



Rev. F | 2025.08

cGas-SD Sample Draw System

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NEED MORE INFORMATION?

This is the **Installation Manual** for the cGas-SD Sample Draw System.

For information on the following topics, please refer to the **cGas-SD Operation Manual**:

- Modbus® and BACnet® Configuration
- Setting Channel Alarm Setpoints, Direction and Hysteresis
- Enable/Disable Internal Buzzer
- Enable/Disable Alarm Blink
- Enable/Disable Channel
- Enable/Disable/Override Relay, Set Relay ON/OFF Delays
- Strobe/Horn Operation
- Logic / Priority Settings & Configuration
- How Replace an Installed, Expired Smart Sensor Board
- How Change the Type of Gas Being Monitored
- Calibration
- Troubleshooting Calibration

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

The most up-to-date version of any manual will always be on our website.

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

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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 CET, 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 that is considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data.

1.3 Service Policy

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

Prior to shipping equipment to CET, 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, CET 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 CET.

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 CET 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 CET 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 foregoing 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 CET policy that all wiring of our products meet this requirement. It is CET policy that all wiring be within properly grounded (earth or safety) conduit.

1.6 Revisions

This manual was written and published by CET. 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 CET at the following address:

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Telephone: +1.604.940.8741
Email: sales@cetci.com
Website: www.critical-environment.com

In no event will CET, 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.

The most up-to-date version of the manual will always be on our website.

2 SAFETY INFORMATION

The cGas-SD complies with:

- CSA-C22.2 No 61010-1
- UL 61010-1 (Edition 3)
- Overvoltage Category II, Pollution Degree 2
- 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.
- CERTIFIED FOR ELECTRIC SHOCK & ELECTRICAL FIRE HAZARD ONLY. LA CERTIFICATION ACNOR COUVRE UNIQUEMENT LES RISQUES DE CHOC ELECTRIQUE ET D'INCENDIE D'ORIGINE ELECTRIQUE.

2.1 General Safety Warnings

The cGas-SD is intended for indoor use. It should be mounted outside the sampling room at viewing height. Sample tubing inside the room should be fixed at the appropriate height for the gas being sampled.

NOTE: For wet environment applications, use liquid tight conduit hubs wherever conduit enters the enclosure.

2.2 Protection Against Electrical Risks



Caution



ISO 7000- 0434B (2004-01)
Caution, possibility of electric shock

Disconnect all power before servicing. There may be multiple power sources.

Power supply shall 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-SD supply (disconnecting power to the cGas-SD). Appropriate markings should be visible at the circuit breaker / switch that is supplying power to the cGas-SD.

If the equipment is used in a manner not specified in this manual, the protection provided by the instrument may be impaired.

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

2.3 Protection Against Mechanical Risks

The enclosure has a screw in each corner to secure the door to the base for electrical safety. 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.

3 INSTRUMENT SPECIFICATIONS

3.1 General Description

The cGas-SD is a self-contained, single sensor, sample draw monitoring system that is designed to draw samples of air from hard to access locations such as shafts, tall ceilings, wells, pits, Magnetic Resonance Imaging (MRI) rooms and many other locations where it is difficult to install gas detectors. The sample draw pump pulls air from the room through the tubing, in through the inlet port and over the sensor. The air is then exhausted through the outlet port. If the gas readings are higher than a specified set point, the cGas-SD will go into alarm.

The cGas-SD comes with a flow detector, a sample draw pump and an internal adjustable flow meter. Features include:

- Single sensor
- 2x16 character LCD display with LED indicators
- Easy access push buttons on the front of the enclosure for configuration and calibration
- Loud door mounted audible buzzer
- Blocked flow alarm
- Internal sample draw pump
- Adjustable flow meter
- One SPDT dry contact relay 5-amp @240 VAC
- One configurable 4-20 mA or 0-10 volt output

CAUTION: The cGas-SD sample draw system should not be used inside classified hazardous areas or to sample draw combustible gases or Oxygen concentrations above 30% vol because the pump is not intrinsically safe.

If after reading through the manual, you have any questions, please do not hesitate to contact us for technical support at help@cetci.com

3.2 Technical Specifications

MECHANICAL

Enclosure	Polycarbonate, water/dust tight, corrosion resistant
Weight	2.7 kg / 6.0 lbs
Size	25.8 x 26.8x 19.9 cm / 10.14 x 10.54 x 7.84 in (W x H x D)
Tubing 15 m / 50 ft (sold separately)	Standard: 3/16" ID x 5/16" OD, p/n/ CET-8000-CKFT Teflon Lined: 3/16" ID x 5/16" OD, p/n CET-8000-CTRL Factory tested distance: 15 m / 50 ft

USER INTERFACE

Display (standard)	2-line by 16 character LCD with LED panel indicating alarm status 1, 2 and 3 for the channel and FAULT
USB Port	Internal port for USB memory stick for configuration changes and firmware upgrades
Push Buttons	Initiate calibration and menu options with external UP, DOWN and OK push buttons

