Installation & Operation Manual

Rev. B | 2020.22

Critical Environment Technologies™

CGAS–A CO$_2$ Detector
Analog Transmitter

www.critical-environment.com

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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:

_____

PURCHASE DATE:

_____

PURCHASED FROM:

_____

1.2 Warranty Policy

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

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

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

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

1.3 Service Policy

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

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

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

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

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

1.4 Copyrights

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

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

1.5 Disclaimer

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

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

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

1.6 Revisions

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

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

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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 Analog Transmitter, a single channel CO_2 gas detection designed for use in non-explosion rated, commercial applications that require continuous monitoring of Carbon dioxide. It offers one 4-20 mA analog output and is ideal for applications where compressed CO_2 is used and stored, climate control in commercial buildings and other processes requiring the continuous monitoring of CO_2.

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

- Single channel, single gas CO_2
- 4 - 20mA analog output (signals gas reading)
- Easy Plug & Play Smart sensor replacement at end of life
- Pre-calibrated replacement sensors
- 3-wire VDC or 4-wire VAC power, 24 volt DC or AC power (nominal)
- In field upgradable firmware/configuration via USB connection
- Bright LCD display
- Option -RHT: Relative Humidity and Temperature sensor (for display only)
- Option -S: Splash guard, factory installed, IP54 rated enclosure
- Standard water / dust tight, corrosion resistant enclosure (drip proof)
- Copper coated interior to reduce RF interference
- RoHS compliant circuit boards
- Auto resetting fuse

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

3 INSTRUMENT SPECIFICATIONS

3.1 Technical Specifications

MECHANICAL

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

USER INTERFACE

Display (standard)	2-line by 16 character graphic LCD, user configurable to suppress reading display
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. Refer to Section *6.6 Wiring Connections*
Wiring	24 VDC or 24 VAC (ground referenced) 3-conductor shielded 18 AWG (or larger) stranded within conduit
Fuses	Automatic resetting thermal

INPUT/OUTPUT

Analog Output	One Linear 4 - 20 mA output, signals gas reading
RH & Temperature (Option -RHT)	User selectable units, user selectable display or hide readings on the display, user selectable analog output (default is the gas reading)

ENVIRONMENTAL

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

CERTIFICATION

Model: CGAS-A-XXX
           S/N: CGASA1807B00010
Rating: 16-30 VDC, 3W, Class 2
           12-27 VAC, 50-60 Hz, 3VA, Class 2

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

Conforms to: CSA-C22.2 No. 205-12, UL508 (Edition 18):2018
Conforms to: EMC Directive 2014/30/EU, EN 50270:2015, Type 1, EN61010
Conforms to: FCC. This device complies with part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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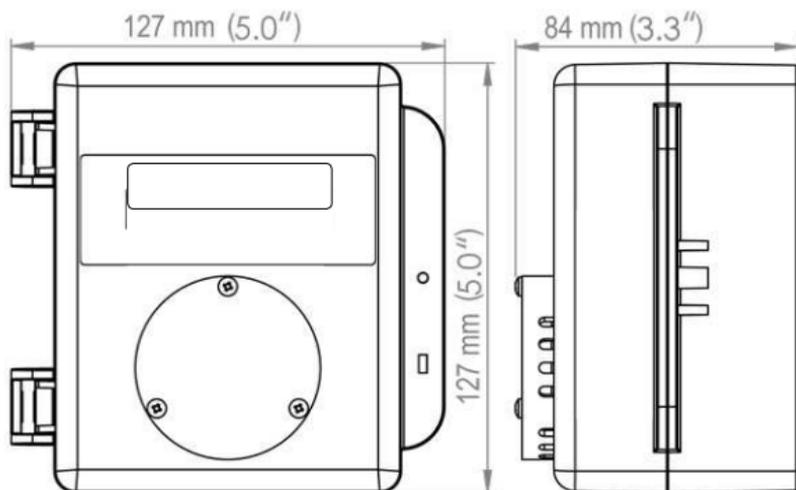
Above dimensions are shown with optional standard splash guard. Without splash guard, thickness is 71 mm / 3.0 in. The area required for enclosure door to be open 90 degrees is 178 mm / 7.0 in or 254 mm / 10.0 in for fully open. With the optional splash guard installed, the enclosure is IP54 rated.

