Panametrics

Datasheet

Delta F nondepleting oxygen sensor

Couloumetric electrochemical oxygen sensor

The nondepleting oxygen cell is a couloumetric electrochemical oxygen sensor used for oxygen measurement in the following industries and applications:

Petrochemical industry

- Purity of olefins
- Gas production industry
- Purity monitoring of argon, hydrogen, nitrogen and helium

Metals industry

- O_2 atmospheres in heat-treating furnaces

Semiconductor industry

- Gas purity/trace O_2

PANA089DS Rev. 5

Nondepleting oxygen cell with electrolytic oxygen sensor

Periodic replacement and reconditioning eliminated

The sensor operates on a simple coulometric process in which oxygen in the sample gas is reduced in an electrochemical cell. Unlike conventional electrochemical oxygen cells, the electrodes in this advanced cell are nondepleting, so they don't undergo chemical changes as oxygen is measured. As a result, periodic cell replacement or conditioning is not required.

Parts per billion oxygen measurement

For oxygen measurement in ultrapure gas applications, an ultralow range sensor that is sensitive to less than five ppb is available. The sensor is equipped with VCR fittings to ensure system cleanliness and integrity.

Withstands acid gases

For most applications where acid gas constituents are present, the patented STAB-EL™ electrolyte option eliminates the need for troublesome gas scrubbing equipment by permitting direct exposure of the cell to the gas stream. These cells have a reputation for reliability in applications that are too difficult for most other oxygen sensors.

Sensor placement

The basic sensor is available separately. It can be mounted in safe or hazardous areas, as it is an intrinsically safe device when connected to a Panametrics moisture analyser. However, for Type 4 applications requiring indoor/outdoor water- and dust-tight enclosures, an R4 sensor is available that is housed in a weatherproof enclosure with integral mounting flanges.
For hazardous (classified) locations, an R7 sensor is available. It is housed in a flame-proof, aluminum electrical box that is rated for hydrogen service, but only for ATEX installations.

Features

- Used with moisture series analyzers to measure oxygen concentration in gases from trace to percent levels
- Ultralow range for ultrapure gas applications
  is sensitive to less than 5 ppb oxygen
- Sensors available for indoor/outdoor
  water- and dust-tight enclosures
- No gas scrubbing equipment needed
  for acid gas applications
- No periodic replacement or reconditioning
  of cells is needed
- Intrinsically safe option available for hazardous areas
- Optional VCR fittings for enhanced
  system cleanliness and leak integrity

Technical **Specifications**

Overall

Type	Nondepleting couloumetric electrolytic oxygen sensing cell
Available sensor ranges/ accuracy	• ppb O_2 range » DFOX-1, 0 to 500 ppb/ 5 ppm/ 50 ppm, 1/4 VCR+/- 3% of reading or 10 ppb • ppm O_2 range » DFOX-9, 0 to 1/10/100 ppm, 1/4 VCR » DFOX-2, 0 to 1/10/100 ppm, 1/8 compression +/- 3% of reading or 50 ppb » DFOX-3, 0 to 10/100/1000 ppm, 1/8 compression +/- 3% of reading or 200 ppb » DFOX-4, 0 to 100/1000/10,000 ppm, 1/8 compression +/- 3% of reading or 2 ppm » DFOX-5, 0 to 50/500/5,000 ppm, 1/8 compression +/- 3% of reading or 1 ppm
Sensitivity	Less than 5 ppb (0 to 500 ppbv range)
Response time	• Fast response to O2 change • Equilibrium time is application specific
Ambient temperature	41°F to 113°F (+5° to 45°C)
Background gas compatibility	STAB-EL® cell: All gas compositions including those containing “acid” gases such as CO2, H2S, Cl2, NOx, SO2, etc.
Hazardous area classification	• ATEX/IECEX intrinsically safe • II 1G Ex ia IIC T5 Ga • Tamb = −4°F to +122°F (−20°C to +50°C) • US/CAN Class I, Division 1, Groups A, B, C, D, T4 • ATEX Flameproof II 2 G Ex dIIC T6 Gb
European compliance	Complies with EMC Directive 2004/108/EC when connected to a moisture.IQ, Moisture Image® Series 1, Moisture Image® Series 2 or Moisture Monitor™ Series 3 analyzer

Sample requirements

Inlet pressure	0.2 psig to 1.0 psig (0.013 barg to 0.06 barg) (standard range)
Flow rate	0.5 to 1.5 SCFH
Moisture	No limits (avoid condensation)
Oil/solvent mist	• Less than 0.5 mg/ft³ (standard range) • Greater than 0.5 mg/ft³ (use filter)
Solid particles	• Less than 2.0 mg/ft³ (standard range) • Greater than 2.0 mg/ft³ (use filter)

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