 mm.

Features
- Sensor: PT1000 RTD Class A
- Measurement range: 0-60°C
- Accuracy: ± 0.1°C from 20 to 50°C
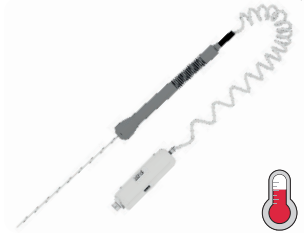
CO2-PPM-MODULE

Designed to measure carbon dioxide at ppm in offices, laboratories, hospitals, and generally, wherever indoor air quality is important for the occupants' comfort and health. The probe is temperature and pressure compensated.

Features
- Sensor: Non-dispersive infrared (NDIR)
- Measurement range: 0-10000 ppm
- Accuracy: ± (50 ppm +3% reading)
- Response time: 2 minutes

HUMIDITY-MODULE

Designed for checking humidity in chambers, incubators, laboratories, and to monitor indoor air quality.

Features - Relative Humidity
- Sensor: Hygromer HT-1
- Measurement range: 0-100%
- Accuracy at 23°C: ±0.8% RH
- Response time: 18 s

Features - Temperature
- Sensor: Pt100 1/3DIN Class B
- Measurement range: -10 + 100°C
- Accuracy: ±0.2°C from 20 to 40°C

FLOW-RATE-MODULE

Compact and accurate flow meter with short response time, ideal for instantaneous gas flow measurements. The highly compact and lightweight design makes it ideal for many different work environments. The presence of display allows to use the sensor module also as a standalone device.

Features
- Sensor: MEMS
- Measurement range: 0-200 ml/min
- Accuracy: ± (2.0 reading +0.5% full scale)
- Response time: <1 s
- Calibration medium: air

LEO TECHNICAL SPECIFICATIONS

LEO Technical Data	
Maximum pressure	1300 mbar (19psig)
Operating flow rate	Min 30 ml/min – Max 400 ml/min
Barometric Pressure sensor	6 mm O tygon tube with a calibrated orifice deliveing a flow of 100 ml/min to Leo when connected to a gas source at 1 barg (14.7 psig)
Measuring range	500 – 1200 mbar
Data Storage	300 measurements
Data Download	Micro USB to USB OTG host adapter
Visual and audio alarm	Selectable for each sensor module
Dimensions	95x155x45 mm
Weight	492 g
Power Consumption	10 W
Power Supply	5V DC
Environmental Conditions	
Temperature range	5°C – 40°C
Relative Humidity	0 - 95%
Barometric Pressure	800 – 1200 mbar
Pump	
Pump type	Brushless
Pump – Flow	From 60 to 260 ml/min
Pump Life Expectancy	10000 hours

NOTES

TRI-GAS MIXER 1.5LPM AND 15LPM

The Tri-Gas Mixer delivers gas mixture of the desired CO_2 and O_2 concentration with output pressure in the range of 0-2 bar (0-30 psi). Delivery pressure is easily regulated by adjusting the knob of the embedded pressure gauge.

The device is equipped with a mixing tank to ensure the highest composition stability even when the required output flow is variable.

Models available with maximum output flow rate of 1.5 L/min and 15 L/min. The actual flow rate delivered automatically adjusts to match the requirements of the equipment connected.

The Tri-Gas Mixer is compatible with any mini incubator available on the market.

GAS INPUT REQUIREMENT

The Tri-Gas Mixer must be connected to pressurized sources of CO_2 - N_2 - Air. Minimum input pressure is related to the desired delivery pressure according to $P_{input} = P_{output} + 1.3$ bar (20 psi).

Okolab air compressors are available to provide pressurized background air.

$P_{in} = P_{out} + 1.3$ bar (20 psi)

P_{out} 0-2 bar (0-30 psi)

GAS OUTPUT

TANK

N2

Air

CO2

Premixed back up

SECURITY FEATURES

The Tri-Gas Mixer features advanced safety routines to ensure that the incubators always receive the proper gas.

To enable the safety routines the Tri-Gas Mixer must also be connected to a pre-mixed back-up cylinder containing gas of the desidered concentration.

