



***PI2-UHP 50 / PI2-UHP 100  
PPB Oxygen Analyzers  
Ultra-High Purity Semiconductor Gases***

**Pico Ion  
2nd Generation**



**Sensor  
Technology**

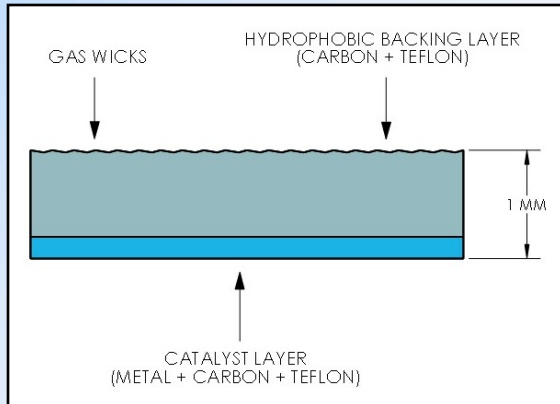
- Lower Detection Limit < 100 PPT Oxygen**
- Fast Recovery from Upset Conditions**
- Selectable Signal Processing Enhances Stability**
- Automated Cal & Bypass Sample System Standard**
- Easy to Use via Front Panel or Digital Communication**
- No Electrolyte Additions or Chemicals to Handle**
- No Maintenance Maximum Online Service**
- Low Cost of Ownership with Comparable Performance**

## 2nd Generation Pico-Ion Sensor Technology

The presence of parts-per-billion levels of oxygen in ultra-high purity semiconductor process gases such as nitrogen, argon, helium and hydrogen can adversely affect both manufacturing yields and quality. Oxygen can react with silicon during processing, forming undesirable gate oxide growth on the wafer surface that alters the characteristics of the device.

### 2nd Generation Pico-Ion PPB Oxygen Sensor Technology

A proprietary sensing electrode engineered and manufactured internally provides a significantly higher signal output per unit area.

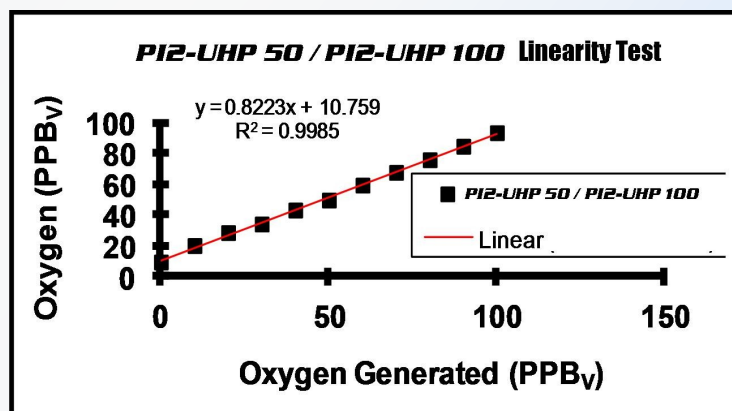


O<sub>2</sub>

This "Metal Catalyzed Gas-Diffusion Electrode" produces an advanced oxygen sensor with a significantly higher signal output and a number of advantages:

- ▶ Lower detectable limit (LDL) of less than 100 PPT
- ▶ High signal to noise ratio provides excellent stability
- ▶ Response time less than 15 seconds
- ▶ Minimizes the temperature dependence of the sensor's signal thereby ensuring long term stability
- ▶ Fast recovery from high oxygen levels during process upset conditions
- ▶ Approximately 12 months of continuous use

The design of the gas chamber above the cathode maximizes the rate oxygen reacts at the cathode thereby minimizing the amount of oxygen that escapes un-reacted and dissolves in the electrolyte.



**End result:** High performance < 100 PPT oxygen, stable output, no maintenance or electrolyte additions..

## 2nd Generation PI2 PPB Oxygen Analyzer

The 2nd generation Pico Ion (PI2) PPB oxygen analyzer focuses on: refining the higher signal output of the new Pico Ion oxygen sensor to provide stable reliable oxygen readings and enhancing and expanding the interface between the operator and the analyzer.

### Expanded Operator Interface

The analyzer is operated by proprietary easy to use menu driven software. Intuitive information is displayed on a large graphical LCD display which the user navigates via four control keys. The analyzer can be operated remotely using a communication link (user specified USB or RS232 or RS-485) and allows the operator to:

- ▶ Select signal filtering to accelerate response time for monitoring recovery from oxygen excursions
- ▶ Select temperature coefficient to fine tune the temperature compensation for added stability
- ▶ Select auto ranging or a fixed manual range
- ▶ Select and lock a specific signal output range while the local LCD display auto-ranges
- ▶ Select the introduction of sample, zero and span gases
- ▶ Program the timing of auto zero and auto span calibration
- ▶ Program the fixed number of data points and recording interval of the integral data logger
- ▶ Automatically isolate the oxygen sensor in standby mode in the event power is interrupted
- ▶ Sensor condition is displayed by the LCD at each calibration



### Standard Full Featured Automated Sample System

The 2nd generation PI2-UHP analyzers continue to offer as standard full featured ultra-clean sampling system designed for the exacting requirements of detecting < 100 PPT oxygen levels.

- ▶ 316 stainless wetted parts including electro-polished tubing, Face Seal fittings or orbital welded connections
- ▶ Integral pressure regulator and flow control
- ▶ Pneumatic diaphragm valves that operate:
  - Sample and span gas inlets
  - Integral bypass system that isolates the sensor from high oxygen levels and
  - An oxygen scrubber system for generating consistent zero gas
- ▶ Temperature control of the sample system combined with the higher output of the Pico Ion sensor limits signal drift during day-and-night cycles where ambient temperatures fluctuations were typically  $\pm 10^{\circ}\text{F}$ .

