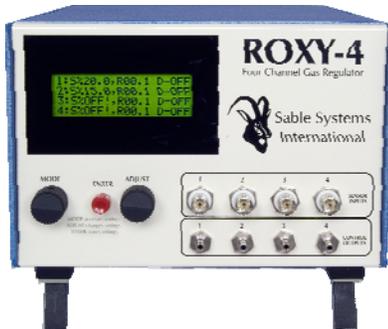


## ROXY-4 Four-Channel Universal Regulator/Controller



Controlling oxygen or carbon dioxide concentration in test chambers, growth chambers, tissue culture chambers, and incubators of various kinds, can be critical to the success of your research. In response to this need, Sable Systems presents the **ROXY-4 Universal Regulator/ Controller**, a versatile, sophisticated and very economically-priced solution for multi-channel gas regulation and control.

**HOW IT WORKS.** The ROXY-4 works by pulsing nitrogen (for hypoxic control), oxygen (for hyperoxic control) or carbon dioxide into the chamber being regulated. Just enough gas is added to reach the user-defined set point – reducing tank gas use to an absolute minimum. Sophisticated PID

(Proportional-Integral-Derivative) control is used, guaranteeing minimal overshoot or undershoot, and compensating for pressure variations in the gas line. It's as close to perfect control as you can get.

**SOPHISTICATED FEATURES.** The ROXY-4 offers several features that set it apart.

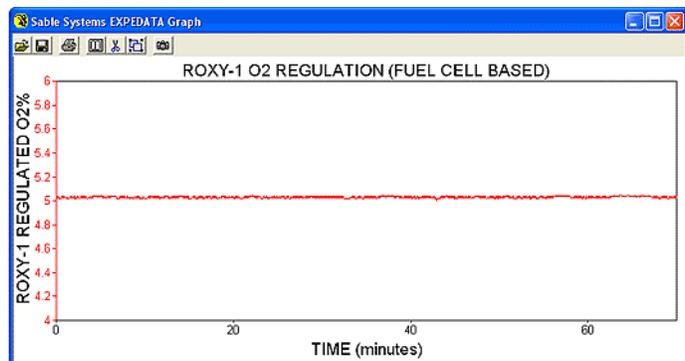
- **A pressure sensor monitors input gas pressures.** If a tank is about to run out, the ROXY-4 can sound an alarm.
- **Second**, it has both **analog and digital outputs** so that the regulated value can be recorded with any data acquisition system for documentation or QC purposes.
- **Third**, it offers **full serial control of setpoint**, allowing ramping, profiling and other sophisticated experimental designs by computer control in addition to its full capabilities in **standalone mode**.
- **Fourth**, the ROXY-4 has an **extremely versatile input system**, it can be connected to fuel cell oxygen sensors, to dissolved O<sub>2</sub> or CO<sub>2</sub> meters, to user-supplied gas analyzers and even to pressure sensors.

Here are some examples of what the ROXY-4 can do

**CONTROL OXYGEN.** The ROXY-4 can intelligently regulate anywhere from <1% to 100% oxygen. Connect a fuel cell sensors to the ROXY-4's and place the sensor inside the cabinet you wish to regulate. Alternatively, use an external oxygen analyzer and connect it to the ROXY-4's input path. With the ROXY-4, some tubing and the appropriate gas source, setting up a regulated environment is easy. The ROXY-4 also supports single point or two point sensor calibrations directly from its menu system.

The graph at right shows the single channel version of this instrument (ROXY-1) controlling aerial O<sub>2</sub> at 5% in a study of the interaction of temperature and hypoxia in *Drosophila*. The mean reading is 5.01% with a standard deviation < 0.008% over a period of an hour.

The ROXY-4 outperforms most dedicated gas mixing systems based on mass flow control valves, which are typically accurate to only 1% of full scale at best. This can translate to mixing inaccuracies approaching 10% at the far ends of their ranges - inaccuracies that our ROXY-4 avoids because it senses oxygen levels directly, using a calibrated sensor, within a closed-loop control system using PID (Proportional-Integral-Derivative) algorithms that minimize "hunting".



