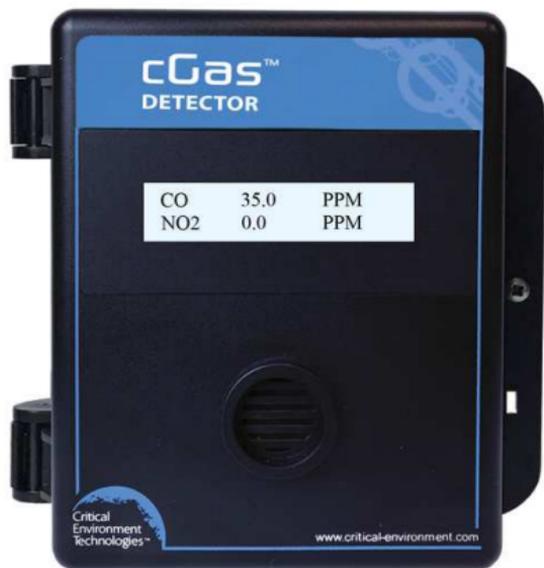


# Installation Manual



Rev. A | 2020.03



## cGas Detector

Digital Transmitter

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

## NEED MORE INFORMATION?

This is the **Installation Manual** for the cGas Detector Digital Transmitter. If you would like it in pdf form, please scan the QR code on the back cover page of this booklet or download it from our website:

<https://www.critical-environment.com/media/download/manuals/CGAS-D-Installation-Manual.pdf>

### There is also an **Operation Manual**, which includes more information:

- Adjusting Display Settings
- Alarm Status, Fault Detection and Communication Failure Notifications
- Setting Channel Alarm Setpoints, Direction and Hysteresis
- Relay Operations
- Enable/Disable Channels
- How to Install a Replacement Smart Sensor
- Calibration
- Accessories
- Maintenance
- Troubleshooting

You can scan the QR code below or download the **Operation Manual** from our website:

<https://www.critical-environment.com/media/download/manuals/CGAS-D-Operation-Manual.pdf>



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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. (the manufacturer) warrants this gas monitoring instrument, (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. The sensors have a warranty period of **one year on a pro-rated basis from the date of purchase** from our facility. This warranty is limited to the mechanics of the physical sensor components and as such, should the sensor become defective within this warranty period, we will repair or replace it at our discretion. This warranty does not extend to sensors that have been poisoned by external compounds such as, but not limited to, extreme gas concentrations, paint fumes, excessive dust, debris, etc. or to sensors that have been improperly zeroed, calibrated or altered in any way. If it is determined **within 90 days of purchase** that a sensor is malfunctioning or unable to remain calibrated due to no fault of its placement or treatment, the instrument may be sent back to the factory for a free calibration service.

The warranty status may be affected if the instrument has not been operated, calibrated or maintained as per the instructions in the instrument's Operation Manual or if the instrument has been abused, damaged or altered in any way. This instrument is only to be used for purposes stated herein. The manufacturer is not liable for auxiliary interfaced equipment or consequential damage.

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.

**All returned goods (whether under warranty or not) must be pre-authorized by obtaining a return merchandise authorization (RMA) number and shipped back to the manufacturer by prepaid freight.** Contact the manufacturer for an RMA number and the procedures required for product transport.

### 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 must be accompanied with an RMA number.

If CETCI is to do the repair work, you may send the instrument, prepaid, to:

**Attention: Service Department**  
**Critical Environment Technologies Canada Inc.**  
**Unit 145, 7391 Vantage Way**  
**Delta, BC, V4G 1M3**

Always include your Returned Merchandise Authorization (RMA) number, address, telephone number, contact name, shipping / billing information, and a description of the defect as you perceive it. You will be contacted with a cost estimate for expected repairs, prior to the performance of any service work.

For liability reasons, CETCI has a policy of performing all needed repairs to restore the instrument to full operating condition.

Pack the equipment well (in its original packing if possible), as we cannot be held responsible for any damage incurred during shipping to our facility.

## 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.

It is CETCI policy that 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:

**Critical Environment Technologies Canada Inc.**  
**Unit 145, 7391 Vantage Way, Delta, BC, V4G 1M3, Canada**  
**Toll Free: +1.877.940.8741**  
**Telephone: +1.604.940.8741**  
**Fax: +1.604.940.8745**  
**Email: [marketing@cetci.com](mailto:marketing@cetci.com)**  
**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 Detector Transmitter. The cGas Detector is a one or two channel gas detection transmitter that offers flexible customization options with the purpose of meeting your specific application and budgetary requirements. Ideal for monitoring toxic, combustible and refrigerant gases in non-hazardous (non-explosion rated) environments such as enclosed parking facilities, commercial HVAC, greenhouses, recreational facilities, refrigeration plants, manufacturing plants and other light industrial applications.

The sensors utilized in this device are accurate enough to measure to Occupational Health & Safety (OHS) hazardous levels for toxic gases. The transmitter operates by diffusion.