4 SENSOR SPECIFICATIONS

4.1 Available Internal Gas Sensors

Infrared Sensors	Part Numbers	Range	Lifespan
Carbon Dioxide (CO_2)	CGAS-A-CO2-5K	0 - 5,000 ppm	~ 8 years
	CGAS-A-CO2-5%	0 - 5% vol	

4.2 RH & Temperature Sensor (Option -RHT)

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

5 INSTRUMENT FEATURES

5.1 Exterior Enclosure
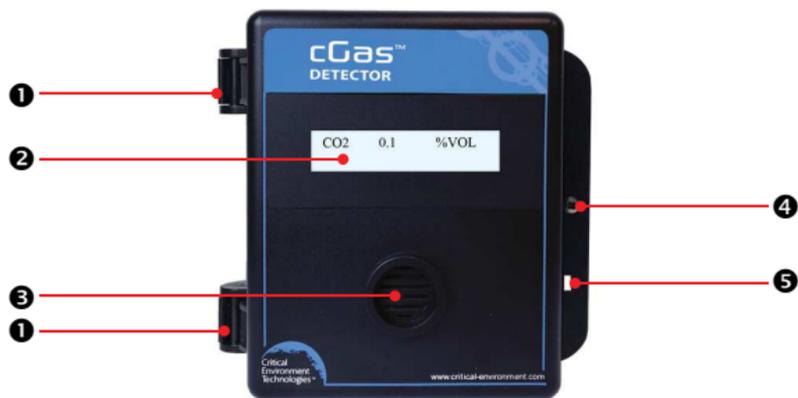
NUMBER	FEATURE	FUNCTION
❶	Door Hinge	Secures door to base and allows easy opening and closing
❷	Display	LCD display (standard display shown)

❸	Sensor Opening	Allows gas diffusion into sensor
❹	Door Screw	Secures door shut
❺	Lock Slot	For security padlock or tie

5.2 Interior System Layout
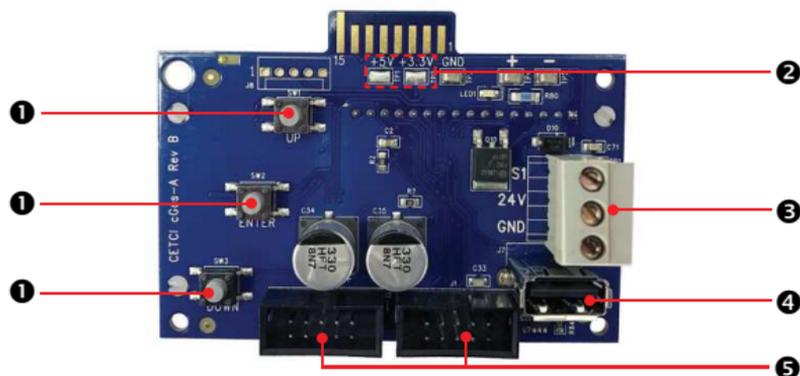
NUMBER	FEATURE	FUNCTION
❶	Programming Buttons	Access menu options and program functions using buttons inside the enclosure. (Arrow up, Enter, Arrow down)
❷	Test Points: TP1 & TP2	For measuring voltage output
❸	TB1 Wiring Terminal	Pluggable terminal for Power & signal output
❹	USB Connection	For firmware and configuration upgrades

❺	Sockets for smart sensor board	The CO_2 sensor board plugs into the main board using these sockets

6 INSTALLATION

The CO_2 sensor in the cGas Detector goes through a burn in period at our factory prior to shipping so it is ready for operation upon arrival. If you install the cGas Detector when it arrives, the sensor will not require a long warm up period (about 2 minutes).

