Oxygen Safety Monitor

- Reliable laser diode technology
- Fast response
- Pressure and temperature correction
- Sample flow monitor
- Remote display and maintenance
- Accuracy with helium diluent
- Insensitive to movement
- Coded password access

You want a rock-solid and immediate alarm for oxygen less than 19.5% in the event of a cryogenic spill leading to rapid displacement of breathing air.

You also want an end to frequent recalibration of oxygen sensors, high maintenance of sampling systems, false alarms, and failure to alarm.

The Oxigraf Model O2iM may be the oxygen safety monitor you need.

Tunable Diode Laser Spectroscopy

The Oxigraf Model O2iM is the next generation oxygen deficiency (or oxygen enrichment) monitor. Laser diode absorption spectroscopy assures stable, long-life oxygen measurement: there are no electrochemical cells to replace or paramagnetic sensors to recalibrate. The laser diode, derived from high reliability telecommunications VCSEL (vertical cavity surface emitting laser) diode technology, is rated for more than 100,000 hours mean time to failure. The laser diode is thermally and electronically tuned to measure the absorption of oxygen at 763 nm, and also periodically measures the background to provide an automated zero. Pressure and temperature corrections are made to yield the correct oxygen concentration as the weather changes.

Fast Response

Blackout from lack of oxygen will cause a fall and possibly more serious consequences. Oxygen deficiency needs to be annunciated before the first breath. The Oxigraf Safety Monitor responds in less than a second. The transit time of the gas sample through the sampling tube may be 1 second per meter of sampling tube. To respond within 5 seconds, a monitor with a 1 second response time would need to be placed within 4 meters of the potential hazard. Electrochemical sensors may incorporate long averaging times, 20 or more seconds, for large, abrupt changes in oxygen concentration. Laser diode technology offers short response times to meet your safety requirements.

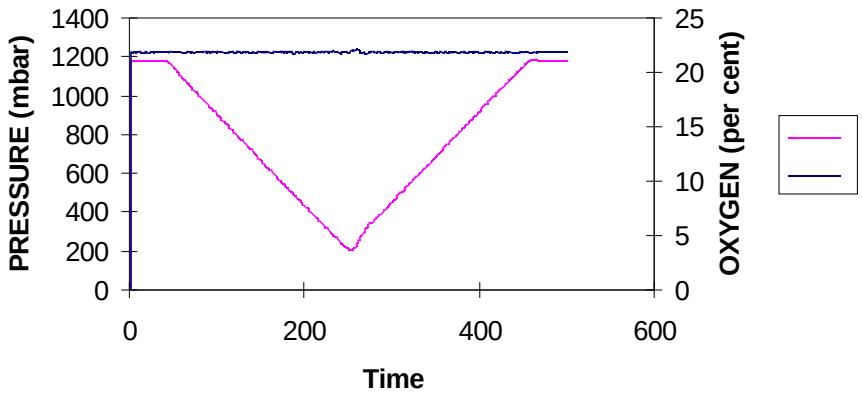
Temperature, Pressure, and Humidity

An error budget must be established for oxygen safety monitors. Humidity changes can cause a large variation in the oxygen measurement. A hot, wet day relative humidity of 50% at 37°C (99°F) corresponds to an absolute humidity of 3.2%. Such a water vapor dilution would cause a variation from the cold, dry air oxygen concentration of 20.9 to 20.2%, a change of 0.7%. If 19.5% is to be the alarm value, then variations from all

other sources must be substantially less than 0.7% (the difference between 19.5 and 20.2%).

Therefore, temperature and pressure corrections are important. An oxygen sensor which measures oxygen partial pressure instead of concentration would report an oxygen variation of 2% with a 10% variation in barometric pressure. The Oxigraf sensor is corrected to within ±0.2% over pressure changes of 50% and temperature changes from 0 to 50°C.

