

ProOx P110

Compact, Versatile O₂ Controller

BioSpherix

WORKS IN:

- Incubators
- Gloveboxes
- Refrigerators
- Animal cages
- Plant chambers
- Plastic bags
- Ice boxes
- Tents
- Etc.



0.1-99.9% Oxygen in Any Semi-Sealable Chamber

TRIED AND TRUE TOOL

The ProOx P110 is a handy little tool for people who do oxygen sensitive work. It makes oxygen control easy. This controller has helped scientists since 1982.

FULL RANGE CONTROL

Control setpoint can be anywhere from 0.1-99.9% oxygen.

The ProOx P110 senses oxygen inside the chamber and infuses either nitrogen to lower the concentration or oxygen to raise it.

WORKS IN ANY CHAMBER

The ProOx P110 fits and controls oxygen in any semi-sealable enclosure. Large, small, square, round, flexible, rigid, leaky, tight, manufactured or custom made. Most chambers can be fitted in minutes.

CONTROL IS EFFICIENT

Feedback from sensor tells the ProOx P110 exactly when and exactly how much gas to infuse. No gas is ever wasted!

OPERATION IS SIMPLE

Oxygen is quickly taken to setpoint and held there indefinitely. Any disturbances are immediately detected and corrected.

Check calibration once in a while and don't run out of gas. Otherwise it's all automatic!

HANDLES ANY JOB

- Where ambient air oxygen (21%) is too high or too low, the ProOx P110 can provide any other level you need.

- Where ambient atmosphere is not air, the ProOx P110 can restore and maintain air-equivalent oxygen.

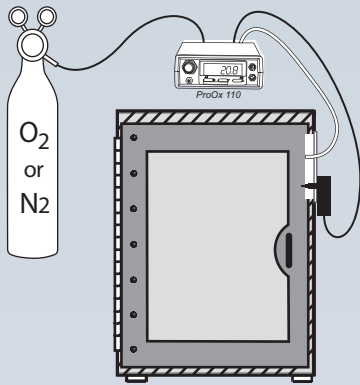
- Where oxygen consumptive or generative processes need to be countered, the ProOx P110 can hold oxygen stable against destabilizing loads.

It can work continuously year round or on occasion as needed. No other oxygen tool offers so much value!

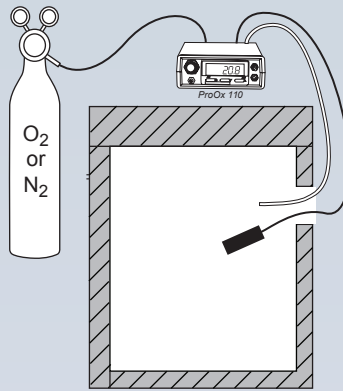


Compact design takes up little lab space

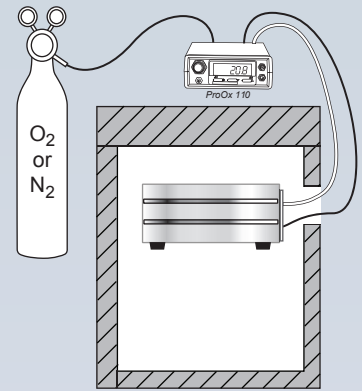
Installation Schematics



Control via Adapter Plate
(shown on BioSpherix A-Chamber)



Direct insertion of sensor/tubing
(shown on generic chamber)



Subchamber via Adapter Plate
(shown on BioSpherix C-Chamber)

ProOx P110 can control any semi-sealable chamber by one of the methods shown above, installation may vary based on chamber.

Installation

1. Set ProOx P110 on or near host chamber and plug it in.
2. Hook up sensor and gas infusion tube and insert both into chamber.
3. Hook up gas supply.

How It Works

From outside the host chamber, the ProOx P110 works by remotely sensing the oxygen concentration inside the chamber and infusing either nitrogen to lower it or oxygen to raise it.

Installation is easy. Simply insert sensor and nozzle of infusion tube into chamber through any convenient passageway. Doors, windows, sample ports, access ports, holes (built-in or custom-drilled) all work.

Nozzle tip of infusion tubing is fitted with a removable gas diffuser. Diffuser muffles gas turbulence inside chamber when gas is injected.

Operation



FRONT PANEL INTERFACE

All operators are conveniently located on the front panel. All connections are on the back panel, out of the way.

Oxygen concentration at sensor continuously displays in bright green digits that can easily be read from across the room.

Manual switch for gas provides convenient shut off. It saves gas when the chamber door is open. Just don't forget to turn it back on! The alarm buzzer also has a manual switch.



CALIBRATION

For easy calibration check, just pull the sensor out of the chamber and check it against room air (21%). Double check it against the control gas (0% nitrogen or 100% oxygen) with the handy bleed valve on the front panel if necessary. There are no third party oxygen analyzers needed.

