

- Reproducible, dynamic O₂ profiles
- Works in any semi sealable container!
- Runs four independent protocols simultaneously
- Works with BioSpherix animal controllers
- User-friendly PC interface
- Data logging



Four Chamber Dynamic 0.1-99.9% O₂

POWERFUL TOOL

The OxyCycler A84XOV is a powerful research tool for scientists who do oxygen sensitive work. It makes complex oxygen profile control easy.

FULL RANGE DYNAMIC PROFILES

Control oxygen profiles with multiple setpoints anywhere from 0.1-99.9% oxygen.

Hold any setpoint for any length of time. Rate of change between any two setpoints is fully adjustable. Cycle any profile any fixed number of times, or continuously.

WORKS IN ANY CHAMBER

The OxyCycler A84XOV works exceptionally well with BioSpherix A-Chambers. However, it can work with practically any semi-sealable enclosure. Large or small. Square or round. Flexible or rigid. Manufactured or custom made. Most chambers can be fitted in minutes.

MULTI-CHAMBER IS PRODUCTIVE

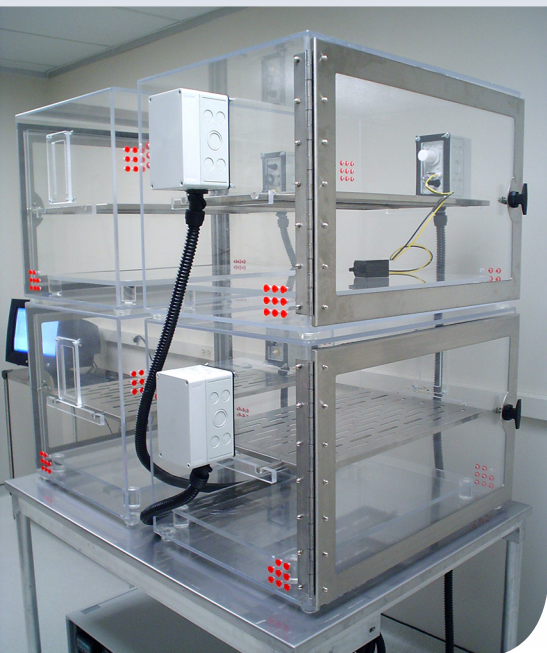
Controls in four chambers at once. Operate all chambers simultaneously, or each independent of the others. Control different profiles, or same profile in every chamber. Start all at the same time, or each at different times.

CONTROL IS EFFICIENT

Nitrogen is infused to lower oxygen. Oxygen is infused to raise it. Feedback from oxygen sensor inside chamber tells the OxyCycler A84XOV exactly when and exactly how much gas to infuse. No gas is ever wasted! Any disturbances are immediately detected and corrected.

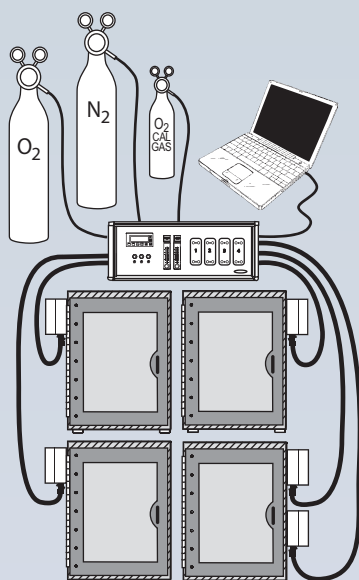
OPERATION IS SIMPLE

Once installed and configured, it's easy. Occasionally check calibration and supply gas, otherwise it's all automatic! Can work continuously year round, or on occasion as needed.



Controls four chambers simultaneously but independently. Actuator pod attaches to each chamber.

Installation Schematic



Installation

1. Set OxyCycler A84XOV on or near host chambers and plug it in.
2. Mount each actuator pod to its host chamber.
3. Hook up gas supply.

How It Works



The OxyCycler model A84XOV can connect up to four chambers via flexible umbilicals. Tip of each umbilical contains an actuator pod with an oxygen sensor, a gas nozzle, fan and mounting hardware (shown above). Pods mount to chamber over special precut holes so oxygen sensors can monitor chamber oxygen and gas can be infused.

The fan pushes air inside the chamber toward an array of 3x3 ventilation holes, forcing circulation and gas homogenization while displacing off-gases, ensuring **GLP** quality air conditions for animals.

Operation



Use PC software for easy interface, real-time trend charting, data logging, and remote operation. Dynamic O₂ exposures are programmed with a series of setpoints that can change, be stored and re-run with the click of a mouse.

Gas

USE ANY GAS SUPPLY

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

SAVES GAS AND SAVES MONEY

Maximum efficiency reduces chamber gas consumption. Gas costs are reduced to absolute minimum.