Pressure Insensitivity--21.9%



Sample Flow Monitor

The Model O2iM includes a sampling pump, hydrophobic filter, and flow sensor. The microprocessor controller maintains the flow at a constant value. Any flow blockage or pump failure is reported as a low flow fault. Filter impedance can also be measured to indicate a need for filter maintenance. Thus remote monitoring of the flow system is enabled.

Remote Display and Remote Maintenance

The Oxigraf Safety Monitor includes various communication outputs of oxygen concentration, alarms, flow, and system status. It is essential for safety to have both local and remote indication of oxygen deficiency. Another advantage of a remote display we call "remote maintenance". A major cost of oxygen deficiency monitors is the requirement for periodic maintenance and recalibration. With remote maintenance, site service and recalibration are no longer required to be periodic. Any system, power, flow or measurement faults will be flagged on a remote display, and service and calibration can be performed on an as-needed basis. For example, choosing an average oxygen concentration in humid air of 20.7%, the central monitor might flag measurements outside a range from 20.2 to 21.2% as requiring a calibration visit; with such a remote maintenance protocol, a periodic calibration frequency might be annual or less frequent.

Accuracy with Helium/Nitrogen Mixtures

It is important that the oxygen concentration measurement be correct irrespective of the foreign gas. Some electrochemical sensors have been found to be inaccurate when helium gas dilutes the oxygen, where a helium spill is the hazard to be detected. The false positive reading was about 3%, the electrochemical sensor reading 19.5% for an actual concentration of 16.6%. The Oxigraf sensor is accurate to ±0.2% with admixtures of noble gases, hydrocarbons, fluorocarbons, CO_2, and N_2O among other gases tested.

Insensitivity to Movement

The Oxigraf technology has no moving parts, in contrast to paramagnetic technology. Laser diode technology will have no false alarms due to equipment vibration, mechanical accidents, or even earthquakes.

Code Access

The 12-key capacitive-touch panel permits access control for maintenance and unit calibration.

O2iM Product Specifications

Measurement Range 0 to 100% Oxygen

Accuracy ±0.5%

Cross Sensitivity 0.2% (XC mode)

Response Time 500 ms at 200 ml/min flow rate, additional low pass filtering programmable

Ambient Temperature -10 to 50°C operating, -20 to 60°C storage

Gas Inlet Temperature -10 to 50°C

Gas Pressure 700 to 1150 mb

Humidity 0 to 95% non-condensing

Warm-up Time 5 minutes

Display Resolution 0.1% O_2

Analog Output 4 to 20 mA (max 750 ohm load), range programmable

Serial Outputs RS232 (TXD, RXD, Ground), RS485 Modbus compatible

Relays SPDT, 5 Amps, 115 VAC or 24 VDC
- Limit Relay 1: Programmable low limit or high limit, failsafe on/off
- Limit Relay 2: Programmable low limit or high limit, failsafe on/off
- Low Flow Relay: Active if sample flow problem
- System OK Relay: Programmable failsafe on/off

Power 15 to 32 VDC, 1.5 A max, 0.6 A typical
Optional 85 to 264 VAC, 50-60 Hz, 40 W max, 16 W typical

