

Nondepleting Oxygen Cell

Panometrics Electrolytic
Oxygen Sensor



Applications

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

Metals Industry

- O₂ atmospheres in heat-treating furnaces

Semiconductor Industry

- Gas purity/trace O₂

Gas Production Industry

- Purity monitoring of argon, hydrogen, nitrogen and helium

Petrochemical Industry

- Purity of olefins

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
- Explosion-proof sensors available for hazardous areas
- VCR fittings assure system cleanliness and 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 electrolytic oxygen sensing cell

Available Cells

ppbv O₂ Range

- L: 0 to 500 ppbv/5 ppmv/50 ppmv
- Ranges for each cell are software selectable in Panametrics analyzers

ppmv O₂ Ranges

- A: 0 to 1/10/100 ppmv
- B: 0 to 10/100/1,000 ppmv
- C: 0 to 100/1,000/10,000 ppmv
- D: 0 to 50/500/5000 ppmv
- Ranges for each cell are software selectable in Panametrics analyzers

Percent O₂ Ranges

- A: 0% to 5%
- B: 0% to 10%
- C: 0% to 25%

Accuracy

- ±1% full scale (FS) (ranges > 0 to 2.5 ppmv)
- ±5% FS (ranges < 0 to 2.5 ppmv)

Sensitivity

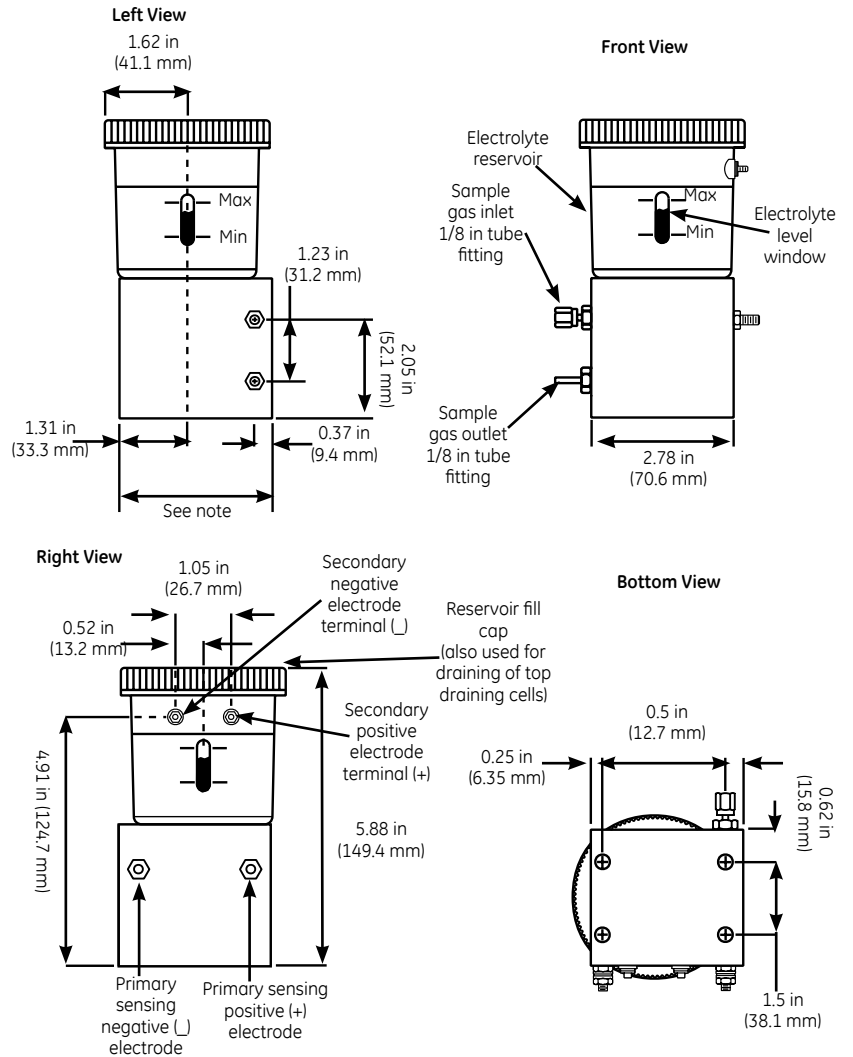
Less than 5 ppb (0 to 500 ppbv range)

Response Time

- Sensor responds instantaneously to O₂ change
- Equilibrium time is application specific

Ambient Temperature

32°F to 120.02°F (0°C to 49°C)



This dimension is dependent upon the oxygen range of the sensor used and varies as follows:

Range	Dimension in (mm)
5,000 ppm	2.74 (69.6)
1%	2.85 (72.4)
25%	2.98 (75.7)
2.5%, 5%, 10%	3.10 (78.7)

