

# Installation Manual



Rev. B | 2022.06



## CGAS-A Gas Detector

Analog Transmitter

[www.critical-environment.com](http://www.critical-environment.com)

## NEED MORE INFORMATION?

This is the **Installation Manual** for the cGas Detector Analog Transmitter. If you would like it in pdf form, [click here](#) to open and download it from our website.

If you need more information, refer to the **cGAS Detector Operation Manual**, which covers topics such as:

- Relays - enable/disable, set ON/OFF Delays
- Enable/Disable Channels
- Replacing Plug & Play Smart Sensors
- Calibration
- Accessories
- Maintenance
- Troubleshooting

If you would like to view or download the **cGAS Detector Operation Manual** from our website [click here](#)

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# 1 POLICIES

## 1.1 Important Note

Read and understand this manual prior to using this instrument. Carefully read the warranty policy, service policy, notices, disclaimers and revisions on the following pages.

This product must be installed by a qualified electrician or factory trained technician and according to instructions indicated in this manual. This instrument should be inspected and calibrated regularly by a qualified and trained technician.

This instrument has not been designed to be intrinsically safe. For your safety, **do not** use it in classified hazardous areas (explosion-rated environments).

**INSTRUMENT SERIAL NUMBER:**

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**PURCHASE DATE:**

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**PURCHASED FROM:**

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## 1.2 Warranty Policy

Critical Environment Technologies Canada Inc. warrants the products we manufacture (excluding sensors, battery packs, batteries, pumps, and filters) to be free from defects in materials and workmanship for a period of two years from the date of purchase from our facility. Sensors are consumable items and once they leave our factory, we cannot reuse or resell them. As such, all sensor sales are final. Should the sensor itself be faulty, there is a one-year pro-rated warranty that would apply from the date of purchase from our facility.

The warranty status may be affected if the instrument has not been used and maintained as per the instructions in the manual or has been abused, damaged, or modified in any way. The product is only to be used for the purposes stated in the manual. Critical Environment Technologies is not liable for auxiliary interfaced equipment or consequential damage.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods, regardless of reason, must be accompanied with an RMA number. Please read our Warranty and Returns Policy and follow our RMA Instructions and Form.

Due to ongoing research, development, and product testing, the manufacturer reserves the right to change specifications without notice. The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data.

## 1.3 Service Policy

CETCI maintains an instrument service facility at the factory. Some CETCI distributors / agents may also have repair facilities; however, CETCI assumes no liability for service performed by anyone other than CETCI personnel.

Repairs are warranted for 90 days after date of shipment (sensors have individual warranties). Should your instrument require non-warranty repair, you

may contact the distributor from whom it was purchased, or you may contact CETCI directly.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods, regardless of reason, must be accompanied with an RMA number. Please read our Warranty and Returns Policy and follow our RMA Instructions and Form.

If the product is deemed repairable, for liability reasons, CETCI will perform all necessary repairs to restore the instrument to its full operating condition.

## 1.4 Copyrights

This manual is subject to copyright protection; all rights are reserved. Under international and domestic copyright laws, this manual may not be copied or translated, in whole or in part, in any manner or format, without the written permission of CETCI.

Modbus® is a registered trademark of Gould Inc. Corporation.  
BACnet® is a registered trademark of American Society of Heating, Refrigeration and Air Conditioning (ASHRAE).

## 1.5 Disclaimer

Under no circumstances will CETCI be liable for any claims, losses or damages resulting from or arising out of the repair or modification of this equipment by a party other than CETCI service technicians, or by operation or use of the equipment other than in accordance with the printed instructions contained within this manual or if the equipment has been improperly maintained or subjected to neglect or accident. Any of the forgoing will void the warranty.

Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires. It is CETCI policy that all wiring of our

products meet this requirement and all wiring be within properly grounded (earth or safety) conduit.

## 1.6 Revisions

This manual was written and published by CETCI. The manufacturer makes no warranty or representation, expressed or implied, including any warranty of merchantability or fitness for purpose, with respect to this manual.

All information contained in this manual is believed to be true and accurate at the time of printing. However, as part of its continuing efforts to improve its products and their documentation, the manufacturer reserves the right to make changes at any time without notice. In addition, due to improvements made to our products, there may be information in this manual that does not exist in the version of the product the user has. Should you detect any error or omission in this manual, or should you want to inquire regarding upgrading the device's firmware, please contact CETCI at the following address:

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Website: [www.critical-environment.com](http://www.critical-environment.com)

In no event will CETCI, its officers or employees be liable for any direct, special, incidental or consequential damages resulting from any defect in any manual, even if advised of the possibility of such damages.



## 2 INTRODUCTION

### 2.1 General Description

Thank you for purchasing our CGAS-A analog cGas Detector, a single sensor, 4 - 20 mA transmitter available with a wide range of sensors and sensor types for continuous monitoring of hazardous gases or oxygen in non-hazardous (non-explosion rated) environments such as commercial HVAC and light industrial applications.

The CGAS-A transmitter is available with internal or remote sensor and operates by diffusion. The sensors utilized in this device are accurate enough to measure to Occupational Health & Safety (OHS) hazardous levels for toxic gases.

### 2.2 Key Features

- Single gas channel
- 4 - 20mA analog output (signals gas concentration reading)
- Easy Plug & Play Smart sensor replacement at end of life
- Pre-calibrated replacement sensors
- 24 volt DC or (ground referenced) AC power
- In-field upgradable firmware/configuration via USB stick
- Bright LCD display
- Option -LT\*: Low temperature package for improved usability in cold environments
- Option -RHT\*\*: Relative Humidity and Temperature sensor
- Option -RLY\*\*\*: One SPDT dry contact relay, rated 30 volts, 2 amps max
- Option -S: Splash guard, factory installed, IP54 rated enclosure
- Option -SN: Splash guard for sticky gas sensors, factory installed
- Standard water / dust tight, corrosion resistant enclosure (drip proof)

- Copper coated interior to reduce RF interference
- RoHS compliant circuit boards
- Auto resetting fuse

**NOTE:** Options may be restricted to certain models and/or gas configurations.

**\*Option -LT** is a low temperature package with OLED display and internal heater for cold environment applications down to -40°C / -40°F. Available with all models except CGAS-A-EETO.

