



CytoCentric Products

ProOx C21

Compact O₂ and CO₂ Subchamber Controller

- Full range O₂ control

- Independent CO₂ control

- Contamination resistant

- Forced gas homogenization

- Combines the best features of O₂ and CO₂ controllers in one unit



Single Chamber 0.1-99.9% O₂ and 0.1-20.0% CO₂

The ProOx C21 is a practical tool for researchers experimenting with cell cultures where both O₂ and CO₂ control and monitoring is needed. It controls both gases in one convenient unit.

FITS MOST CELL CULTURE CHAMBERS

The ProOx C21 fits and controls most bench-top incubators and a variety of common cell culture chambers. The ProOx C21 is compatible with the BioSpherix C-Chamber (subchamber). The unit is installed quickly and easily.

PHYSIOLOGIC AND PATHOLOGIC O₂

Cells normally exist in low oxygen micro-environments and thus need to be modeled *in vitro*. The ProOx C21 is able to simulate any low oxygen environment. The unit can also supply elevated oxygen concentration for hyperoxic conditions. It independently controls CO₂ for correct pH maintenance. The gases are infused and controlled to the user programmed set point.

CONTROL IS EFFICIENT

Feedback from the custom designed O₂ and CO₂ sensors tells the ProOx C21 the time and amount of gas to infuse. Thus, no gas is ever wasted. Recovery after access is especially rapid.

DECREASES RISK OF CONTAMINATION

The remote gas pod has a unique design that is resistant to initial and inadvertent cross-contamination. The pod works by isolating the potential source of the contamination, using disposable microbial barriers on all parts of the gas delivery system. If the sampling loop becomes contaminated the microbial barrier eliminates the risk of cross infection on the return. All of the controlled, infused gas is sterile filtered. The microbial barrier filters are user-replaceable. All contact surfaces, including the gas homogenization fan, are easily decontaminated.

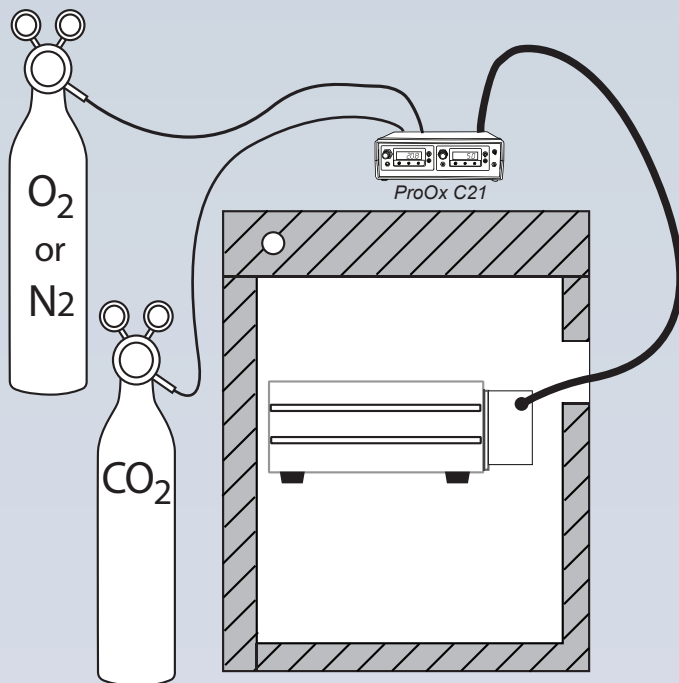
HANDLES ANY JOB

- Where ambient conditions are not correct, the ProOx C21 can provide any other level of O₂ or CO₂ you need.
- Where ambient atmosphere is not air, the ProOx C21 can restore and maintain air-equivalent O₂.
- Where O₂ or CO₂ consumptive or generative processes need to be countered the ProOx C21 can hold both stable against destabilizing loads. It can work continuously year-round, or on occasion as needed.

