

cGas™ DETECTOR



Rev. A | 2019.11

cGas Detector Digital Transmitter Operation Manual



www.critical-environment.com

TABLE OF CONTENTS

1 POLICIES	6
1.1 Important Note	6
1.2 Warranty Policy	7
1.3 Service Policy	8
1.4 Copyrights	9
1.5 Disclaimer	9
1.6 Revisions	9
2 INTRODUCTION	10
2.1 General Description	10
2.2 Key Features	11
3 INSTRUMENT SPECIFICATIONS	12
3.1 Technical Specifications	12
3.2 Enclosure Dimensions	15
4 SENSOR SPECIFICATIONS	16
4.1 Single Channel Gas Sensor Options	16
4.2 Dual Channel Gas Sensor Options	18
4.3 Calibration Extending Firmware (CEF) and Sensor Aging	19
5 INSTRUMENT FEATURES	19
5.1 Exterior Enclosure	19
5.2 Interior System Layout	20
6 SYSTEM OPERATION & CONFIGURATION	21
6.1 Navigating the Menu Structure	21
6.2 Accessing the Menu with Passcodes	22

6.3 Display Settings	23
6.3.1 Adjust Display Brightness.....	24
6.3.2 Display Configurations	24
6.3.3 Display or Hide Line 1 and/or 2	25
6.4 Alarm Status, Fault Detection and Communication Failure Notifications.....	26
6.5 Enable / Disable Channels	27
6.6 Setting Channel Alarm Setpoints, Direction and Hysteresis.....	28
6.7 Relay Function (Option -RLY)	31
6.8 Change Units (°C or °F) of Temperature Readings	32
6.9 Temperature and/or Relative Humidity Offset	33
6.10 Test Functions	34
6.10.1 Test Digital Output	34
6.10.2 Test Relay (Option -RLY)	35
7 MODBUS AND BACNET CONFIGURATION.....	36
7.1 Changing Communication Type (Modbus®/BACnet®) in the Field	36
7.2 Configuring Modbus® Settings.....	37
7.2.1 Change Modbus® MAC Address	38
7.2.2 Change Baud Rate.....	38
7.2.3 Modbus® Holding Registers	39
7.3 Configuring BACnet® Settings.....	39
7.3.1 Change BACnet® MAC Address	39
7.3.2 Change BACnet® Instance ID	40
7.3.3 Change BACnet® Baud Rate.....	41
7.3.4 BACnet® PICS Information.....	42

8 PLUG & PLAY SMART SENSOR REPLACEMENT	49
8.1 How to Replace or Add a New Smart Sensor Board	49
8.2 Read from Sensor	50
8.3 Write to Sensor.....	51
9 CALIBRATION.....	52
9.1 Calibration Specifications.....	52
9.1.1 Gas.....	52
9.1.2 Regulators & Flow	53
9.1.3 Adapters.....	53
9.1.4 Calibration Frequency	53
9.1.5 Gas Testing Frequency (Bump Testing)	54
9.1.6 Sticky Gases.....	54
9.2 Calibrating the Internal Sensor(s)	54
9.2.1 Set Calibration Gas Value.....	55
9.2.2 Zero (Null) Calibration	56
9.2.3 Span Calibration.....	57
9.3 Troubleshooting Calibration	59
9.3.1 Calibration Adapter Plug Doesn't Fit.....	59
9.3.2 Zero Fault	60
9.3.3 Span (Calibration) Fault.....	60
9.3.4 Zero Override.....	60
9.3.5 Span Override.....	60
9.4 Calibrating an Oxygen Sensor	61

10 ACCESSORIES	63
10.1 Splash Guard (Option -S).....	63
10.2 Calibration Adapter Clip "Cal Clip"	64
10.3 Splash Guard for Sticky Gases (Option -SN)	64
10.4 Metal Protective Guard	65
10.5 Calibration Kit	66
11 MAINTENANCE	66
12 TROUBLE SHOOTING	67

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:

PURCHASE DATE:

PURCHASED FROM:

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 goods must be shipped to the manufacturer by **prepaid freight**. All returned goods (whether under warranty or not) must be pre-authorized by obtaining a return merchandise authorization (RMA) number. 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

Website: 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.

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
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 (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

ELECTRICAL

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

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 ₂ gas configurations
RH and Temperature (Option -RHT)	Available with CO ₂ 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
Pollution Degree	Degree 2
Altitude	below 2,000 m

CERTIFICATION

Model: CGAS-D-XXX

S/N: CGASD1807B00010

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

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



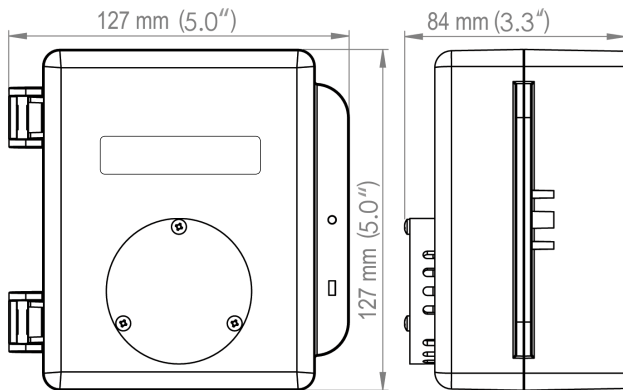
CERTIFIED FOR ELECTRIC SHOCK & ELECTRICAL FIRE HAZARD ONLY. LA CERTIFICATION ACNOR
COUVRE UNIQUEMENT LES RISQUES DE CHOC ELECTRIQUE ET D'INCENDIE D'ORIGINE ELECTRIQUE.