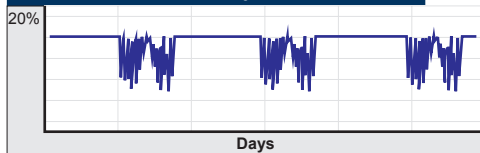
Monitor Pod



Precisely adjust the ventilation of the chamber by using the sensors in a monitor pod (ppm CO₂, temperature, humidity and remote O₂). In most cases, if the ppm CO₂ exhaled by the animals is controlled and limited all other off-gases will be handled successfully as well. One exception may be relative humidity when there is an excessive source of humidity such as overly moist litter, increased animal activity, dripping water, etc.

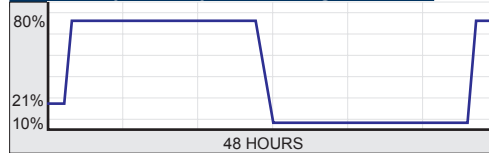
Once the monitor pod has been used to adjust the ventilation, it can be used for documentation in animal safety reviews to verify all worrisome off gases were successfully handled. Furthermore, the monitor pod can be easily moved from chamber to chamber when there is a new need to characterize a chamber. A chamber needs to be characterized before an experiment is performed if there is any change in the chamber. The need to characterize the off-gas in each individual chamber is the reason why the monitor pod has its unique mobile design.

Episodic Hypoxia



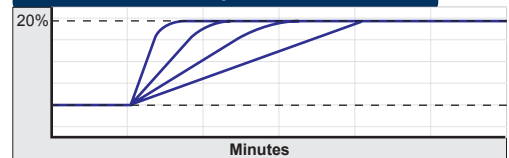
Recurring episodes of hypoxia can reproduce hypoxemia patterns created by occupational flight, sleep apnea, asthma, and pulmonary infections. Chronic hypoxic episodes might promote chronic degenerative diseases such as hypertension, diabetes, rheumatoid arthritis, macular degeneration, psoriasis, osteoporosis, etc.

Hyper/Hypo Swings



Hyperoxia for a day, then hypoxia for a day, back to hyperoxia for a day, hypoxia, hyperoxia, etc. quickly creates rich neovascularization in neonatal retina. Specifically models neovascular retinopathies. Nonspecifically models angiogenesis. Throws off redox regulation.

Acute Hyperoxia



Sudden increases in inspired oxygen can cause pulmonary damage. Model toxicity of oxygen therapy in young (premature born) and old (emphysemics) and in between (trauma patients). Model toxicity of recreational oxygen inhalation by athletes and revelers. Rate of oxygen increase can be adjusted faster or slower. Change faster to overwhelm antioxidants, or change slow to condition for antioxidants.

Graded Hypoxia



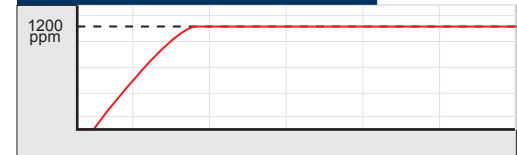
Model altitude acclimation. Or condition for hypoxia. Organs transplant better when prepared for the hypoxic journey. Conditioning can be gentle, but any rate of change can be set and repeated. Faster or slower. And held there any length of time.

Acute/Intermittent Hypoxia



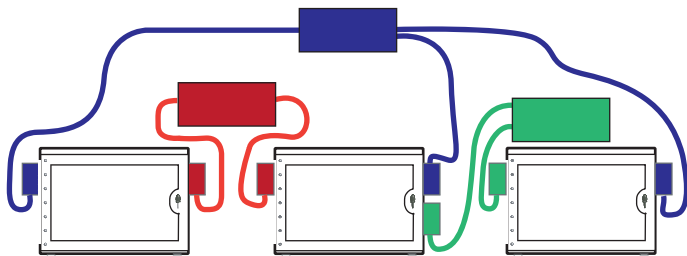
Hypoxia stress can model components of many severe diseases: heart attacks, stroke, asthma, choking, epilepsy, massive hemorrhage, etc. Deep sudden drops in chamber oxygen can create ischemia, apoptosis, and necrosis. Frequency, duration, and degree of drop are all adjustable.

CO₂ Limit Control



The optional Monitor Pod can track CO₂ and signal the controller to increase airflow to flush excess while maintaining O₂ protocols. CO₂ is the by-product animals produce the most. If it is limited, other by-products will also be kept low.

Works With Other Controllers



The OxyCycler A84XOV can also supplement CO, NO and NO₂ controllers to ensure O₂ levels are not flushed too low.

The OxyCycler series was designed to be very flexible to meet researcher's needs. The OxyCycler A84XOV can work with any BioSpherix controller, or completely independently. A-Chambers come standard with two cutouts, one on each side, but can easily be modified to accommodate up to four separate controllers. This can lead to many configuration options for control chambers and simultaneous experiment protocols. Shown above, the A84XOV can control three chambers alongside two AT series controllers. Additionally a fourth A-Chamber can act as a control.

OxyCyclers can work together on the same chamber. Software configuration makes two controllers work together seamlessly as one. Each controls their respective gases simultaneously; even dynamic setpoints while holding other gases static.

PROFILING IS FLUX

Oxygen flux can affect physiology. It can only be studied if it can be recreated. Profiles are reproducible flux patterns. Profiles have multiple setpoints which change at precise times, with any rate of change from one setpoint to the next.