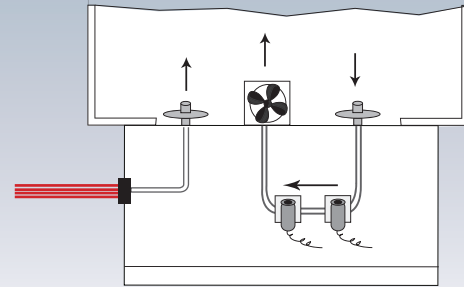


ProOx C21 consists of two basic parts connected by an umbilicus: the controller itself and its adapter pod that attaches to a C-Chamber.

Installation Schematic



How It Works



From outside the host chamber, the ProOx C21 works by remotely sensing oxygen and carbon dioxide inside the chamber and infusing gas to control both. Oxygen and carbon dioxide are infused to raise each of their levels and nitrogen is infused to lower them through displacement. Once the initial gas reaches its set point, the second quickly follows. The accessory pod that attaches to the sub chamber contains the gas sensors. These sensors are isolated behind microbial barriers and also isolated from the controlled environment of the culture chamber. The pod also provides the infused, sterile, filtered gas. A flexible conduit (umbilical) connects the controller to the pod.

The pod component of the ProOx C21 is uniquely designed to isolate the critical cell environment (which can get contaminated) from the sensing mechanisms for monitoring the gases in the chamber. This isolation is accomplished by putting the sensors inside the pod and pulling a sample of gas from the chamber to the pod, then through the sensors back into the chamber. This side stream sampling starts with a sterile filter and ends with a sterile filter, so that if there was contamination it wouldn't get past the sensors.

Installation

1. Set ProOx C21 on or near host chamber and plug it in.
2. Hook up sensor and gas infusion tube and insert both into the chamber.
3. Hook up gas supply.

Operation



FRONT PANEL INTERFACE

All operations are conveniently located at the front of the panel and all connections are located at the back and out of the way allowing for less interference and increasing usability for cell culture research and development.

O₂ and CO₂ concentration sensor readings are displayed in bright green numbers to be continuously and easily monitored from across the lab.

Manual switch for gas provides a convenient shut off thus saving gas when chamber door is opened. An alarm buzzer, also manual, will remind you if you have forgotten to turn the gas back on.

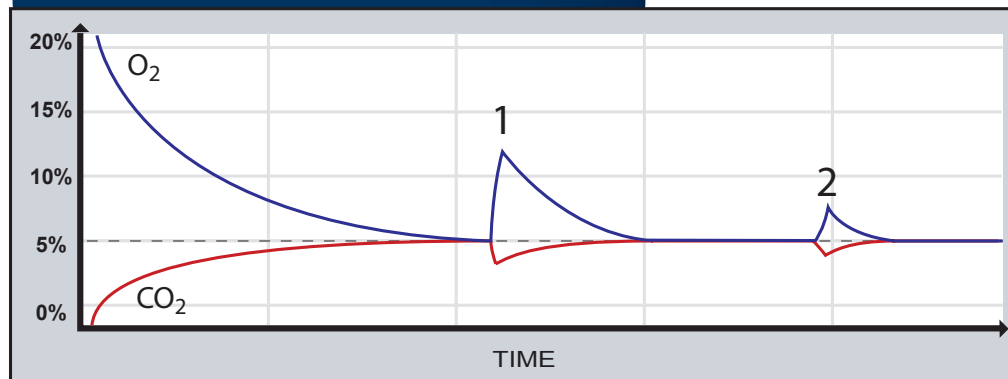
Gas

USE ANY GAS SUPPLY

Conveniently utilizes gas from any source. Best supply depends on consumption. Compressed gas is best in low consumption applications. Generator is best in high consumption applications. Liquid is best in between.