The mixer will automatically switch to the backup pre-mixed cylinder if any of the following condition occurs:

- pressure in the mixing tank becomes too low (for instance due to gas requirement exceeding maximum mixer capacity).
- pressure of any of the input gasses becomes too low.
- target gas concentration cannot be achieved.
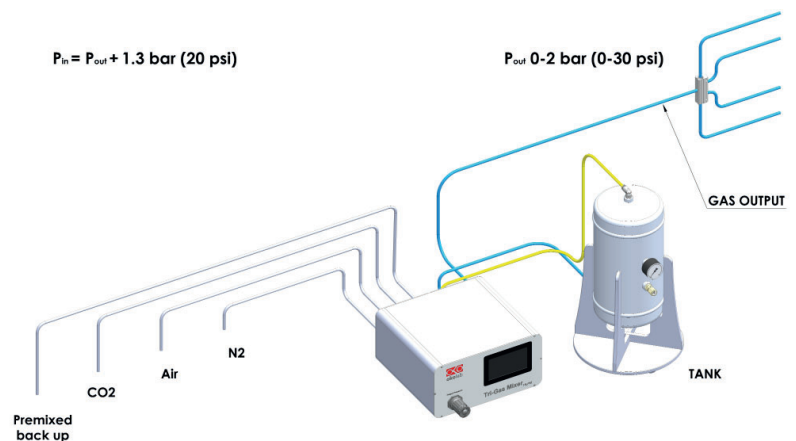
AVAILABLE MODELS

The Tri-Gas Mixer is available in two models, with maximum output flow rate capacity of 1.5 and 15L/min. Besides internal components, the two models differ by the size of the mixing tank (specs in the back of this brochure).
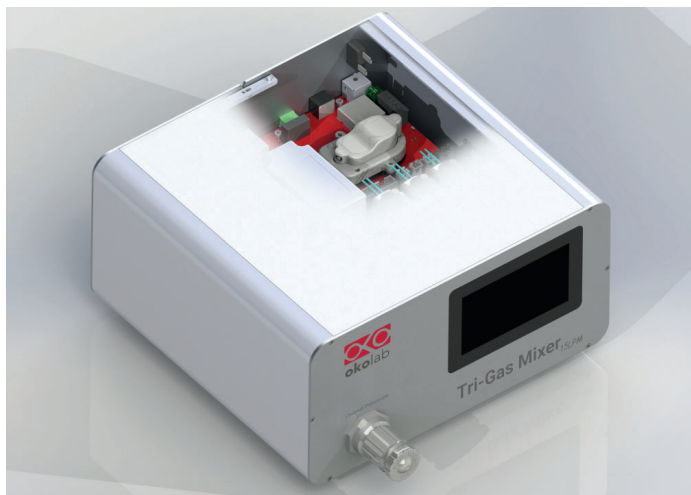
TRI-GAS MIXER 1.5LPM
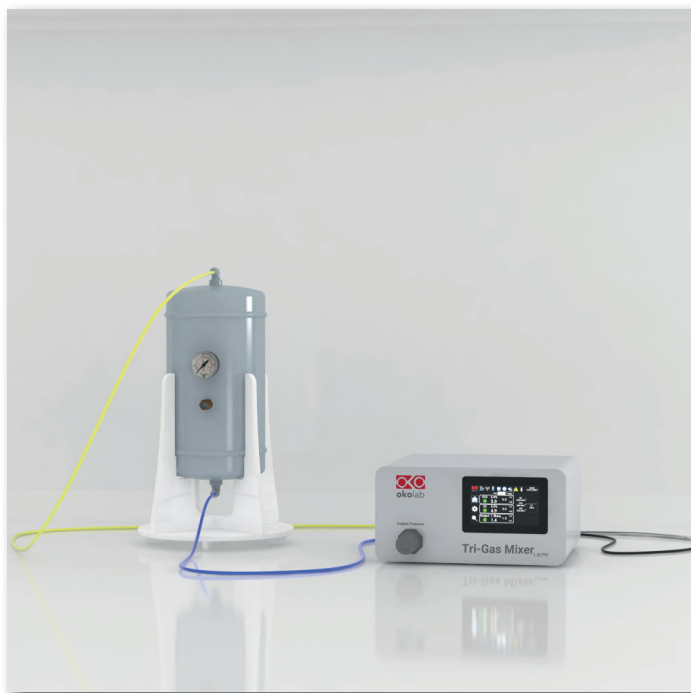
TRI-GAS MIXER 15LPM

CO_2-O_2 SENSOR CALIBRATION

The CO_2-O_2 sensor module stores the calibration in local memory. The CO_2-O_2 sensor module can be conveniently calibrated on-site with intuitive routines or can be easily extracted from the Tri-Gas Mixer, replaced with a spare CO2-O2 sensor module and sent out for calibration. In both cases, there is no need to disconnect or turn off the Tri-gas Mixer nor to discontinue the gas supply to the incubators.