## 2.2 Key Features

- 1 or 2 gas channel operation
- User configurable Modbus® RS-485 RTU or BACnet® MS/TP communication protocols for communication with a Controller or Building Automation System (BAS)
- Easy Plug & Play Smart sensor replacement at end of life
- Customizable sensor and option combinations to meet specific application requirements
- 24 volt DC or (ground referenced) AC power
- 4-conductor shielded network wiring (daisy-chain)
- In field upgradable firmware/configuration via USB connection
- Bright LCD display
- Option -RLY \*: One SPDT dry contact relay, rated 30 volts, 2 amps max
- Option -LT\*: Low temperature package for improved usability in cold environments
- Option -RHT \*: Relative Humidity and Temperature sensor
- 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:** \* Option 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-D-EETO

**Option -RHT** is an RH & Temperature sensor (°C or °F)

- Available with all single channel configurations except sticky gas sensors (Cl<sub>2</sub>, ClO<sub>2</sub>, HCl, HCN, O<sub>3</sub>, PH<sub>3</sub>)
- Available with dual channel configurations that have a CO sensor
- The UL2075 approved CO sensor is not available with RH and Temperature sensor

**Option -RLY** is a 1 SPDT dry contact relay, rated 30 volts, 2 amps max

- Available with all single channel 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-D-CO

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 2.8 in

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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

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## USER INTERFACE

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Display (standard)	2-line by 16 character graphic LCD, user configurable to suppress reading display.
Display (Option -LT)	Optional OLED display for improved usability in low temperature applications, 2-line by 16 character
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.
Digital Wiring	VDC or VAC (ground referenced) four-conductor shielded 16 AWG stranded within conduit, network wiring (daisy-chain)
Fuses	Automatic resetting thermal

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## INPUT/OUTPUT

Communication Modbus® RTU (version 1.1b3) RS-485	Modbus® ID: 100 (default, configurable) Baud rate: 19,200 (default, configurable) Data bits: 8 Start bits: 1 Stop bits: 1 Parity: none
Communication BACnet® MS/TP (version 1 rev 14) RS-485	BACnet® MS/TP; ANSI/ASHRAE standard 135 BACnet® Communication protocol: 135-2012 Baud Rate: 76,800 (default) Base Address: 270 (default) MAC Address: 100 (default) Parity: no parity Stop bits: 1 Data bits: 8
Relay (Option - RLY)	One SPDT dry contact relay rated 30 volts, 2 amps max (not available with CO <sub>2</sub> gas configurations)
RH and Temperature (Option -RHT)	Available with CO <sub>2</sub> and CO gas configurations only

## ENVIRONMENTAL

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

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Pollution Degree	Degree 2
Altitude	below 2,000 m

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## CERTIFICATION

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Model: CGAS-D-XXX

S/N: CGASD1807B00010

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

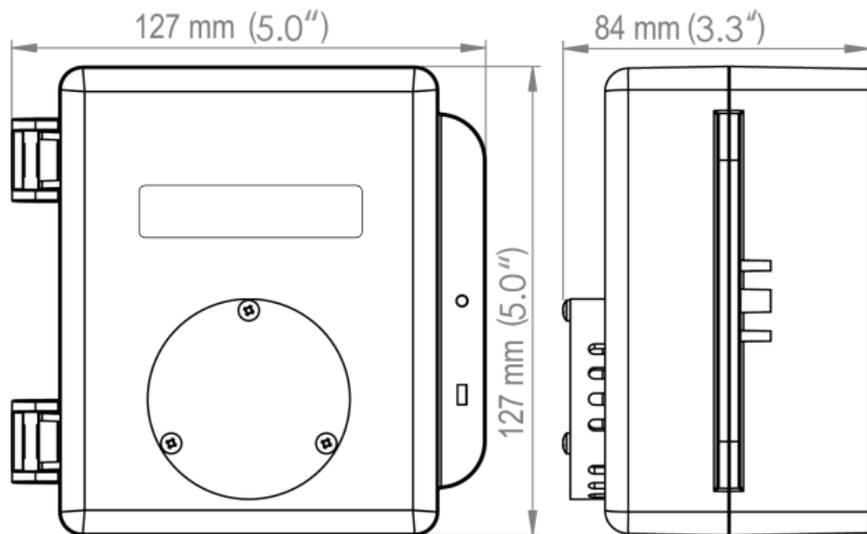
Conforms to: EMC Directive 2014/30/EU, EN 50270:2015, Type 1, EN61010

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 splash guard. Without splash guard, thickness is 71 mm / 2.8 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.