**\*\*Option -RHT** is an RH & Temperature sensor (°C or °F). Available with all internal gas sensor configurations except sticky gas sensors (Cl<sub>2</sub>, ClO<sub>2</sub>, HCl, HCN, O<sub>3</sub>, PH<sub>3</sub>). The CGAS-A has one analog output which is used for gas readings when configured with a gas sensor; RH and Temperature readings will be locally displayed only.

**\*\*\*Option -RLY** is a one SPDT dry contact relay, rated 30 volts, 2 amps max. Available with all internal gas sensor configurations except CO<sub>2</sub> and sticky gas sensors (Cl<sub>2</sub>, ClO<sub>2</sub>, HCl, HCN, O<sub>3</sub>, PH<sub>3</sub>).

**Options -RHT and -RLY** are both available with CGAS-A-CO only.

If after reading through the manual, you have any questions, please do not hesitate to contact our service department for technical support.

## 3 INSTRUMENT SPECIFICATIONS

### 3.1 Technical Specifications

#### MECHANICAL

Enclosure	ABS / Polycarbonate, IP54 rating with splash guard installed. Copper coated interior to reduce RF interference.
Weight	400 g / 14 oz
Size	127 mm x 127 mm x 71 mm / 5.0 in x 5.0 in x 3.0 in
Conduit Entry Points	12.7 mm / 1/2 in diameter
Mounting Holes	4.47 mm / 0.175 in diameter maximum head diameter 8 mm / 0.32 in, #8 or 4 mm screw

#### USER INTERFACE

Display (standard)	2-line by 16-character graphic LCD, user configurable to suppress reading display
Display (low temp)	2-line by 16-character OLED display for low temperature applications (with Option -LT)
USB Port	Internal port for USB memory stick connection for field configuration/firmware upgrades
Push Buttons	Initiate calibration and menu options with internal UP, DOWN and ENTER push buttons
Audible Alarm	none

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## ELECTRICAL

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Power Requirement	16 - 30 VDC, 3 W, Class 2 12 - 27 VAC, 50-60 Hz, 3 VA, Class 2 24V recommended. Refer to Section 6.7 <i>Wiring Connections</i>
Wiring	24 VDC or 24 VAC (ground referenced) 3-conductor shielded 14-18 AWG stranded within conduit
Fuses	Automatic resetting thermal

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## INPUT/OUTPUT

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Analog Output	One Linear 4 - 20 mA output, signals gas reading
RH & Temperature (Option -RHT)	User selectable units (°C or °F), user selectable display or hide readings
Relay (Option -RLY)	1 SPDT dry contact relay, rated 30 volts @ 2 amps (not available with CO <sub>2</sub> , CL <sub>2</sub> , CLO <sub>2</sub> , HCl, HCN, O <sub>3</sub> or PH <sub>3</sub> sensor configurations)

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## ENVIRONMENTAL

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Operating Temperature	0°C to 40°C / 32°F to 104°F (standard) -40°C to 40°C / -40°F to 104°F (with Option -LT)
Operating Humidity	15 - 90% RH non-condensing
Pollution Degree	Degree 2
Altitude	below 2,000 m

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## CERTIFICATION

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Model: CGAS-A-XXX

S/N: CGASA1807B00010

Rating: 16-30 VDC, 3W, Class 2

12-27 VAC, 50-60 Hz, 3VA, Class 2



CERTIFIED FOR ELECTRIC SHOCK & ELECTRICAL FIRE HAZARD ONLY. LA CERTIFICATION ACNOR COUVRE UNIQUEMENT LES RISQUES DE CHOC ELECTRIQUE ET D'INCENDIE D'ORIGINE ELECTRIQUE.

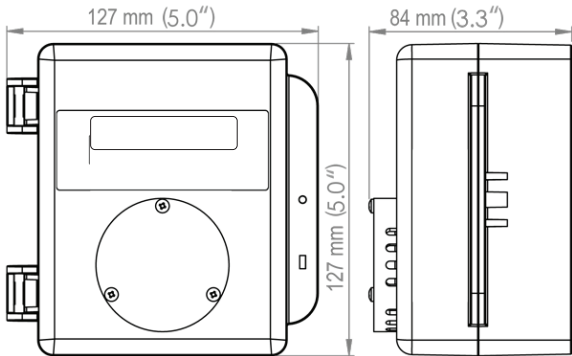
Conforms to: CSA-C22.2 No. 205-12, UL508 (Edition 18):2018

Conforms to: EMC Directive 2014/30/EU, EN 50270:2015, Type 1, EN61010

Conforms to: FCC. This device complies with part 15 of the FCC Rules,

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### 3.2 Enclosure Dimensions



Above dimensions are shown with optional standard splash guard. Without splash guard, thickness is 71 mm / 3.0 in. The area required for enclosure door to be open 90 degrees is 178 mm / 7.0 in or 254 mm / 10.0 in for fully open. With the optional splash guard installed, the enclosure is IP54 rated.

**NOTE:** During calibration, the sensor response time will be slower with a splash guard installed.

**NOTE:** The standard splash guard (Option -S) is optional for protecting non sticky gas sensors in wash down applications. For sticky gas sensors such as Chlorine ( $\text{Cl}_2$ ), Chlorine Dioxide ( $\text{ClO}_2$ ), Hydrogen Chloride (HCL), Hydrogen Cyanide (HCN), Hydrogen Fluoride (HF), Ozone ( $\text{O}_3$ ) and Phosphine ( $\text{PH}_3$ ) order the sticky gas splash guard Option -SN or use the metal splash guard p/n: SCS-8000-WSG.