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.

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

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

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

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

6.1 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 *6.4 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.

6.2 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 a have a pacemaker, follow your healthcare provider's instructions about being around this type of equipment.

6.3 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.

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

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

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

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

6.4 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 6.5 *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.

6.4.1 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.

6.4.2 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.

6.4.3 Mounting Height

The sensor mounting height depends on the molecular weight of the gas in relation to the molecular weight of air. Carbon dioxide has a molecular weight close to that of air and the sensor should be installed in the "breathing zone". The breathing zone refers to the area 4 - 6 f / 1.2 - 1.8 m from the finished floor. This range is where most human breathing takes place.

6.5 Enclosure Mounting Components

6.5.1 Enclosure Base
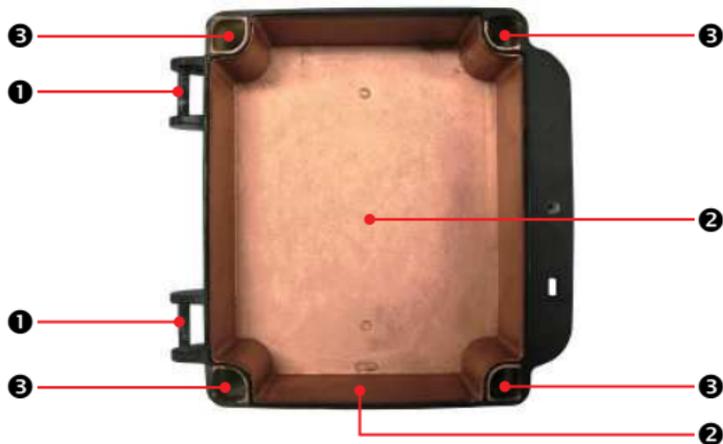
NUMBER	FEATURE
❶	Door Hinge
❷	Conduit Entry Points 12.7 mm / 1/2 in diameter
❸	Mounting Holes 4.47 mm / 0.175 in diameter maximum head diameter 8 mm / 0.32 in, #8 or 4 mm screw

6.5.2 Enclosure Bottom

NUMBER	FEATURE
❶	Door Hinge
❷	Conduit Entry Points 12.7 mm / 1/2 in diameter

6.6 Wiring Connections

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

All wiring should be run in EMT (or better) conduit properly earth grounded.

Signal output and supply should be in shielded cable. The cable shield should be connected to earth ground at the controller/power supply that is providing power for the cGas.

If the cGas Detector is being connected to either 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. In an analog configuration, a dedicated 4-20 mA signal wire is connected to each transmitter and only the ground and power wires are daisy chained.

CGAS-A Connected to an FCS or QCC Controller (3-wire VDC)
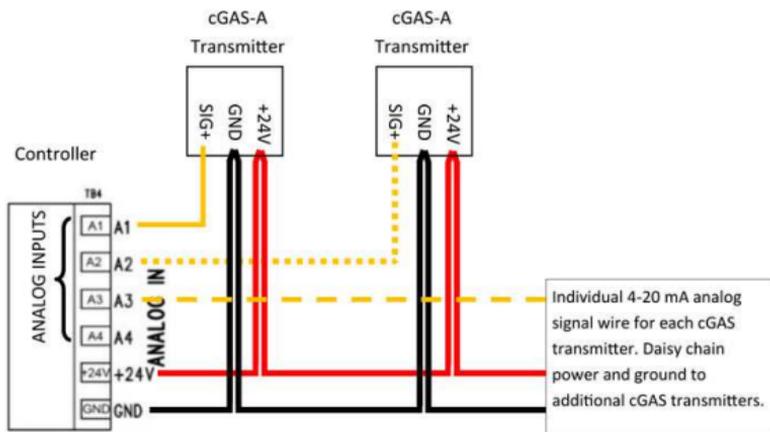
If the cGas Detector is being connected to a BAS, DDC or other control panel then either a 24 VDC power supply or 24 VAC Class 2 or better transformer need to be used.