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 Numbers	Range	Lifespan
Ammonia (NH ₃)	CGAS-D-NH3	0 - 500 ppm	± 2 years
Carbon Monoxide (CO)	CGAS-D-LCO	0 - 200 ppm	± 6 years
Chlorine (Cl ₂)	CGAS-D-CL2	0 - 5.0 ppm	± 3 years
Chlorine Dioxide (ClO ₂)	CGAS-D-CL02	0 - 1 ppm	± 2 years
Ethylene (C ₂ H ₄)	CGAS-D-C2H4	0 - 200 ppm	± 2 years
Ethylene Oxide (C ₂ H ₄ O)	CGAS-D-EETO	0 - 20 ppm	± 2 years
Fluorine (F ₂)	CGAS-D-F2	0 - 1 ppm	± 2 years
Formaldehyde (CH ₂ O)	CGAS-D-CH2O	0 - 5 ppm	± 2 years
Hydrogen (H ₂)	CGAS-D-EH2	0 - 2,000 ppm	± 2 years
Hydrogen Sulphide (H ₂ S)	CGAS-D-H2S	0 - 50 ppm	± 2 years
Hydrogen Chloride (HCl)	CGAS-D-HCL	0 - 30 ppm	± 2 years
Hydrogen Cyanide (HCN)	CGAS-D-HCN	0 - 30 ppm	± 2 years
Hydrogen Fluoride (HF)	CGAS-D-HF	0 - 10 ppm	± 2 years
Nitric Oxide (NO)	CGAS-D-NO	0 - 100 ppm	± 2 years
Nitrogen Dioxide (NO ₂)	CGAS-D-NO2	0 - 10 ppm	± 6 years
Oxygen (O ₂)	CGAS-D-O2	0 - 25% Vol	± 3 years
Ozone (O ₃)	CGAS-D-O3	0 - 2 ppm	± 2 years

Phosphine (PH ₃)	CGAS-D-PH3	0 - 5 ppm	± 2 years
Silane (SiH ₄)	CGAS-D-SIH4	0 - 20 ppm	± 2 years
Sulphur Dioxide (SO ₂)	CGAS-D-SO2	0 - 20 ppm	± 2 years

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

Catalytic Sensors	Part Numbers	Range	
Hydrogen (H ₂)	CGAS-D-CH2-100	0 - 100% LEL	± 5 years
Methane (CH ₄)	CGAS-D-CCH4-100	0 - 100% LEL	± 5 years
Propane (C ₃ H ₈)	CGAS-D-CC3H8-100	0 - 100% LEL	± 5 years

PID Sensors	Part Numbers	Range	
TVOC	CGAS-D-SPL	0 - 30 ppm	usage / application dependent
TVOC	CGAS-D-SPH	0 - 300 ppm	
Infrared Sensors	Part Numbers	Range	
Carbon Dioxide (CO ₂)	CGAS-D-CO2-5K	0 - 5,000 ppm	± 8 years
	CGAS-D-CO2-5%	0 - 5% vol	

4.2 Dual Channel Gas Sensor Options

Two Internal Electrochemical Sensors	Part Numbers	Range	Lifespan
Carbon Monoxide (CO) and Nitrogen Dioxide (NO ₂)	CGAS-D-LCO-NO2	0 - 200 ppm 0 - 10 ppm	± 6 years
Carbon Monoxide (CO) and Ethylene (C ₂ H ₄)	CGAS-D-LCO-C2H4	0 - 200 ppm	± 6 years ± 2 years
Carbon Monoxide (CO) and Hydrogen Sulphide (H ₂ S)	CGAS-D-LCO-H2S	0 - 200 ppm 0 - 50 ppm	± 6 years ± 2 years
Carbon Monoxide (CO) and Oxygen (O ₂)	CGAS-D-LCO-O2	0 - 200 ppm 0 - 25% vol	± 6 years ± 3 years
Carbon Monoxide (CO) and Nitric Oxide (NO)	CGAS-D-LCO-NO	0 - 200 ppm 0 - 100 ppm	2-3 years

Hydrogen Sulphide (H ₂ S) and Sulphur Dioxide (SO ₂)	CGAS-D-H2S-SO2	0 - 50 ppm 0 - 20 ppm	2+ years
---	----------------	--------------------------	----------

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 NO₂ 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.

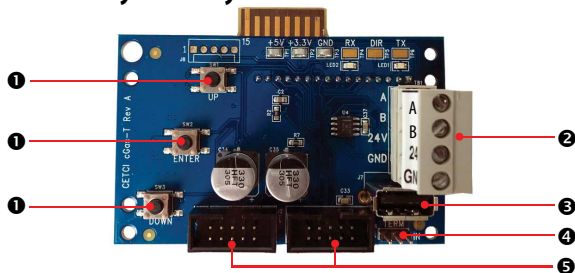
5 INSTRUMENT FEATURES

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	Programing 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 SYSTEM OPERATION & CONFIGURATION

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.

6.1 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.

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.

6.2 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"> • Test Reading • Test Relay (if Option -RLY is installed)
1001	Basic Menu	If configure as a MODBUS® device <ul style="list-style-type: none"> • Comm Type • Comm Mac • Comm Baud If configured as a BACNET® device <ul style="list-style-type: none"> • Comm Type • Comm Mac • Comm Baud • Instance ID
1014	Display Menu	<ul style="list-style-type: none"> • Display Type • Brightness • Display Line 1 • Display Line 2

2012	Alarms Menu	<ul style="list-style-type: none"> • Selected Channel • Selected Alarm Level • Set Alarm Setpoint • Set Alarm Direction (Ascending/Descending) • Set Alarm Hysteresis
3022	Config Menu	<ul style="list-style-type: none"> • Selected Channel • Enable/Disable Channel • Read from Sensor • Write to Sensor
3032	Calibrate Menu	<ul style="list-style-type: none"> • Selected Channel • Set Calibration Gas • Calibrate Zero • Calibrate Span • Temperature Offset* • Humidity Offset* • Temperature Units* <p><i>*displayed only if -RHT option is installed</i></p>

6.3 Display Settings

The LCD display can display up to 2 lines of 16 characters. It is backlit green with black text. 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 communication type, ID and baud rate, the gas type and AD counts; the channel number, gas type and gas level and the

temperature and relative humidity levels (if option is installed).

6.3.1 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?      N
50             >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.

6.3.2 Display Configurations

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

```

CO           0 PPM
NO2          0 PPM
  
```

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

```

*****-CO-*****
*****-NO2-*****
  
```

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
```

6.3.3 Display or Hide Line 1 and/or 2

The display can show a maximum of two lines of data. Choose what you want to see on line 1 and line 2 from four available options.

From the main display, press ENTER.

Enter passcode 1014 using the UP button and ENTER button.

```
Enter Password
1014
```

Press ENTER to access the Basic Menu.

```
Display Menu
Press Enter
```

Press the UP button until you see Display Line 1 (or Display Line 2).