## 4 SENSOR SPECIFICATIONS

### 4.1 Internal Gas Sensor Types

Internal Infrared Sensors	Part Number	Range	Lifespan
Carbon Dioxide (CO <sub>2</sub> )	CGAS-A-CO2-5K	0 - 2,000 ppm	~ 8 yrs
	CGAS-A-CO2-5K	0 - 5,000 ppm	
	CGAS-A-CO2-5%	0 - 5% vol	

Internal Electrochemical Sensors	Part Number	Range	Lifespan
Ammonia (NH <sub>3</sub> )	CGAS-A-NH3	0 - 500 ppm	~2 yrs
Carbon Monoxide (CO)	CGAS-A-CO	0 - 200 ppm	~3 yrs
Chlorine (Cl <sub>2</sub> )	CGAS-A-CL2	0 - 5.0 ppm	~3 yrs
	CGAS-A-CL2-10	0 - 10 ppm	~3 yrs
Chlorine Dioxide (ClO <sub>2</sub> )	CGAS-A-CLO2	0 - 1.0 ppm	~2 yrs
Ethylene (C <sub>2</sub> H <sub>4</sub> )*	CGAS-A-C2H4 *	0 - 200 ppm	~2 yrs
* not suitable for use in applications with continuous exposure to ethylene, i.e. ripening rooms, use LPT-A, LPT-B or LPT-M instead			
Fluorine (F <sub>2</sub> )	CGAS-A-F2	0 - 1.0 ppm	~1-2 yrs
Formaldehyde (CH <sub>2</sub> O)	CGAS-A-CH2O	0 - 5.0 ppm	~2 yrs
Hydrogen (H <sub>2</sub> )	CGAS-A-EH2	0 - 2,000 ppm	~2 yrs
Hydrogen Chloride (HCl)	CGAS-A-HCL	0 - 30 ppm	~2 yrs

Hydrogen Cyanide (HCN)	CGAS-A-HCN	0 - 30 ppm	~2 yrs
Hydrogen Fluoride (HF)	CGAS-A-HF	0 - 10.0 ppm	~1-2 yrs
Hydrogen Sulphide (H <sub>2</sub> S)	CGAS -A-H2S	0 - 50 ppm	~2 yrs
Nitric Oxide (NO)	CGAS-A-NO	0 - 100 ppm	~2 yrs
Nitrogen Dioxide (NO <sub>2</sub> )	CGAS-A-NO2	0 - 10 ppm	~3 yrs
Oxygen (O <sub>2</sub> )	CGAS-A-O2	0 - 25% Vol	~3 yrs
Ozone (O <sub>3</sub> )	CGAS-A-O3	0 - 1.0 ppm	~2 yrs
Phosphine (PH <sub>3</sub> )	CGAS-A-PH3	0 - 1.0 ppm	~2 yrs
Silane (SiH <sub>4</sub> )	CGAS-A-SIH4	0 - 20 ppm	~2 yrs
Sulphur Dioxide (SO <sub>2</sub> )	CGAS-A-SO2	0 - 20 ppm	~2 yrs

<b>Internal Solid State Sensors</b>	<b>Part Number</b>	<b>Range</b>	<b>Lifespan</b>
Refrigerant (R22)	CGAS-A-SR22	0 - 2,000 ppm	~5 yrs
Refrigerant (R134A)	CGAS-A-SR134A	0 - 2,000 ppm	~5 yrs
Refrigerant (R402A)	CGAS-A-SR402A	0 - 2,000 ppm	~5 yrs
Refrigerant (R404A)	CGAS-A-SR404A	0 - 2,000 ppm	~5 yrs
Refrigerant (R407C)	CGAS-A-SR407C	0 - 2,000 ppm	~5 yrs
Refrigerant (R410A)	CGAS-A-SR410A	0 - 2,000 ppm	~5 yrs
Refrigerant (R422D)	CGAS-A-SR422D	0 - 2,000 ppm	~5 yrs
Refrigerant (R438A)	CGAS-A-SR438A	0 - 2,000 ppm	~5 yrs



Refrigerant (R507A)	CGAS-A-SR507A	0 - 2,000 ppm	~5 yrs
Refrigerant (R513A)	CGAS-A-SR513A	0 - 2,000 ppm	~5 yrs
Refrigerant (R514A)	CGAS A-SR514A	0 - 2,000 ppm	~5 yrs
TVOC (Isobutylene)	CGAS-A-STVOC	0 - 500 ppm	~5 yrs

<b>Internal Catalytic (Combustible) Sensors</b>	<b>Part Number</b>	<b>Range</b>	<b>Lifespan</b>
Ethanol or Dimethyl Ether (C <sub>2</sub> H <sub>6</sub> O)	CGAS-A-CC2H6O-100	0 - 100% LEL	~5 yrs
Ethane (C <sub>2</sub> H <sub>6</sub> )	CGAS-A-CC2H6-100	0 - 100% LEL	~5 yrs
Hydrogen (H <sub>2</sub> )	CGAS-A-CH2-100	0 - 100% LEL	~5 yrs
Methane (CH <sub>4</sub> )	CGAS-A-CCH4-100	0 - 100% LEL	~5 yrs
Methanol (CH <sub>4</sub> O)	CGAS-A-CCH4O-100	0 - 100% LEL	~5 yrs
Propane (C <sub>3</sub> H <sub>8</sub> )	CGAS-A-CC3H8-100	0 - 100% LEL	~5 yrs

<b>Internal PID Sensors</b>	<b>Part Number</b>	<b>Range</b>
TVOCs	CGAS-A-SPL	0 - 30 ppm
TVOCs	CGAS-A-SPH	0 - 300 ppm

<b>Internal RH &amp; Temp Sensor (no gas sensor)</b>	<b>Part Number</b>
Relative Humidity and Temperature	CGAS-A-RHT

<b>No Internal Gas Sensor</b>	<b>Part Number</b>
Add a remote ESH-A sensor	CGAS-A-R

## 4.2 ESH-A-Remote Gas Sensor Types

<b>Remote Catalytic (Combustible) Sensors</b>	<b>Part Number</b>	<b>Range</b>	<b>Lifespan</b>
Acetylene (C <sub>2</sub> H <sub>2</sub> )	ESH-A-CC2H2-100	0 - 100% LEL	~5 yrs
Hydrogen (H <sub>2</sub> )	ESH-A-CH2-100	0 - 100% LEL	~5 yrs
Methane (CH <sub>4</sub> )	ESH-A-CCH4-100	0 - 100% LEL	~5 yrs
Propane (C <sub>3</sub> H <sub>8</sub> )	ESH-A-C3H8-100	0 - 100% LEL	~5 yrs

<b>Remote Infrared Sensors</b>	<b>Part Number</b>	<b>Range</b>	<b>Lifespan</b>
Infrared Propane (C <sub>3</sub> H <sub>8</sub> )	ESH-A-JET	0 - 100% LEL	~8 yrs

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<b>Remote PID Sensors</b>	<b>Part Number</b>	<b>Range</b>
TVOCs	ESH-A-SPL	0 - 30 ppm
	ESH-A-SPH	0 - 300 ppm

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### 4.3 RH & Temperature Sensor (Option -RHT)

The CGAS-A is a single channel device, it has one analog output. If ordered with an internal or remote gas sensor and a relative humidity and temperature sensor, the analog output signal will be used to send the gas reading signal to a controller or BAS/DDC. Therefore, the RH & temperature readings are for display purposes only, there is no current output or communication back to a controller or BAS/DDC for RH or temperature readings when a gas sensor is present.