In all cases the voltage supply to the cGas Detector should never drop below 16

VDC or 12 VAC.

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

When using solid core wiring for distribution (in the conduit), use stranded wire pigtails 18 AWG within the enclosure to connect to the circuit board. The rigidity of solid-core wire can pull a soldered terminal strip completely off a circuit board and this will not be covered under warranty.

6.6.1 Analog Wire Gauge vs Run Length

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

SUPPLY VOLTAGE	MAXIMUM LOAD (Wire + Termination Resistor) (ohms)	WIRE GAUGE (awg)	MAXIMUM CABLE LENGTH (feet)
24 VDC	592	20	4,400
		18	7,100
		16	10,700
16 VDC	216 (assume a 200 Ω termination resistor)	20	700
		18	1,200
		16	1,800
24 VAC	1,060	20	27,000
		18	43,200
		16	65,500

12 VAC	316 (assume a 200 Ω termination resistor)	20	5,600
		18	8,900
		16	13,583

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

7 SYSTEM OPERATION

The cGas Detector continuously monitors CO_2 gas concentrations on one configured channel. It must be connected to a controller (ie. QCC, FCS, CGAS-SC), control panel or BAS / BMS / DDC system; the cGas Detector is not a standalone gas detection system.

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 the sensor has not completely stabilized during the warm up period. This is normal and the length of time the gas alarms exist is dependent upon the length of time since the unit

was last powered up, and the state of the environment it is installed in.

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	• Test Analog Output
1014	Display Menu	• Display Type • Brightness • Selected Channel • Hide Channel
2012	Alarms Menu	• Selected Channel • Selected Alarm Level • Set Alarm Setpoint • Set Alarm Direction (Ascending/Descending) • Set Alarm Hysteresis • Fault Reading
3022	Config Menu	• Selected Channel • Enable/Disable Channel • Read from Sensor • Write to Sensor
3032	Calibrate Menu	• Selected Channel • Set Calibration Gas • Calibrate Zero • Calibrate Span • Set Analog Output Mode • Set Analog Output Priority • Calibrate Analog Output • Set Analog Output Zero • Set Analog Output Range • Temperature Offset* • Humidity Offset* • Temperature Units* *if -RHT option is installed

7.4 Display Settings

The LCD display can display up to 2 lines of 16 characters. The backlight can be turned off, but in normal operation, as configured from the factory, the display is backlit. After warm up and upon normal operation, the display will show the current gas level reading for each channel that it has been configured.

Pressing the UP or DOWN button allows you to scroll through a series of information screens showing the model name, serial number and firmware version; the gas type and AD counts; the channel number, gas type and gas level; and temperature and relative humidity (if option is installed).

7.4.1 Adjust Display Brightness

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

From the main display, press ENTER.
Enter passcode 1014 using the UP button and ENTER button.

```
Enter Password
    1014
```

Press ENTER to access the Display Menu.

```
DisplayMenu       Brightness
Press Enter       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        Confirm?        N
>050              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.

7.4.2 Display Information - Normal or Minimal

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

```
CO2          536 PPM
```

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

```
********-CO2-********
```

From the main display, press ENTER.
Enter passcode 1014 using the UP button and ENTER button.

```
Enter Password
1014
```

Press ENTER to access the Display Menu.

```
DisplayMenu          Display Type
Press Enter          Normal
```

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

```
Display Type
>Minimal
```

7.4.3 Display or Hide Gas Channel, RH and/or Temperature Readings

You can choose what reading(s) you want displayed on the screen by hiding or unhiding lines.

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.

```
Display Menu
Press Enter
```

Press ENTER. Press the UP button until you see Selected Channel.

```
Selected Channel
>CO
```

Press ENTER. Using the UP or DOWN buttons, scroll through the item you want to apply changes to:

- Gas Type (CO2)
- Temperature (if installed)
- Humidity (if installed)

Press ENTER.Press the UP button until you see Hide Channel.

