series **800**

Process Oxygen Analyzers

Advanced Technologies
in Process Oxygen
Measurement

illinois
instruments

The solution for demanding, on-line applications

The Series 800 Oxygen Analyzers offer unsurpassed accuracy, reliability, and flexibility under the most demanding on-line operating conditions.

Typical applications include:

Electronics
- Solder Powder Production
- Semiconductor Furnaces
- Gas Quality

Metals
- Heat Treating / Annealing
- Steel Production
- Alloys and Powdered Metals

Pharmaceutical
- Inert Packaging
- Fermentation
- Vessel Blanketing

Process
- Ceramics
- Contact Lens Manufacturing
- Food Packaging
- Glass/Fiber Optics
- Inert Gas Welding
- Lamp Manufacturing

General
- Gas Production
- Controlled Environments
- Glove Boxes
- Oxygen Deficiency
- R & D

Advanced Features:

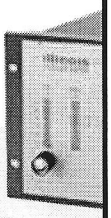
Technical innovation and product versatility combine to provide these useful and advanced features:
- Ambient air calibration
- Calibrated to NIST standards
- Microprocessor controlled functions
- Large, autoranging LED display
- Fast response
- Sturdy, reliable construction
- Unaffected by vibration or position
- Specific to oxygen
- Insensitive to sample flow rate

Unmatched Versatility in High on-line Oxygen Analyzers

Fast. Accurate. Reliable. Flexible. These are characteristics you require in a process oxygen analyzer. The new generation of oxygen analyzers from Illinois Instruments is designed with this in mind.

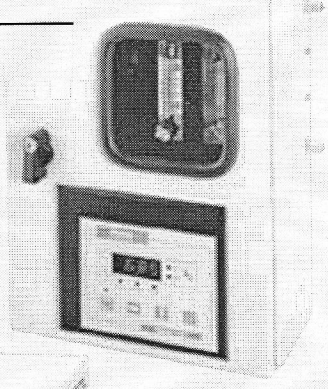
The Series 800 Zirconia Oxygen Analyzers are capable of measuring from 0.1ppm up to 100% oxygen in most industrial gas streams. With a response time and accuracy unparalleled in the industry, the Series 800 has found wide acceptance in the electronics, semiconductor, food processing, and gas manufacturing industries. These microprocessor controlled instruments have user-friendly menu driven software to customize the analyzer to meet your demanding needs.

The Series 800 Oxygen Analyzers.
Performance you can count on.

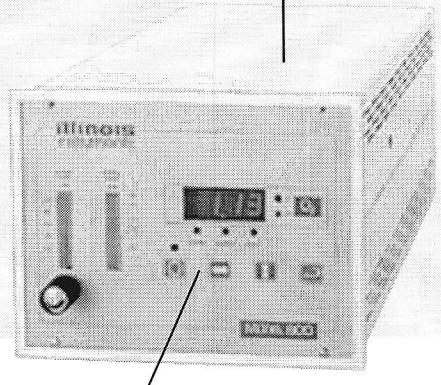


Cabinetry & Mounting

Three different configurations to match your needs.
- 19 in. rack mount
- NEMA 4X / IP66 waterproof and weatherproof
- Panel or bench mount



Model 820



Model 810

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

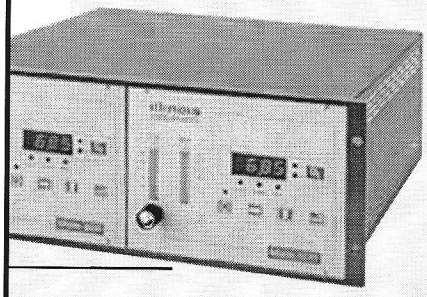
Sampling Systems
- Bypass flowmeter
- Pressure regulator
- Sample pump
- Flow alarm
- Auto Calibration

Performance

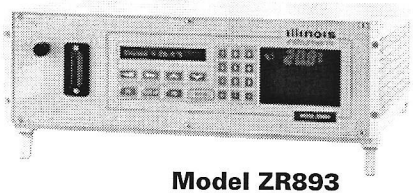
Outputs & Alarm Options

For charting, process control, or remote monitoring:

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



Model 830



Model ZR893

ZR893 Features:

- Alphanumeric display
- Range switching
- Programmable through 12 digit keyboard
- Both manual and automatic timed printout available
- Customized instrumentation systems are possible
- Large expansion possibilities
- Stream switching capabilities available
- Rack mount available
- Multi analyzer outputs

5.24"H x 17.68"W x 12.52"D
133mmH x 449mmW x 318mmD
16.74lb, 7.6kg

Precision Zirconia Oxide Sensors

All Series 800 Oxygen Analyzers utilize precision Zirconia Oxide diffusion sensors for accurate detection of oxygen.

