ZR800 Process Oxygen Analysers

SYSTECH Illinois

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

Features & Benefits

- Non depleting, maintenance free, oxygen sensors
- Ambient air or traceable gas calibration
- Microprocessor controlled functions
- Large, autoranging LED display
- Fast response
- Unaffected by vibration or position
- Sturdy, reliable construction with three mounting options
- Specific to oxygen

Conforms to European Directives:
Electromagnetic Compatibility Directive 89/336/EEC 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 Systech's process oxygen analysers. The ZR800 Series Oxygen Analysers 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 analyser 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
- Analogue outputs
- High / low alarms
- Fault alarms
- Flow alarm

Precision Sensors

All ZR800 Oxygen Analysers utilise 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 linearised 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 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.

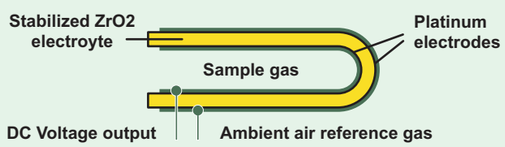
The electrodes provide a catalytic surface for the change in oxygen molecules, O_2, to oxygen ions, and oxygen ions to oxygen molecules. Oxygen molecules on the high concentration reference gas side of the cell gain electrons to become ions which enter the electrolyte. Simultaneously, at the inner electrode, 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



ZR800 Process Oxygen Analysers

ZR810
Bench/Panel Mount
190H x 237W x 410D (mm)
7.9 kg

ZR820
IP66/NEMA 4X
Wall Mount/Weatherproof
460H x 380W x 160D (mm)
15.5kg

ZR830
Rack Mount 4U - 19 inch
Houses 1 or 2 Analysers
178H x 484W x 410D (mm)
9.7kg (single unit)

Technical Specifications

Range	Autoranging from 0.001 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	-5 to 50°C
Ambient Temperature	-5 to 50°C
Sample Humidity	0-99% non-condensing
Sample Connections	1/8" OD compression fitting
Communications	RS232/RS485
Unsuitable Gases	H_2S, Ammonia, Corrosive gases, Hydrocarbons, Combustibles, Hydrogen, Carbon Monoxide, NO_2, Halogens, Halogenated Hydrocarbons, Sulphur containing compounds, Lead containing compounds

Power Requirements

Power Supply	115 / 230 VAC, 50 / 60 Hz
Display Type	4 digit high visibility LED

Options

High/Low Alarms	2 Volt free changeover contacts. Rated 240VAC / 5A
Analogue Outputs	Scaleable 4-20mA, 0-20mA, 0-10V, 0-100mV, 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.

Systech Illinois have over 25 years experience of providing analysis solutions for a wide range of industries. From our manufacturing plants in the UK and U.S we produce gas analysers for industrial process industries, headspace analysers for monitoring gas flushing of food products, and our range of permeation analysers.

Systech Instruments Ltd (UK)
17 Thame Park Business Centre,
Wenman Road,
Thame, Oxfordshire OX9 3XA
Tel: +44 (0)1844 216838
Fax: +44 (0)1844 217220
E-mail: advice@systech.co.uk
www.systechillinois.com

Illinois Instruments, Inc (U.S)
2401 Hiller Ridge Road
Johnsburg, Illinois 60051
U.S.A
Tel: +1 815 344 6212
Fax: +1 815 344 6332
E-mail: sales@illinoisinstruments.com
www.systechillinois.com

Illinois Instruments (Thailand)
6th fl Nopnarong Bldg No7
Ladprao23, Jatujak, Bangkok 10900
Thailand
Tel: +66 (0)2938 0798
Fax: +66 (0)2938 1058
E-mail: mai@illinoisinstruments.com
www.systechillinois.com

Systech Illinois (China)
Room 519, No.3 FuCheng Building
No. 900 Quyang Rd, Hongkou district,
Shanghai, China 200434
Tel: +86 21 65533022
Fax: +86 21 65539651
Email: info@systechillinois.cn
www.systechillinois.cn