```
Hide Channel
>Unhidden
```

If you want to change its present condition, press ENTER. Use the UP button to choose Hidden (or Unhidden) and press ENTER to save and Exit.

Repeat for each channel you want to hide or unhide.

7.5 Alarm Status, Fault Detection and Communication Failure Alerts

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

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

```
CO2      800 low     CO2      1000 mid     CO2      1200 high
```

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

NOTE: If a question mark ? is displayed then the system is in a minor fault and a re-zeroing is recommended. For a list of Fault Codes, refer to Section 12 Troubleshooting.

7.6 Enable / Disable Channels

This setting allows you to enable or disable the gas channel and the temperature and RH readings if configured in the device. Disabling a channel does not mean information won't show on the display. If you want the disabled channel information not to show on the display, you must hide the line. Refer to Section *7.4.3 Display or Hide Gas Channel, RH and/or Temperature Readings*.

NOTE: The cGas Detector has one gas channel. Enabling the temperature and RH only allows the information to be displayed on the display, it will not be sent to a Controller or BAS/DDC.

A disabled channel will not display gas, temperature or RH readings. A disabled channel will show on the normal display with four dashes in the middle of the line:

```
CO2          ---- PPM   CO2              Ø 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 CO2
```

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 the configuration of the device:
- CH1 CO2
- 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        ChannelEn/Dis
Enabled              >Disable

CO2          Ø PPM
----degF     38%RH
```

7.7 Setting Channel Alarm Setpoints, Direction and Hysteresis

NOTE: The cGas Detector DOES NOT HAVE an internal alarm. Alarm setpoints should be configured at the controller or BAS/DCC. Configuring them in the analog cGas Detector will be for display purposes only.

The LOW, MID and HIGH gas alarm setpoints can be configured in the cGas Detector. The number entered as the setpoint is the exact number/level of gas concentration at which the device will indicate an alarm condition on the display and send a signal to the controller or control panel to trigger a predetermined response such as horn and strobe or other emergency protocol.

The alarm set points can be changed at any time and do not require a calibration before, during or after changing them.

For a CO_2 sensor, the alarm setpoint should be configured as Ascending. 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.

Almost all installations will use the factory default alarm setpoints. Default setpoints are as follows:

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

Setting a hysteresis value determines at what gas concentration the alarm condition will stop when the gas reading goes below the alarm setpoint. For example, if the alarm setpoint is 100 ppm and the hysteresis is 5 ppm, when the gas concentration reaches or exceeds 100 ppm, the cGas Detector will indicate an alarm condition. It will remain in alarm condition until the gas concentration reduces to 95 ppm (5 ppm below the alarm setpoint).

Using hysteresis prevents the alarm condition from coming on and going off repetitively if the gas fluctuates just above and just below 100 ppm (which would happen if the hysteresis is set to 0). Sending in alarm and out of alarm signals to the control panel could trigger relays to repetitive turn on and off, causing them to burn out and equipment to suffer unnecessary wear and tear.

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 <u>Selected Channel</u> menu, confirm the correct channel is showing.

```
Selected Channel
CO2
```

Press the UP button until you see <u>Selected Alarm</u>, 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 <u>Alarm Setpoint</u>, confirm the desired number is showing.

```
Alarm Setpoint
800 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          Confirm?        N
>1000 PPM               >1000 PPM      >Y
```

Press the Up button until you see <u>Alarm Direction</u>, confirm the correct direction - ascending is <u>used for a CO_2 sensor.</u>

```
Alarm Direction
ASCENDING
```

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

```
Alarm Hysteresis
005 PPM CO2
```

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          Confirm?        N
>010 PPM CO2              >10 PPM        >Y
```

7.8 Change Units (oC or oF) 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        Selected Channel
CO2                     >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
```

7.9 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 *7.8 Change Units (oC or oF) of Temperature Readings*.

