## Overview

The Model 4501-XX Series Toxic Gas 2-wire gas sensor modules allow easy direct connection to many DCS, PLC and other control devices. The sensor module is best in class for ease of installation, reliable operation, ease of use with 180 day calibration cycle, low cost of operation.

- Industry's longest calibration interval of 180 days
- 2-wire loop powered for easy installation and direct interface to common PLC and DCS
- Integral scrolling LCD 2-line, 16 character display
- Non-intrusive one-person calibration
- 316 Stainless Steel or Aluminum enclosure
- 4-20 mA output
- Long sensor life
- Robust RFI immunity
- Ability to rotate face plate to enable the enclosure to be mounted in any orientation

The 4501-XX Gas Sensor Module utilizes the electrochemical cell to monitor for the specified gas over various gas specific ranges. This compact Module requires minimal maintenance. Internal continuous self-diagnostics will automatically indicate any fault problems. The 4501-XX is best in class providing all the built-in features desired by instrumentation and safety professionals.

## How It Works

Electrochemical sensors are fuel cell-like devices consisting of an anode, cathode, and electrolyte. The components of the cell are selected so a subject gas, allowed to diffuse into the cell, will cause a chemical reaction and generate a current. The cells are diffusion limited so the rate the gas enters the cell is solely dependent on the gas concentration. The current generated is proportional to the rate of consumption of the subject gas in the cell.

Sierra Monitor electrochemical sensors provide improved reliability by allowing the gas to diffuse into the sensor through a capillary port, rather than diffusing through membranes. The result is an extremely stable sensor with very low temperature and pressure coefficients and the capability to monitor gas as ppm (toxics).

| Model 4501 Series Sensors | |
|---|---|
| 4501-03 | Oxygen, $O_2$ |
| 4501-04 | Carbon Monoxide, CO |
| 4501-05 | Hydrogen Sulfide, $H_2S$ |
| 4501-06 | Chlorine, $Cl_2$ |
| 4501-08 | Chlorine Dioxide, $ClO_2$ |
| 4501-10 | Sulfur Dioxide, $SO_2$ |
| 4501-12 | Nitrogen Dioxide, $NO_2$ |
| 4501-25 | Ammonia, $NH_3$ |
| 4501-26 | Hydrogen Fluoride, HF |
| 4501-27 | Ethylene Oxide, ETO |

| Gas Type | Model | Std. Range [1] | Opt. Max Range | Resolution | Response Time [2] | Sensor Life | Operating Range [1] | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | °F | °C | RH* |
| Oxygen | 4501-03 | 0-25 %Vol | 25 %Vol | 0.2% | <10 sec. | 20 Months | - 4 to 122 | -20 to 50 | 15 – 90% |
| Carbon Monoxide | 4501-04 | 0-1500 PPM | 1200 PPM | 0.5 PPM | <25 sec. | 2 Years | - 4 to 122 | -20 to 50 | 15 – 90% |
| Hydrogen Sulfide | 4501-05 | 0-100 PPM | 100 PPM | 0.1 PPM | <30 sec. | 2 Years | - 40 to 122 | -40 to 50 | 15 – 90% |
| Chlorine | 4501-06 | 0-10 PPM | 10.0 PPM | 0.1 PPM | <60 sec. | 2 Years | - 4 to 122 | -20 to 50 | 15 – 90% |
| Chlorine Dioxide | 4501-08 | 0-3 PPM | 3.0 PPM | 0.1 PPM | <60 sec. | 2 Years | - 4 to 122 | -20 to 50 | 15 – 90% |
| Sulfur Dioxide | 4501-10 | 0-100 PPM | 100 PPM | 0.5 PPM | <20 sec. | 2 Years | - 4 to 122 | -20 to 50 | 15 – 90% |
| Nitrogen Dioxide | 4501-12 | 0-20 PPM | 20.0 PPM | 0.2 PPM | <35 sec. | 2 Years | - 4 to 122 | -20 to 50 | 15 – 90% |
| Ammonia | 4501-25 | 0-100 PPM | 20.0 PPM | 1.0 PPM | <30 sec. | [3] | +14 to 113 | -10 to 45 | 20 – 95% |
| Hydrogen Fluoride | 4501-26 | 0-10 PPM | 10 PPM | 1.0 PPM | <90 sec. | [3] | +14 to 113 | -10 to 45 | 20 – 95% |
| Ethylene Oxide | 4501-27 | 0-20 PPM | 20 PPM | 0.1 PPM | <90 sec. | 2 Years | - 4 to 122 | -20 to 50 | 15 – 90% |

[1] Optional ranges and temperatures available

[2] Response time to 90% full signal value for applied concentration

\* = Non-Condensing

[3] Ammonia and HF sensors require periodic electrolyte recharge

## Specifications **

### Output
**Display:** LCD, 2-line, 16-characters
**Signal Output:** 2-wire sensor powered analog 4-20mA (Trouble: 3.6mA)
**Loop Resistance:** 800 ohm