## 4 SENSOR SPECIFICATIONS

### 4.1 Single Channel Gas Sensor Options

Electrochemical Sensors	Part Number	Range	Lifespan
Ammonia (NH <sub>3</sub> )	CGAS-D-NH3	0 - 500 ppm	~2 yrs
Carbon Monoxide (CO)	CGAS-D-CO <sup>1</sup>	0 - 200 ppm	~6 yrs
Chlorine (Cl <sub>2</sub> )	CGAS-D-CL2	0 - 5.0 ppm	~3 yrs
Chlorine Dioxide (ClO <sub>2</sub> )	CGAS-D-CLO2	0 - 1 ppm	~2 yrs
Ethylene (C <sub>2</sub> H <sub>4</sub> )	CGAS-D-C2H4	0 - 200 ppm	~2 yrs
Ethylene Oxide (C <sub>2</sub> H <sub>4</sub> O)	CGAS-D-EETO	0 - 20 ppm	~2 yrs
Fluorine (F <sub>2</sub> )	CGAS-D-F2	0 - 1 ppm	~2 yrs
Formaldehyde (CH <sub>2</sub> O)	CGAS-D-CH2O	0 - 5 ppm	~2 yrs
Hydrogen (H <sub>2</sub> )	CGAS-D-EH2	0 - 2,000 ppm	~2 yrs
Hydrogen Sulphide (H <sub>2</sub> S)	CGAS-D-H2S	0 - 50 ppm	~2 yrs
Hydrogen Chloride (HCl)	CGAS-D-HCL	0 - 30 ppm	~2 yrs
Hydrogen Cyanide (HCN)	CGAS-D-HCN	0 - 30 ppm	~2 yrs
Hydrogen Fluoride (HF)	CGAS-D-HF	0 - 10 ppm	~2 yrs
Nitric Oxide (NO)	CGAS-D-NO	0 - 100 ppm	~2 yrs
Nitrogen Dioxide (NO <sub>2</sub> )	CGAS-D-NO2	0 - 10 ppm	~6 yrs
Oxygen (O <sub>2</sub> )	CGAS-D-O2	0 - 25% Vol	~3 yrs
Ozone (O <sub>3</sub> )	CGAS-D-O3	0 - 2 ppm	~2 yrs

Phosphine (PH <sub>3</sub> )	CGAS-D-PH3	0 - 5 ppm	~2 yrs
Silane (SiH <sub>4</sub> )	CGAS-D-SIH4	0 - 20 ppm	~2 yrs
Sulphur Dioxide (SO <sub>2</sub> )	CGAS-D-SO2	0 - 20 ppm	~2 yrs

<b>Refrigerant Sensors</b>	<b>Part Numbers</b>	<b>Range</b>	<b>Lifespan</b>
Refrigerant R22	CGAS-D-SR22	0 - 2,000 ppm	~5 yrs
Refrigerant R134A	CGAS-D-SR134A	0 - 2,000 ppm	~5 yrs
Refrigerant R402A	CGAS-D-SR402A	0 - 2,000 ppm	~5 yrs
Refrigerant R404A	CGAS-D-SR404A	0 - 2,000 ppm	~5 yrs
Refrigerant R407A	CGAS-D-SR407C	0 - 2,000 ppm	~5 yrs
Refrigerant R410A	CGAS-D-SR410A	0 - 2,000 ppm	~5 yrs
Refrigerant R422D	CGAS-D-SR422D	0 - 2,000 ppm	~5 yrs
Refrigerant R438A	CGAS-D-SR438A	0 - 2,000 ppm	~5 yrs
Refrigerant R507A	CGAS-D-SR507A	0 - 2,000 ppm	~5 yrs
TVOCs	CGAS-D-STVOC	0 - 500 ppm	~5 yrs

<b>Catalytic Sensors</b>	<b>Part Number</b>	<b>Range</b>	<b>Lifespan</b>
Hydrogen (H <sub>2</sub> )	CGAS-D-CH2-100	0 - 100% LEL	~5 yrs
Methane (CH <sub>4</sub> )	CGAS-D-CH4-100	0 - 100% LEL	~5 yrs
Propane (C <sub>3</sub> H <sub>8</sub> )	CGAS-D- CC3H8-100	0 - 100% LEL	~5 yrs

PID Sensors	Part Number	Range	
TVOC	CGAS-D-SPL	0 - 30 ppm	usage / application dependent
TVOC	CGAS-D-SPH	0 - 300 ppm	

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

## 4.2 Dual Channel Gas Sensor Options

Two Internal Electrochemical Sensors	Part Number	Range	Lifespan
Carbon Monoxide (CO) and Nitrogen Dioxide (NO <sub>2</sub> )	CGAS-D-CO-NO2 <sup>1</sup>	0 - 200 ppm 0 - 10 ppm	~6 yrs
Carbon Monoxide (CO) and Ethylene (C <sub>2</sub> H <sub>4</sub> )	CGAS-D-CO-C2H4 <sup>1</sup>	0 - 200 ppm	~6 yrs ~2 yrs
Carbon Monoxide (CO) and Hydrogen Sulphide (H <sub>2</sub> S)	CGAS-D-CO-H2S <sup>1</sup>	0 - 200 ppm 0 - 50 ppm	~6 yrs ~2 yrs