Nondepleting oxygen cell dimension

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

- Intrinsically safe when connected to a GE Panametrics Moisture Series analyzer (rack-, bench- or panel-mount Series 1, 2 or 3 with serial no. 2001 or above) in accordance with the user's manual. The oxygen cell connection to the analyzer must comply with IP20 or CSA Type 2 protection requirements.
- Ex II 1 G EEx ia IIC T5
-4°F to +122°F (-20°C to +50°C)
- BAS01ATEX1098X
- CSA c-us Class I, Division 1, Groups A, B, C, D, T4

European Compliance

Complies with EMC Directive 2004/108/EC when connected to a Moisture Image® Series 1, Moisture Image® Series 2 or Moisture Monitor™ Series 3 analyzer

Sample Requirements

Inlet Pressure

- Less than -0.5 psig (-0.03 barg) (use compressor)
- -0.5 psig to 0.2 psig (-0.034 barg to 0.013 barg) (use pump)
- 0.2 psig to 1.0 psig (0.013 barg to 0.06 barg) (standard range)
- 1.0 psig to 60 psig (0.06 barg to 4.13 barg) (use valve or regulator)
- 60 psig (4.13 barg) (use pressure regulator)

Flow Rate

0.5 to 1.5 L/min

Moisture

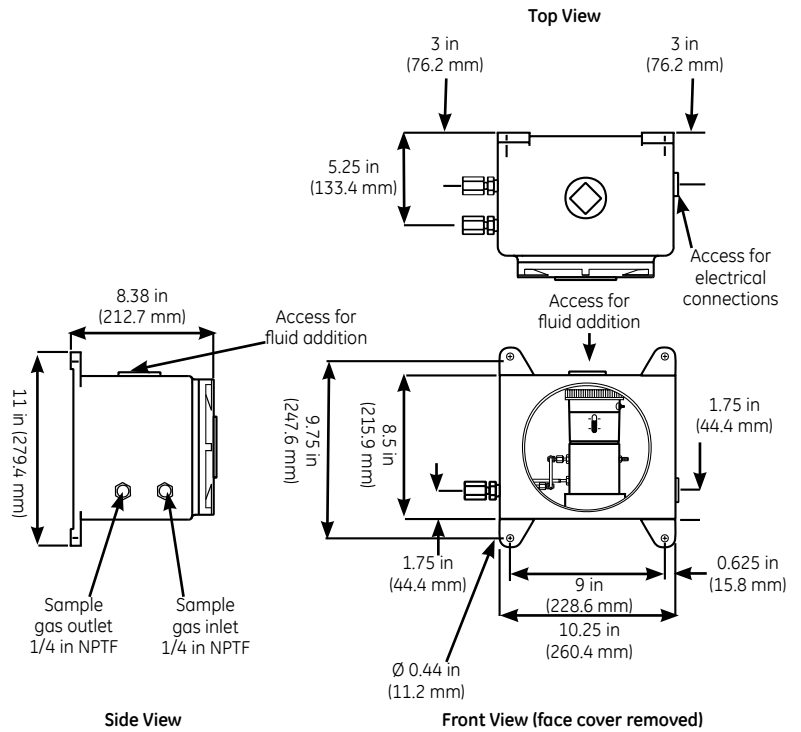
No limits (avoid condensation)

Oil/Solvent Mist

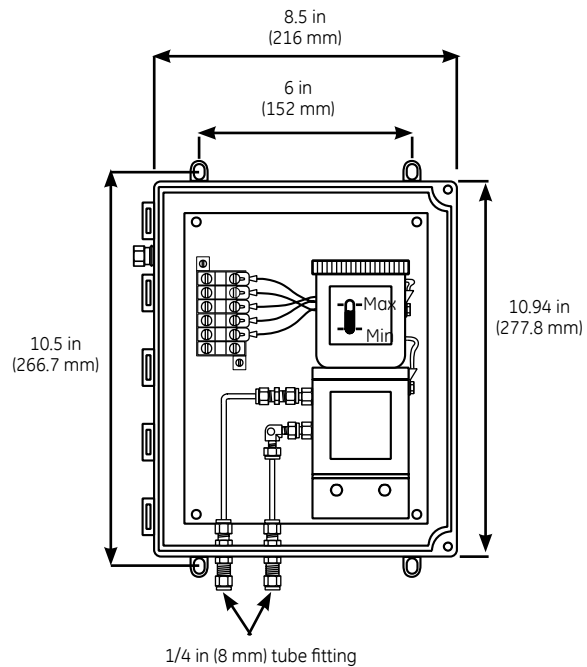
- Less than 0.5 mg/ft³ (standard range)
- Greater than 0.5 mg/ft³ (use filter)

Solid Particles

- Less than 2.0 mg/ft³ (standard range)
- Greater than 2.0 mg/ft³ (use filter)



R7 oxygen sensor cell (Type 7)



R4 FRP oxygen sensor cell (Type 4)



www.ge-mcs.com

920-014C