```
Display Line 1
>CO
```

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

- Gas Type (ie. CO)
- Gas Type (ie. NO2)
- Temp + Humidity (if installed)
- Off

The factory default is to display the gas types for the sensors installed. If only one gas sensor is installed, Display Line 2 will show the Temp + Humidity (if installed) or it will be blank.

NOTE: The Temp + Humidity option is only available with CO and CO₂ gas sensors, or by itself.

6.4 Alarm Status, Fault Detection and Communication Failure Notifications

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

CO	0 PPM
NO2	0.7 low

CO	0 PPM
NO2	1.0 mid

CO	0 PPM
NO2	1.5 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: To ensure safe operation, monthly bump tests should be done. A damaged solid state or catalytic sensor will go open circuit and a dead or damaged electrochemical sensor will usually appear to the transmitter as a zero gas reading. Both instances will cause an incorrect reading during a bump test and create a fail indication during calibration.

NOTE: If a question mark ? is displayed then the system is in a minor fault and a re-zeroing is recommended.

If there is a communication failure between the cGas Detector and the controller or BAS, the screen will display COMM at the end of the line.

CO	0 COMM
NO2	0 COMM

For a list of Fault Codes, refer to Section 12 *Troubleshooting*.

6.5 Enable / Disable Channels

This setting allows you to enable or disable the channel(s) that are already configured in the device. If the device has one channel, you can enable or disable that one channel. If the device has two channels you can independently enable or disable each channel. You may also hide the lines of disabled channels. Refer to Section 6.3.3 *Display or Hide Line 1 and/or 2*.

NOTE: If the device has one channel, enabling the second channel does not add an operational channel to the device.

A disabled channel acts as if it does not exist, it will not show gas readings. A disabled channel will show on the normal display with four dashes in the middle of the line:

CO	----	PPM	CO	0	PPM
NO2		0 PPM	76.4	degF	----%RH

From the main display, press ENTER.

Enter passcode 3022 using the UP button and ENTER button.

```
Enter Password
3022
```

Press ENTER to access the Config Menu.

```
Config Menu
Press Enter
```

In the Selected Channel menu, confirm the correct channel is showing.

```
Selected Channel
CH1 CO
```

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.

```
Selected Channel
>Temperature
```

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

- CH1
- CH2
- Temperature (if installed)
- Humidity (if installed)

Press the UP button to find Channel En/Dis. To make a change, press ENTER and then the UP button to choose Enable or Disable and press ENTER to select and Exit.

ChannelEn/Dis Enabled	ChannelEn/Dis >Disable
CO 0 PPM ---degF 38%RH	

NOTE: If the cGas has two gas sensors and Option -RHT installed and configured for both gases to show on the display (on line 1 and line 2), the temperature and RH can be viewed at anytime by opening the enclosure and pressing the up or down arrow to scroll through the info screens until you see the temp/RH info screen.

6.6 Setting Channel Alarm Setpoints, Direction and Hysteresis

The cGas Detector is configurable as a one or two channel gas detector and each channel can be configured with LOW, MID and HIGH gas alarm setpoints in an ascending or descending direction. The number entered as the setpoint is the exact number/level of gas concentration at which the device will indicate an alarm condition and trigger a predetermined response from the controller or control panel. The alarm set points can be changed at any time and do not require a calibration before, during or after changing them.

NOTE: The cGas Detector DOES NOT HAVE an internal alarm. Gas readings are sent to the BAS or DDC and if the readings hit an alarm setpoint the BAS or DDC will trigger whatever type of alarm device or emergency protocol it has been configured to trigger.

Most installations will use the following factory default alarm setpoints:

SENSOR GAS TYPE	STANDARD RANGE	LOW ALARM	MID ALARM	HIGH ALARM
Carbon Dioxide (CO ₂)	0 - 5,000 ppm	1,000 ppm	1,250 ppm	1,500 ppm
Carbon Dioxide (CO ₂)	0 - 5.0% vol	1% vol	2% vol	3% vol
Carbon Monoxide (CO)	0 - 200 ppm	25 ppm	50 ppm	100 ppm
Nitrogen Dioxide (NO ₂)	0 - 10 ppm	0.7 ppm	1.0 ppm	1.5 ppm
Combustibles (catalytic)	0 - 100% LEL	10% LEL	15% LEL	20% LEL
Solid State Refrigerants	0 - 2,000 ppm	250 ppm	500 ppm	1,000 ppm

NOTE: Standard range and alarm setpoints are subject to change when required.

For a complete list of all sensors please go to:

<https://www.critical-environment.com/support/faq/suggested-alarm-setpoints>

An Ascending alarm is used when monitoring a gas that becomes hazardous in increasing quantity. The normal/safe gas level is below the alarm setpoint and when the gas level increases, reaching and exceeding the alarm setpoint, the alarm is tripped.

A Descending alarm is used when monitoring a gas that becomes hazardous in decreasing quantity, such as oxygen. The normal gas level for oxygen is above the alarm setpoint so if the oxygen level starts to deplete and reaches/goes below the alarm setpoint, the alarm will trip. You can set a hysteresis value that will be common for all alarm setpoints on that channel.

Hysteresis is the difference between the ON point and OFF point of the alarm and the value entered will determine at what gas concentration the alarm will stop. If the alarm setpoint is 100 ppm and

the hysteresis is 5 ppm, when the gas concentration reaches or exceeds 100 ppm, the alarm will come on. The alarm will stay on until the gas concentration reduces to 95 ppm (5 ppm below the alarm setpoint).

The purpose of hysteresis is to prevent the alarm from chattering on and off repetitively if the gas fluctuates just above and just below 100 ppm, which would happen if the hysteresis is set to 0. Likewise, if the device triggers relays, repetitive turning on and off could cause them to burn out.

From the main display, press ENTER.

Enter passcode 2012 using the UP button and ENTER button.

```
Enter Password
2012
```

Press ENTER to access the Alarms Menu.

```
Alarms Menu
Press Enter
```

In the Selected Channel menu, confirm the correct channel is showing.

```
Selected Channel
C0
```

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

```
Selected Channel
>N02
```

Press the UP button until you see Selected Alarm, confirm the correct alarm level is showing.

```
Selected Alarm
Low Alarm
```

If you want to choose a different alarm level (ie. Mid or High), press Enter and use the UP button to scroll to the next alarm level. Press ENTER and continue.