Tri-gas Mixer Technical Specification

FEATURES	TRI-GAS MIXER 1.5 LPM	TRI-GAS MIXER 15 LPM
Output maximum flow rate	1.5 L/min	15 L/min
Output pressure	0-2 bar (0-30 psi) regulated with embedded pressure gauge	
CO_2 range	0-10%	
CO_2 accuracy	±0.1%	
CO_2 sensor	Non Dispersive InfraRed (NDIR) dual wave length detector. Expected lifetime 10 years	
O_2 range	0-10%	
O_2 accuracy	±0.1%	
O_2 sensor	Optical Oxygen Sensor. Expected lifetime 5 years	
Air compressor	AIR-COMPRESSOR-1.5L	AIR-COMPRESSOR-CP3-15L
Mixer dimensions	270x140x325 mm	
Mixing tank size	4L	40L
Input gas	CO_2, N_2, air @ 1.3 bar (20 psi) above output pressure	
Input gas connectors	stainless steel ¼" tube fittings	
Switch over to backup cylinder	✓	✓

NOTES

H401-T-CONTROLLER

H401-T-CONTROLLER is a 2-channel controller which can be employed to control up to two devices at the same time.

The devices are connected to the controller with fast connectors and can be easily replaced. The controller is equipped with a 4.3'' Touch Screen and an intuitive software to offer accuracy and simplicity of use at the same time.

The external sensor allows to automatically and independently calibrate the devices by performing the self calibration routine.

A password protected procedure allows to calibrate the controller and the sensors for periodic maintenance.

The controller is equipped with local memory for on-board data logging and storage of calibration and alarms events.

GLASS PLATE CALIBRATION
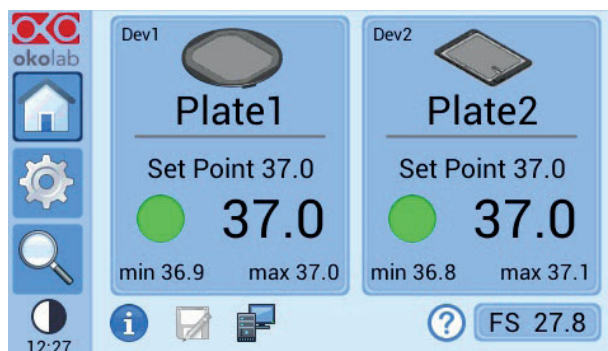
The GLASS PLATE can be automatically calibrated by employing the external temperature sensor of the controller and by starting the self calibration routine from the touch screen.

The algorithm will progressively increase the temperature of the plate until the desired set point temperature is reached inside the calibration Petri.

FEATURES

- H401-T-CONTROLLER can control up to 2 devices
- Set point value from room temperature to 60°C
- T - accuracy on specimen: ± 0.3°C, after self calibration routine
- Intuitive 4.3''Touch Screen Display
- External k-type thermocouple for self calibration
- Independent calibration of the devices connected
- Start up protocol with tunable heating rate (°C/min)
- On-board Data Logging / Download via mini-USB
- Alarm buzzer and External Alarm Connector
- Password protected procedure for periodic calibration against certified thermometer
- Dimensions: 103x130x59 mm

FEATURES

H401-T-CONTROLLER can be connected to any of these devices (maximum two devices can be controlled at the same time):

- H601 GLASS PLATES series
- H401 GLASS PLATES series
- H401 METAL PLATES series
- H401 GLASS TABLE
- H401 T PAD series
- H401 STAGE T PAD (clamp on stage T-PAD)
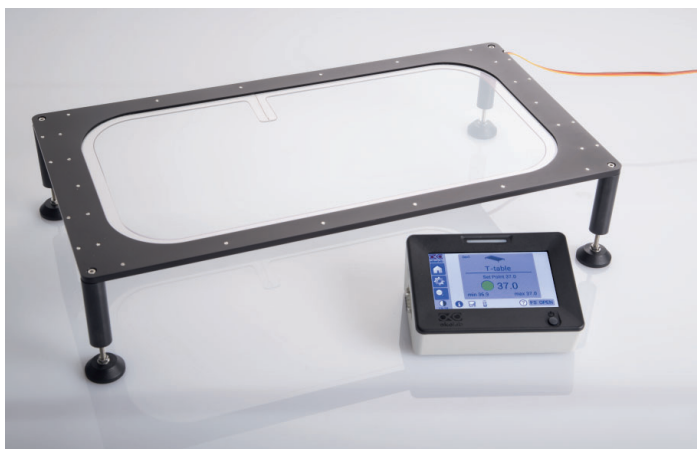- OBJECTIVE HEATER