Carbon Monoxide (CO) and Oxygen (O <sub>2</sub> )	CGAS-D-CO-O2 <sup>1</sup>	0 - 200 ppm 0 - 25% vol	~6 yrs ~3 yrs
Carbon Monoxide (CO) and Nitric Oxide (NO)	CGAS-D-CO-NO <sup>1</sup>	0 - 200 ppm 0 - 100 ppm	~3 yrs
Hydrogen Sulphide (H <sub>2</sub> S) and Sulphur Dioxide (SO <sub>2</sub> )	CGAS-D-H2S-SO2	0 - 50 ppm 0 - 20 ppm	~2 yrs

<sup>1</sup> Carbon Monoxide sensor UL2075 Approved

**NOTE:** Carbon Monoxide detectors that are ordered with Option -RHT can not use UL2075 approved CO sensor

### 4.3 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.

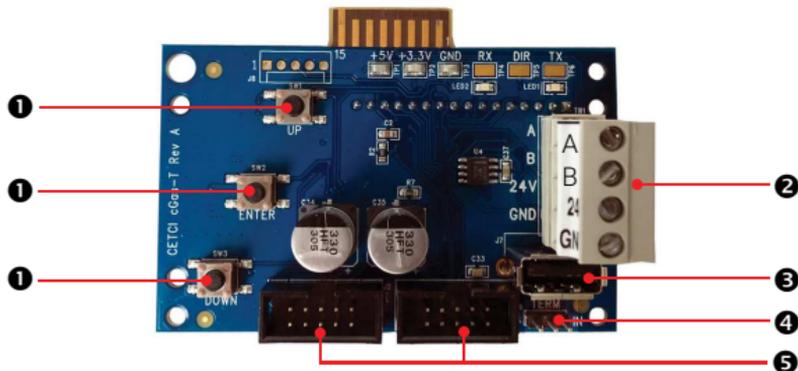
## 5 INSTRUMENT FEATURES

### 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)
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	RS-485 Communication Terminals	Pluggable power and signal terminal for connection to controller and next transmitter.
3	USB Connection	For firmware and configuration upgrades
4	Termination Resistor	Network termination resistor. "IN" position includes 120 ohm resistor.
5	Sockets for sensors and Options boards	Sensor boards and Options boards plug into the main board using these sockets

## 6 INSTALLATION

The sensor(s) in the cGas Detector go through a burn in period at our factory prior to shipping so it is ready for operation upon arrival. When installing the cGas Detector for the first time, the sensor may require a long warm up time (24 to 48 hours) to stabilize 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. **\*except, Ammonia, which should be left to warm up for 48 hours.**

**NOTE:** All sensors are calibrated in the factory 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.

### 6.1 Special Considerations for Different Types of Sensors

If the cGas Detector is being installed in an environment that is different than ambient room temperature, you may want to do a zero calibration. This will allow for the device to compensate for the new environment in which it is being installed.

After installing a cGas Detector with an Oxygen sensor, leave it to warm up for at least 2 hours before looking at the readings. If after a minimum of 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.

Ammonia sensors should be left to warm up for 48 hours so the sensor can stabilize. 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 version. 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.

Grasp the door with one hand, being careful not to make contact with any of the internal components (circuit board), and grasp the base with your other hand. Tug on the base and pull straight apart. **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, simply locate the lid hinges over the installed base hinges and pull toward you. 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 on a flat vertical surface using 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.

Two ½ in / 12.7 mm conduit entry points are provided in the enclosure. Both 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 Height (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.

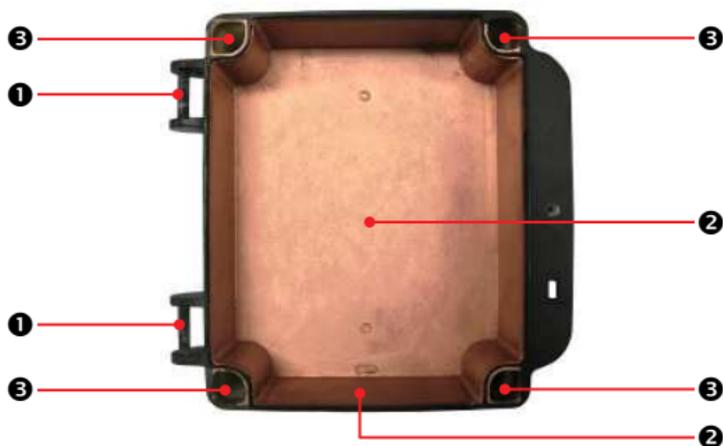
GAS	APPLICATIONS / TYPES	SUGGESTED MOUNTING HEIGHT
Carbon Monoxide (CO)	Gas engine exhaust	1.2 - 1.8 m above the floor
Nitrogen Dioxide (NO <sub>2</sub> )	Diesel engine exhaust	4 - 6 ft above the floor
Ammonia (NH <sub>3</sub> )	Commercial ice rinks Compressor rooms	Near the ceiling
Chlorine (Cl <sub>2</sub> )	Commercial swimming pools	15 cm above the floor
Ozone (O <sub>3</sub> )		6 in above the floor