```
Selected Alarm
>Mid Alarm
```

Press the UP button until you see Alarm Setpoint, confirm the desired number is showing.

Alarm Setpoint 25 PPM

If you want to enter a different alarm setpoint, press Enter and use the UP and ENTER buttons to change the number. Press ENTER to confirm and continue.

Alarm Setpoint >050 PPM

Confirm?	N
>50 PPM	>Y

Press the Up button until you see Alarm Direction, confirm the correct direction (ascending or descending) is showing.

Alarm Direction ASCENDING

If you want to change the direction, press Enter and use the UP button to scroll to the next value. Press ENTER to continue.

Alarm Direction >DESCENDING

Press the Up button until you see Alarm Hysteresis, confirm the desired value is showing.

Alarm Hysteresis 005 PPM CO

If you want to change the value, press Enter and use the UP and ENTER buttons to change the value. Press ENTER to confirm and continue.

Alarm Hysteresis >010 PPM CO

Confirm?	N
>10 PPM	>Y

6.7 Relay Operation

NOTE: The relay option is not currently available with CO₂ gas configurations.

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. Do not switch the socket that the relay comes factory configured in.

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 relay is SPDT (single pole, double throw) thereby providing one set of usable dry contacts for the relay. 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.

The default factory settings for the relay are as follows and are currently not user configurable:

- Enabled
- 10 second ON Delay
- 10 second OFF Delay
- Activated on MID alarm level
-

NOTE: For information on LOW, MID and HIGH alarm setpoints, refer to Section 6.6 *Setting Channel Alarm Setpoints, Direction and Hysteresis*.

6.8 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
```

6.9 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 6.8 *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 CO

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	>Y
>-4.0 degC	

Confirm? N	>Y
>+2 %RH	

6.10 Test Functions

6.10.1 Test Digital Output (Test Reading)

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.

Enter Password 0001

Press ENTER to access the Test Menu.

```
Test Menu
Press Enter
```

In the Selected Channel menu, confirm the correct channel is showing.

```
Selected Channel
CO
```

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.

```
Selected Channel
>NO2
```

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?      N
>10.0 PPM NO2  >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.

6.10.2 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.

7 MODBUS AND BACNET CONFIGURATION

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

7.1 Changing Communication Type (Modbus® / BACnet®) in the Field

When the communication type is changed, the device will reset, which 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 7.2 *Configuring Modbus® Settings* or 7.3 *Configuring BACnet® Settings*.

7.2 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 are not using the cGas Detector with a CETCI controller but are 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.

7.2.1 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
```

7.2.2 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 button and ENTER to Exit.

7.2.3 Modbus® Holding Registers

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

7.3 Configuring BACnet® Settings

The cGas Detector can be configured with BACnet® output to communicate with a BAS, DDC or similar control panel.

7.3.1 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      Comm MAC
BACnet         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      Confirm?      N
>111          >111          >Y
```

7.3.2 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

7.3.3 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 then ENTER to Exit.

7.3.4 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.

To follow is the BACnet® Protocol Implementation Conformance Statement (PICS) information that can also be found on the BACnet® International website at <http://www.bacnetinternational.org>

Date: April 2019

Vendor Name: Critical Environment Technologies Canada Inc.

Product Name: CGAS Detector Family

Product Model Numbers: CGAS-D, CGAS-DP, CGAS-SC

Application Software Version: 1.1

Firmware Revision: 3.7.12.0

BACnet® Protocol Version/Revision: 14

Product Description: The CGAS Detector product line is a group of customizable two channel gas detectors featuring a range of possible gases and options. The various gases are added to the device using plug and play “smart sensor” boards, which attach to the main board within the enclosure. The main board handles communication back to a controller or building management system via field configurable Modbus® RTU or BACnet® MS/TP.

BACnet® Standardized Device Profile (Annex L):

- BACnet® Operator Workstation (B-OWS)
- BACnet® Building Controller (B-BC)
- BACnet® Advanced Application Controller (B-AAC)

- BACnet® Application Specific Controller (B-ASC)
- BACnet® Smart Sensor (B-SS)
- BACnet® Smart Actuator (B-SA)

List all BACnet® Interoperability Building Blocks Supported (Annex K):

BIBB	Service	Responds to
DS-RP-B	ReadProperty-B	X
DS-WP-B	WriteProperty-B	X
DM-DDB-B	Dynamic Object Device Binding-B	X
DM-DOB-B	Dynamic Object Binding-B	X

Segment Capability:

Segment requests supported

Window Size 480

Segment requests supported

Window Size 480

Standard Object Types Supported:

An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

- Whether objects of this type are dynamically creatable using the CreateObject service
- Whether objects of this type are dynamically deletable using the DeleteObject service
- List of the optional properties supported
- List of all properties that are writable where not otherwise required by this standard
- List of proprietary properties and for each its property identifier, datatype, and meaning
- List of any property range restrictions

NOTE: None of the object types listed in this section is dynamically creatable or dynamically deletable.

NOTE: The BACnet conformance codes are as follows:

O - Optional (may be required under some conditions)

R - Required, but not required to be writable (may be required to be writable under some conditions)

W - Not only required, but also required to be writable

The following codes are used in this document to describe how the properties are implemented:

R/W	Read/write
R/O	Read-only
R/O=value	Implemented as a read-only with the indicated value

Device Object

Property	BACnet® Conf Code	Implementation
Object_Identifier	R	R/O
Object_Name	R	R/O
Object_Type	R	R/O="device"
System_Status	R	R/O="operational"
Vendor_Name	R	R/O
Vendor_Identifier	R	R/O
Model_Name	R	R/O
Firmware_Revision	R	R/O
Application_Software_Version	R	R/O
Location	O	R/W

Protocol_Version	R	R/O=1
Protocol_Revision	R	R/O=14
Protocol_Services_Supported	R	R/O
Protocol_Object_Types_Supported	R	R/O
Object_List	R	R/O
Max_APDU_Length_Accepted	R	R/O=480
Segmentation_Supported	R	R/O="none"
APDU_Timeout	R	R/W=7000
Number_Of_APDU_Retries	R	R/W=1
Max_Master	O	R/O=127
Device_Address_Binding	R	R/O=empty list
Data_Base_Revision	R	R/O
Max-Info-Frames	O	R/O=1

Analog Input

Property	BACnet® Conf Code	Implementation
Object_Identifier	R	R/O
Object_Name	R	R/O
Object_Type	R	R/O="analog input"
Present_Value	R	R/O
Status_Flags	R	R/O
Event_State	R	R/O="normal"
Out_Of_Service	R	R/O=FALSE
Units	R	R/O
Property_List	R	R/O
Description	O	R/W