T-Controller. Controls up to two devices

T-sensor for automatic plate calibration

On board memory for Data Logging with USB option

H401-Glass Table

T-PAD + Glass Plate

H401-T-PENNY

H401-T-PENNY is a compact single-channel Temperature Controller compatible with OKOLAB single-channel metal and glass heated plates and heated objective collars.

H401-T-PENNY combines performance and simplicity at an affordable price.

FEATURES

- Temperature range: from ambient to 60°C maximum
- T - accuracy on specimen: ± 0.3°C
- Single Channel
- One-Point Temperature Calibration and Adjustment
- Dim.: 84x45x20 mm
- Weight: 47.5 g

Penny+ Glass Table
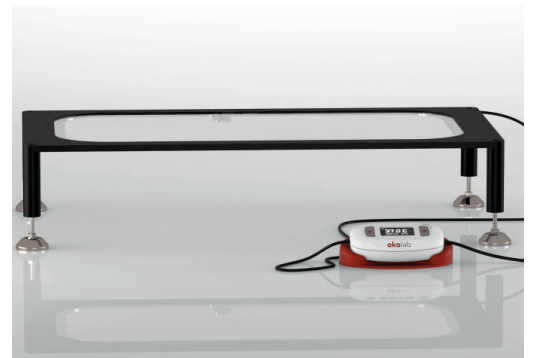
Penny+T PAD

Penny+T Glass Plate

NOTES

HEATED PLATES

Okolab offers the widest range of heated plates' solutions on the market.
The possibility to configure them with different types of controllers and different models of plates ensures to be always able to offer to customers a package that is perfect for their needs.
10 years warranty for all H601 heated glass plates.

Heated Plates models for inverted microscopes: **Heated Plates models for stereomicroscopes:**
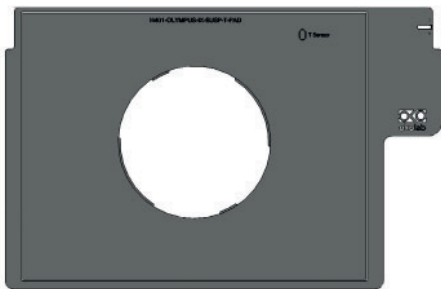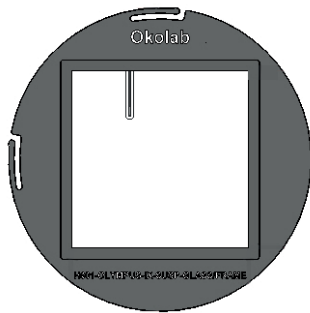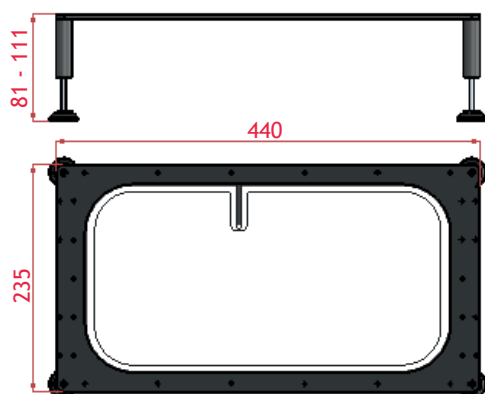

Heated Plates models are available for all microscopy/stage.
The Heated Plates require one of the following controllers according to the model:
  • H401-T-CONTROLLER
  • H401-PENNY

Standalone Heated Plates

H401-GLASS-TABLE
Heated Flat Glass Table - (440x235 mm)
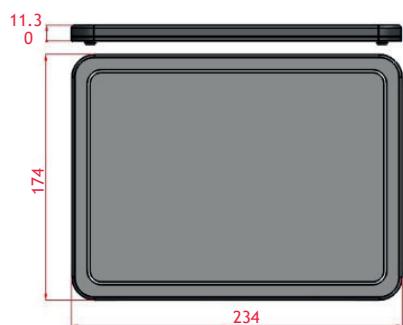
Features:
  • Can be positioned on any surface (Table Top, Cabinet work surface, etc) to create a temperature controlled area
  • Temperature range: 27°C - 45°C
Requires one of the following controllers:
  • H401-T-CONTROLLER
  • H401-PENNY