ELECTRICAL

Power Requirement	Line Voltage 100-240V AC +/-10%, 50/60 Hz, 20W, 1-phase Low Voltage (field configurable) 16-30 VDC / 12-28 VAC, 50/60 Hz, 20W
Overvoltage Category	Category II
Wiring	Line Voltage: VAC three-conductor (Line, Neutral, Ground) shielded 14-18 awg stranded within conduit Low Voltage: 24VDC or 24VAC two-conductor shielded 14-18 awg stranded within conduit
Fuses	Thermal, resetting

OUTPUT

Output	One 4 - 20 mA analog output, jumper selectable 0 - 10 volts, 2 - 10 volts output User selectable BACnet® MS/TP or Modbus® RTU RS-485 Horn/strobe output terminal
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Modbus® Output WAN (output to BAS)	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 (default, configurable)
BACnet® Output WAN (output to BAS)	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, configurable) Base Address: 270 (default) MAC Address: 100 (default, configurable) Parity: no parity Stop bits: 1 Data bits: 8
Relay	One SPDT dry contact relay rated 5 amps @ 240 VAC
Audible Alarm	Standard door mounted buzzer, rated 76 dB @ 3 m (10 ft)
Flow Rate	Normal Operation: 0.5 - 1 LPM Alarm: 0 LPM

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-SD-XXX-XX
S/N: CGASSD2405F00012

Rating: 16-30V / 12-28 Vac, 50/60 Hz 20W
100-240V AC, 50/60 Hz 20W 1-phase



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

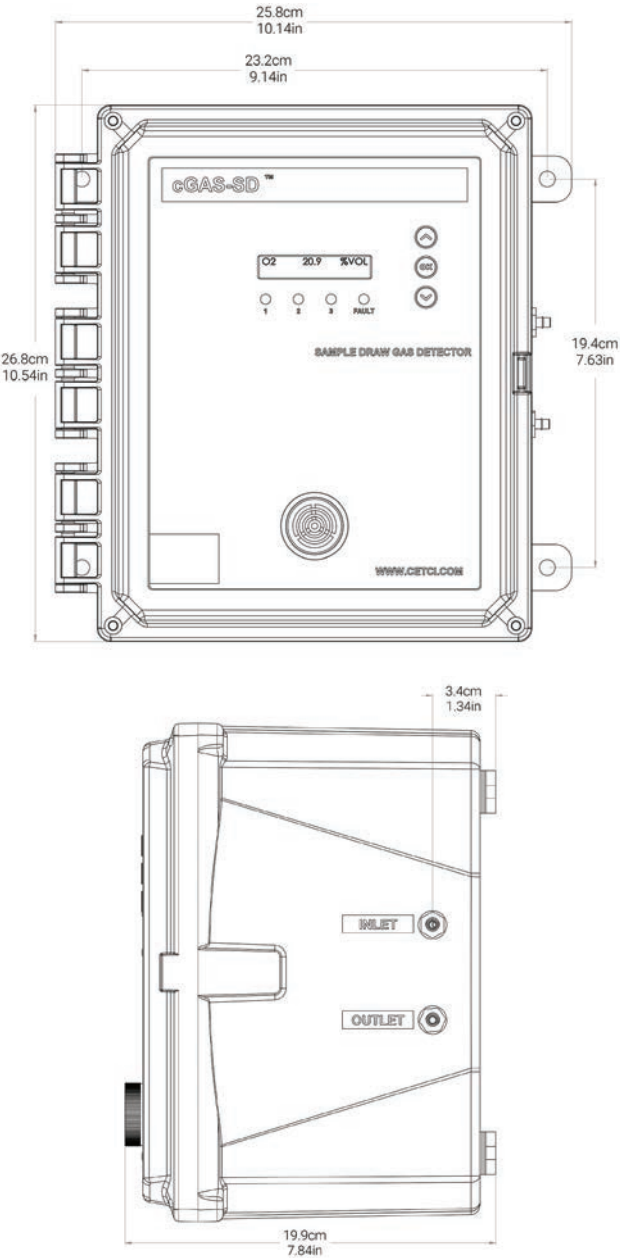
Conforms to: CSA-C22.2 No 61010-1, UL 61010-1 (Edition 3)
Conforms to: FCC. This device complies with part 15 of the FCC Rules, Operation is subject
to the following two conditions: (1) This device may not cause harmful interference, and (2)
this device must accept any interference received, including interference that may cause
undesired operation.