For more examples, visit:

<https://www.critical-environment.com/support/faq/at-what-height-should-sensors-be-mounted>

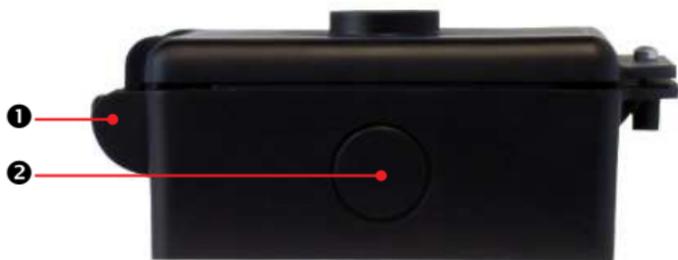
## 6.6 Enclosure Mounting Components

### 6.6.1 Enclosure Base



NUMBER	FEATURE
1	Door Hinge
2	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 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. All communications (network) wiring must be in shielded cabling. Wire shielding must be connected together at each device and taped off so it cannot cause a short on the circuit board when the door is closed. The wiring shield should be connected to ground only at the controller, have a contiguous connection throughout the network and be left taped and floating at the last device in the network. The recommended 4 conductor, 16 AWG, shielded stranded wire cable types are AlphaWire 79220, Belden 5202FE 008500 or equivalent.

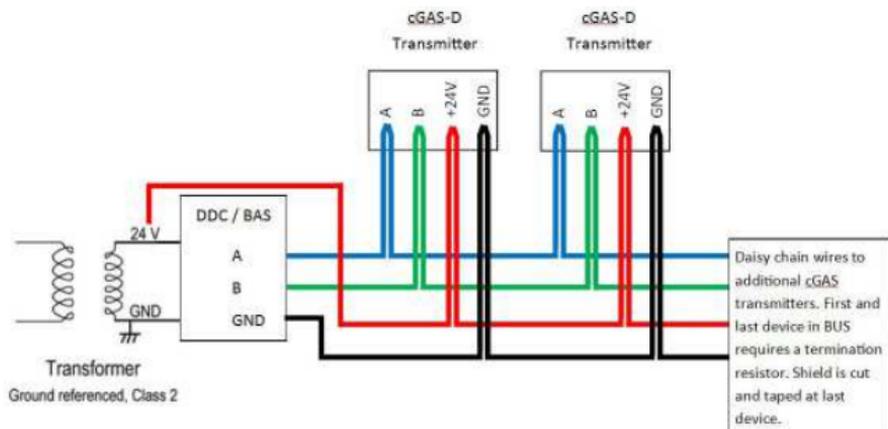
To ensure robust data communications, a daisy chain wiring configuration must be used. No tee taps. No star configurations. This means, four wires run from one end of the digital network to the other, through the same connections along the entire run. From one digital device to the next digital device, A goes to A; B goes to B; GND goes to GND; 24V goes to 24V. Do not mix up the individual wires or the two groups of four wires.

An end of line jumper must be installed at both ends of the digital network. To terminate, you must place a 120 ohm resistor on the IN (or sometimes labelled EN) termination jumper position ON the TERM jumper bank on the FIRST DIGITAL DEVICE (which might not be the Controller) and the LAST DIGITAL DEVICE in the wire run. The termination resistor jumper on all other digital devices in the network should be in the disabled position. Every CETCI digital device has a termination resistor jumper. The factory default setting of the termination resistor on all digital devices disabled.

The wiring should be 4-conductor shielded 16 awg stranded within conduit in a network wiring (daisy-chain) configuration. Suggested 4-conductor, 16 AWG, shielded stranded wire cable types are AlphaWire 79220, Belden 5202FE 008500 or equivalent.

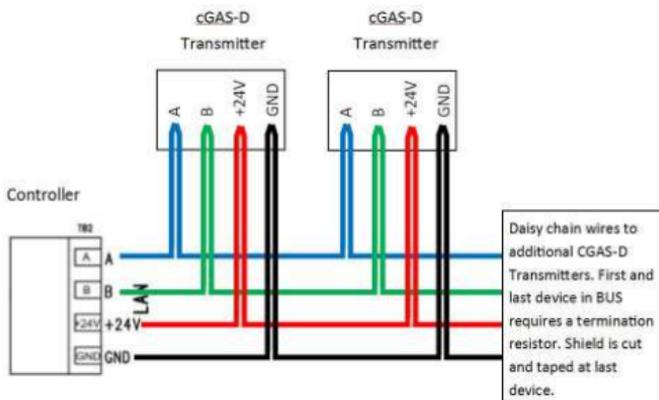
### **Wiring Example: 4-Wire VAC**

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 needs to be used.