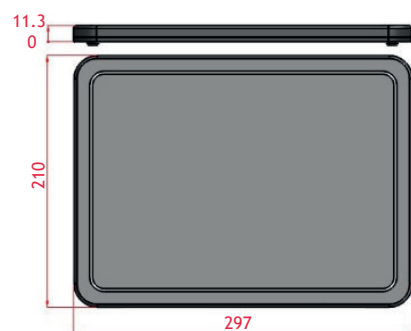## T-Pads

H401-T-PAD-SMALL
Heated Flat Metal Plate (174x234 mm)

Features:
- Can be positioned on any surface (Table Top, Cabinet work surface, etc) to create a temperature controlled area
- Temperature range: 27°C - 45°C

Requires one of the following controllers:
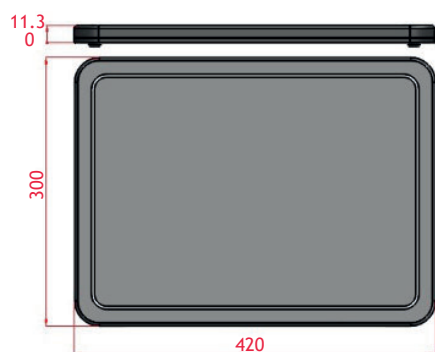- H401-T-CONTROLLER
- H401-PENNY

H401-T-PAD-MEDIUM
Heated Flat Metal Plate - size A4 (297x210 mm)

Features:
- Can be positioned on any surface (Table Top, Cabinet work surface, etc) to create a temperature controlled area
- Temperature range: 27°C - 45°C

Requires one of the following controllers:
- H401-T-CONTROLLER
- H401-PENNY

H401-T-PAD-LARGE
Heated Flat Metal Plate - size A3 (420x300 mm)

Features:
- Can be positioned on any surface (Table Top, Cabinet work surface, etc) to create a temperature controlled area
- Temperature range: 27°C - 45°C

Requires one of the following controllers:
- H401-T-CONTROLLER
- H401-PENNY

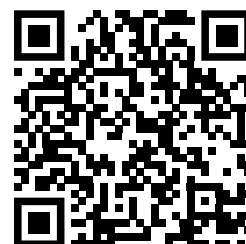## Objective Heaters

OBJ-KIT

Temperature controlled heating band.
Fits any objective on the market.

Heated Plates available for all microscopy models.
Discover our products basket on our website:

Please write to info@oko-lab.com if you can't find your stage/stereo model, to check latest models or to ask for a customized one.

CO$_2$-O$_2$ CONTROLLERS FOR CELL INCUBATOR

O$_2$ CONTROLLER is compatible with any existing Cell Culture CO$_2$ incubator equipped with an access port to add O2 control in the entire incubator.

CO$_2$ -O$_2$ CONTROLLER adds both O$_2$ and CO$_2$ control to the entire incubator or to a smaller semi sealed volume inside it.

To avoid contamination, the system introduces only 2 small tubes through the access port of the incubator.

The inlet tube infuses pure N$_2$ and CO$_2$ into the incubator. The suction pump periodically withdraws a small amount of gas from the incubator to measure O$_2$ and CO$_2$ concentration to provide feedback.

A DRYER attaches magnetically to the side of the incubator and reduces the humidity content of the gas before performing the measurement.