### 4.4 Calibration Extending Firmware (CEF) and Sensor Aging

The cGas Detector with integral electrochemical sensor(s) have been programmed with our CEF. This firmware takes into consideration the aging of the electrochemical CO and NO<sub>2</sub> sensors so that less frequent calibrations are required in less-critical applications such as parking garages. The system tracks the age of the sensor and automatically compensates for the reduced output of the sensor as it ages.

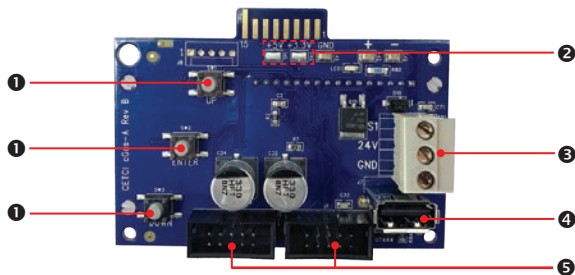
## 5 INSTRUMENT FEATURES

### 5.1 Exterior Enclosure



NUMBER	FEATURE	FUNCTION
1	Door Hinge	Secures door to base and allows easy opening and closing
2	Display	LCD display (standard display shown)
3	Sensor Opening	Allows gas diffusion into sensor
4	Door Screw	Secures door shut
5	Lock Slot	For security padlock or tie

## 5.2 Interior System Layout



NUMBER	FEATURE	FUNCTION
1	Programming Buttons	Access menu options and program functions using buttons inside the enclosure. (Arrow up, Enter, Arrow down)
2	Test Points: TP1 & TP2	For measuring voltage output
3	TB1 Wiring Terminal	Pluggable terminal for Power & signal output
4	USB Connection	For firmware and configuration upgrades
5	Sockets for smart sensor board	The gas smart sensor board plugs into the main board using these sockets

## 6 INSTALLATION

The sensor in the CGAS-A goes through a burn in period at our factory prior to shipping so it is ready for operation upon arrival. If you install the CGAS-A when it arrives, most sensors will not require a long warm up period (about 5 minutes for Ammonia and Nitrogen dioxide, 2 minutes for the other gases, except Oxygen which is a minimum of 2 hours).

**If the device is not installed within two weeks of delivery, the sensor may require a longer warm up time to stabilize (approximately 48 hours) and provide accurate readings.**

**NOTE:** CETCI suggests that upon power-up, all sensors be left to warm up for 24 hours prior to considering the gas readings to be accurate.

**NOTE:** All sensors are calibrated in the factory before they are shipped and should not require calibration at the time of a routine installation or replacement.

**NOTE:** Temperature affects calibration. It is important to ensure the gas is at the appropriate temperature during calibration. If the sensor is being used in an extreme temperature range, calibration should be done in that same temperature range.

A bump test will help you determine if a sensor requires calibration. If the sensor still does not respond as it should after a successful calibration, it probably requires replacing.

### 6.1 Special Considerations for Different Types of Sensors

After installing an CGAS-A with an Oxygen sensor, leave it to warm up for at least 2 hours before looking at the readings. If after at least 2 hours, the gas reading is not 20.9%, you should do a respan.

After a substantial warm up period, an Ethylene Oxide sensor should be zeroed on site if the ambient temperature is above 22°C (71.6°F). This particular sensor has a drift factor that can be as much as 1 ppm if the temperature rises to 25°C (77°F). With the low set point you could experience false alarms.

During calibration, when flowing span gas on an Ammonia sensor, if the reading climbs higher than the calibration point after applying gas for 3 minutes, use that reading as the calibration point. It should be around 300 ppm.

Ozone sensors are reactive to temperature changes and will drift.

Silicone, lead and chlorinated hydrocarbon vapours can poison catalytic sensors.

A bump test will help you determine if a sensor requires calibration. If the sensor still does not respond as it should after a successful calibration, it probably requires replacing.

## 6.2 General Safety Warnings

The cGas Detector is intended for indoor use, permanently mounted at a height that is appropriate for the type of gas being monitored. Refer to Section 6.5 *Mounting the Transmitter*. The cGas Detector should be protected from extreme weather conditions.

The cGas Detector requires no assembly and virtually no maintenance other than regular calibration of the internal and/or remote sensors and ensuring that excess water or dust not somehow entering the enclosure and physically damaging the circuit board or internal components. There are no serviceable elements other than the calibration instructions outlined in this manual. There are no replaceable components except the sensors.

### 6.3 Protection Against Electrical Risks

Disconnect all power before servicing. There may be multiple power sources. Power supply may have a building installed circuit breaker / switch that is suitably located and easy to access when servicing is required and should be labelled as cGas Detector supply (disconnecting power to the cGas Detector). Appropriate markings should be visible at the circuit breaker / switch that is supplying power to the cGas Detector.

This device may interfere with pacemakers. Modern pacemakers have built-in features to protect them from most types of interference produced by other electrical devices you might encounter in your daily routine. If you have a pacemaker, follow your healthcare provider's instructions about being around this type of equipment.

### 6.4 Protection Against Mechanical Risks

The door of the enclosure can be removed if absolutely necessary to facilitate installation of the base but it is not recommended on this model. Extreme care and caution must be exercised when removing the door to avoid damaging the hinges. The door should only be removed when absolutely required. Any damage occurring from door removal procedure will not be covered under warranty.

If the unit is installed on a wall, open the enclosure fully, grasp the door, keeping it open and being careful not to make contact with any of the internal components (circuit board). If the base is not mounted, grasp the base with your other hand. Tug on the door, pulling towards you making sure the door is still open and straight. **DO NOT TWIST.** The section of the hinges located on the base should "snap" apart from the part of the hinges located on the door.