Analog Output

Property	BACnet® Conf Code	Implementation
Object_Identifier	R	R/O
Object_Name	R	R/O
Object_Type	R	R/O="analog-output"
Present_Value	W	R/W
Status_Flags	R	R/O="all normal"
Event_State	R	R/O="normal"
Out_Of_Service	R	R/O=FALSE
Units	R	R/O
Priority_Array	R	R/O
Relinquish_Default	R	R/W
Property_List	R	R/O
Description	O	R/W

Binary Output

Property	BACnet® Conf Code	Implementation
Object_Identifier	R	R/O
Object_Name	R	R/O
Object_Type	R	R/O="binary-output"
Present_Value	W	R/W
Status_Flags	R	R/O="all normal"
Event_State	R	R/O="normal"
Out_Of_Service	R	R/O=FALSE
Polarity	R	R/W
Priority_Array	R	R/O
Relinquish_Default	R	R/O
Description	O	R/W

Data Link Layer Options:

- BACnet® IP, (Annex J)
- BACnet® IP, (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) _____
- MS/TP Master Node (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200
- MS/TP Slave (Clause 9), baud rate(s): _____
- Point-To-Point, EIA 232 (Clause 10), baud rate(s): _____
- Point-To-Point, modem, (Clause 10), baud rate(s): _____
- LonTalk, (Clause 11), medium: _____
- Other: _____

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) Yes No

Networking Options:

- Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
- Annex H, BACnet Tunneling Router over IP
- BACnet®/IP Broadcast Management Device (BBMD)
Does the BBMD support registrations by Foreign Devices? Yes No

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- | | | | |
|---|---|--|--|
| <input checked="" type="checkbox"/> ANSI X3.4 | <input type="checkbox"/> IBM™/Microsoft™ DBCS | <input type="checkbox"/> ISO 8859-1 | <input type="checkbox"/> ISO 10646 (UTF-8) |
| <input type="checkbox"/> JIS C 6226 | <input type="checkbox"/> ISO 10646 (UCS-2) | <input type="checkbox"/> ISO 10646 (UCS-4) | |

Network Security Options:

- Non-secure Device - is capable of operating without BACnet® Network Security

BACnet® Communications Defaults:

Baud rate = 78,800 (default, configurable)

Base address = 270 (default, configurable)

MAC address = 100 (default, configurable)

Parity = no parity

Stop bits = 1

Data bits = 8

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

8 PLUG & PLAY SMART SENSOR REPLACEMENT

A sensor will need to be replaced when it does not have enough sensitivity to respond to a bump test or it repeatedly fails calibration. Similarly, the sensor may need to be replaced if the application requirements change and a different gas needs to be monitored.

A Plug & Play Smart Sensor Board is a sensor that is fastened to a small circuit board with a memory chip that contains the sensor's calibration and configuration information. When a replacement smart sensor board or a brand new gas smart sensor board is installed, the information it contains must be written to the main circuit board.

8.1 How to Replace or Add a New Smart Sensor Board

Smart board replacement sensors arrive pre-calibrated and factory configured. After you physically replace the smart sensor board, you have to Read the data stored in the new sensor board up to the main board, overwriting the old sensor's calibration information. After an appropriate warm up period (24 hours), you may want to do a bump test to confirm the response from the sensor.

Power OFF the unit during the physical replacement of the sensor boards.

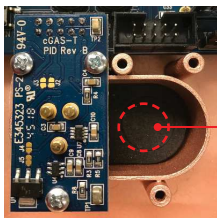
With the door open, look at the smart sensor boards, CH1 is the socket on the left side and CH2 is the socket on the right side.

If replacing an existing sensor, unscrew the smart sensor board you want to replace and gently pull it out of the socket. Insert the new smart sensor board and screw it in place.

If adding a new smart sensor to an empty socket, make sure to remove the perforated foam circle in the sensor cavity, then insert the smart board and screw it in place.

NOTE: If the second sensor is a CO sensor smart board, it will be shipped with a small plastic short

sensor adapter. After removing the foam, insert the short sensor adapter before plugging the CO smart sensor board into the socket.



When installing a second smart sensor after initially ordering a single smart sensor model, you will need to remove the center circular cut out of the foam in the second sensor vent area before installing the smart board.

8.2 Read from Sensor

During this process, the main board reads from the smart sensor board and uploads the calibration and configuration information stored in the smart sensor board, saving the information and overwriting the existing calibration and configuration information for that sensor in the main board.

With the unit powered ON, from the main display, press ENTER.
Enter passcode 3022 using the UP button and ENTER buttons.

Enter Password
3022

Press ENTER to access the Config Menu.

Config Menu
Press Enter

In the Selected Channel menu, confirm the desired 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.

Selected Channel
CH1 C02

Press the UP button to find Read From Sensor. Press ENTER.

Read from Sensor
CH1 (Left)

Read from Sensor
>YES

Press the UP button to change from NO to YES and press ENTER to select. The system will upload and save the new calibration information to the main board. Press ENTER to exit. Repeat for the second channel if required.

NOTE: Make sure you are reading from the correct sensor - left vs right.

8.3 Write to Sensor

This process forces an upload of the calibration and configuration information that is stored in the main board to the sensor smart board. Every time a change is made on the cGas Detector, the main circuit board saves the change to the smart sensor board automatically. However, there may be instances when you may want to force save the changes to the smart sensor board, such as if the memory of the smart sensor board gets corrupted.

From the main display, press ENTER.

Enter passcode 3022 using the UP button and ENTER buttons.

Enter Password
3022

Press ENTER to access the Config Menu.

Config Menu
Press Enter

In the Selected Channel menu, confirm the desired channel is showing.

Selected Channel
CH1 CO2

Press the UP button to find Write to Sensor. Press ENTER.

Write to Sensor
CH1 (left)

Write to Sensor
>YES

Press the UP button to change from NO to YES and press ENTER to select. The system will write the sensor configuration information from the main board to the smart sensor board. Press ENTER to exit. Repeat for the second channel if required. Repeat for the second channel if required.

NOTE: Make sure you are writing to the correct sensor - left vs right.

9 CALIBRATION

9.1 Calibration Specifications

9.1.1 Gas

Calibration span gas cylinders should have at least $\pm 5\%$ accuracy and have a current date stamp. Gas generators should have a current dated cell installed.

Service personnel should flow zero emissions air or 20.9% volume O_2 (scrubbed of hydrocarbons) before attempting to null adjust (zero) toxic gas sensors. In some cases nitrogen (N_2) can be substituted for zero air when null adjusting electrochemical sensors. Contact CETCI for clarification.

