

ZR800 Process Oxygen Analyzers



The ZR800 Oxygen Analyzers offer unsurpassed accuracy, reliability and flexibility under the most demanding on-line operating conditions.



Features & Benefits

- Non depleting, maintenance free, oxygen sensor
- Ambient air or traceable gas calibration
- Microprocessor controlled functions
- Extremely fast response
- Sturdy, reliable construction with three mounting options
- Large, autoranging LED display
- Unaffected by vibration or position
- Specific to oxygen
- New hydrocarbon tolerant version for ultra high purity analysis
- 24VDC version

Conforms to European Directives:

Electromagnetic Compatibility Directive 2004/108/EC Low Voltage Directive 73/23/EEC

Unmatched Speed in High Performance On-Line Oxygen Analysis

Applications

Electronics

Solder Powder Production
Semiconductor Furnaces
Gas Quality

Metals

Heat Treating / Annealing
Steel Production
Pure Metal Production

Pharmaceutical

Inert Packaging
Fermentation
Vessel Blanketing

Process

Ceramics
Contact Lens Manufacturing
Food Packaging
Glass/Fibre Optics
Inert Gas Welding
Lamp Manufacturing
Solar Cell Manufacturing

General

Gas Production
Controlled Environments
Glove Boxes
Oxygen Deficiency
Research & Development

Unmatched Performance

Fast. Accurate. Reliable. Flexible. These characteristics are found in Illinois' process oxygen analyzers. The ZR800 Series Oxygen Analyzers are capable of measuring from 0.1ppm up to 100% oxygen in most industrial gas streams. With a response time and accuracy unparalleled in the industry, the ZR800 has found wide acceptance in the electronics, semiconductor, food processing, and gas manufacturing industries. These microprocessor controlled instruments have user-friendly menu driven software to customise the analyzer to meet your requirements. The ZR800 series is specifically designed to provide ultra fast oxygen analysis and performance you can count on.

Cabinetry & Mounting

Three different configurations to match your needs.

- Panel or bench mount
- NEMA 4X / IP66 waterproof and weatherproof
- 19 in. rack mount

Operator Interface /Diagnostics

- User-friendly menu
- Read-only mode available
- Diagnostic capabilities
- Fault alarms

Sampling Systems

- Bypass flowmeter
- Pressure regulator
- Sample pump
- Flow alarm
- Auto Calibration
- Cartridge Filter Kit

Outputs & Alarm Options

For charting, process control, or remote monitoring

- RS232 / 485
- Analog outputs
- High / low alarms
- Fault alarms
- Flow alarm

Precision Sensors

All ZR800 Oxygen Analyzers utilize precision Zirconia Oxide sensors for accurate detection of oxygen.

ZR810



ZR820



ZR830



Basic Principle of Operation

The oxygen detection cell is a high purity, high density, stabilised zirconia ceramic. The sensor produces a voltage signal relative to the oxygen concentration of the sample gas stream. The cell's logarithmic output is converted and linearized by a high speed microprocessor to provide a direct digital readout on the instrument's LED display.

Zirconia Oxide Sensor Theory

The conventional zirconium oxide cell consists of a zirconium oxide ceramic tube plated with porous platinum electrodes on its inner and outer surfaces. As the sensor is heated above 1112°F, it becomes permeable to oxygen ions (O₂⁻) with vacancies in its crystal lattice structure permitting their mobility. Because of this, the sensor becomes an oxygen ion-conducting electrolyte.

The electrodes provide a catalytic surface for the change in oxygen molecules, O₂, to oxygen ions, and oxygen ions to oxygen molecules. Oxygen molecules on the high concentration reference gas side of the cell gain electrons to become ions which enter the electrolyte. Simultaneously, at the inner electrode, oxygen ions lose electrons and become released from the surface as oxygen molecules.

When the oxygen concentration differs on each side of the sensor, oxygen ions migrate from the high concentration side to the low concentration side. This ion flow creates an electronic imbalance resulting in a DC voltage across the electrodes. This voltage is a function of the sensor temperature and the ratio of oxygen partial pressures (concentrations) on each side of the sensor.

The relationship between the oxygen concentration of the unknown gas, the oxygen concentration of the reference gas (typically air which is 20.9% oxygen by volume), the temperature, the voltage output, and the cell constant is defined by the Nernst Equation which states:

$$E(mV) = \frac{RT}{4F} \log \frac{O_2 \text{ Ref. gas}}{O_2 \text{ Sample}}$$

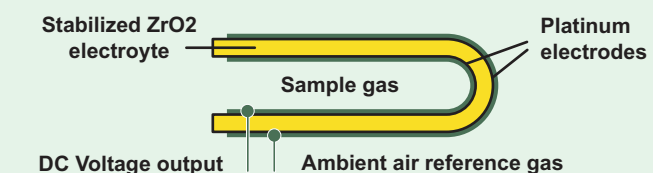
Where: R = gas constant

F = Faraday's constant

O₂ Ref. gas = partial pressure of oxygen in air

O₂ Sample = partial pressure of oxygen in sample gas

T = absolute temperature of Zirconia sensor



ZR800 Process Oxygen Analyzers



ZR810
Bench/Panel Mount
7.48H x 9.33W x 16.14D (inches)
17.4 lbs



ZR820
IP66/NEMA 4X
Wall Mount/Weatherproof
18.11H x 14.96W x 6.3D (inches)
34.2 lbs



ZR830
Rack Mount 4U - 19 inch
Houses 1 or 2 Analyzers
7H x 19.05W x 16.14D (inches)
21.4 lbs (single unit)

Technical Specifications

Range	Autoranging from 0.1ppm to 100%	
Accuracy	10% -100%	0.2% absolute (max 2% of reading) and ±1 on the last digit shown
	1% -9.99%	0.02% absolute (max 2% of reading) and ±1 on the last digit shown.
	100ppm - 0.999%	max 1% of reading and ±1 on the last digit shown
	0.1ppm - 100 ppm	max 2% of reading and ±1 on the last digit shown
Response Time	90% of step change within 5 seconds	
Repeatability	0.2% of measured value	
Measuring Cell Type	Stabilised zirconia sensor	
Operating Conditions		
Sample Inlet Pressure	0.25 to 4 Barg	
Sample Flow Rate	Approximately 150cc/min	
Sample Temperature	23 to 122°F (-5 to 50°C)	
Ambient Temperature	23 to 122°F (-5 to 50°C)	
Sample Humidity	0-99% non-condensing	
Sample Connections	1/8" OD compression fitting	
Communications	USB/RS232/RS485	
Unsuitable Gases	H ₂ S, Ammonia, Corrosive gases, Hydrocarbons, Combustibles, Hydrogen, NO ₂ , Carbon Monoxide, Halogenated Hydrocarbons, Sulphur containing compounds, Halogens, Lead containing compounds.	
	Note: Optional version for use with gases containing low ppm levels of hydrocarbons, combustibles, hydrogen and carbon monoxide for high purity analysis.	
Power Requirements		
Power Supply	90-260 VAC, 50/60 Hz, 80 VA 24 VDC version option.	
Display Type	4 digit high visibility LED	
Options		
High/Low Alarms	2 Volt free changeover contacts. Rated 240VAC / 5A	
Analog Outputs	Scaleable 4-20mA, 0-20mA, 0-10V, 0-100mV, all isolated, optional for 1 channel or 3.	
Autocalibrate	Provision for remote calibrate start and autocal in progress	
Sample Stream Options	Bypass flowmeter, Sample pump, Flow alarm, Stainless steel sample system in place of brass/copper.	
Nitrosave	O ₂ measurement and control system ZR8500	

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