### Wiring Example: 4-Wire VDC

If the cGas Detector is being connected to a QCC or FCS the supply voltage will either be supplied by the QCC or FCS and any additional power requirements of the system will be supplied by RPS-24VDC Remote Power Supply devices.



### 6.7.1 Digital Wire Gauge vs Run Length

It is important to use the appropriate gauge of wire for the required length of the run to ensure sufficient available voltage, noise reduction, dissipation of heat, and overall optimum performance along the entire wire run. Large wire sizes will have less voltage drop than smaller wires sizes of the same length. Similarly, shorter wire lengths will have less voltage drop than longer wires for the same wire size. The longer the wire run, the more attention there should be made to preventing voltage drop. The addition of an RPS-24VDC Remote Power Supply may be required.

CETCI highly suggests 4-conductor, 16 AWG, shielded, stranded wire cable types such as AlphaWire 79220, AlphaWire 5534, Belden 9954 or equivalent. **Do not use solid core wire.**

Minimum Cable Length vs Size (AWG) for Digital Communication and Power Supply

Cable Length		# of Sensors	4	6	8	10	12	14	16
Meters	Feet								
0.3 to 1552	1 to 500	AWG #	18	18	18	18	18	18	18
153 to 305	501 to 1,000	AWG #	18	18	18	18	18	18	18
306 to 457	1,001 to 1,500	AWG #	18	18	18	16	16	16	16
458 to 914	1,501 to 3,000	AWG #	18	16	16	16	16	16	16

In large system applications, if the recommended maximum cable length needs to be exceeded, an LNK-XT Network Extender can be used to boost the waning signal strength. One LNK-XT extends the network length by an additional 610 m (2,000 ft). It is recommended that an LNK-XT be installed approximately every 32 connected devices, or when a drop in signal strength is detected.

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

The cGas Detector can be ordered with Option -RLY, an SPDT dry contact relay rated 30 volts, 2 amps max. The relay components are connected to a circuit board that plugs into one of the plug & play smart sensor sockets. The system does not provide any power from the relay terminal. A dry contact relay operate like a switch to simply activate (switch on) or de-activate (switch off) equipment to be controlled, such as fan starters.

The cGas Detector is designed to be fail-safe, any equipment to be controlled by the system relays 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.

## 7 BASIC SYSTEM OPERATION

The cGas Detector continuously monitors target gas concentrations on one or two configured channels. It must be connected to a controller, control panel or BAS / BMS / DDC system; the cGas Detector is not a standalone gas detection system.

FOR THE FULL SYSTEM OPERATION INSTRUCTIONS, INCLUDING CALIBRATION AND SENSOR REPLACEMENT, **REFER TO THE OPERATION MANUAL**. Refer to Page 2 of this manual for more details.

### 7.1 Power Up and Warm-up Process From 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 one or both of the sensors 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 can edit the menu line item.

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 have to 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 Reading (Digital Output)</li> <li>• Test Relay (if Option -RLY is installed)</li> </ul>
1001	Basic Menu	If configured as a Modbus® device <ul style="list-style-type: none"> <li>• Comm Type</li> <li>• Comm Mac</li> <li>• Comm Baud</li> </ul>

---

1001	Basic Menu	If configured as a BACnet® device <ul style="list-style-type: none"><li>• Comm Type</li><li>• Comm Mac</li><li>• Comm Baud</li><li>• Instance ID</li></ul>
1014	Display Menu	<ul style="list-style-type: none"><li>• Display Type</li><li>• Brightness</li><li>• Display Line 1</li><li>• Display Line 2</li></ul>
2012	Alarms Menu	<ul style="list-style-type: none"><li>• Selected Channel</li><li>• Selected Alarm Level</li><li>• Set Alarm Setpoint</li><li>• Set Alarm Direction (Ascending/ Descending)</li><li>• Set Alarm Hysteresis</li></ul>
3022	Config Menu	<ul style="list-style-type: none"><li>• Selected Channel</li><li>• Enable/Disable Channel</li><li>• Read from Sensor</li><li>• Write to Sensor</li></ul>
3032	Calibrate Menu	<ul style="list-style-type: none"><li>• Selected Channel</li><li>• Set Calibration Gas</li><li>• Calibrate Zero</li><li>• Calibrate Span</li><li>• Temperature Offset*</li><li>• Humidity Offset*</li><li>• Temperature Units*</li></ul> <p>*displayed only if -RHT option is installed</p>