- Adds 100% CO$_2$ and 100% N$_2$ to the volume in which gas control is desired.
- CO$_2$ range: 0-20%
- O$_2$ range: 1-20%
- Accuracy: ± 0.1%
- Set Point Resolution: 0.1%; Repeatability: better than 0.1
- CO$_2$ sensor: 10 year-life Non Dispersive InfraRed (NDIR) dual wave length detector
- O$_2$ sensor: optical sensor - 5 years lifetime
- Sensor calibration against external meter or calibration gas
- Suitable for semi sealed volumes ranging from 10 to 200 liters
- Build in suction pump allows to suck out the gas to perform the concentration measurements
- High efficiency dryer to dehumidify the gas for concentration measurement (needed only if gas in controlled volume is humid)
- Alarm Buzzer and External Alarm Connector
- RS232 and Mini USB ports for data logging through Okolab DATA LOG software or any third party software via DLL
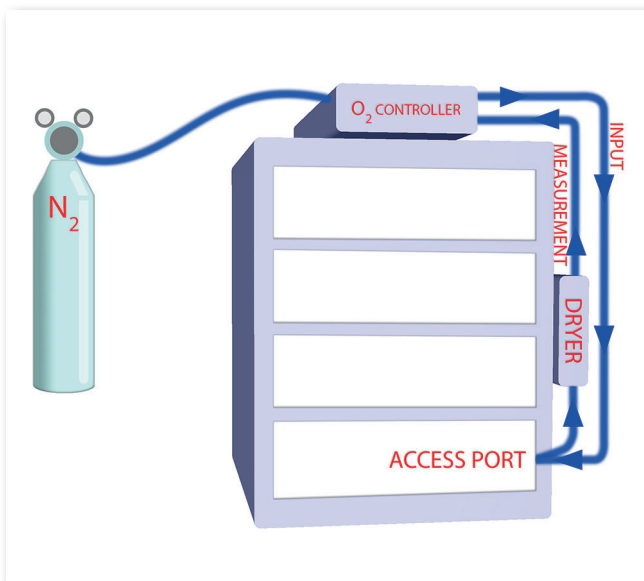- DRYER: membrane based dryer that attaches magnetically to the outer side of the incubator

Gas Controllers for Cell Cultures Incubator

AVAILABLE MODELS

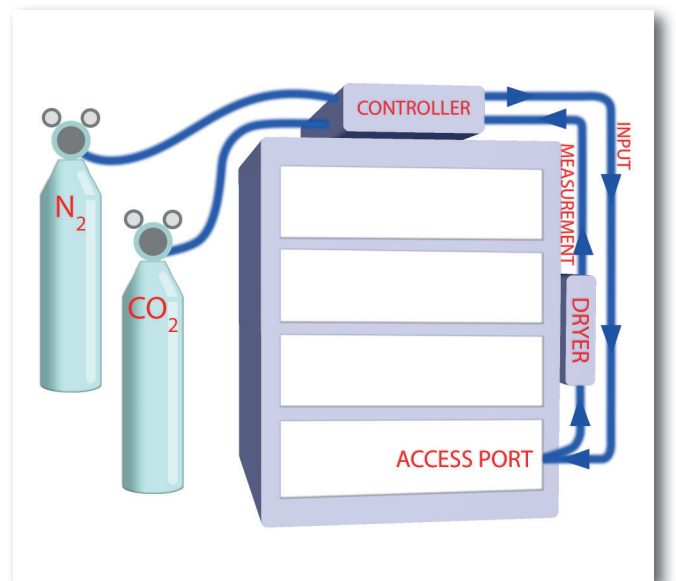| PRODUCT CODE	CO_2 RANGE	O_2 RANGE
O_2 CONTROLLER	-	0-21%
CO_2 CONTROLLER	0-20%	-
CO_2 - O_2 CONTROLLER	0-20%	0-21%

O_2 CONTROLLER

Adds hypoxia control to any CO_2 Incubator or semi-sealed volume
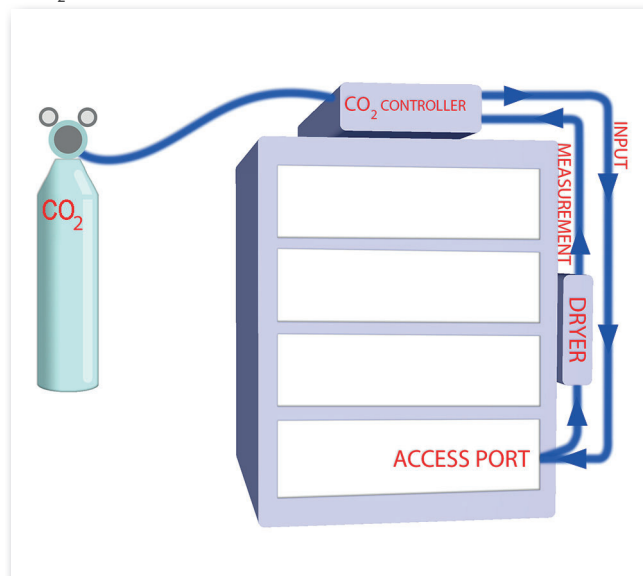

CO_2-O_2 CONTROLLER

Adds hypoxia and CO_2 control to any Incubator or semi-sealed volume

CO_2 CONTROLLER

Adds CO_2 control to any Incubator or semi-sealed volume

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