GG-03-A OZONE GAS SENSOR

Installation and Operation Manual

CALIBRATION TECHNOLOGIES INC.
GAS DETECTION SPECIALISTS

Warning

Use this product only in the manner described in this manual. If the equipment is used in a manner not specified by Calibration Technologies, the protection provided by the equipment may be impaired.

This equipment should be installed by qualified personnel.

Table of Contents

General Description 4
Installation 4
Locating the Sensor 4
Installation Guidelines 5
Wiring 6
Operation 7
Start-Up 7
Calibration 7
Maintenance 9
Specifications 10
Warranty 11

For technical support, contact:

Calibration Technologies
920 N Tradewinds Pkwy
Columbia, MO 65201
866-394-5861
Sales@ctiengineering.com
www.ctiengineering.com

General Description

The GG-O3-A sensor is a +24 VDC, three-wire, 4/20 mA sensor for ozone which utilizes proven electrochemical sensor technology for fast and accurate detection. The 0 – 1 ppm detection range of the GG-O3-A provides real-time continuous monitoring of ozone concentrations accurately down to 0.5 ppm without false alarms.

The GG-O3-A provides an industry standard linear 4/20 mA output signal compatible with most gas detection systems and PLCs. The output signal is not affected by drastic temperature and moisture variations that occur during daily process cycles.

The transmitter circuit board is sealed in potting compound, protecting sensitive electronic components and copper tracing from corrosion. The specially vented chemical-resistant polycarbonate enclosure protects the sensor from accidental damage, weather and direct hose-hits from clean-up crews. An optional stainless steel enclosure is also available.

Installation

Locating the sensor

One of the most important considerations when installing GG-O3-A sensors is that they must be easily accessible for calibration and maintenance.

For optimum personnel protection (representative concentration reading that an employee would be exposed to), mount the sensor at a height in the breathing zone of the employees. It would typically be about five feet off the ground, which also allows easy access. As a general rule of thumb, try to mount sensors within 20 feet of ozone gas sources.

Caution: Remove protective label.
The sensor is shipped with a label installed over the gas diffusion port of the electrochemical cell to preserve cell life. The cell will not detect ozone vapors with this label installed. Remove label and discard during installation.

Installation Guidelines:

- Remove and discard protective cell label.
- Always mount the sensor vertically.
- Must be easily accessible for calibration and maintenance.
- Mount the sensor close to the ozone gas source.
- For optimum personnel protection, mount sensor in the “breathing zone” (5 feet above floor).
- Take air movement and ventilation patterns into account.
- To prevent electrical interference, keep sensor and wire runs away from mercury vapor lights, variable speed drives, and radio repeaters.
- Protect sensor from physical damage (forklifts, etc.).
- If mounting sensor outdoors, consider prevailing wind direction and proximity to the most likely source of leaks. Protect the sensor from sun and rain as much as possible.
- Never mount the sensor in CA (controlled atmosphere) rooms because normal atmospheric levels of oxygen are required for operation.
- For highly critical locations more than one sensor should be installed in each room.
- Mount sensor enclosures through the mounting holes as shown in Figure 1. Use the supplied self-tapping screws for mounting on sheet metal surfaces.

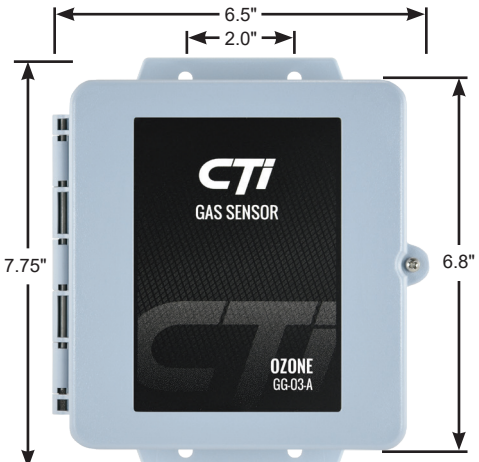


Figure 1: Mounting Dimensions

Wiring

Electrical wiring must comply with all applicable codes.

Electrical Power: 24 VDC regulated, 350 mA.
Output: Linear 4/20 mA output. Monitoring equipment may have a maximum input impedance of 700 ohms.
Cable Recommendation: 20/3 shielded cable (General Cable C2525A or equivalent). Length of cable to sensor should be no greater than 1,500 feet.
Monitoring: Monitoring equipment must be configured to indicate a fault if the signal is below 1 mA. All signals over 20 mA must be considered high gas concentrations. Alarm setpoints should not be lower than 10% of full-scale range.