After installation, place the door hinges over the installed base hinges, with the unit fully open and push towards the wall. The hinges should easily "snap" back into place.



The enclosure has one screw securing the door to the base for electrical safety and provides an opening to allow the user to apply a padlock or tie wrap if they desire the transmitter to be locked.

Be aware that the hinged door that could potentially pinch fingers and the sharp edges and/or jumper pins on the board could potentially prick or cut fingers if not handled carefully.

## 6.5 Mounting the Transmitter

The cGas Detector should be installed vertically and upright on a flat surface like a wall or column. Secure the transmitter using the the four 4.4 mm / 0.175 in diameter mounting holes provided to maintain water tight status. **Care should be taken to ensure that the face of the cGas Detector is not obstructed in order to maximize the sensor's exposure to the environment being monitored. Do not mount the transmitter upside down, sideways or flat on the floor or other surface.**

Two ½ in / 12.7 mm conduit entry points are located in the enclosure base - one in the rear of the base and one on the bottom edge of the base. Refer to Section 6.6 *Enclosure Mounting Components*.

The clearance from the PCA to the base enclosure is 12.7 mm / ½ in. **Do not use a conduit connector that has more than 12.7 mm (½ in) of thread length.**

**NOTE:** When mounting the enclosure, allow enough room to allow the end user to open the door fully to access the internal adjustments.

### 6.5.1 Wet Environment Considerations

If the cGas Detector is to be installed in a potential hose-down application or any application whereby liquid could be directed towards the sensor opening, the cGas Detector should be ordered with an optional attached splash guard (factory installed).

If used in a wet or wash down application, the conduit hub entering the cGas Detector enclosure must be liquid tight type. Any water or physical damage to the transmitter that occurs from the installer drilling their own installation holes will not be covered under warranty.

### **6.5.2 EMI and RF Interference Considerations**

All electronic devices are susceptible to EMI (Electromagnetic Interference) and RFI (Radio Frequency Interference). Our detectors have been designed to reduce the effects of these interferences and we meet CSA FCC and CE requirements for these type of devices. However there are still circumstances and levels of interference that may cause our equipment to respond to these interferences and cause them to react as if there has been gas detected.

There are some installation procedures that will reduce the likelihood of getting faulty readings:

1. Locate the detectors and controllers out of the way from normal foot traffic and high energy equipment.
2. Confirm the devices are properly grounded using conduit and shielded cabling.
3. Inform operators and technical staff working in the surrounding area to be aware of these possible conditions and that two way radios, Bluetooth enabled devices, cell phones and other electrical equipment may interfere with the response of the gas detectors.

### **6.5.3 Mounting Heights (Sensor Dependent)**

The sensor mounting height depends on the density of the gas relative to air. Heavier than air gases should be detected 6 in / 15 cm from the floor, lighter than air gas sensors should be placed on or near the ceiling, and gases which have a density close to that of air should have sensors installed in the "breathing zone" 4 - 6 ft / 1.2 - 1.8 m from the floor. The breathing zone refers to the area 4 - 6 ft / 1.2 - 1.8 m from the floor, where most human breathing takes

place. This is a good default location for sensors, as many gases are often well dispersed in air.

### Typical Mounting Height by Gas:

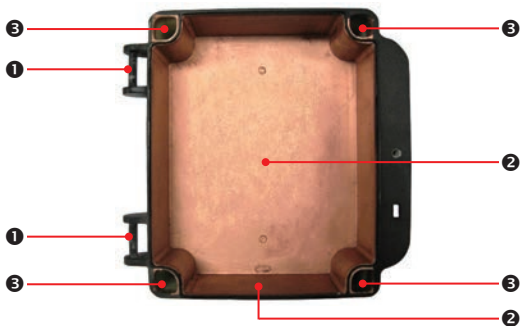
GAS TYPE	MOUNTING HEIGHT	COVERAGE (ft <sup>2</sup> )	COVERAGE (m <sup>2</sup> )
Ammonia (NH <sub>3</sub> )	on or near the ceiling	3000	279
Carbon Dioxide (CO <sub>2</sub> )	breathing zone	3000	279
Carbon Dioxide (CO <sub>2</sub> )	breathing zone	3000	279
Carbon Monoxide (CO)	breathing zone	5000 - 7500	465 - 697
Chlorine (Cl <sub>2</sub> )	6 in (15 cm) from floor	3000	279
Ethane (C <sub>2</sub> H <sub>6</sub> ) (combustible)	6 in (15 cm) from floor	3000	279
Propane (C <sub>3</sub> H <sub>8</sub> ) (combustible)	6 in (15 cm) from floor	3000	279
Methane (CH <sub>4</sub> ) (combustible)	on or near the ceiling	5000	465
Hydrogen (H <sub>2</sub> ) (combustible)	on or near the ceiling	5000	465
Ethanol (C <sub>2</sub> H <sub>6</sub> O) (alcohol)	6 in (15 cm) from floor	3000	279
Methanol (CH <sub>4</sub> O) (alcohol)	6 in (15 cm) from floor	3000	279

Hydrogen (H <sub>2</sub> ) (electrochemical)	application dependent	3000	279
Ethylene (C <sub>2</sub> H <sub>4</sub> )	breathing zone	5000	465
Fluorine (F <sub>2</sub> )	6 in (15 cm) from floor	3000	279
Formaldehyde (CH <sub>2</sub> O)	breathing zone	3000	279
Hydrogen Chloride (HCl)	12 in (30 cm) from floor	3000	279
Hydrogen Cyanide (HCN)	12 in (30 cm) from floor	3000	279
Hydrogen Sulphide (H <sub>2</sub> S)	3 ft (91 cm) from floor	3000	279
Nitric Oxide (NO)	breathing zone	5000	465
Nitrogen Dioxide (NO <sub>2</sub> )	breathing zone	5000	465
Oxygen (O <sub>2</sub> )	breathing zone	5000	465
Ozone (O <sub>3</sub> )	6 in (15 cm) from floor	3000	279
Phosphine (PH <sub>3</sub> )	breathing zone	3000	279
Silane (SiH <sub>4</sub> )	breathing zone	3000	279
Sulphur Dioxide (SO <sub>2</sub> )	6 in (15 cm) from floor	3000	279
All freon refrigerants	12 in (30 cm) from floor	3000	279

