GASGUARDIAN EM   Entrance Monitor

OPERATING & INSTALLATION MANUAL

CALIBRATION
TECHNOLOGIES
INC.

Gas	Unit					
NH$_3$	PPM	250	200	150	100	50
NH$_3$	PPM	300	240	180	120	60
NH$_3$	PPM	500	400	300	200	100
O$_2$	%	25	23	21	19	17
CO	PPM	200	160	120	80	40
CO$_2$	%	3.0	2.4	1.8	1.2	0.6
R22	PPM	3000	2400	1800	1200	600
R507a	PPM	1000	800	600	400	200
R507a	PPM	3000	2400	1800	1200	600
NH$_3$	%	1.0	0.8	0.6	0.4	0.2
NH$_3$	%	2.0	1.6	1.2	0.8	0.4
NH$_3$	%LEL	100	80	60	40	20
R404a	PPM	1000	800	600	400	200
R404a	PPM	3000	2400	1800	1200	600
H$_2$	%	1.0	0.8	0.6	0.4	0.2
H$_2$	PPM	2000	1600	1200	800	400
CO$_2$	%	1.0	0.8	0.6	0.4	0.2
CO$_2$	%	5.0	4.0	3.0	2.0	1.0
NH$_3$	PPM	1000	800	600	400	200
R22	PPM	500	400	300	200	100
R404a	PPM	500	400	300	200	100
R134a	PPM	3000	2400	1800	1200	600
R507a	PPM	500	400	300	200	100
H$_2$S	PPM	50	40	30	20	10
CL$_2$	PPM	5.0	4.0	3.0	2.0	1.0
O$_3$	PPM	1.0	0.8	0.6	0.4	0.2
NO$_2$	PPM	10	8	6	4	2
H$_2$	%LEL	25	20	15	10	5
R134a	PPM	500	400	300	200	100
R134a	PPM	1000	800	600	400	200
R410a	PPM	500	400	300	200	100
R410a	PPM	1000	800	600	400	200
R22	PPM	1000	800	600	400	200
	%LEL	100	80	60	40	20
CH$_4$	%LEL	100	80	60	40	20
H$_2$	%LEL	100	80	60	40	20

Sensor range labels (included with unit)

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Calibration Technologies   866-394-5861

General Description

Powered by 24VDC, the GasGuardian Entrance Monitor terminates the gas sensor's 4/20 mA signal, and re-transmits the 4/20 mA signal to another analog input device such as gas detection controller or plant PLC. If no connection is made to the signal output terminal, the unit will act as a stand-alone device. Multiple units can be installed in series, providing flexible remote viewing options.

The GasGuardian EM is assembled into a wall mounted enclosure designed for non-classified locations. The gas sensor (not included) is installed at the location where gas is to be detected, up to 1,500 feet from the readout via a three conductor cable.

The GasGuardian EM provides continuous real-time monitoring of the sensor. Gas concentrations are indicated by the 10 segment LED bargraph display. The status LED provides an at-a-glance status of power, including an alarm or fault condition.

A calibration mode setting allows for sensor maintenance and calibration without tripping the relay. The onboard relay has a 10 second on/off time delay to prevent unnecessary cycling during a fault or alarm condition. The alarm setpoint is adjusted by a ten position rotary switch on the display board.

An optional add-on power supply is also available to allow for 120VAC operation.

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Installation

Locating the GasGuardian EM
The important consideration when installing GasGuardian EM readout is that it must be easily accessible for operating personnel.

Installation Guidelines:
- Mount readout on a solid surface with minimal vibration
- Mount readout in a general-purpose location only. Do not install in a hazardous environment.
- Mount readout away from electromagnetic interference.
- Protect readout from physical damage.

Figure 1: Dimensions

Wiring
Electrical wiring must comply with all applicable codes.

Wiring Guidelines:
- Always use three conductor, insulated, stranded, shielded copper cable for all sensor cables.
- Do not pull sensor wiring with AC power cables. This can cause electrical interference.
- Be sure to land the shield conductors of the sensor cables at the shield terminals of the sensor connectors.
- Bonding between metallic conduit connections is not automatic with the non-conductive enclosure. Separate bonding must be provided.