Wiring Guidelines:

- Always use three conductor, insulated, stranded, shielded copper cable.
- Do not pull sensor wiring with AC power cables. This can cause electrical interference.
- If cable runs cannot be made without a splice, all splice connections should be soldered.
- Ground the shield at the main control panel. Connect the shield wire in the sensor terminal block labeled SHLD.
- Always disconnect power at the controller before performing any wiring at the sensor.
- To maintain NEMA rating of the enclosure, conduit fittings of the same rating or better must be used.

Terminal Block Plug (Field Wiring):
SHLD: To case (earth) ground of monitoring equipment
GND: To ground terminal of power supply
+24V: To +24V terminal of power supply
SIG: To signal input of monitoring equipment

Operation

Start-up

Sensor can be response tested and/or span calibrated immediately after power up. Allow 60 seconds for power up time delay of sensor to end (green power LED will flash during power up).

Start-Up Test:

1. One person exposes each sensor to calibration gas
2. The second person stays at the control unit to determine that each sensor, when exposed to the gas, is connected to the proper input and responds, causing appropriate alarm functions.

LED functions (see **Figure 2** on page 8)

Calibration

The GG-O3-A sensor comes factory calibrated and should require only minimal adjustments after installation. There are two pots on the preamp that are used for calibration (see Figure 2).

Note: Never measure sensor output in mA. Always use mVDC or VDC voltmeter settings.

Zero Calibration: After the sensor is installed and has been powered up for a minimum of 8 hours, the unit can be zero calibrated by the following:

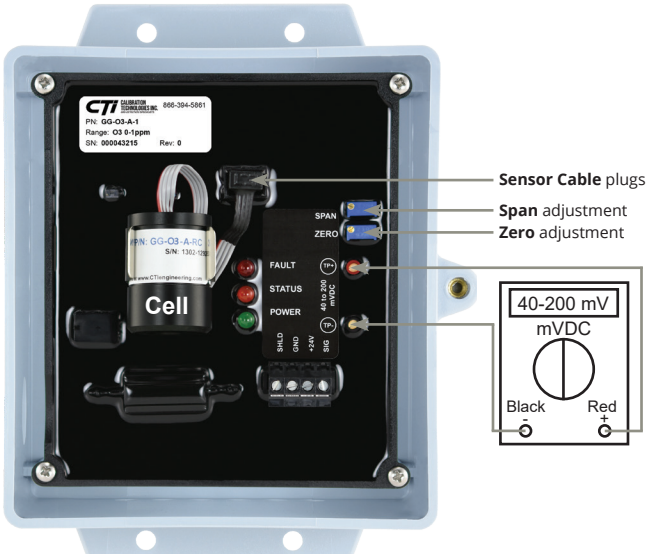
- Be sure the unit is in clean air. If in doubt, apply Zero Air gas at 0.5 to 1.0 L/min.
- Adjust the zero pot until the sensor outputs 40 mV from Test [-] to Test [+] (see Figure 2).

Span Calibration: Never adjust the span pot without an ozone generator. If an ozone generator is not available, the unit can be calibrated with chlorine. The relative response of the ozone sensor to chlorine is 1:1. To calibrate with chlorine, apply 1 ppm and adjust output to 200 mV.

- Perform zero adjustment before spanning.
- Apply span gas at 0.5 to 1.0 L/min.
- Sensor should react to gas within 30 seconds
- Once the output signal has peaked (or five minutes maximum) adjust the span pot until the correct output is achieved (see **Figure 2**).

Note: Below are a few response characteristics which may be an indication that the gas sensor is at or near the end of its useful life. If any of these are observed, the cell should be replaced:

- Slow response to / recovery from calibration gas.
- Failure of the output to reach 50% of the calibration gas value prior to span adjustment.
- Unable to achieve correct output during span adjustment.



Fault (red) LED:
- On steady if supply voltage is less than 10VDC.

Status (amber) LED:
- Blinks once per second if RFI is detected.

Power (green) LED:
- On steady to Indicate Power.
- Blinks once per second for 60 seconds during power-up.
- Blinks once per second continuously if supply voltage is too low.