### Flexible Configuration

The analyzer is packaged in a compact bench top enclosure and is suitable for panel or 19" rack mounting with optional bezels.

The PI2-UHP analyzers are ideal for either dedicated on-line analysis of process gases or tracking down leaks and certifying the integrity of the piping delivery systems as part of a mobile cart.



### Unrivalled Low Cost of Ownership, Performance & Value

The new 2nd Generation Pico-Ion Oxygen Sensor Technology and PI2-UHP Series Oxygen Analyzers provide a cost effective, high performance and easy to use no maintenance solutions for detecting sub-PPB level oxygen contamination in UHP process gases.



## Technical Specifications \*

|              | <i>PI2-UHP 50</i>   | <i>PI2-UHP 100</i>  |
|--------------|---|---|
| Accuracy:    | ± 3% of reading or ± 0.25 PPB at constant temp, pressure, flow                          | ± 3% of reading or ± 0.5 PPB at constant temp, pressure, flow                           |
| Analysis:    | 0-50, 0-100 PPB, 0-1, 0-10 PPM Full Scale ranges  | 0-100 PPB, 0-1, 0-10 PPM, 0-100 PPM Full Scale ranges                                   |
| Application: | Analyze PPB O <sub>2</sub> in ultra high purity N <sub>2</sub> , He, Ar, H <sub>2</sub> | Analyze PPB O <sub>2</sub> in ultra-high purity N <sub>2</sub> , He, Ar, H <sub>2</sub> |
| LDL:         | < 100 PPT   | < 250 PPT   |
| Sensor:      | GPR-13-2000 UHP-2E  | GPR-13-2000 UHP-2   |

| Area Classification: | General purpose, CE certified   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
|----------------------|---|-----------------------|----------------------------|-----------------------|----------------------------|-------|----------|--------|------------|-------|----------|-------|------------|
| Alarms:              | 2 adjustable form C relay contacts non-latching; "weak sensor" indicator; power failure   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Calibration:         | Certified span gas of O <sub>2</sub> content (balance N <sub>2</sub> ) approximately 5-8 PPM  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Compensation:        | Barometric pressure and temperature; heated sample system and sensor housing  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Connections:         | Sample and span inlets - 1/4" Face Seal fittings; air inlet and vent - 1/4" compression tube fittings   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Controls:            | Water resistant keypad; menu driven range selection, calibration, alarm and system functions  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Data Acquisition:    | Selectable data point intervals: USB or RS232 or RS485  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Display:             | Graphical LCD 5 x 2.75; resolution 0.01 ppb; displays real time ambient temperature and pressure  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Enclosure:           | Bench top, painted aluminum 13.9" x 9.9" x 13.4"<br>Options: panel or 19" rack mounting   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Flow:                | Recommended flow rate 1-2 SCFH  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Linearity:           | > .995  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Pressure:            | Inlet - 20-50 psig, max 150 psig; vent - atmospheric  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Power:               | Specify 100-240 VAC   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Range ID:            | 1-5VDC and 4-20mA, optional Dry Relay Contacts  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Recovery Time:       | <table border="1"> <thead> <tr> <th>O<sub>2</sub> Level</th> <th>Duration</th> <th>O<sub>2</sub> Target</th> <th>Recovery on N<sub>2</sub></th> </tr> </thead> <tbody> <tr> <td>9 PPM</td> <td>1 minute</td> <td>10 PPB</td> <td>15 minutes</td> </tr> <tr> <td>9 PPM</td> <td>1 minute</td> <td>1 PPB</td> <td>60 minutes</td> </tr> </tbody> </table> | O <sub>2</sub> Level  | Duration                   | O <sub>2</sub> Target | Recovery on N <sub>2</sub> | 9 PPM | 1 minute | 10 PPB | 15 minutes | 9 PPM | 1 minute | 1 PPB | 60 minutes |
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| 9 PPM                | 1 minute  | 10 PPB                | 15 minutes                 |                       |                            |       |          |        |            |       |          |       |            |
| 9 PPM                | 1 minute  | 1 PPB                 | 60 minutes                 |                       |                            |       |          |        |            |       |          |       |            |
| Response Time:       | <15 seconds   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Sample System:       | Pressure regulation, flow control and indicator. Pneumatic (separate 80 psig minimum air supply) valves control sample and span gas inlets, bypass and isolation of sensor, and, integral zero gas system. Electro-polished tubing with orbital welded or Face Seal connections.  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Sensor Life:         | 12 months   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Signal Output:       | 4-20mA isolated, 0-1V and 0-5V Full Scale   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Temp. Range:         | 0° to 45°C  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Warranty:            | 12 months analyzer; 12 months sensor  |                       |                            |                       |                            |       |          |        |            |       |          |       |            |
| Wetted Parts:        | Stainless Steel   |                       |                            |                       |                            |       |          |        |            |       |          |       |            |

\* Specifications subject to change without notice



## PI2-UHP 50 / 100 PPB Oxygen Analyzers

**2nd Generation Pico-Ion™ Sensor**

**LDL < 100 parts-per-trillion**

**Fast Recovery from Upset Excursions**

**No Maintenance or Electrolyte Additions**

**Expanded User Interface**

**Full Featured Sample System Standard**

**Choice of Communication Link**

**Low Cost Ownership - High Performance**

