Cemtek Instruments
Model 1010
Oxygen Analyzer

User's Manual

Manual P/N: 1000-0400
May 2009

Important Precautions

Safety Notice

This instrument operates from potentially lethal line voltage. In addition, some internal components operate at high temperature and can cause serious burns. Observe all precautions when using this device, and particularly be sure that all devices connected to the instrument are safely wired and properly grounded. Always disconnect power to the instrument before opening the enclosure or making any adjustments.

Contact Information:

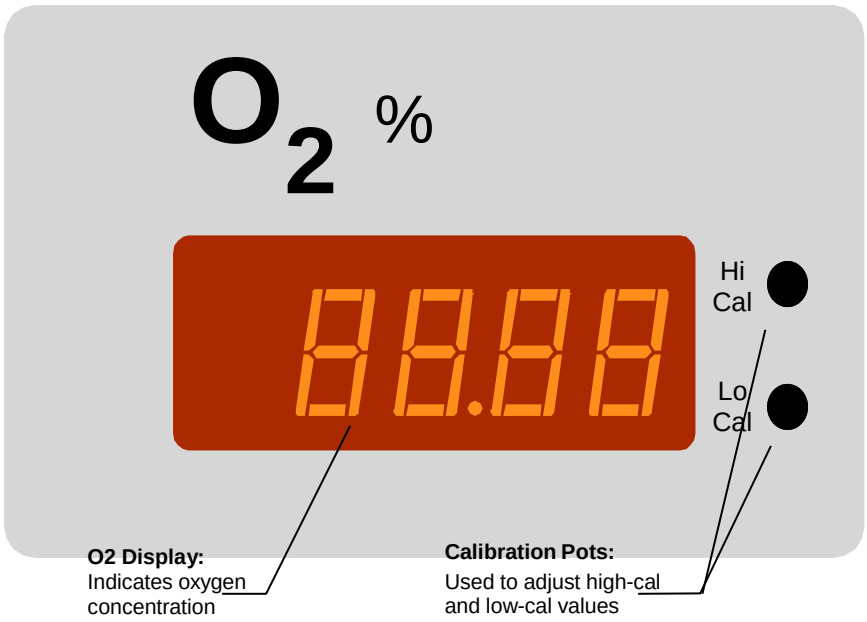
Telephone: (908) 474-9630

24 hr. Emergency Service: 888-400-0201

Specifications

Measurement technology	Zirconium oxide cell
Measurement range	0 to 25 % O2
Full scale range	25.0 % O2
Zero noise	< 0.02 %O2
Zero calibration drift	Better than ± 0.1 %O2
Span noise	< 0.02 %O2
Span calibration drift	Better than ± 0.1 %O2
Linearity error	< 1% of high calibration gas value
Interference (sum of all interferences)	< 1% of measured value for typical applications
Response time	T95 < 10 seconds
Sample Flow rate	0.2 to 10 SLPM

Front Panel Controls



Analyzer Setup

To ensure the quickest and most reliable startup, please follow the steps below in the order shown.

1. Apply power and sample to analyzer

1. Connect sensor (if external), analog signals, and AC wiring to the analyzer as depicted in the accompanying wiring diagram.
2. Supply a metered amount of sample to the analyzer and verify the Sample flow meter should be between 0.2 and 10 SLPM.
3. Apply power to the instrument (85 to 250 VAC, 50-60 Hz).

Warning: This instrument is designed for use with 85 to 250 VAC input power only. Serious equipment damage and/or injury will occur if it is connected to improper power.

4. After a few seconds, the oxygen concentration display will illuminate. The display will move from zero up to the approximate sample value in about one minute. It will fully warm-up in approximately 30 to 60 minutes.

2. Calibrate the analyzer

After installation and at least a 1-hour warm up period, the instrument can be calibrated via the following procedure.

Note: This oxygen analyzer calibrations are generally very stable. If the calibration appears to have drifted significantly, or requires frequent adjustment, do not recalibrate the unit. Check for analyzer malfunction and/or check the sample delivery system for leaks or other problems.

1. Low calibration:
   a. Flow low calibration gas (typically zero) through the sample handling system and analyzer. Dry nitrogen or EPA protocol gas is recommended as a low calibration gas.
   b. Wait approximately two minutes or until reading settles
   c. Adjust the "low cal" potentiometer on the front panel until the display reads the desired concentration (typically zero).
2. High calibration:
   a. Flow High calibration gas through the sample handling system and analyzer.
   b. Wait approximately two minutes or until reading settles
   c. Adjust the "high cal" potentiometer on the front panel until the display reads the desired concentration.

3. Calibrate the current outputs

Warning: This operation should only be performed by qualified service personnel. Some internal analyzer components are at high temperature and/or at lethal line voltage.

The analyzer provides a 4-20mA signal representing 0 to 25% oxygen concentration. This current loop is factory-calibrated and should never require adjustment under normal circumstances. If necessary, the current loop may be field calibrated using the trim potentiometers on the back of the large blue output module (underneath its label) on the display board, accessible by removing the top cover of the analyzer. Flow zero and span concentrations to the analyzer, verify the display reads the proper value, and adjust the zero and span pots to calibrate the analog output to correspond with the display values. The span pot is nearest the center of the output module. The zero pot is nearest the edge.

Theory of Operation

Zirconium Oxide Measurement of O2

The oxygen measurement makes use of the fact that zirconium oxide conducts oxygen ions when heated above 600 °C. Platinum electrodes on the interior and exterior of a zirconium oxide tube provide a catalytic surface for the exchange of oxygen molecules and oxygen ions. As molecules encounter the platinum electrodes, they become ionized and are transported through the body of the zirconium oxide. This charge transport ultimately sets up an electric potential across the electrodes that is proportional to the log of the ratio of oxygen concentrations on each side of the oxide. Thus, if a reference gas (usually instrument air at 20.9 %O2) flows across the inner electrode, the concentration of sample gas flowing across the outer electrode can be determined. In a conventional zirconium-oxide oxygen analyzer, this voltage is exponentiated to determine the concentration.

In the Model 1010, a second zirconium-oxide cell is ganged together to pump oxygen into the first cell, which is maintained at a constant voltage. The amount of oxygen needed to maintain the primary cell at the operating point is a more sensitive measurement of sample concentration, and allows for measurement at zero oxygen. This pump signal is carefully measured and related back to the sample concentration.

Wiring Diagram