NORMOBARIC FLUX

Oxygen profiles in a semi-sealed chamber are normobaric. Nitrogen and oxygen gas infusions displace chamber gas and equilibrates with ambient barometric pressure outside the chamber. Normobaric avoids hassles of pressure equipment. Chamber control avoids hassle of ventilation equipment.

MULTIPLE PROFILING

Four chambers means one control profile and up to three experimental profiles. Comparing profiles makes optimizing models easy and straightforward. It also makes dose-response studies possible.

Up to 17 different profiles can be stored. Each can be run or re-run in any of the four chambers at any time. Any given profile can be run in all the chambers simultaneously, or staggered at different times. Or every chamber can have a different profile running.

MODEL ANY OXYGEN FLUX

Pattern any oxygen flux. Each profile can have 1- 20 setpoints. Setpoints can be anywhere from 0.1 - 99.9% oxygen. Straight line rate between any two sequential setpoints can be 0 - 999 minutes with resolution to seconds. Profiles can be cycled 1-99 times, or cycled continuously.

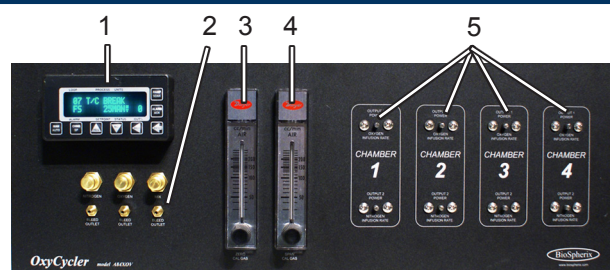
Specs

ELECTRICAL POWER: 12 VDC @ 6.66A
CONTROL RANGE: 0.1-99.9% oxygen
ACCURACY: ±1%
RESOLUTION: 0.1%
GAS SOURCE: Compressed gas tanks, liquid carboys (from headspace), or generators.
GAS SUPPLY: Pressurized O2 and N2
GAS SUPPLY LINE: 1/4 inch I.D. hose pressure rated at 40 PSIG.
GAS SUPPLY LINE PRESSURE: 0-40 PSIG
GAS INFUSION RATE: 1-150 S.C.F.H. each control gas each chamber.
GAS SUPPLY HOSE FITTINGS: 1/4 inch hose barb.
UMBILICAL LENGTH: 12 feet (custom lengths available).
ACTUATOR POD SIZE: 7"H, 4.375"W, 4.5"D
ALARM OUTPUT: Visible flashing indicator. PC adds audible and more visible indicators.
ALARM MODES: Process high, process low, deviation high, deviation low, deviation band.
WEIGHT: 31 lbs. (Controller Only)
DIMENSIONS: 9"H x 21.2"W x 18.5"D

Sensor Operational Parameters

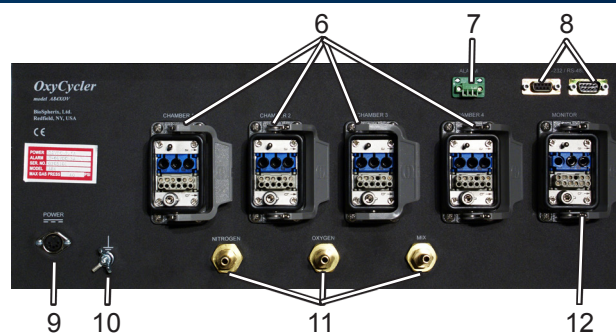
HOST CHAMBER TEMPERATURE: 0-40°C (depending on sensor).
HOST CHAMBER CO2: 0-20% (depending on sensor).
HOST CHAMBER HUMIDITY: 5-95% non-condensing

Front Panel



- 1. Controller:** Bright blue digits on black background. Continuously displays current control gas level, control status, and alarm status in all chambers. Displays menu items and settings during programming.
- 2. Bleed Valves and Barbs:** Bleeds gases out of gas supply lines. Calibration cup for sensor attaches here.
- 3. ZERO Cal Gas Flowmeter:** Used for calibration.
- 4. SPAN Cal Gas Flowmeter:** Used for calibration.
- 5. Needle Valves:** Sets infusion rate of control gases in each chamber to accommodate different dynamics. Can manually override controller to shut off gas.

Back Panel



- 6. Actuator Pod Umbilical:** Flexible umbilicals connect remote actuator pods to back panel. Semi-swivel connectors at both ends allow 360° orientation at both ends. Some models are hard welded; function is the same.
- 7. Alarm Receptacle:** Connect an appropriate alarm to this jack.
- 8. 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).
- 9. Power Receptacle:** 12VDC power supply connects here.
- 10. Ground Stud:** For grounding the unit to protect from electric damage.
- 11. Supply Gas Hose Barb:** Barbs for 1/4 inch I.D. hose from gas sources. Handles pressure up to 40 PSIG.
- 12. Monitor Pod Umbilical:** Flexible umbilical connects remote monitor pod to back panel. Semi-swivel connectors at both ends allow 360° orientation. Some models are hard welded; function is the same.



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