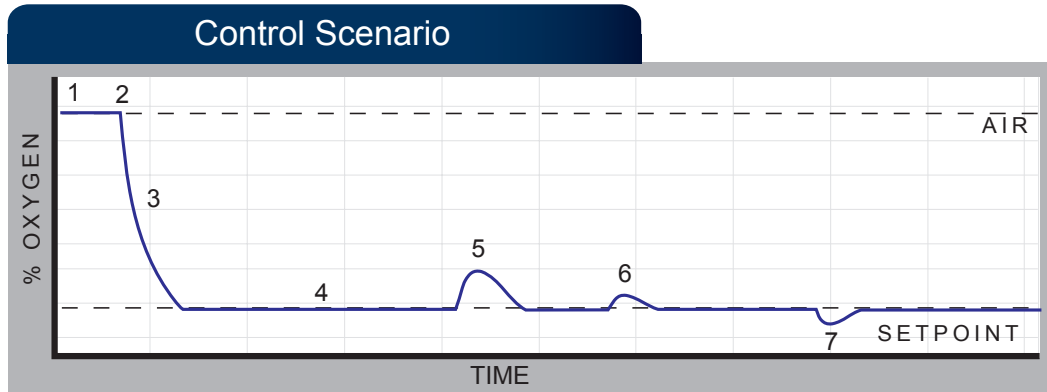
Gas

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 P110 always and absolutely minimizes gas consumption. It's maximally efficient! Gas costs are reduced to absolute minimum.



1. No control yet. Chamber oxygen is ambient air oxygen (21%).
2. Control starts. Control gas is nitrogen. Infusion immediately starts to push oxygen down.
3. Oxygen is taken to setpoint. How fast depends on infusion rate. Infusion rate is adjustable. The higher the infusion rate, the faster to setpoint. Gas consumption in this phase is mostly a function of chamber size. The larger the chamber, the more gas it takes.
4. Steady-state control at setpoint is established. Infusion of control gas exactly matches chamber leakage to hold oxygen level constant. Gas consumption here is mostly a function of chamber leakage. The leakier the chamber, the more gas it takes.

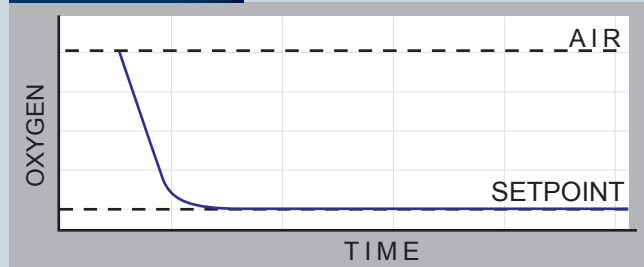
5. Door of chamber is suddenly opened and closed. Steady-state is disrupted. Inrush of air is immediately detected and chamber oxygen is promptly returned to setpoint. Gas consumption depends on how wide and how long the door was opened. The more it's disrupted, the more gas it takes to get back to setpoint.
6. Door suddenly unlatches. Leakage goes up but ProOx P110 compensates and immediately re-establishes steady-state at setpoint. Gas consumption goes up dramatically, but oxygen is kept at setpoint. Consumption increases in proportion to leakage.
7. Door gets shut tight. Leakage goes back down to normal. ProOx P110 compensates by drifting back to setpoint and re-establishes steady-state at setpoint. Gas consumption goes back down to normal levels, while oxygen stays put.

NORMOBARIC OXYGEN FEEDBACK CONTROL

ProOx P110 works in semi-sealable chambers. It controls chamber oxygen by forced displacement of gas inside chamber via dilution with either oxygen-rich or oxygen-poor control gas. Pressure inside the chamber stays the same as pressure outside.

Dilution is a logarithmic process. The further away from ambient, the slower it goes. But closed-loop control is efficient. By constantly monitoring chamber oxygen, it promptly gets to setpoint. It responds immediately to correct any disturbance. It automatically adjusts to different loads. And in the process, it uses the least amount of gas possible!

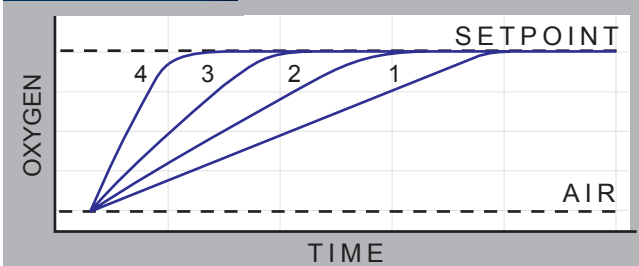
Hyoxia



CONTROL GAS IS NITROGEN

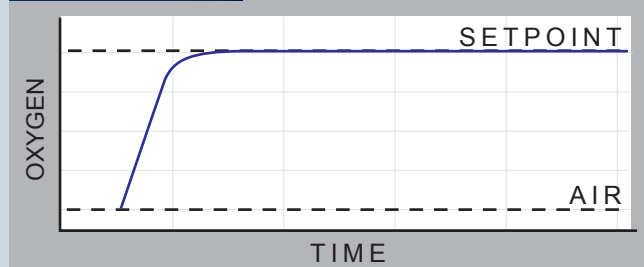
Setpoints are 0.1-20.7% oxygen. The lower the set point: (1) the more time it takes to reach setpoint, (2) the more nitrogen it takes to reach setpoint, (3) the more nitrogen it takes to hold setpoint.