### Electrical Data
**Power consumption:** 0.2 watts
**Connection type:** 2-wire, loop-powered
**Input voltage:** 24VDC nominal: 14-30VDC
**RFI/EMI Protection:** EN50081-2, EN50082-2

### Construction
**Dimensions:** (HxWxD)
7.0 x 3.6 x 4.0 in. (H x W x D)
(17.8 x 9.1 x 11.2 cm.)
4501-25/26   8.4 x 4.4 x 3.9 in. (H x W x D)
(21.3 x 11.2 x 9.9 cm.)
**Weight:**   2.2 lb. (1.0 Kg) Al or 4.6 lb. (2.1 Kg) AL
4501-25/26   3.0 lb. (1.3 Kg) Al or 5.0 lb. (2.3 Kg) SS
**Enclosure:** Aluminum, Stainless Steel

### Operating Range
**Ambient Temp Range:**
Standard   -4° to 122°F (-20° to 50°C)
4501-25/26   14° to 113°F (-10° to 45°C)
Extended Temp:   Sensor and 4-20 mA will continue To operate to -40°F (-40°C) but the LCD display will decay over time if exposed to temperatures below -4° (-20°C) for significant time (not for 4501-25).
**Storage Temp:**   -4° to 122°F (-40° to 50°C)
**Relative Humidity:**
Standard   15-90% Non-Condensing
4501-25/26   20-90% Non-Condensing

**Warranty:** 2 years

### Approvals
Hazardous Location: Explosion proof, **NEMA 4X**
**FM:** Class I, Div. I, Groups B, C, D
Class II, Div. I, Groups E, F, G
**CSA:** Class I, Div. I, Groups B, C, D
Class II, Div. I, Groups E, F, G
**CQST:** Certificate for China (4501-05)
**4501-05 FM Performance Approval:** 4501-05 Approval
**FM ISA:** 92.0.01, Part I-1998 and FM 3600
**ATEX (4501-05):** II 2G, Ex d IIB + H2 T6 TA = -22°C to 50°C
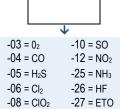**IECEx (4501-05):** Certificate of Approval

**\*\*Specifications subject to change without notice**

## Ordering Information: 
The following part number is essential in selection of the correct product. Please build up the desired part by inserting the code for each element into the appropriate space (i.e. 4501-05-A1-0).
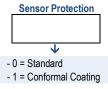
**Model**
**4501**

**Gas Type**
↓
-03 = $O_2$   -10 = SO
-04 = CO   -12 = $NO_2$
-05 = $H_2S$   -25 = $NH_3$
-06 = $Cl_2$   -26 = HF
-08 = $ClO_2$   -27 = ETO

**Enclosure**
↓
- A1 = AL ¾" NPT
- A2 = AL M20 x 1.5
- S1 = SS ¾" NPT
- S2 = SS M20 x 1.5

**Sensor Protection**
↓
- 0 = Standard
- 1 = Conformal Coating

### High Capacity Calibration Accessories
| | |
|---|---|
| 1250-01 | Gas Sensor Calibration Kit, Type A (CO, $H_2S$) |
| 1250-02 | Gas Sensor Calibration Kit, Type B ($SO_2$, $NO_2$) |
| 1250-03 | Gas Sensor Calibration Kit, Type C ($Cl_2$, $ClO_2$) |
| 1260-00 | Gas Cylinder, Air (Type A) 105 liters |
| 1260-04 | Gas Cylinder, Carbon Monoxide, 100 ppm, Type A |
| 1260-05 | Gas Cylinder, $H_2S$ in $N_2$, 25 ppm Type A |
| 1260-06 | Gas Cylinder, Chlorine, 5 ppm, Type C |
| 1260-10 | Gas Cylinder, Sulfur Dioxide, 50 ppm, Type B |
| 1260-12 | Gas Cylinder, Nitrogen Dioxide, 10 ppm, Type B |
| 1260-13 | Gas Cylinder, Carbon Monoxide, 1000 ppm, Type A |
| 1260-45 | Gas Cylinder, $H_2S$ in $N_2$, 10 ppm, Type A |
| 9210-00 | Calibrator, Permeation tube |
| 9211-09 | Permeation Tube, Ammonia, $NH_3$ |
| SPX 27057 | Kit, Sensor Recharge, for 4501-25 |

### Accessories
| | |
|---|---|
| 5311-00 | Rainshield |
| 5311-02 | Rainshield with calibration port |

### Calibration Accessories
| | |
|---|---|
| 5358-01 | Calibration Adapter, Standard |
| 5360-00 | Calibration Gas Delivery Fitting |
| 5358-51 | Calibration/Configuration Magnetic Tool, 4501-XX |

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