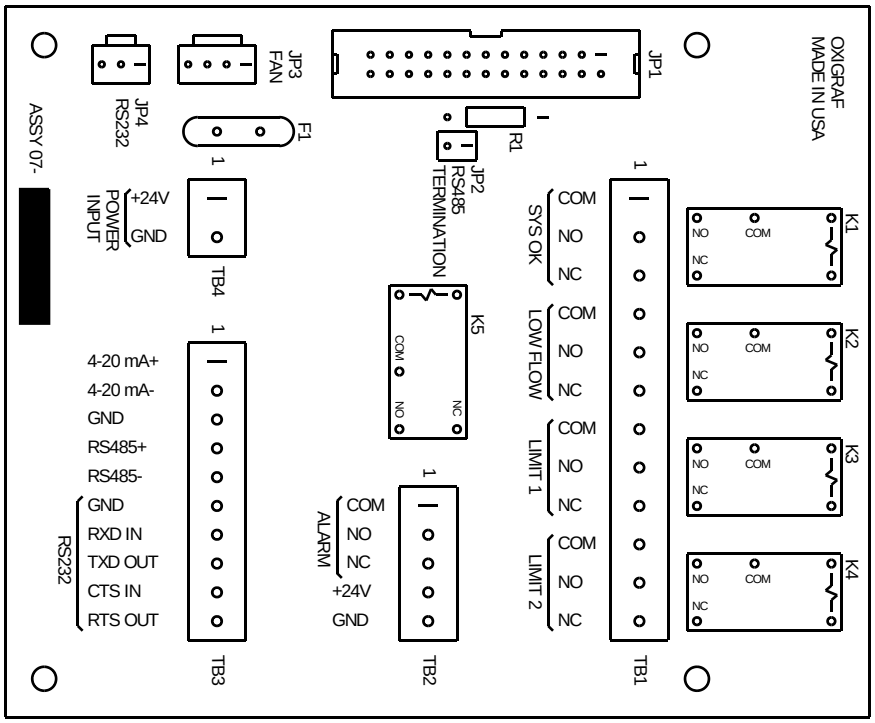
Display 16 x 2 character VFD, 8 mm character size

Strobe Red lens flashing strobe

Enclosure NEMA 4X rated non-metallic box with Lexan window, wall mounted.
Outside dimensions: 300 x 250 x 165 mm
Weight: 3.2 kilograms (8 pounds)
Conduit connection: ¾ EMT

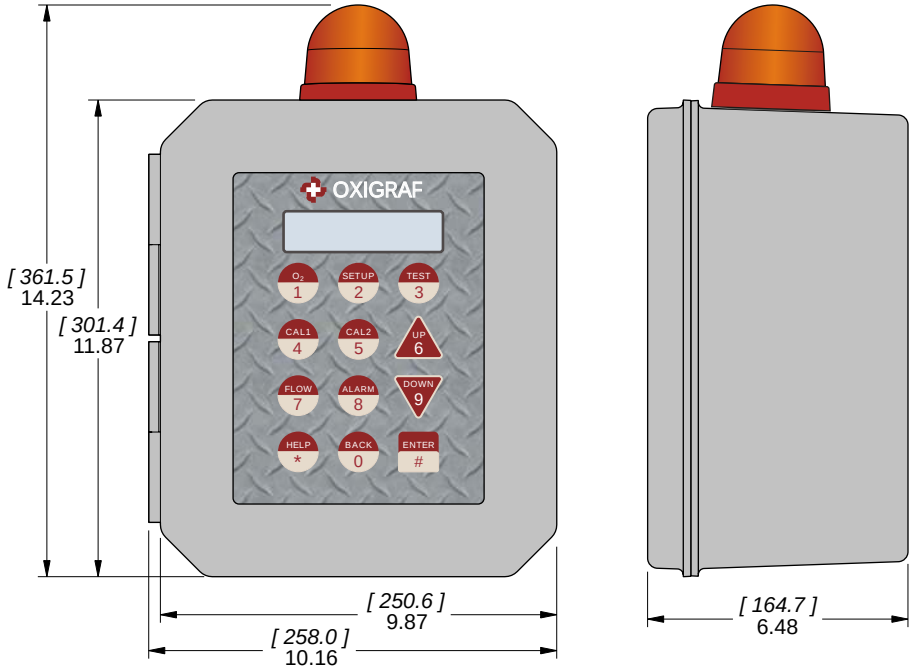
Electrical Interface Power Terminal strip
- 4-20 mA: Terminal strip
- RS232 Serial: Terminal strip and connector (Switchcraft EN3P3F)
- RS485 Modbus: Terminal strip
- Relays: Terminal strip

Pneumatic Interface A vibrator pump draws a gas sample at a flow up to 250 ml/min at atmospheric pressure. A hydrophobic PTFE inlet filter blocks any condensate. Sintered brass inlet and outlet filters protect the analyzer from other ingress.