The type of gas mixture, how old the gas is and what temperature it has been stored at will affect repeatability during field calibration.

IMPORTANT NOTES:

- Oxygen sensors require 99.9% nitrogen (N_2) for a true zero. We recommend doing the span first, followed by zeroing.
- Carbon dioxide sensors require 99.9% nitrogen (N_2) for a true zero. If the cGas Detector has a splash guard you will need to flow the nitrogen for approximately 4 minutes BEFORE you enter the Calibrate Zero menu. Same when flowing CO_2 calibration gas, flow for 4 minutes BEFORE you enter the Calibrate Span menu.
- Catalytic sensors require oxygen to work and thus the user MUST flow clean air or oxygen to

obtain a true zero and the span gas must have “air” balance, not N₂ balance.

9.1.2 Regulators & Flow

Calibration gases that are lighter than or the same weight as air (CO, O₂, etc.) should be flowed at 0.5 LPM. Gases heavier than air (NO₂, etc.) should be flowed between 0.5 and 1.0 LPM. Fixed flow regulators provide more accuracy.

9.1.3 Adapters

The proper calibration adapter should be utilized to allow the gas to properly diffuse around the sensor. The calibration adapter plug for a cGas Detector with an internal sensor without a splash guard is part number **CET-7000-CAP**. For a cGas Detector with a splash guard, use part number **CET-4700-SCC** or use the Cal Clip hands free adapter, part number **CET-SGC**.

9.1.4 Calibration Frequency

- Parking garage detectors: Once every 12 months
- OHS applications: Once every 6 months (OHS: Occupational Health & Safety)
- For best performance and to meet published specifications: once every six months

NOTE: A calibration label should be applied after every calibration to confirm work performed and the date it was confirmed. If a controller is involved, the alarm set points should be indicated on a label on the front door of the enclosure so anyone working in the environment can be aware.

Equipment: Calibration Kit, Calibration gases

Users can order the calibration kit, calibration accessories and / or gases from any CETCI authorized distributor or you can supply your own gas and equipment as long as the gas meets the minimum specifications. CETCI does not ship gas cylinders outside of Canada.

9.1.5 Gas Testing Frequency (Bump Testing)

For the purpose of safety in OHS applications, sensors should be gas tested (bump tested) once every month to confirm response and alarm activation.

9.1.6 Sticky Gases

Sticky gases, such as Ozone (O_3), Chlorine (Cl_2), Chlorine Dioxide (ClO_2), Hydrogen Chloride (HCl), Hydrogen Cyanide (HCN), Nitrogen Dioxide (NO_2) and Phosphine (PH_3) adhere to surfaces such as tubing and splash guards. The cGas Detector can be ordered with a special splash guard if configured with a sticky gas sensor. When calibrating with sticky gases we suggest using Teflon lined tubing so the gas doesn't adhere to the tubing, reducing the concentration of the flow of gas. Also keep the length of the tubing as short as possible, no more than 0.91 to 1.22 m / 3 - 4 ft so the gas flow concentration doesn't lessen over the distance from the gas cylinder to the sensor. Furthermore, when calibrating a Chlorine sensor, use a chlorine gas generator. Chlorine gas in a cylinder can be highly unstable and it is difficult to get accurate readings from that source.

NOTE: A dual channel cGas Detector with internal CO + NO₂ sensors that requires a splash guard should be ordered with Option -SN.

9.2 Calibrating the Internal Sensor(s)

Calibration has three processes - Set Calibration Gas Value, Span and Zero. The Span and Zero calibrations can be done in any order. However when calibrating an Oxygen sensor we suggest the Zero calibration be done before the Span calibration. Refer to Section 9.4 *Calibrating an Oxygen Sensor*. When calibrating a CO₂ sensor, flow the nitrogen gas and the span gas for 4 minutes before entering the Calibrate Zero and Calibrate Span menus.

9.2.1 Set Calibration Gas Value

Check to make sure that the calibration gas value configured in the device matches the gas concentration of the calibration gas cylinder you are using. This is especially important if you are not using the same Cal gas concentration that was used previously to calibrate the device. How much gas the sensor detects is directly related to the Cal gas setting and the actual concentration of calibration gas used during calibration.

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, confirm the desired channel is showing.

```
Selected Channel
CO
```

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

```
Selected Channel
>NO2
```

Press the UP button to accept the displayed calibration gas value if it is correct. Or press ENTER and change the value using the UP or DOWN buttons.

```
Calibration Gas
50 PPM CO
```

```
Calibration Gas
>100 PPM CO
```

When finished pressed ENTER and then ENTER again to confirm and ENTER to exit.

```
Confirm?      N
>100 PPM      >Y
```

The factory default calibration gas concentrations are:

SENSOR GAS TYPE	CALIBRATION GAS LEVEL*
Carbon Dioxide (CO ₂)	1,000 ppm
Carbon Dioxide (CO ₂)	1.0 % VOL
Carbon Monoxide (CO)	100 ppm
Nitrogen Dioxide (NO ₂)	5 ppm
Combustibles	20% LEL
Solid State Refrigerants	1,000 ppm

* subject to change when required

9.2.2 Zero (Null) Calibration

Before trying to zero toxic gas sensors, zero emissions air or 20.9% volume O₂ (scrubbed of hydrocarbons) should be flowed over the sensors. In some cases nitrogen (N₂) can be substituted for zero air when null adjusting electrochemical sensors. Oxygen and CO₂ sensors require 99.9% N₂ for a true zero. Catalytic sensors require oxygen to work and thus the user MUST flow clean air or oxygen to obtain a true zero and the span gas must have “air” balance, not N₂ balance. If using ambient air to zero the gas detector, make sure the environment has clean air or the process could result in a Zero fault.

NOTE: To exit the Zero Calibration at any time, press ENTER.

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, confirm the desired channel is showing.

```
Selected Channel  
CO
```

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

```
Selected Channel  
>NO2
```

Press the UP button to find Calibrate Zero.

```
Calibrate Zero  
100 AD
```

Press ENTER if using ambient air or attach the regulator to the cylinder of zero air, insert the calibration adapter into the sensor opening on the front of the enclosure door (refer to Section 9.3.1 *Calibration Adapter Plug* if the adapter will not fit). Press ENTER to start the Zero calibration. The display will show a countdown from 20 seconds.

```
Zeroing  
47AD 18s
```

```
Zero Success  
56AD
```

When the process has finished and the Zero calibration was accepted, press ENTER and use the UP button navigate to Exit and press ENTER to exit. Remove the cylinder of zero gas.

