

Delta F Nondepleting Oxygen Sensor

Coulometric Electrochemical Oxygen Sensor



Applications

The nondepleting oxygen cell is a coulometric 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

- O₂ atmospheres in heat-treating furnaces

Semiconductor Industry

- Gas purity/trace O₂

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



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. 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 an explosion-proof, aluminum electrical box that is rated for hydrogen service, and can be used in Class I, Groups B,C&D; Class II, Groups E,F&G; and Class III, hazardous locations.



Nondepleting Oxygen Cell Specifications

Overall

Type

Nondepleting coulometric electrolytic oxygen sensing cell

Available Sensor Ranges / Accuracy

ppb O₂ Range

DFOX-1, 0 to 500 ppb/ 5 ppm/ 50 ppm, 1/4 VCR
+/- 3% of reading or 25 ppb

ppm O₂ 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

% O₂ Range

DFOX-6, 0 to 5%, 1/8 compression
+/- 3% of reading or 10 ppm

DFOX-7, 0 to 10%, 1/8 compression
+/- 3% of reading or 20 ppm

DFOX-8, 0 to 25%, 1/8 compression
+/- 3% of reading or 50 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

32°F to 120.02°F (0°C to 49°C)

Background Gas Compatibility

- STAB-EL® cell: All gas compositions including those containing "acid" gases such as CO₂, H₂S, Cl₂, NO_x, SO₂, etc.

Hazardous Area Classification

BASO1ATEX1098X

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

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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