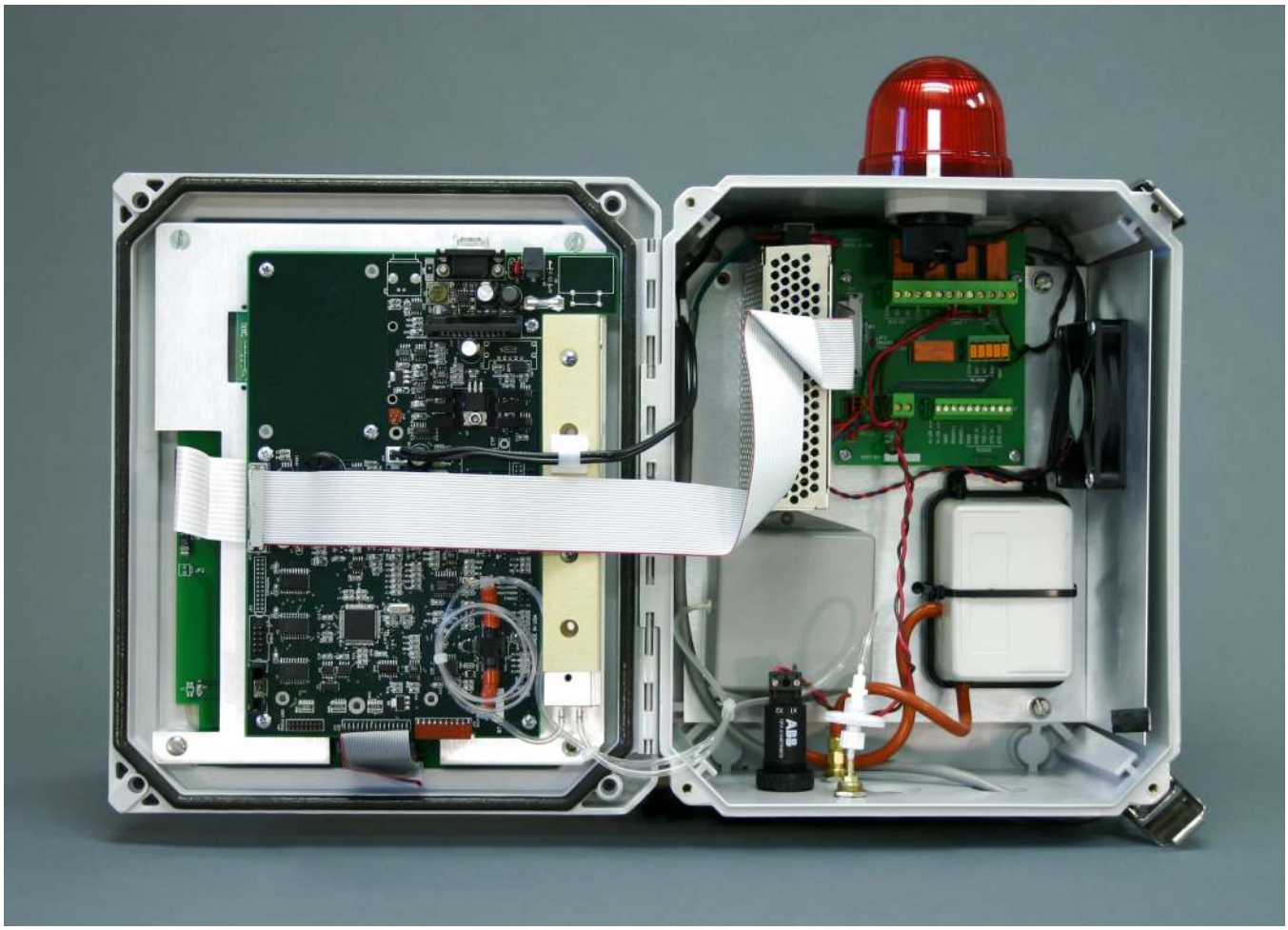


Relay and Interface Terminal Board

Oxigraf Model O2i Remote Transmitter Oxygen Sensor



Oxigraf Model O2i Process Monitor Oxygen Sensor



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