DC Power:
- Requires +24VDC, 125 mA (not including other connected devices)

Sensor Wiring: 4/20 mA, 100 Ohm input impedance.
- Refer to sensor manual for cable recommendations.
- Typically 20/3 shielded cable (Belden #8772 or equivalent).
- Length of cable should not exceed 1,500 feet.

Relay Wiring:
- AC wiring must be run in separate conduit from the sensor cables.

- If a separate relay cable conduit hole is needed, do not drill or punch hole on hinge side of enclosure due to close proximity of cable connectors.
- The alarm relay has Form C dry contacts, and is rated 10 Amps @ 110 VAC or 24 VDC. (dry contacts require external power connection)
- The alarm relay is normally energized. It will de-energize to the alarm state upon sensor alarm, fault or loss of power.
- The alarm relay has a status LED to show the state of the relay. During normal operation, the green status LED is on, indicating the relay is energized.

Stand-Alone and Feed-Through Applications
The GasGuardian EM terminates the gas sensor's 4/20 mA signal, and re-transmits the 4/20 mA signal to another analog input device such as gas detection controller or plant PLC. If no connection is made to the signal output terminal, the unit will act as a stand-alone device.

Feed-through application wiring specifications:
- Maximum input impedance: 700 Ohms
- Cable recommendations: 20/3 shielded cable (Belden #8772 or equivalent).
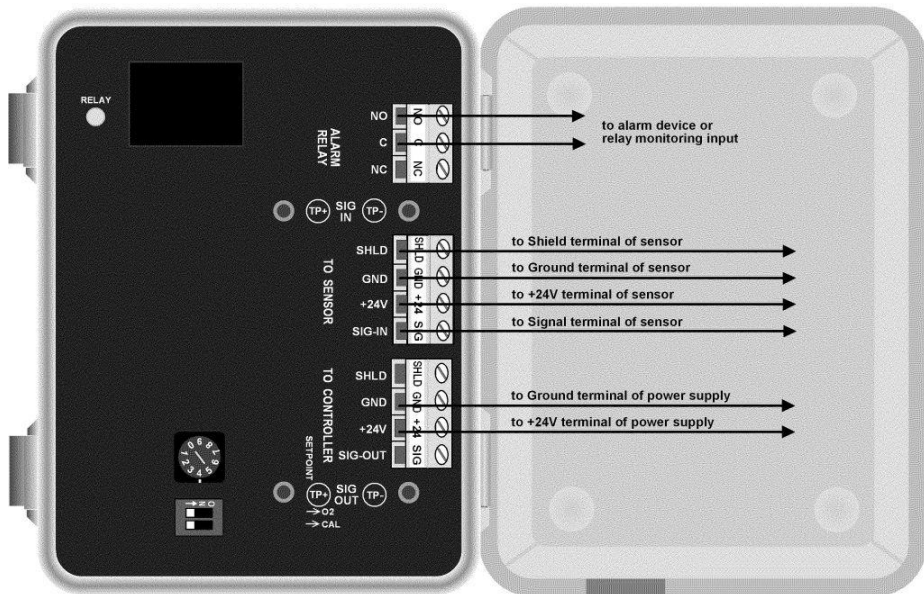- Length of cable should not exceed 1,500 feet.