---

## 7.4 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
CO
```

```
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
```

## 7.5 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 Celcius or Fahrenheit. The units can be changed at any time, refer to **Section 7.4 Change Units (°C or °F) of Temperature Readings.**

The temperature and relative humidity sensors come pre-calibrated from the factory. If you find that the readings on the cGas Detector are higher or lower than another measurement device, 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 and the Humidity offset value is a percentage, both in either direction of 0.

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  
C0

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.



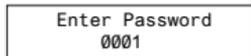
## 7.6 Test Functions

### 7.6.1 Test Reading / Test Digital Output

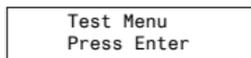
For each gas channel, you can manually enter a gas reading value of your choice (within the range of the sensor) that will be sent over the digital network to test the connection and configured responses between the cGas Detector and the DDC/BAS. You can do the same for relative humidity and temperature if the -RHT option is installed.

From the main display, press ENTER.

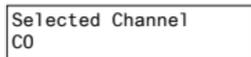
Enter passcode 0001 using the UP button and ENTER button.



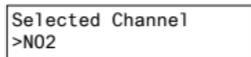
Press ENTER to access the Test Menu.



In the Selected Channel\_menu, confirm the correct channel is showing.



If you want to choose a different channel, press ENTER and use the UP button to scroll to the next value. Press ENTER and continue.



The list to choose from will depend on included sensors and options:

- Gas Type (ie. CO)
- Gas Type (ie. NO2)

- Temperature
- Humidity

Press the UP button to find Test Reading. To make a change, press ENTER and then use the UP, DOWN and ENTER buttons to enter the value.

Test Reading 0 PPM NO2
---------------------------

Test Reading >10.0 PPM NO2
-------------------------------

Press ENTER and then again to Confirm Y.

Confirm? >10.0 PPM NO2	N >Y
---------------------------	---------

Test Reading 10.0 PPM NO2
------------------------------

**The test will start as soon as you press ENTER to confirm and will remain in the test mode as long as the Test Reading screen remains untouched.** To stop the test, press the UP or DOWN button. Test another reading value or press ENTER to Exit.

### 7.6.2 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 and ON/OFF delays.

```
Test Relay:SB
Untripped
```

```
Test Relay:SB
>Tripped
```

To stop the relay test, Press ENTER and the UP button to change to Untripped. Press ENTER. You will hear a soft click and the relay will deactivate.

```
Test Relay:SB
>Untripped
```

When finished, press ENTER and then UP to Exit.

## 8 MODBUS & BACNET CONFIGURATION

The cGas Detector can be changed from Modbus® to BACnet® or vice versa in the field.

### 8.1 Changing Digital Communication Type in the Field

When the communication type is changed from/to Modbus® or BACnet®, the device will reset. This will briefly interrupt communications on the network it is connected to.

From the main display, press ENTER.

Enter passcode 1001 using the UP button and ENTER button.

```
Enter Password
1001
```

Press ENTER to access the Basic Menu.