All freon refrigerants	12 in (30 cm) from floor	3000	279
R123 refrigerant (only)	12 in (30 cm) from floor	3000	279
TVOCs	target gas dependent	3000	279

## 6.6 Enclosure Mounting Components

### 6.6.1 Enclosure Base



NUMBER	FEATURE
<b>1</b>	Door Hinge
<b>2</b>	Conduit Entry Points 12.7 mm / 1/2 in diameter

- 
- ③ Mounting Holes 4.47 mm / 0.175 in diameter  
maximum head diameter 8 mm / 0.32 in, #8 or 4 mm  
screw
- 

### 6.6.2 Enclosure Bottom



NUMBER	FEATURE
--------	---------

---

- |   |            |
|---|------------|
| ① | Door Hinge |
|---|------------|
- 

- |   |  |
|---|--|
| ② | Conduit Entry Points 12.7 mm / 1/2 in diameter |
|---|--|
- 

### 6.7 Wiring Connections

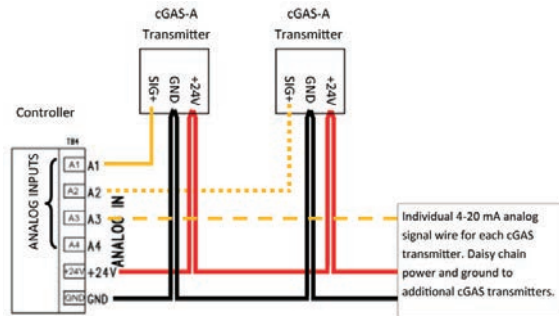
The cGas Detector analog transmitter is a low voltage powered device. Any application of operating voltages higher than indicated in the specification may result in damage. Double check wiring connections prior to powering the transmitter. Damage from incorrect wiring connections or from too much voltage applied is not covered under warranty.

All wiring should be run in EMT (or better) conduit properly earth grounded. Signal output and supply should be in shielded cable. The cable shield should be connected to earth ground at the controller/power supply that is providing power for the cGas.

If the cGas Detector is connected to an FCS, the supply voltage will be supplied by the FCS and if required, additional power can be supplied by RPS-24VDC

Remote Power Supply devices. In an analog configuration, a dedicated 4-20 mA signal wire is connected to each transmitter and only the ground and power wires are daisy chained.

### CGAS-A Connected to an FCS Controller (3-wire VDC)



If the cGas Detector is being connected to a BAS, DDC or other control panel then either a 24 VDC power supply or 24 VAC Class 2 or better transformer need to be used.

In all cases the voltage supply to the cGas Detector should never drop below 16 VDC or 12 VAC.

**NOTE: WARRANTY VOID IF SOLID-CORE WIRE IS USED AT THE WIRING TERMINAL STRIP.**

When using solid core wiring for distribution (in the conduit), use stranded wire pigtails 14 - 18 AWG within the enclosure to connect to the circuit board. The

rigidity of solid-core wire can pull a soldered terminal strip completely off a circuit board and this will not be covered under warranty.

### 6.7.1 Analog Wire Gauge vs Run Length

The table below shows the **maximum cable length between the cGas Detector and the Controller** for normal installations (a separate signal line from the controller for each cGas Detector is required).

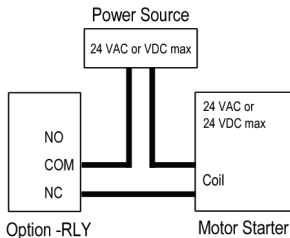
SUPPLY VOLTAGE	MAXIMUM LOAD (Wire + Termination Resistor) (ohms)	WIRE GAUGE (AWG)	MAXIMUM CABLE LENGTH (feet)
24 VDC	592 (assume a 500 $\Omega$ termination resistor)	18	7,100
		16	10,700
		14	20,000
16 VDC	216 (assume a 200 $\Omega$ termination resistor)	18	1,200
		16	1,800
		14	3,500
24 VAC	1,060 (assume a 500 $\Omega$ termination resistor)	18	43,200
		16	65,500
		14	100,000
12 VAC	316 (assume a 200 $\Omega$ termination resistor)	18	8,900
		16	13,583
		14	25,000



**NOTE:** The termination resistor could be as high as 500  $\Omega$  (10-volt measurement at 20 mA). A poor quality 24 VAC transformer might supply as little as 14 volts at low line conditions.

### 6.7.2 Wiring the Relay Smart Board (Option -RLY)

The cGas Detector is designed to be fail-safe. Equipment to be controlled by the relay smart board should be wired to the “NC” (Normally closed) and “COM” (Common) terminals. With this wiring, the connection will be open under normal, low gas concentration conditions. When the gas concentration rises to the configured alarm point or if there is a power failure, the connection relay will close. The relay coils are normally energized in a non-alarm state for failsafe operation. Refer to the *cGas Detector Operation Manual* for more information.



### 6.7.3 ESH-A Remote Sensor Wiring Connection

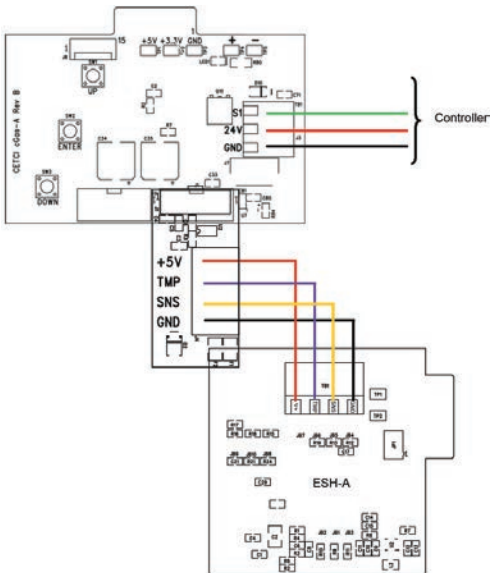
**Each ESH-A is given the same serial number as the device it is being connected to. Make sure to connect the ESH-A to the CGAS-A that has the same serial number or the factory calibration will be void.**

Four-conductor, 16 AWG stranded shielded cable is recommended for the ESH-A remote sensor wiring. This wiring should be run in a conduit, separate from the signal output, and should not exceed 15 m (50 ft). The voltage at the

remote sensor (Red V+ to Black GND) should not be below 4.5 volts. If this voltage is not met after installation, the wrong gauge wire may have been used or the wiring run is too long.