Power



Power is a function of infusion rate of control gas. The higher the infusion rate, the faster to setpoint. Above: infusion rate #4>#3>#2>#1. Infusion rate is a function of control gas supply pressure. The higher the pressure, the higher the infusion rate. Maximum 25 PSIG provides 35 Standard Cubic Feet per Hour.

Hyperoxia



CONTROL GAS IS OXYGEN

Setpoints are 20.9-99.9% oxygen. The higher the setpoint: (1) the more time it takes to reach setpoint, (2) the more oxygen it takes to reach setpoint, (3) the more oxygen it takes to hold setpoint.

Specs

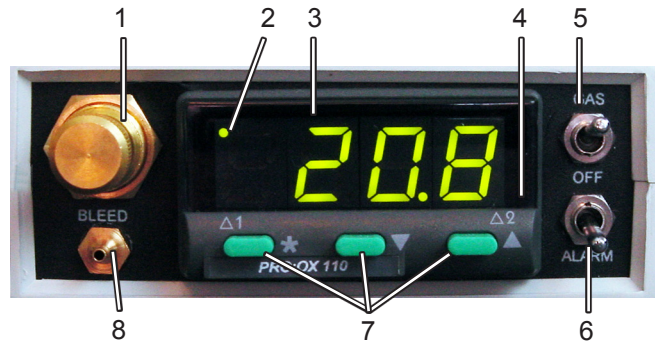
ELECTRICAL POWER: 12 VDC/2.5A
CONTROL RANGE: 0.1-99.9% oxygen depending on the power/load balance
ACCURACY: ±1% at constant temperature/pressure ±2% full scale over operating temperature range
RESOLUTION: to 0.1% oxygen, display and set point.
OXYGEN SENSOR: various application specific sensors are available.
GAS SOURCE: compressed gas tanks, liquid carboys (from headspace), or generators.
GAS SUPPLY: pressurized gas.
GAS SUPPLY LINE: 1/8" I.D. pressure rated hose.
GAS SUPPLY LINE PRESSURE: 1-25 P.S.I.G.
GAS INFUSION RATE: 1-35 S.C.F.H.
GAS CONSUMPTION: depends on (1) size and leakiness of hose chamber, (2) frequency and duration of opening chamber doors, and (3) oxygen level controlled.
GAS SUPPLY HOSE FITTING: 1/8" I.D. hose barb.
INFUSION TUBING HOSE FITTING: 1/8" I.D. hose barb.
INFUSION TUBING DIAMETER: 1/4" O.D. x 1/8" I.D. (special tubing sizes available).
INFUSION TUBING LENGTH: 10 ft. (custom lengths available).
SENSOR CABLE LENGTH: 10 ft.
SENSOR CABLE DIAMETER: 4 mm.
ALARM OUTPUT: audible 40dB and visible flashing indicator.
ALARM MODES: process high, process low, deviation high, deviation low, deviation band.
WEIGHT: .7lbs (Controller Only)
DIMENSIONS: 1.5"H x 3.75"W x 7"D (Controller)

Sensor Operational Parameters

HOST CHAMBER SIZE: depends on the chamber gas dynamics and oxygen level controlled.
HOST CHAMBER TEMPERATURE: 5-40°C
HOST CHAMBER CO₂: 0-100% (depending on sensor)
HOST CHAMBER HUMIDITY: 0-95%RH. Non-Condensing

Optional: Windows® based software package that provides trend plotting, data logging, and remote operation via RS connection to your PC. Multiple ProOx P110s can be daisy chained via optional RS-485 interface.

Front Panel



- 1. Bleed Valve:** Bleeds gas (nitrogen or oxygen) out of gas supply line. Used for calibrating sensor and depressurizing gas supply.
- 2. Control Indicator Light:** Flashes when gas is infused.
- 3. Digital Display:** Bright green 0.4 inch digits. Continuously displays oxygen concentration at sensor, unless preempted by other operations. Displays menu items and settings during programming.
- 4. Alarm Indicator Light:** Flashes when alarm output is activated.
- 5. Gas Switch:** Manually overrides controller to shut off gas.
- 6. Alarm Switch:** Manually overrides controller to shut off alarm.
- 7. Touch Keys:** 3 amply-spaced tactile keys for setting configuration and control parameters.
- 8. Bleed Outlet:** 1/8" hose barb where gas bleeds out from bleed valve. Calibration cup for sensor attaches here.

Back Panel



- 9. Sensor Input Jack:** Locking sensor cable connects here. Finger tightened locking nut on cable plug secures it.
- 10. Power Receptacle:** 12VDC power supply connects here.
- 11. Gas Supply Inlet:** 1/8" brass hose barb where in-coming control gas supply line connects. Pressure rated to 25 PSIG.
- 12. Control Gas Outlet:** 1/8" brass hose barb to connect infusion tubing from host chamber.



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