There is no way to calibrate a temperature or relative humidity sensor. However, if you find that the temperature or humidity reading on the cGas Detector is higher or lower than another device measuring the ambient temperature or relative humidity, you can adjust the reading by setting an offset value so the reading is more accurate. The Temperature offset value is a number of degrees in either direction of 0 and the Humidity offset value is a percentage between 0 or 100)

From the main display, press ENTER.
Enter passcode 3032 using the UP button and ENTER button.

> Enter Password
> 3032

Press ENTER to access the Calibrate Menu.

> Calibrate Menu
> Press Enter

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

> Selected Channel
> CO2

> Selected Channel
> >Temperature

> Selected Channel
> >Humidity

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

```
Temperature Adj          Humidity Adj
>-4.0 degC               >+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           Confirm?    N
>-4.0 degC       >Y    >+2 %RH           >Y
```

7.10 Set Analog Output Mode

The cGas Detector has one analog output, which is factory configured to output a signal to a controller or control panel. You can set the analog output to OFF which will result in a 0 current output and will stop the analog output from sending a signal to the controller or control panel. This may be useful if you need to perform maintenance on or replace the transmitter.

NOTE: If the analog output mode is OFF, the gas detector is not in operation.

To set the analog output mode, 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         Selected Channel
      Press Enter            CO2
```

Press the UP button to find Set AO Mode. Press ENTER and change the value using the UP or DOWN buttons.

- OFF - the analog output will have 0 current output
- PEAK - (default) the analog output will transmit a signal according to the highest gas concentration reading of the cGas Detector

```
Set AO Mode              Set AO MOde
OFF                      >PEAK
```

When finished pressed ENTER and then ENTER again to exit.

7.11 Test Analog Output

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

From the main display, press ENTER.
Enter passcode 0001 using the UP button and ENTER button.

```
Enter Password
    0001
```

Press ENTER to access the Test Menu.

```
Test Menu
Press Enter
```

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

```
Test AO
4.0 mA
```

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

```
Test AO
>14.0 mA
```

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

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

The test will start as soon as you press ENTER to confirm and will remain in the test mode as long as the Test AO screen remains untouched. To stop the test, press the UP or DOWN button. To test another analog output value repeat the process by pressing ENTER.

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 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 board.

The CO_2 smart sensor board is wide and plugs into two sockets. Unscrew the smart sensor board you want to replace and gently pull it out of the sockets. Insert the new smart sensor board and screw it in place. Complete the process by loading the sensor (refer to Section *8.2 Read from Sensor*).

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.

```
Selected Channel
CH1 CO2
```

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

```
Read from Sensor        Read from Sensor
CH1 (Left)              >YES
```

Press the UP button to change from NO to YES and press ENTER to select.
The system will Read the new calibration information to the main board. Press ENTER to exit.

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
CH2 (left)
```

Press the UP button to change from NO to YES and press ENTER to select.

The system will Write the sensor configuration information to the smart sensor board.

9 CALIBRATION

9.1 Calibration Specifications

9.1.1 Gas

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

- 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.

9.1.2 Regulators & Flow

CO_2 and N_2 calibration gases should be flowed at 0.5 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

- Follow local codes and regulations
- 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.

9.2 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.

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          Selected Channel
     Press Enter            CO2
```

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             Calibration Gas
500 PPM CO2                 >1000 PPM CO2
```

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

```
   Confirm?        N
>1000 PPM        >Y
```

The factory default calibration gas concentrations are:

GAS TYPE	RANGE	CALIBRATION GAS LEVEL
Carbon Dioxide (CO_2)	0 - 5,000 ppm	1,000 PPM
Carbon Dioxide (CO_2)	0 - 5% vol	1.0 % VOL

* subject to change when required

9.2.2 Zero (Null) Calibration

Use nitrogen (N_2) to zero a CO_2 sensor. To exit the Zero Calibration at any time, press ENTER.

Flow the nitrogen gas for 4 minutes before entering the Calibrate Zero menu. 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      Selected Channel
       Press Enter        CO2
```

Press the UP button to find Calibrate Zero.