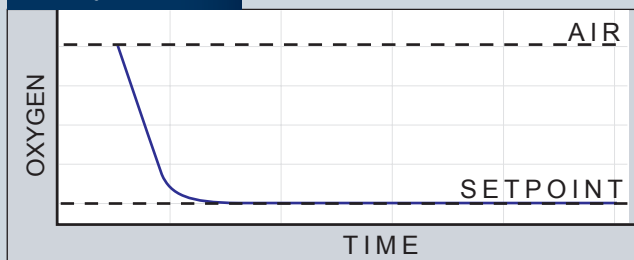
SAVES GAS AND MONEY

Chamber gas consumption varies widely, but in every case the ProOx C21 always and absolutely minimizes gas consumption. It's maximally efficient! Gas costs are reduced to absolute minimum.

5% CO₂ and 5% O₂ Control

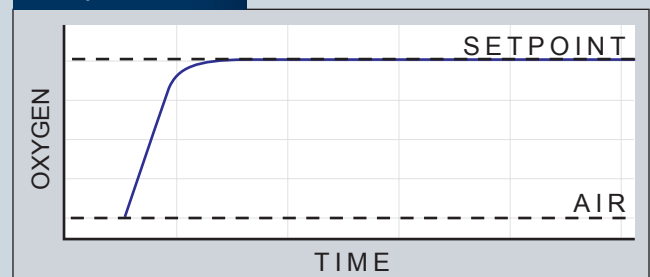
At time (1) user opened and closed door briefly for access. Room air rushed in and took both O₂ and CO₂ away from setpoint. However, automatic feedback immediately responded and returned both gases back to setpoint. At time (2) user unlatched door but before he could open it became distracted and forgot to re-latch, thus increased chamber leakage. Again however, automatic feedback control quickly adjusted and re-established setpoints. Obviously gas consumption increased to accommodate the increased load but the integrity of the experiment was maintained.

Hypoxia

**CONTROL GAS IS NITROGEN**

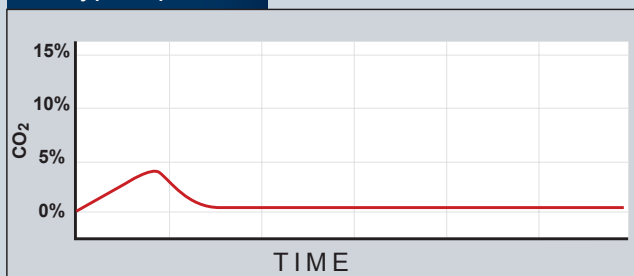
Setpoints are 0.1-20.7% oxygen. The lower the set point, the more time and nitrogen it takes to reach and hold the setpoint.

Hyperoxia

**CONTROL GAS IS OXYGEN**

Setpoints are 20.9-99.9% oxygen. The higher the set point, the more time and oxygen it takes to reach and hold the setpoint.

Hypocapnia



Hypocapnia is a relative term to cells that means a lesser amount of CO₂ concentration. The ProOx C21 can create hypocapnia in a CO₂ incubator by infusing N₂ into the sub-chamber until it reaches the set point and thus holding it there. This allows a hypocapnia experiment without disturbing other cultures.

Hypercapnia



Hypercapnia is a relative term that means excess concentration of CO₂. The ProOx C21 can create hypercapnia by infusing the CO₂ into the chamber until it reaches the setpoint and holding it there.