If the Zero calibration was not successful refer to Section 9.3.2 *Zero Fault*.

9.2.3 Span Calibration

Span calibration is flowing a known concentration of the target gas over the sensor to adjust the output signal to match the gas concentration. It resets the sensor's electronic circuit against a known concentration of target gas to correct drift and keep linearity.

NOTE: To exit the Span Calibration at any time, press ENTER.

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, confirm the desired channel is showing.

```
Selected Channel
C0
```

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

```
Selected Channel
>N02
```

Use the UP button to find Calibrate Span. Press ENTER.

```
Calibrate Span
4000 AD
```

Confirm the span calibration gas level. It is important to make sure that the span gas level value matches the calibration gas concentration you are using to calibrate the sensor. Press ENTER to confirm value is correct. (If the value is not correct, press the UP button to move the cursor to N and press ENTER. Change the cal gas level using the UP and ENTER buttons.)

```
Confirm CalGas      N
>100 PPM            >Y
```

Press ENTER to confirm. Attach the regulator to the span gas cylinder and flow the span gas over the sensor. You have 120 seconds to start flowing the gas. If the gas isn't detected, the display will return to Calibrate Span.

```
Waiting for Gas
53AD          35s
```

When the gas is detected the display will show stabilizing for a countdown from 120 seconds and then spanning for a countdown from 60 seconds.

Stabilizing 1961AD 82s	Spanning 1957AD 21s
Span Success 1956 AD 19	

When the process has finished and the Span calibration was accepted, press ENTER and use the UP button navigate to Exit and press ENTER to exit. Remove the cylinder of span gas.

If the Span calibration was not successful, refer to Section 9.3.3 *Span Fault*.

Repeat the calibration steps above for each enabled gas channel.

NOTE: If an inappropriate concentration of span gas is applied during calibration, calibration may succeed but it does not mean the equipment has been calibrated properly. CETCI is not responsible for improperly calibrated transmitters. Follow manual instructions carefully.

NOTE: After 5 minutes of inactivity on any screen, the display will return to the normal operation.

9.3 Trouble Shooting Calibration

This section is intended to aid in correcting issues that may arise during the calibration procedure. If you are unable to correct a problem or you have questions, please contact our service department at service@cetci.com or 604-940-8741 (Local) or 1877-940-8741 (Toll Free).

9.3.1 Calibration Adapter Plug Doesn't Fit

Use a slight twisting motion as you gently push the calibration adapter plug (p/n: **CET-7000-CAP**) into the sensor opening. If it is hard to insert, moisten the O-ring seal slightly then try re-inserting it. If the splash guard is installed, use the Cal Clip (p/n: **CET-SGC**).

NOTE: Response time will be slower with the splash guard installed.

9.3.2 Zero Fault

If the zeroing process fails, the cGas Detector will show a Zero fault. This will happen if the ambient gas readings are at an unacceptable level due to not enough clean air - there is enough residual target gas in the environment or other gases that are interfering with the sensor seeing oxygen.

9.3.3 Span Fault

If the cGas shows a Span fault after trying to calibrate, it is possible that the sensor is dead or the device isn't seeing the gas (cylinder is empty, regulator or adapter plug is not attached properly, tube is blocked, kinked, etc.).

Span Fault	
197 AD 1	0s

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. Over time, a sensor degrades and when it has gone beyond an acceptable level, it has reached its end of life and will no longer pass a calibration. If replacing the sensor does not correct the fault, please contact our service department at service@cetci.com.

9.3.4 Zero Override

If the gas level (possible residual gas) is too high, but still within the override range, the display will indicate that an override is required.

Override?	N
-1PPM	>Y

To override the value use the UP button to select Y and press ENTER. To keep the original zero value, leave the indicator on N and press ENTER.

9.3.5 Span Override

During the Span calibration, readings are taken and from the results sensitivity is calculated and compared to the original sensitivity of the sensor at the time of installation. If this sensitivity is below the override range, but above the fault limit, the display will indicate that an override is required. To override the value use the UP button to select Y and press ENTER. To keep the original

value, leave the indicator on N and press ENTER.

Override?	N
1953 AD 19	>Y

9.4 Calibrating an Oxygen Sensor

When calibrating an Oxygen sensor, a Span calibration should be done first, then a Zero calibration. The Zero calibration is done using a cylinder of 99.9% Nitrogen (N₂) gas.

NOTE: During the Span calibration, flowing the Nitrogen will cause the Oxygen readings to decrease which may trigger the alarms to go off. You may want to disable the alarms during the calibration of an Oxygen sensor.

To calibrate the Oxygen sensor, 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, confirm the O2 channel is showing.

Selected Channel O2

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

Press Enter to continue. Use the UP button to find Calibrate Span. Press ENTER.

Calibrate Span 4000 AD

Confirm the span calibration gas level. It is important to make sure that the span gas level value matches the calibration gas concentration you are using to calibrate the sensor. Press ENTER to

confirm value is correct. (If the value is not correct, press the UP button to move the cursor to N and press ENTER. Change the cal gas level using the UP and ENTER buttons.)

Confirm CalGas	N
>20.9 %VOL	>Y

The factory default calibration gas concentration is:

SENSOR GAS TYPE	CALIBRATION GAS LEVEL
Oxygen (O ₂)	20.9% VOL

Either use a cylinder of 20.9% Oxygen or if you are confident of the air quality, the oxygen in the breathing environment can be used as a fairly accurate source of span gas (be careful not to exhale in the direction of the Oxygen sensor vent). It is not recommended to use this procedure for all span adjustments of Oxygen sensors.

Attach the regulator to the span gas cylinder and flow the span gas over the sensor. You have 120 seconds to start flowing the gas. If the gas isn't detected, the display will return to Calibrate Span.

Waiting for Gas	
53AD	35s

When the gas is detected the display will show stabilizing for a countdown from 120 seconds and then spanning for a countdown from 60 seconds.

Stabilizing	
1961AD	82s

Spanning	
1957AD	21s

Span Success	
1956 AD	19

When the process has finished and the Span calibration was accepted, remove the cylinder of span gas. Refer to Section 9.3.5 *Span Override* if the Span calibration was not successful.