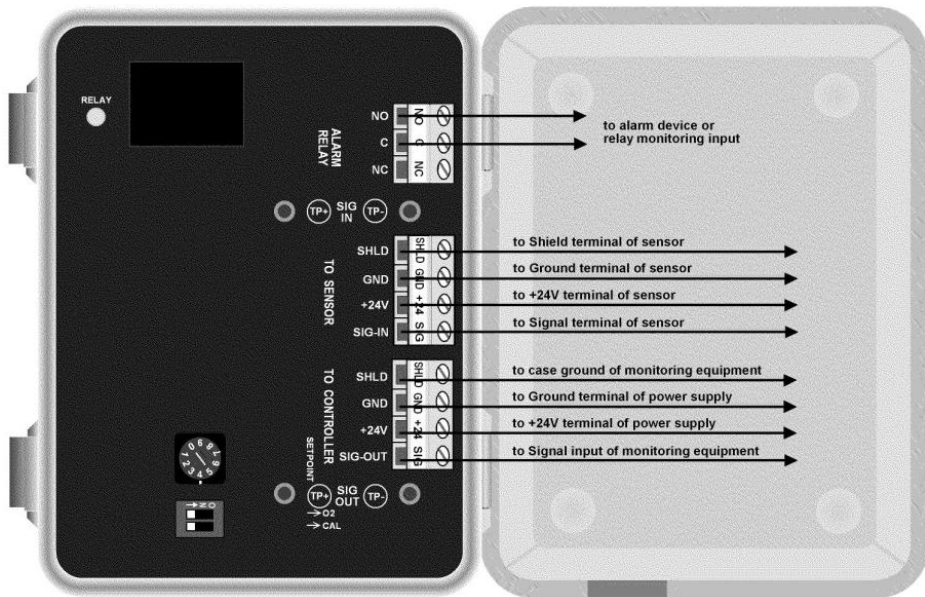**Figure 2: Wiring Diagram (Stand-Alone application)**

Figure 3: Wiring Diagram (Feed-Through application)

Operation

Sensor Range Label

The GasGuardian EM is shipped with various range labels. If the range of the sensor is not the default range of 0/100 ppm, select the proper range label and affix it over the default label.

Start-up

Before applying power, make a final check of all wiring for continuity, shorts, grounds, etc. It is usually best to disconnect external alarms and other equipment from the GasGuardian EM until the initial start-up procedures are completed.

Refer to sensor manual for proper warm-up time of sensor prior to any sensor test.

Because sensors are normally located at a distance from the main unit, the test time required and accuracy of the response checks will be improved if two people perform the start-up procedures and use radio contact.

Start-Up Test:
1) One person exposes the sensor to calibration or test gas.
2) The second person stays at the control unit to determine that the sensor, when exposed to the gas, causes appropriate alarm functions.

Alarm Setpoint

The GasGuardian EM is has one adjustable alarm setpoint. The 10-position rotary switch allows for alarm setpoint adjustments in 10% increments. Once the sensor signal has exceeded the alarm setpoint, the alarm LED will light immediately, and the alarm relay will set after a 10 second time delay. Once the signal has decreased lower than the alarm setpoint, the relay will clear after a 10 second time delay.

Relay/Alarm Test

The relay test function allows for testing of the relay output function without gassing the sensor. To test the relay, put unit into "calibration mode" (see below), and turn the 10-position rotary switch to the "0" setting. After the short time delay, the relay will "set" into the alarm condition. To "clear" the relay, adjust the setpoint to the intended alarm position.

Calibration Mode

Calibration mode allows for sensor calibration and maintenance without causing external alarm conditions. To activate calibration mode, slide the Cal switch to the on position. To deactivate, slide switch to off position.

In calibration mode, the following conditions apply:
1. The green power LED will flash twice per second
2. The relay will remain locked in the clear, non-alarm condition.
3. The analog output will remain locked at 4 mA.

Oxygen Downscale-Alarm Mode

The oxygen downscale mode provides downscale alarming for oxygen level monitoring. To activate downscale alarm mode, slide the O2 switch to the on position.

Status LED's

The GasGuardian EM is equipped with the following status LEDs:

Gas Concentration Bargraph: The 10-segment yellow LED bargraph will display the gas concentration in 10% increments. Use the tick-marks on the full-scale range label to the left of the display to determine the concentration.

**Power:** The green power LED will remain on solid to indicate power

Alarm: The red alarm LED will flash once per second during an alarm condition.

Fault: The red fault will light and remain on solid in the event of a sensor fault condition. Since the GasGuardian EM is constantly monitoring the sensor signal, any signal below 1 mA will be considered a sensor fault.

Relay Status: (see page 10 for LED location) The green relay LED will remain on solid, in the "clear" position, during normal operation.