```
Calibrate Zero
100 AD
```

Attach the regulator to the cylinder of nitrogen, insert the calibration adapter into the sensor opening on the front of the enclosure door (refer to Section *9.3.1 Calibration Adapter Plug Doesn't Fit* 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 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.

When calibrating a CO_2 sensor, flow the span gas for 4 minutes before entering the Calibrate Span menu. 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         Selected Channel
       Press Enter           CO2
```

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
>1000 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              Spanning
1961AD          82s    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 Zero and Span 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 Technical Service Department at help@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 you don't use nitrogen during the zeroing process or if you don't flow the nitrogen long enough or if the sensor detects ambient gas readings that 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 nitrogen.

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 Technical Service Department at help@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 the Analog Output (requires a 4-20 mA meter)

NOTE: The analog output is calibrated at the factory prior to shipping and should not require re-calibration in the field.

The output mode of the cGas Detector is a current loop. If you find the instrument is not outputting what is expected, you can recalibrate the analog output. The values entered in the Set Analog Ouput Zero and Set Analog Output Range are the values the device will be calibrated to (by default 4 mA and 20 mA respectively).

To calibrate the analog output you will need an electronic multi-meter that measures current. The multi-meter connects to the S1 and G position on the terminal block.

Follow the same steps - first for calibrating the zero output (Cal AO 4.0 mA) and then the range output (Cal AO 20.0 mA).

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        Selected Channel
 Press Enter          CO2
```

Use the UP button to find Cal AO 4.0mA. Press ENTER. Use the UP and Down buttons to adjust the AD count number.

```
Cal AO 4.0mA          Cal AO 4.0mA
275                   >450
```

Press ENTER to confirm.

```
     Confirm?    N
>450            >Y
```

Press ENTER to make another adjustment to the number, confirm and repeat until the desired current output is reached on the multi-meter (in this example, keep adjusting the number until the multimeter reads 4.0 mA).

Repeat the steps above in the Cal AO 20.0 mA screen, adjusting the AD count number until the multi-meter reads 20.0 mA.

9.4.1 Set Analog Output Zero / Set Analog Output Range

The Set AO Zero and Set AO Range screens are under in the Calibrate Menu under passcode 3032. The default analog output zero (no gas concentration) value is 4.0mA and the default analog output range (max gas concentration) value is 20 mA. These values will only need to be changed if required by the application. If you require assistance, please contact our Technical Service Department at help@cetci.com or 604-940-8741 or 1877-940-8741 (Toll Free).

NOTE: If you change the analog output zero and range values, you MUST recalibrate the analog output. Refer to Section *9.4 Calibrating the Analog Output*.

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.

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

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 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 (½ 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.

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)

10.4 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.

The Calibration Kit 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. **NOTE: 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 *6.6 Wiring Connections.*

When calibrating a CO$_2$ 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.

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.

Frequent, unexpected alarm signal sent to BAS/DDC.
Check to see if EMI and RF interference is causing the equipment to react this way. Refer to Section *6.4.2 EMI and RF Interference Considerations* for more information.

List of Possible cGas Error Codes:
(appears on the display in place of the units for a channel)

CODE		DESCRIPTION
F01	Negative Fault Reading	Check to make sure the smart sensor board is present and installed properly in the socket. If installed, the cGas detects the sensor signal is too far below its zeroAD. May be caused by a sensor that is temperature or humidity sensitive. Zeroing the sensor will normally resolve this.
F02	Smart Board Fault	cGas cannot communicate with the smart board. Ensure the smart board is installed and installed on the correct side (left) if a single channel unit. Otherwise power cycle or replace the sensor smart board.
F03	CO2 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).
FO6	SB ID Mismatch	Firmware expected a different smart board than what is in the sensor socket.

FO7	RH & Temp Fault	cGas cannot communicate with the sensor. Ensure the smart board is installed correctly. If unresolved, contact our Technical Support Department
F30	AO DAC is not responding	Indicates a hardware failure in the analog output circuit. A replacement main board may be required.

NOTES

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