Oxygen Meter

model O2M-F

Owners Manual

Model: O2M
-D or -F

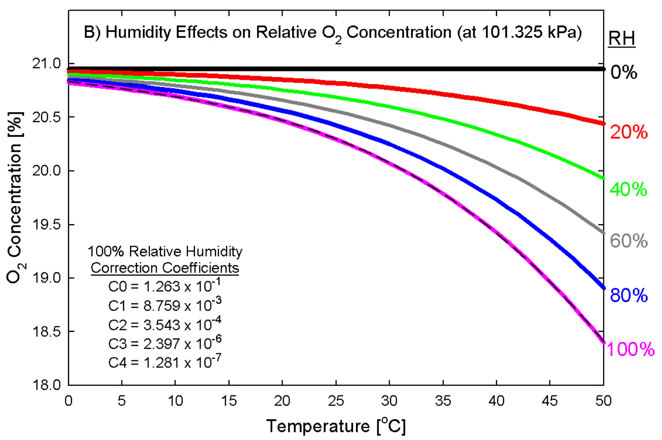
Oxygen Meter

This sensor is a galvanic cell type oxygen sensor that measures oxygen gas (O_2) in air. It has a lead anode, a gold cathode, an acid electrolyte, and a Teflon membrane. The current flow between the electrodes is proportional to the oxygen concentration being measured. An internal bridge resistor is used to provide a mV output. Unlike polargraphic oxygen sensors, they do not require a power supply. The hand-held meter used to measure the sensor uses a standard 9 V battery.

The mV output responds to the partial pressure of oxygen in air. The standard units for partial pressure are kPa. However, gas sensors that respond to partial pressure are typically calibrated to read out in mole fraction of the gas in air, or units of moles of oxygen per mole of air. These units can be directly converted to % O_2 in air, or ppm O_2 in air. The concentration of oxygen in our atmosphere is 20.9476 %, and this precise percentage has not changed for decades. It is also constant across changing temperatures or pressures. This allows for precise calibration of the instrument.

Humidity Changes

The graph below shows an example of humidity dependency. The sensor chemistry is not influenced by humidity, but its output decreases because O_2 is displaced by water vapor molecules in the air. The effect of humidity is larger at warmer temperatures because there is more water vapor in the air.



For use in high humidity, such as in soil, remove the head and take the calibration measurement over water in a sealed container as shown at right.

A flow-through or diffusion head is not required for taking measurements; heads remove by twisting. In this setup, the oxygen sensor has been connected to a petri dish to monitor germinating kernels of corn.

Effects on Output

Influence From Various Gases
The sensor is unaffected by CO, H_2, and various acidic gases such as CO_2, H_2S, NO_X, SO_X. However, the Teflon membrane used in the sensor may be damaged by ozone.

Temperature Sensitivity
By itself, the uncorrected mV output of the galvanic cell would follow changes of the absolute temperature. A 3 °C change at room temperature (about 25 °C), would change the output by approximately 1 %.

Pressure Changes
A change in barometric pressure changes the amount of oxygen available to the sensor and therefore changes what mV output correlates to oxygen's atmospheric constant of 20.95 %. To eliminate this possible error, simply re-calibrate.

Zero Offset
The mV output in ultra-pure nitrogen gas (0.000 % oxygen) is typically ± 0.05%. Precise measurements of hypoxic and anaerobic conditions can be made by making a periodic zero calibration of the sensor with ultra-pure nitrogen gas. The zero offset for each sensor is highly reproducible and should be entered into the programming after a zero- test.

Life Expectancy
The life expectancy of the sensor is expressed in %-hours as follows:

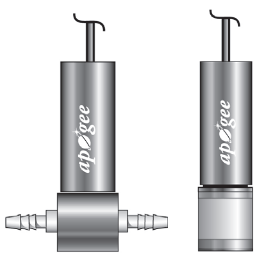
[Oxygen Concentration (%) x Exposure Time (hours)]

Accordingly, the life of the Apogee Oxygen Meter is 900,000 %-hours or approximately 5 years of continuous use at 21% oxygen at 20 ˚C.

Storage Temperature
The life of the sensor can be extended by storage at a lower temperature. For example a sensor stored at 0 ˚C will have a life expectancy approximately twice that of a sensor stored at 20 ˚C. The absolute minimum storage temperature is -20 ˚C. Below that temperature the electrolyte will freeze. Maximum storage temperature is 60 ˚C.

Shock And Vibration
The sensor is resistant to 2.7 G of shock. However, vibration may influence the sensitivity of the sensor and should be minimized.

Using the Meter

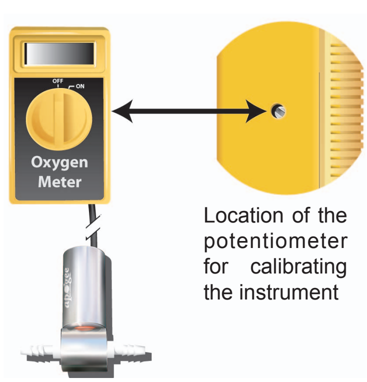


For the most stable reading, the sensor should be used with the sensor opening facing down. This facilitates the best contact of the electrolyte with the O_2 sensing elements.

1. To use the instrument, turn the dial to the "ON" position.

2. To calibrate, place the sensor in a well ventilated area and use a small screw driver to turn the potentiometer until the meter reads "100". This represents 100 % of the atmospheric constant 20.95 %.

5. Recalibrate as needed when changes in pressure, temperature, or humidity occur.



Location of the potentiometer for calibrating the instrument

Specifications

Sensor head dimensions	Diffusion Head (D)	Flow Through (F)
	1.375" tall, 1.375" dia., 125 mesh screen creates air pocket	3.5 long by 3.5 cm dia. 1/8" Barbed adapters for hose connections
Sensor dimensions	3.15 dia. by 6.85 cm long. 1/2" X 20 threaded end	
Mass	290 g	
Range	0 to 100% O_2	
Accuracy	< 0.01% O_2 drift per day	
Repeatability	±0.001% O_2 (10 ppm)	
Input power	Standard 9 V battery	
Operating environment	0 to 50 °C. Less than 90% non-condensing relative humidity up to 30 °C. Less than 70% RH from 30 to 50 °C	
Cable	2 meters of shielded, twisted pair cable wire with Santoprene casing. Extra cable 2.95/meter	
Warranty	1 year parts and labor	

apogee instruments inc.

435-792-4700
www.apogeeinstruments.com
techsupport@apogee-inst.com