Signal Voltage Testpoints

There are two sets of signal testpoints for signal verification and troubleshooting purposes. These signals are measured in mVDC, and range from 40 to 200 mV. The SIG IN testpoints indicate the 4/20 mA signal coming from the sensor. The SIG OUT testpoints indicate the 4/20 mA signal being re-transmitted to another control panel or PLC if used as a feed-through device.
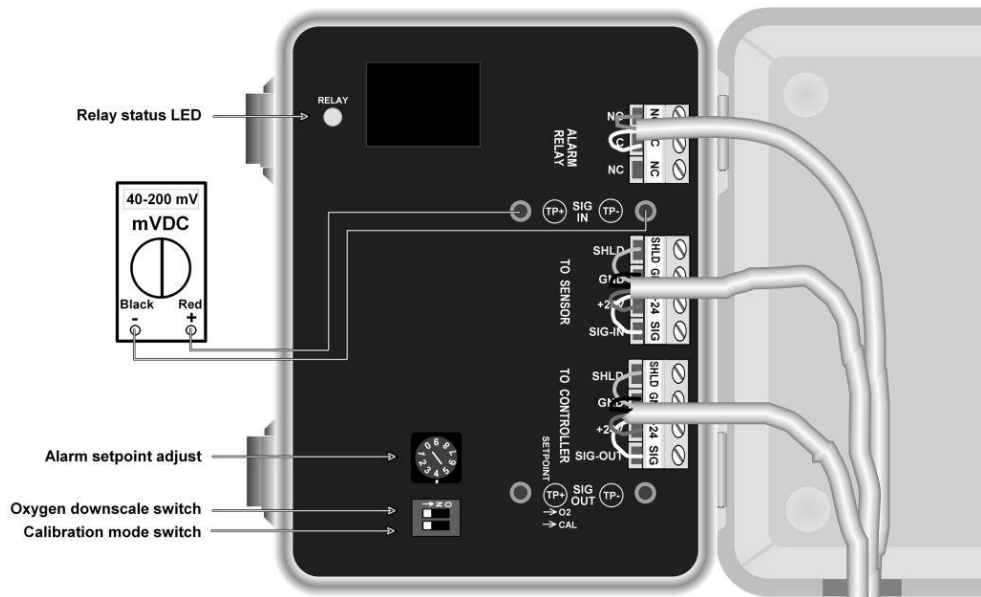
Figure 4: Components and Operation

Maintenance

All gas detection systems should be calibrated with certified calibration gas once every six months. At this interval, all alarm functions and outputs should be tested, verified and documented.

If sensor span or zero cannot be adjusted, refer to the sensor manual. The sensor may be approaching its end of life and may need to be replaced. Keep an operation log of all maintenance, calibrations and alarm events.

To clean the controller, use a mild cleaning solution and soft cloth.

Specifications

Power Requirements: +24 VDC, 125 mA (not including other connected devices)
Dimensions: 6.2" high x 4" wide x 3" deep
Weight: 1 lb
Enclosure: Injection-molded NEMA 4X polycarbonate gasketed housing. Hinged lid with (2) latching clasps. For non-classified areas. Rated for outdoors and washdown locations. Anodized aluminum mounting plate.
Temperature Range: -40°F to +122°F
Humidity Range: 0% to 100% condensing
Sensor Inputs: (1) 4/20 mA, 100 Ohm input impedance
Analog Output:
4/20 mA (max input impedance: 700 Ohms)
Relay Outputs:
(1) SPDT relay, 10A @ 24 VDC or 120 VAC. Dry contacts
Wiring Connections:
3 conductor, shielded, stranded, 20 AWG cable (Belden 8772 or equivalent) up to 1500 ft (for sensor and analog output wiring).
Visual Status Indications: (1) Yellow 10-segment LED bargraph gas concentration display. (1) Green power LED. (1) Red alarm LED. (1) Red fault LED. (1) Green relay status LED.

Optional Power Supply

The GasGuardian EM is available with an optional AC to DC power supply, which mounts inside of the enclosure. This supply can be used for stand-alone applications where only 120 VAC power is available and/or external devices (horns, strobes, exhaust fans, etc.) will be activated via the onboard relay of the GasGuardian EM.

Order number: GG-EM-PS

Specifications:
Output: 24 VDC, 0.625 A
Overload, short-circuit and thermal protection
Washdown and weatherproof with proper conduit fittings

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 one year, 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 any 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.

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