Specs

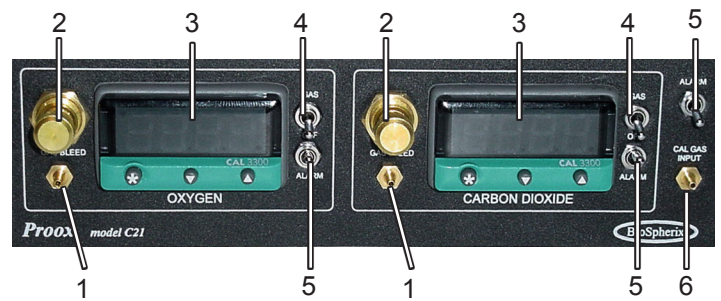
ELECTRICAL POWER: 12 VDC at 2.5A
CONTROL RANGE: 0.1-99.9% oxygen, 0.1-20% carbon dioxide
ACCURACY: O ₂ : ±1% at constant temperature/pressure ±2% over entire temperature range. CO ₂ : .1% or 5% of measurement, whichever is greater.
RESOLUTION: 0.1%
OXYGEN SENSOR: Various application specific sensors available.
GAS SOURCE: compressed gas tanks, liquid carboys (from headspace), or generators.
GAS SUPPLY: pressurized CO ₂ , O ₂ , and/or N ₂
GAS SUPPLY LINE: 1/8 inch I.D. hose, pressure rated to 25 PSIG.
GAS SUPPLY LINE PRESSURE: 1-25 PSIG
GAS INFUSION RATE: 1-14 S.C.F.H.
GAS CONSUMPTION: depends on (1) size and leakiness of host chamber, (2) frequency and duration of opening chamber doors, and (3) oxygen level controlled.
GAS SUPPLY HOSE FITTING: 1/8" hose barb.
UMBILICAL LENGTH: 12 Ft. (custom lengths available).
SENSOR CABLE LENGTH: 12 Ft.
SENSOR CABLE DIAMETER: 6mm.
ALARM OUTPUT: audible 40dB and visible flashing indicator.
ALARM MODES: process high, process low, deviation high, deviation low, deviation band.
WEIGHT: 2.2lbs (Controller Only)
DIMENSIONS: 2.5"H x 8"W x 7"D (Controller Only)

Sensor Operational Parameters

HOST CHAMBER TEMPERATURE: 5-40°C (depending on sensor)
HOST CHAMBER CO₂: 0.1-20% (depending on sensor)
HOST CHAMBER HUMIDITY: 0-95% RH. Non-Condensing

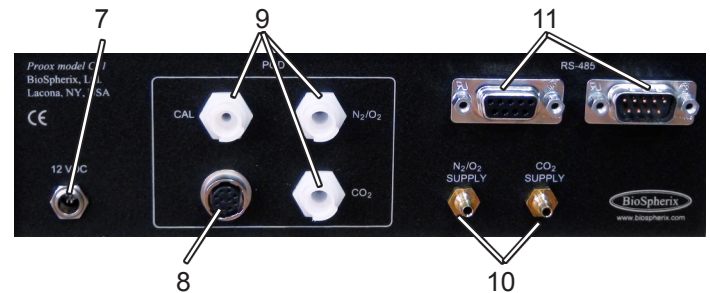
Options include a Windows® based software package that provides trend plotting, data logging, and remote operation via RS connection to your PC. Multiple ProOx C21s can be daisy chained via optional RS-485 interface.

Front Panel



- 1. Bleed Barbs:** Used in calibration. Calibration cup for sensor attaches here.
- 2. Bleed Valves:** bleeds gases out of gas supply lines.
- 3. Controller:** bright blue digits on black back ground. Continuously displays current gas level, control status, and alarm status in all chambers. Displays menu items and settings during programming.
- 4. Gas Switch:** Manually overrides controller to shut off gas.
- 5. Alarm Switch:** Manually overrides controller to shut off alarm.
- 6. Cal Gas Input:** This barb is for calibration purposes.

Back Panel



- 7. Power Receptacle:** 12VDC power supply connects here.
- 8. Communications Cables:** These cables relay information for the sensors and give power to the sample draw pump.
- 9. Connecting Infusion Tubes:** Attach the 1/16 inch ID infusion tubes to the "CAL" N₂/O₂ and CO₂.
- 10. Supply Gas Hose Barb:** Barbs for 1/4 inch I.D. hose from gas sources. Handles pressure up to 25 PSIG.
- 11. RS 485 Connections:** One cable attaches to a computer and the other cable attaches to another unit, to allow communication with the computer (if applicable).



cyto-centric
cell incubation and processing
systems

Toll Free 800.441.3414
www.biospherix.com
25 Union Street, Parish, NY 13131

Ph: 315.387.3414 Fax: 315.387.3415 E-mail: sales@biospherix.com