### Wiring Example: ESH-A Remote Sensor

**Note:** The maximum length of wire between the ESH-A Remote Sensor and the cGas Detector should not exceed 15 m (50 ft).



## 7 BASIC SYSTEM OPERATION

The cGas Detector continuously monitors gas concentrations on one configured channel. It must be connected to a controller (FCS, DCC or SCC), a control panel or a BAS / BMS / DDC system; the cGas Detector is not a standalone gas detection system.

**NOTE:** For functions that do not appear in this section, refer to the *cGAS Detector Operation Manual*.

### 7.1 Power Up and Warm-up Process from the Factory

Upon application of power to a cGas Detector shipped from the factory, the LCD display will turn on and rotate through several info screens that differ depending on the configuration of the transmitter. The warm-up period takes between 2 and 5 minutes depending on the gas sensors type.

**NOTE:** The cGas Detector will be visible on the controller / BAS / DDC system during the warm-up countdown but a correct reading will not show up until the unit has finished the warm-up period and the sensor(s) has stabilized.

All alarms will be disabled during the system warm-up period. After the warm-up period, the system may exhibit gas alarm condition(s) if the sensor has not completely stabilized during the warm-up period. This is normal and the length of time the gas alarms exist is dependent upon the length of time since the unit was last powered up, and the state of the environment it is installed in. Refer to *Section 6.1 Special Considerations for Different Types of Sensors* for more information about sensor warm up time.

**Upon power-up, all sensors\* should be left to warm up for 24 hours prior to considering the gas readings to be accurate.**

\*except, Ammonia, which should be left to warm up for 48 hours.

**All sensors are calibrated in the factory prior to shipping and should not require calibration at the time of a routine installation or replacement.**

## 7.2 Navigating the Menu Structure

The three programming push-buttons inside the enclosure are used to navigate through the cGas Detector menu structure. Refer to Section 5.1 *Exterior Enclosure* for location photo.

ENTER begins a process or moves you to the next screen in the same menu.

The UP or DOWN buttons are used to enter characters/numbers and to navigate to the next menu item. For simplicity's sake, directions in this manual use the UP button.

A line under a character or number indicates that is the space into which you are entering a character or number. Use the ENTER button to move to the next space. Or use the UP or DOWN button to change the value in that space.

The > symbol indicates that you are in the edit mode as opposed to scrolling through available menu items.

After entering and confirming a value you can either Exit the menu or press the UP button to move to the next item in that menu. All menus are circular and will bring you back to the Exit screen. Press ENTER to Exit.

## 7.3 Accessing the Menu with Passcodes

You must enter a passcode to access the menu. From the normal operation screen, press ENTER to access the password entry screen. Use the UP or DOWN arrow to scroll to the desired number. Press ENTER to move to the next position. Continue until the full code is entered and press ENTER when finished.

CODE	NAME	DESCRIPTION
0001	Test Menu	<ul style="list-style-type: none"> <li>• Test Analog Output</li> <li>• Test Relay (if Option -RLY is installed)</li> </ul>
1014	Display Menu	<ul style="list-style-type: none"> <li>• Display Type</li> <li>• Brightness</li> <li>• Hide Channel</li> </ul>

## 7.4 Display Settings

The LCD display can display up to 2-lines of 16-characters. The backlight can be turned off, but in normal operation, as configured from the factory, the display is backlit. After warm-up and upon normal operation, the display will show the current gas level reading for each channel that it has been configured. Pressing the UP or DOWN button allows you to scroll through a series of information screens showing the model name, serial number and firmware version; the gas type and AD counts; the channel number, gas type and gas level; and temperature and relative humidity (if option -RHT is installed).

### 7.4.1 Adjust Display Brightness

The brightness of the display and the information displayed can be changed as per your preference.

From the main display, press ENTER.

Enter passcode 1014 using the UP button and ENTER button.

Enter Password  
1014

Press ENTER to access the Display Menu.

DisplayMenu  
Press Enter

Brightness  
100

Press ENTER. Use the UP button to change the numeric value. Move to the next

digit by pressing ENTER. When finished, press ENTER to confirm and Exit.

Brightness >050	Confirm? 50	N >Y
--------------------	----------------	---------

**NOTE:** You cannot enter a number higher than 100. Entering a value of 000 turns the backlight off completely. With ambient light the text can still be read on the display.

### 7.4.2 Display Configurations

The default display set from the factory is normal mode which displays the gas type, gas reading and gas units for CH1.

CO2	536 PPM
-----	---------

The information can be reduced to just the gas type by changing the setting to the minimal mode display.

*****.CO2.*****
-----------------

From the main display, press ENTER.

Enter passcode 1014 using the UP button and ENTER button.

Enter Password 1014
------------------------

Press ENTER to access the Display Menu.

DisplayMenu Press Enter	Display Type Normal
----------------------------	------------------------

Press ENTER. Use the UP button to change the display type and press ENTER to save and Exit.

Display Type >Minimal
--------------------------

## 7.5 Alarm Status, Fault Detection and Communication Failure Alerts

If a channel is in alarm, the following letters will be displayed at the end of the line for that channel.

- low for low alarm
- mid for mid alarm
- high for High alarm

CO2	800	low
-----	-----	-----

CO2	1000	mid
-----	------	-----

CO2	1200	high
-----	------	------

The cGas Detector has built in fault detection, and in the event of a problem with the measurement circuitry the transmitter will indicate a fault condition on the display. Normal operation will resume once the fault condition has been corrected.

**NOTE:** If a question mark ? is displayed, the system is reading slightly negative but not enough to adversely affect the alarm functionality; a re-zeroing is recommended.

## 7.6 Change Units (°C or °F) of Temperature Readings

**NOTE:** This menu item only applies if the cGas Detector has the -RHT option installed.

You can change the factory configured temperature unit type from Celsius to Fahrenheit (or vice versa) very easily.

From the main display, press ENTER.

Enter passcode 3032 using the UP button and ENTER button.

Enter Password 3032
------------------------

Press ENTER to access the Calibrate Menu.

Calibrate Menu Press Enter
-------------------------------

In the Selected Channel menu, if Temperature is not displayed, press ENTER and use the UP button to scroll to find Temperature. Press ENTER.