**CONTROL CARBON DIOXIDE.** Using an external carbon dioxide analyzer, the ROXY-4 can read and regulate CO<sub>2</sub> concentrations anywhere within the range of the analyzer. Set the analyzer to read the CO<sub>2</sub> concentration within the controlled environment, connect a CO<sub>2</sub> line to the ROXY-4, connect a line from the ROXY-4 to your controlled environment, connect the analog signal from the analyzer to the ROXY-4, tell the ROXY-4 your set point and you're done. The ROXY-4 will add sufficient CO<sub>2</sub> to the air within the regulated environment to bring it to the correct set point with no waste. Want to log the results? No problem - choose between analog and digital (RS-232) outputs.

**CONTROL DISSOLVED OXYGEN.** The ROXY-4 can **intelligently regulate anywhere from <1% to 100% dissolved oxygen in aquatic media.** Use your own dissolved-oxygen analyzer with an analog output to read oxygen concentrations, and bubble air or nitrogen into your medium under the ROXY-4's command to maintain an exact set point with no wasted gases!

**ALTERNATE BETWEEN HYPOXIA and HYPEROXIA:** By using two channels on the ROXY-4, you can alternate between hypoxic and normoxic or hyperoxic setpoints, **automatically without user intervention.**

**CONTROL LEVELS OF TWO DIFFERENT GASES AT THE SAME TIME; You can, in fact, use the ROXY-4 to control practically anything in the aerial or dissolved gas phase** for which you have a suitable analyzer. Other examples might include dew point (water vapor), methane, carbon monoxide or hydrogen. Connect the analyzer, connect the gas, give the ROXY-4 an appropriate set point - and proceed to regulate flawlessly. What could be simpler?

**RELIABILITY IS DESIGNED-IN. Sable Systems has always offered a three year guarantee, so we never take shortcuts** that other firms take to hold down cost - because our pledge is to manufacture only instruments that we ourselves would rely on in our own research. The ROXY-4 also does its part to **alert you if a problem develops.** In the event of user error, low gas pressure, or the unlikely event of equipment failure, the ROXY-4 includes a **user-configurable alarm** to alert users to the problem. For example, the critical transistor that operates the gas solenoid is closely monitored. In the very unlikely event it develops an open or short circuit, or if the solenoid develops an open-circuit fault, an alarm immediately sounds so that disruption to regulation is minimized. **You can trust us and our products, period.**

**For all its versatility and reliability, the ROXY-4 is very reasonably priced!  
Would you trust your research to anything less?**

## **ROXY-4 TECHNICAL SPECIFICATIONS**

**Four chamber regulation**

**Uses fuel cell oxygen sensor, or user-supplied gas or pressure analyzer with voltage output**

**Covers the range** <1 - 99+% oxygen (fuel cell), or whatever range an attached analyzer can measure (analog input range -0.2V to +5.2V)

**Voltage sensitivity for attached sensor or analyzer:** <1 mV to +5.2 V

**Gain range and resolution:** gain 1 to 10,000 (auto-ranging), 24 bits resolution, update rate 5 Hz

**Gas pressure sensor** 0 - 350 kPa; sounds alarm if tank pressure falls below user-settable limit

**Gas pressure (input line):** 50 - 175 kPa (10 - 25 psi) recommended

**Fully self-contained, with display** - no expensive surprises!

**Microcomputer-based,** intelligent, auto-diagnosing

**Fully menu-driven;** intuitive and flexible

**Driftless digital controls** backed by 100-year memory

**Full user control** over all PID control parameters

**Power Requirement:** 100-240VAC or 12VDC operation

**Power consumption** 0.1W - 2W, depending on operation mode

**Digital** (RS-232) outputs for regulation monitoring and control

**Analog** output for regulation monitoring, 0 - 4 VDC, multiple ranges

**THREE YEAR WARRANTY**

If you're ready to make the move to **intelligent oxygen and/or CO<sub>2</sub> regulation and control**, contact us for pricing and other information.

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