Attach the regulator to the cylinder of Nitrogen (N₂), insert calibration adapter into the sensor

opening on the front of the enclosure door (refer to Section 9.3.1 *Calibration Adapter Plug* if the adapter will not fit). Flow the gas for a couple minutes and continue flowing while you press the UP button to find Calibrate Zero.

Calibrate Zero 100 AD

Press ENTER to start the Zero calibration. The display will show a countdown from 19 seconds.

47AD	Zeroing	18s
------	---------	-----

When the process has finished and the Zero calibration was accepted, press ENTER to Exit and remove the cylinder of Nitrogen (N_2) gas.

56AD	Zero Success
------	--------------

Refer to Section 9.3.4 *Zero Override* if the Zero calibration was not successful.

10 ACCESSORIES

10.1 Splash Guard (Option -S)

The splash guard attaches to the front of the enclosure to protect the sensor during water spray or washdown applications. It is factory installed and when attached the enclosure meets IP54 standards. To calibrate a device with a splash guard, use the Cal Clip. This type of splash guard can be used with any gas type except sticky gases. Refer to Section 10.3 *Splash Guard (Option -SN)* for more information.



NOTE: The splash guard will slow down the response time of the sensor.

NOTE: To ensure proper calibration, units configured with an internal CO and internal NO_2 that require a splash guard should use Option -SN, splash guard for sticky gases.

10.2 Calibration Adapter Clip “Cal Clip” (p/n: CET-SGC)

To calibrate a cGas Detector with a factory installed splash guard (Option -S), attach the Cal Clip around the splash guard to allow the use of both hands during calibration. The small barb hose fitting accommodates standard or Teflon tubing of 1/8” (3.175 mm) ID and 3/16” (4.762 mm) ID.



NOTE: The Cal Clip is designed to prevent entry or exit of air except via the hose barb fitting, therefore it **must be removed during normal operation** or else the gas readings will not be accurate.

10.3 Splash Guard for Sticky Gases (Option -SN)

This specially designed Splash Guard for sticky gases is an optional factory installed accessory for protection of a sticky gas sensor (such as Chlorine, Chlorine Dioxide, Ozone or Hydrogen Chloride) in wet and/or wash down environments.

NOTE: The Splash Guard for sticky gases comes with a specialized **Calibration Adapter Slide Cap** which **MUST be removed during normal operation** or else the gas readings will not be accurate.



Sticky Gases: Ozone (O_3), Chlorine (Cl_2), Chlorine Dioxide (ClO_2), Hydrogen Chloride (HCl), Hydrogen Cyanide (HCN), Nitrogen Dioxide (NO_2) and Phosphine (PH_3). In addition, units configured with an internal CO + internal NO_2 that require a splash guard should use the splash guard for sticky gases.

10.4 Metal Protective Guard (p/n: SCS-8000-RSG)

The metal protective guard (p/n: **SCS-8000-RSG**) is made of heavy gauge, galvanized metal and helps protect against abrasive damage, theft and vandalism to the transmitters. The 16-gauge galvanized steel has 13 mm ($\frac{1}{2}$ in) square openings in the front to allow gas and air to flow through to the sensor. With only four slotted mounting holes, installation and removal for gas detector servicing is easy. In applications where sticky gases are being monitored, such as Ozone, Chlorine or Hydrogen Chloride and frequent wash-downs are required, the metal guard can be ordered with a splash cover (p/n: **SCS-8000-WSG**). The splash cover is made of a material called PC CPE that allows the sticky gas to reach the sensor without adhering to the vent opening, plus protects the sensor from water ingress.



Enclosure	16 gauge galvanized steel
Weight	800 g (28 oz)
Size	178 mm W x 160 mm H x 91 mm D (7.0" W x 6.3" H x 3.6" D)

10.5 Calibration Kit (p/n: CET-715A-CK1)

Calibration Kit contains the items necessary for common field and shop calibrations. It comes in a durable, hard plastic carrying case and includes a regulator, adapters, humidification chamber, brass fitting, hand tools and tubing. It does not include cylinders of gas. These must be ordered separately.



Calibration Kits and gases are available from the CETCI factory. Many gases, but not all are carried in inventory. Check with any CETCI authorized distributor for availability of specific gas types. **Gas cylinders cannot be shipped from Canada to other countries, including the USA.**

11 MAINTENANCE

The cGas Detector transmitter requires virtually no maintenance other than regular calibration of the sensor(s). There are no replaceable components except the sensors.

The transmitter should be monitored for possible damaging conditions.

- The sensor vents should be kept free of dirt or soot build up.
- If in a damp location, source of water should be shielded from contacting the top of the transmitter.
- If located in a working area, the front of the transmitter should be kept clear.

- If painting is to be done in the same area as the transmitter, the transmitter needs to be protected from over spray and the sensor vent should be covered so as to not receive paint fumes. Paint fumes may damage and / or reduce the life of the sensor.

It is important to ensure that excess water and/or dust is not somehow entering the enclosure and physically damaging the circuit board or internal components.

12 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 in the cGas Detector Digital Installation Manual*.

Display shows "ZERO FAULT" message.

The cGas Detector is unable to complete the zeroing (null) process. If using ambient air, make sure there are no contaminants or residual target gas in the air. If using a cylinder of oxygen, use 20.99% volume, scrubbed of hydrocarbons. In some cases nitrogen (N_2) can be substituted for zero air when null adjusting electrochemical sensors. Oxygen sensors require 99.9% N_2 for a true zero. Catalytic sensors require oxygen to work and thus the user **MUST** flow clean air or oxygen to obtain a true zero and the span gas must have "air" balance, not N_2 balance.

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.

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.

When calibrating a CO₂ sensor, Calibrate Zero keeps failing or the Calibrate Span passes but the gas level reading keeps climbing.

Start the calibration process over. Flow the nitrogen gas for 4 minutes before entering the Calibrate Zero menu. Then flow the span gas for 4 minutes before entering the Calibrate Span menu.

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 ₂ Communication Fault	cGas cannot communicate with the CO ₂ 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 gainPOT 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.
F20 RLY GPIO chip is not responding	Check to make sure the relay board is present and installed properly in the socket. If installed, main board is unable to communicate with the relay board and may be damaged A replacement relay board may be required.

NOTES

NOTES



Critical Environment Technologies Canada Inc.

Unit 145, 7391 Vantage Way, Delta, BC, V4G 1M3, Canada

Toll Free: +1.877.940.8741

Tel: +1.604.940.8741

Fax: +1.604.940.8745

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