Selected Channel  
CO2

Selected Channel  
>Temperature

Use the UP button to find Temperature Unit. If you want to change the unit type, press ENTER.

Temperature Unit  
Celsius

Press the UP button to choose Fahrenheit press ENTER and ENTER to exit.

Temperature Unit  
>Fahrenheit

## 7.7 Temperature and/or Relative Humidity Offset

**NOTE:** This menu item only applies if the cGas Detector has the -RHT option installed.

**NOTE:** Depending on the configuration, the device will show the temperature in either Celsius or Fahrenheit. The units can be changed at any time, refer to Section 7.6 *Change Units (°C or °F) of Temperature Readings*.

The temperature and relative humidity sensor is calibrated prior to shipping. If the readings on the cGas Detector are higher or lower than another device measuring the ambient temperature or relative humidity, you can adjust the reading by setting an offset value so the reading is more accurate. The Temperature offset value is a number of degrees in either direction of 0 and the Humidity offset value is a percentage between 0 or 100.

From the main display, press ENTER.

Enter passcode 3032 using the UP button and ENTER button.

Enter Password  
3032

Press ENTER to access the Calibrate Menu.



Calibrate Menu Press Enter
-------------------------------

In the Selected Channel menu, if Temperature (or Humidity) is not displayed, press ENTER and use the UP button to scroll to find the item you are looking for. Press ENTER.

Selected Channel CO2
-------------------------

Selected Channel >Temperature
----------------------------------

Selected Channel >Humidity
-------------------------------

Use the UP button to find Temperature Adj (or Humidity Adj). If you want to change the offset value, press ENTER. Change the offset value using the UP or DOWN and ENTER buttons.

Temperature Adj >-4.0 degC
-------------------------------

Humidity Adj >+02 %RH
--------------------------

Press ENTER to confirm the value is correct. If you entered the wrong value, press the UP button to move the cursor to N and press ENTER and reenter the value.

Confirm?	N
>-4.0 degC	>Y

Confirm?	N
>+2 %RH	>Y

## 7.8 Test Functions

### 7.8.1 Test Analog Output

Testing the analog output allows you to determine if the installation was successful. The test forces the cGas Detector to output a predetermined signal to the controller or DDC/BAS to test that the correct signal is being transmitted and the controller responds as configured (ie. if analog output is configured for VFD control, the fans operate as expected).

From the main display, press ENTER.

Enter passcode 0001 using the UP button and ENTER button.

Enter Password  
0001

Press ENTER to access the Test Menu.

Test Menu  
Press Enter

In the Test AO menu, the default entry is 4 mA. Press ENTER.

Test AO  
4.0 mA

Enter the preferred output value between 0 and 30 mA by using the UP, DOWN and ENTER buttons, or to continue with 4 mA press ENTER to the end.

Test AO  
>14.0 mA

When finished, press ENTER and then again to Confirm Y.

>14.0 mA	Confirm? N	>Y	Test AO 14.0 mA
----------	---------------	----	--------------------

The test will start as soon as you press ENTER to confirm. To stop the test, press the UP or DOWN button. To test another analog output value repeat the process by pressing ENTER.

## 7.8.2 Test Relay (models with Option -RLY installed)

**NOTE:** Before testing the relay, notify the appropriate people so unnecessary distress or response is not caused by activating fans or equipment or inadvertently calling the fire department or other emergency response team.

From the main display, press ENTER.

Enter passcode 0001 using the UP button and ENTER button.

Enter Password  
0001

Press ENTER to access the Test Menu.

Test Menu  
Press Enter

In the Test Relay menu, the default entry is Untripped. Press ENTER and use the UP button to change to Tripped. Press ENTER. You will hear a soft click and the relay will activate accordingly, respecting its failsafe setting.

```
Test Relay
Untripped
```

```
Test Relay
>Tripped
```

To stop the relay test, press the UP or DOWN button. You will hear a soft click and the relay will deactivate.

```
Test Relay;SB
>Untripped
```

When finished, press the UP button and press ENTER on the Exit menu item.

## 8 TROUBLESHOOTING

### **cGas Detector won't power up. (blank display)**

Is the power properly connected? Check the wiring connections. Refer to Section 6.7 *Wiring Connections*.

### **Display shows "SPAN FAULT" message.**

Check all connections and possible interferences and try a complete calibration procedure from the beginning again to see if this corrects the fault. If a second calibration does not resolve the fault then the sensor needs to be replaced.

Check to make sure the gas cylinder isn't empty.

### **Frequent, unexpected alarm signal sent to BAS/DDC.**

Check to see if EMI and RF interference is causing the equipment to react this way. Refer to Section 6.5.2 *EMI and RF Interference Considerations* for more information.

**List of Possible cGas Error Codes:**

(appears on the display in place of the units for a channel)

CODE		DESCRIPTION
F01	Negative Fault Reading	Check to make sure the smart sensor board is present and installed properly in the socket. If installed, the cGas detects the sensor signal is too far below its zeroAD. May be caused by a sensor that is temperature or humidity sensitive. Zeroing the sensor will normally resolve this.
F02	Smart Board Fault	cGas cannot communicate with the smart board. Ensure the smart board is installed and installed on the correct side (left) if a single channel unit. Otherwise power cycle or replace the sensor smart board.
F03	CO <sub>2</sub> Communication Fault	cGas cannot communicate with the CO <sub>2</sub> sensor even though it can communicate with the smart board. Power cycle or replace the sensor smart board.
F04	POT chip has failed	The internal smart sensor board gain POT chip has failed. If a power cycle does not resolve this, replace the sensor smart board.
F05	Error in reading Smart Board	cGas detected an error in the smart board ID. Use "Write to Sensor" for the indicated channel (passcode 3022).

---

F06	SB ID Mismatch	Firmware expected a different smart board than what is in the sensor socket. Confirm the correct smart board is installed in the correct socket. ie. CH1 gas should be in the left socket. When confirmed, if still in error, use "Write to Sensor" for the indicated channel (passcode 3022).
F07	RH & Temp Fault	cGas cannot communicate with the sensor. Ensure the smart board is installed correctly. If unresolved, contact our Technical Support Department
F30	AO DAC is not responding	Indicates a hardware failure in the analog output circuit. A replacement main board may be required.

---





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