```
Basic Menu
Press Enter
```

```
Comm Type
MODBUS
```

Press ENTER. Use the UP or DOWN buttons to choose MODBUS or BACNET or Cancel. Press ENTER. If you have changed the communication type, the device will display Reset Device.

Comm Type >BACNET
----------------------

Reset Device
--------------

Press ENTER and the cGas Detector will power off and on. This will cause a brief interruption in communications if the cGas Detector is on a network.

**NOTE: If you change the Comm Type, make sure you make the necessary changes to the corresponding MAC, Baud and Instance ID as appropriate. Refer to the following Sections 8.2 Configuring Modbus® Settings or 8.3 Configuring BACnet® Settings.**

## 8.2 Configuring Modbus® Settings

If a complete system (controller with digital transmitters and peripherals) is ordered from the factory, it will be shipped preconfigured with the appropriate Modbus® settings.

### Factory Default Modbus® Settings

- Modbus® ID = 100 (default, configurable)
- Baud rate = 19,200 (default, configurable)
- Data bits = 8
- Stop bits = 1
- Parity = none

If you adding it to an existing system the transmitters may require changes to the default Modbus® settings in order for communication to be successful between devices. Make sure your network connection is complete, the network termination switches are set appropriately and all the devices are configured with the same baud rate, character format, etc. Each device must have its own unique Modbus® ID.

### 8.2.1 Change Modbus® MAC Address

All devices on the same network must have a unique Modbus ID. The range of numbers that can be used as a Modbus® MAC address is 100 to 255.

From the main display, press ENTER.

Enter passcode 1001 using the UP button and ENTER button.

Enter Password 1001
------------------------

Press ENTER to access the Basic Menu.

Basic Menu Press Enter
---------------------------

The Comm Type displayed should be MODBUS. Press the UP button until you see Comm MAC.

Comm Type MODBUS
---------------------

Comm MAC 000
-----------------

Press ENTER. Use the UP or DOWN buttons to change the numeric value. Move to the next digit by pressing ENTER. When finished, press ENTER to confirm and again to Exit.

Comm MAC >101
------------------

Confirm?	N
>101	>Y

### 8.2.2 Change Modbus® Baud Rate

All devices on the same network must have the same baud rate. The default Modbus® baud rate for all CETCI Modbus® devices is 19,200.

From the main display, press ENTER.

Enter passcode 1001 using the UP button and ENTER button.

Enter Password 1001
------------------------

Press ENTER to access the Basic Menu.

Basic Menu  
Press Enter

The Comm Type should be Modbus. Press the UP button until you see Comm Baud.

Comm Type  
MODBUS

Comm Baud  
19,200

Press ENTER. Use the UP or DOWN buttons to scroll through the baud rates to choose from:

- 9,600
- 14,400
- 19,200 (default, configurable)
- 38,400
- 57,600
- 76,800
- 115,200

Select the preferred baud rate by pressing ENTER to save. Press the UP buttons and ENTER to Exit.

### 8.2.3 Modbus® Holding Registers

If you have specific requirements, have any questions or require clarification about the Modbus® holding registers, please contact CETCI for assistance.

## 8.3 Configuring BACnet® Settings

### 8.3.1 Change BACnet® MAC Address

The factory set default BACnet® MAC address is 100. The MAC ID along with the Instance ID make up the complete ID for the device. Each device requires a unique ID in order to communicate with the BAS / DDC. A MAC address should be set for each digital cGas Detector during installation.

From the main display, press ENTER.  
Enter passcode 1001 using the UP button and ENTER button.

Enter Password 1001
------------------------

Press ENTER to access the Basic Menu.

Basic Menu Press Enter
---------------------------

The Comm Type should be BACnet. Press the UP button until you see Comm MAC.

Comm Type BACnet
---------------------

Comm MAC 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.

Comm MAC >111
------------------

Confirm?	N
>111	>Y

### 8.3.2 Change BACnet® Instance ID

Every device on a BACnet® network must have a unique Instance ID. An Instance ID is the Vendor ID (or Base ID) followed by the device's MAC address. CETCI's Vendor ID is 270. If the device's MAC ID is 100, then the Instance ID would be 270100.

From the main display, press ENTER.  
Enter passcode 1001 using the UP button and ENTER button.

Enter Password 1001
------------------------

Press ENTER to access the Basic Menu.

Basic Menu Press Enter
---------------------------

The Comm Type should be BACnet. Press the UP button until you see Instance ID.

Comm Type BACnet	Instance ID 270100
---------------------	-----------------------

Press ENTER. Use the UP button to enter the numeric value. Move to the next digit by pressing ENTER. When finished, press ENTER to confirm and Exit.

Instance ID >0270111	Confirm?      N >270111      >Y
-------------------------	------------------------------------

### 8.3.3 Change BACnet® Baud Rate

All devices on the same BACnet® network must have the same baud rate. The default BACnet® baud rate is 76,800.

From the main display, press ENTER.  
Enter passcode 1001 using the UP button and ENTER button.

Enter Password 1001
------------------------

Press ENTER to access the Basic Menu.

Basic Menu Press Enter
---------------------------

The Comm Type should be BACnet. Press the UP button until you see Comm Baud.

Comm Type BACnet	Comm Baud >19200
---------------------	---------------------

Press ENTER. Using the UP or DOWN buttons, scroll through the baud rates to choose from:

- 9,600
- 14,400
- 19,200

- 38,400
- 57,600
- 76,800 (default, configurable)
- 115,200

Select the preferred baud rate by pressing ENTER to save. Press the UP button and ENTER to Exit.

#### **8.3.4 BACnet® PICS Information**

Critical Environment Technologies Canada Inc. (CETCI) has been granted the BACnet® Testing Laboratories (BTL) certification for the CGAS Detector Family upon passing the BTL requirements for the BACnet® Smart Actuator (B-SA) designation.

For a copy of the BACnet® Protocol Implementation Conformance Statement (PICS) information go to BACnet® International website:

<https://www.bacnetinternational.net/btl/index.php?m=81>

or visit our website:

<https://www.critical-environment.com/media/download/btlpics/CGAS-Family-BACnet-PICS.pdf>

If you have specific requirements, have any questions or require clarification about the BACnet® PICS information, please contact CETCI for assistance.

## 9 TROUBLE SHOOTING

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

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

### **cGas Detector display shows "COMM" message.**

Modbus® or BACnet output signal has not been connected properly. Check the wiring connections and the network settings.

### **Device cannot be seen by the Controller and/or the BAS / DDC on the Modbus® network.**

- Check the Baud rate. All devices in the network must have the same Baud rate.
- Check that local area network wiring is correct, especially the A and B lines to make sure they are not swapped between devices on the network.
- Check the Modbus® ID. Each device must have a unique ID assigned to it.

### **Device cannot be seen by the Controller and/or the BAS / DDC on the BACnet® network.**

- Check the Baud rate. All devices in the network must have the same Baud rate.
- Check to make sure the device has a unique ID assigned to it, which is made up of the MAC ID and the Base ID.
- Check that local area network wiring is correct, especially the A and B lines to make sure they are not swapped between devices on the network.

### **Frequent, unexpected alarm reading reported 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 in the cGas Detector Digital Installation Manual for more information.









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