Figure 2: Sensor board components and zero/span adjustment

Maintenance

The GG-O3-A was designed for long life and minimal maintenance. For proper operation it is essential that the test and calibration schedule be adhered to. Calibration Technologies recommends the following maintenance schedule

Maintenance Guidelines:

- The sensor is shipped with a factory calibration. Sensor should be calibrated 6 months from purchase date.
- Calibrate the detector at least once every 6 months.
- Calibration should be performed with a certified ozone gas generator or chlorine gas generator. Chlorine generators are available for field calibrations. Contact Calibration Technologies for more details.
- In highly critical areas, a response test should be performed between calibrations to verify proper sensor response and alarm functions. The response test is not required if multiple ozone sensors are installed in the same room.
- All tests and calibrations must be logged.

Sensor life: These electrochemical cells are extremely reliable, but several things can cause the cell chemicals to become depleted including:

- a period of time
- exposure to high temperatures
- continuous, long term exposure to ozone

When the cell becomes depleted, the unit will give no indication of failure other than that the sensor will not respond. For this reason **it is absolutely essential that these sensors be calibrated on a regular basis.**

Typical sensor life is one to two years. When the cell becomes depleted, a replacement cell can be obtained from Calibration Technologies. Simply unplug the cell's ribbon cable from the transmitter, pull the old cell from the spring clip, discard the old cell and replace it with a new one.

The new cell can be span-calibrated immediately, however, an 8-hour warm-up period is required before zeroing, if necessary.

Replacement cell order #: GG-O3-A-RC

Specifications

Input Power: +24 VDC, 350 mA

Detection Principle: Electrochemical

Detection Method: Diffusion

Gases: Ozone (O3)

Ranges: 0-1 ppm

Output Signal:

Linear 4/20 mA (max input impedance: 700 Ohms)

Response Time:

T_{50} = less than 120 seconds

T_{90} = less than 180 seconds

Accuracy:

+/- 5% of full-scale, but dependent on calibration gas accuracy and time since last calibration

Zero Drift: Less than 0.1% of full-scale per month, non-cumulative

Span Drift: Application dependent, but generally less than 3% per month

Linearity: +/- 1% of full-scale

Repeatability: +/- 1% of full-scale

Wiring Connections:

3 conductor, shielded, stranded, 20 AWG cable (General Cable C2525A or equivalent) up to 1500 ft.

Terminal Block Plug (Field Wiring): 26-12 AWG, torque 4 lbs-in.

Temperature Range: 0°F to +120°F (-18°C to +49°C)

Humidity Range: 5% to 100% condensing

Dimensions: 7.7" high x 6.7" wide x 3.8" deep

Weight: 3 lbs

Enclosure: Injection-molded, NEMA 3RX washdown-duty, polycarbonate sensor housing with hinged lid and captive screw. For non-classified areas.

Optional 18 GA, NEMA 3RX washdown-duty stainless steel enclosure with hinged lid and captive screw. For non-classified areas.

Limited Warranty & Limitation of Liability

Calibration Technologies, Inc. (CTI) warrants this product to be free from defects in material and workmanship under normal use and service for a period of two years (including the sensor element), beginning on the date of shipment to the buyer. This warranty extends only to the sale of new and unused products to the original buyer. CTI's warranty obligation is limited, at CTI's option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a CTI authorized service center within the warranty period. In no event shall CTI's liability hereunder exceed the purchase price actually paid by the buyer for the product.

This warranty does not include:

a) routine replacement of parts due to the normal wear and tear of the product arising from use;

b) any product which in CTI's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use;

c) any damage or defects attributable to repair of the product by and person other than an authorized dealer or contractor, or the installation of unapproved parts on the product

The obligations set forth in this warranty are conditional on:

a) proper storage, installation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of CTI;

b) the buyer promptly notifying CTI of any defect and, if required, promptly making the product available for correction. No goods shall be returned to CTI until receipt by the buyer of shipping instructions from CTI; and

c) the right of CTI to require that the buyer provide proof of purchase such as the original invoice, bill of sale or packing slip to establish that the product is within the warranty period.

THE BUYER AGREES THAT THIS WARRANTY IS THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CTI SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT OR RELIANCE OR ANY OTHER THEORY.

[redacted]

CALIBRATION TECHNOLOGIES INC.
GAS DETECTION SPECIALISTS

GG-O3-A-DOC1-0
20190605