Basic Principle of Operation

The oxygen detection cell is a high purity, high density, stabilized 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 micro-processor 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 1100°F (600°C), 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.

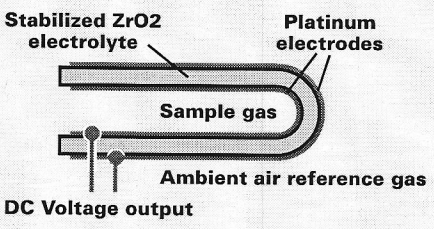
The platinum electrodes provide a catalytic surface for the change in oxygen molecules, O_2, to oxygen ions, and oxygen ions to oxygen molecules. Oxygen molecules on the high concentration reference gas side of the cell gain electrons to become ions which enter the electrolyte. Simultaneously, at the 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 potential across the electrodes. This voltage potential is a function of the sensor temperature and the ratio of oxygen partial pressures (concentrations) on each side of the sensor.

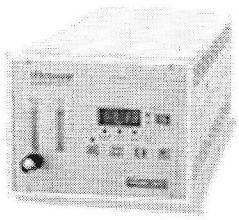
The relationship between the oxygen concentration of the unknown gas, the oxygen concentration of the reference gas (typically air which is 20.9% oxygen by volume), the temperature, the voltage output, and the cell constant is defined by the Nernst Equation which states:

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

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

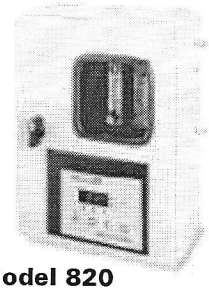


Series 800 Enclosure Options



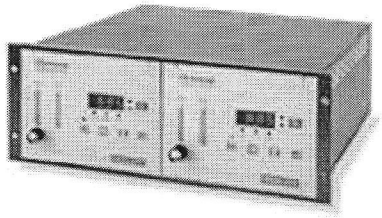
Model 810
Bench / Panel Mount

7.48"H x 9.33"W x 16.14"D
190mmH x 237mmW x 410mmD
17.4lb, 7.9kg



Model 820
IP66 / NEMA 4X
Wall Mount / Weatherproof

15.9"H x 12.91"W x 7.09"D
404mmH x 328mmW x 180mmD
28.9lb, 13.1kg



Model 830
Rack Mount 4U – 19 inch
Houses 1 or 2 analyzers

7.00"H x 19.06"W x 16.14"D
178mmH x 484mmW x 410mmD
21.4lb, 9.7kg (single unit)

Technical Specifications

Measurement Ranges:	Autoranging from 0.01ppm to 100%
Accuracy:	1% or better of measured value in ppm
Repeatability:	0.2% of measured value
Response Time:	90% of step change within 5 seconds
Display Type:	4 digit high visibility LED
Sample Connections:	1/8 in. Swagelok® type, brass
Max Sample Pressure:	90 P.S.I.
Sample Flow:	Approximately 150cc/min (.15L/min)
Sample Humidity:	0-99% non-condensing
Sample Temperature:	0-40C (32-104F)
Power Requirements:	110 / 220 VAC, 50 / 60 Hz
Operating Conditions:	Temperature – 0-40C (32-104F), Humidity – 0-99% non-condensing
Unacceptable Gases:	Hydrocarbons, Combustibles, Hydrogen, Carbon Monoxide, NO_2 Halogens, Halogenated Hydrocarbons, Sulphur containing compounds Lead containing compounds

Options

High / Low Alarms:	2 Voltage free with changeover contacts rated 240V 3A
Analog Outputs:	Scalable 0 - 10V, 0 - 100mV and 4 - 20mA or 0 - 20mA all isolated
Autocalibrate:	Programmable timed or manual to any oxygen level
Sample Stream Options:	Bypass Flowmeter, Sample Pump, Flow Alarm, Stainless Steel Sample System in place of brass/copper
OEM Package:	Model ZR897 is available for OEM configuration

CE

Analyzers conform to the following European Directives:
Electromagnetic Compatibility Directive 89/336/EEC, Low Voltage Directive 73/23/EEC

REPRESENTED BY:

illinois instruments

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