



# Process Oxygen Analyzers

## ZR800

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

## 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" 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

## Contact Details

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## 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
- 24VDC version

## Applications

<b>Electronics</b>	Solder Powder Production Semiconductor Furnaces Gas Quality
<b>Metals</b>	Heat Treating / Annealing Steel Production Pure Metal Production
<b>Pharmaceutical</b>	Inert Packaging Fermentation Vessel Blanketing
<b>Process</b>	Ceramics Contact Lens Manufacturing Food Packaging Glass/Fibre Optics Inert Gas Welding Lamp Manufacturing Solar Cell Manufacturing
<b>General</b>	Gas Production Controlled Environments Glove Boxes Oxygen Deficiency Research & Development

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## 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 ( $O_2^-$ ) 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,  $O_2$ , 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:

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

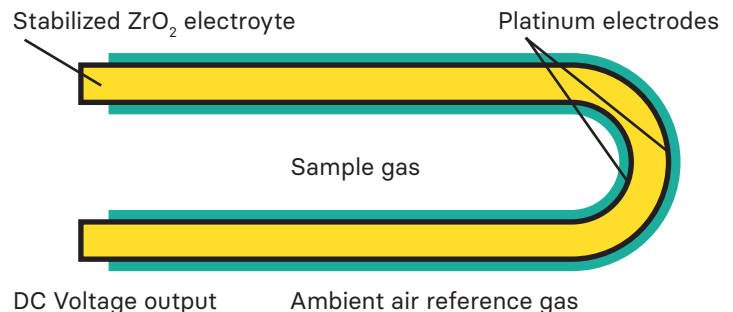
Where: R = gas constant

F = Faraday's constant

$O_2$  Ref. gas = partial pressure of oxygen in air

$O_2$  Sample = partial pressure of oxygen in sample gas

T = absolute temperature of Zirconia sensor



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## Technical Specification

<b>Range</b>	Autoranging from 0.1ppm to 100%	
<b>Accuracy</b>	10% -100%	0.2% absolute (max 2% of reading) and $\pm 1$ on the last digit shown
	1% -9.99%	0.02% absolute (max 2% of reading) and $\pm 1$ on the last digit shown.
	100ppm - 0.999%	max 1% of reading and $\pm 1$ on the last digit shown
	0.1ppm - 100 ppm	max 2% of reading and $\pm 1$ 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

### 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.

### 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<sub>2</sub>S, Ammonia, Corrosive gases, Hydrocarbons, Combustibles, Hydrogen, NO<sub>2</sub>, Carbon Monoxide, Halogenated Hydrocarbons, Sulphur containing compounds, Halogens, Lead containing compounds.

**Power Requirements** Power Supply 90-260VAC, 50/60Hz, 80VA  
24VDC version option.

**Display Type** 4 digit high visibility LED

### Weights & Dimensions

	Weight (lb)	Width (in)	Depth (in)	Height (in)
<b>ZR810</b> Bench/Panel Mount	17.4	9.33	16.14	7.48
<b>ZR820</b> IP66/NEMA 4X	34.2	14.96	6.3	18.11
<b>ZR830</b> (single unit) Rack Mount 4U - 19 inch Houses 1 or 2 analyzers	21.4	19.05	16.14	7

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Conforms to European Directives:  
Electromagnetic Compatibility Directive 2004/108/EC  
Low Voltage Directive 73/23/EEC