3.3 Exterior Enclosure Features

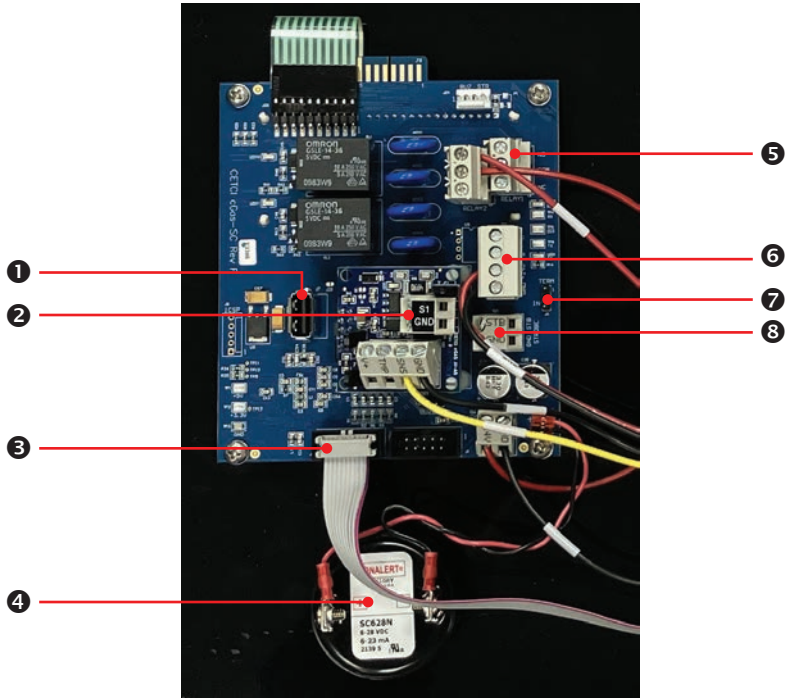


NUMBER	FEATURE	FUNCTION
1	Door Screws	Secures door shut
2	Door Hinges	Secures door to base and allows easy opening and closing
3	Display	LCD display
4	Status LEDs	Indicate alarm status 1, 2 and 3 for channel and FAULT
5	Mounting Brackets	Use to secure device to the wall (there are 2 on each side)
6	Push Buttons for menu operation	ARROW up - Press to scroll up through menu OK - Press to select menu choice ARROW down - Press to scroll through menu
7	Inlet Port	Sampled air inlet
8	Outlet Port	Exhausted air out
9	Audible Alarm	Door mounted buzzer

3.4 Enclosure Dimensions

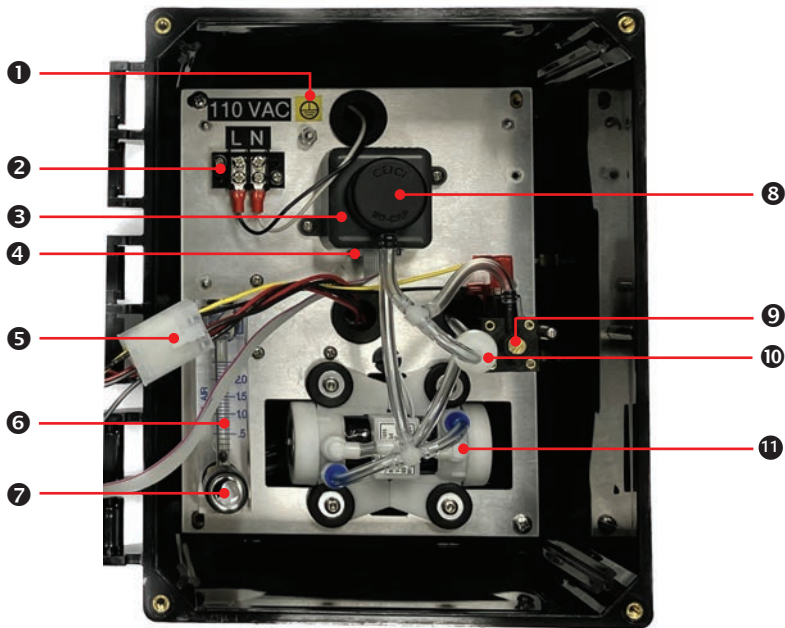


3.5 Interior System Layout (Left side)



NUMBER	FEATURE	FUNCTION
1	USB Connection	For firmware and configuration upgrades
2	Analog Output Terminal	Field configurable for one current or voltage output. Factory default is 4-20 mA.
3	Ribbon Cable	Connects the smart sensor board to the main board.
4	Audible Alarm	Door mounted buzzer
5	Relay Terminal	NO/COM/NC connections for one available relay
6	Primary Field Wiring Terminal	Connection for 24VAC/VDC low voltage power supply and connection to a BAS (Modbus® or BACnet®)
7	WAN End of Line Jumper	120 ohm digital network line termination jumper
8	Horn/Strobe Output Terminal	Connection for a remote 24 VDC horn and/or strobe combination (ie. RSH-24VDC), 0.5 Amps max.

3.6 Interior System Layout (Right side)



NUMBER	FEATURE	FUNCTION
1	Earth Ground Connection	Connect with ground from incoming power
2	Incoming Line Voltage Barrier Strip	Connection for line voltage power supply
3	Sensor Enclosure	Houses the smart sensor board
4	Ribbon Cable	Connects the smart sensor board to the main board
5	Quick Disconnect Plug	Disconnect to separate wires if need to send main board for servicing
6	Flow Meter	Shows the flow rate
7	Flow Meter Adjustment Knob	Turn knob to adjust the flow rate. The air flow rate should remain between 0.5 - 1 LPM.
8	Sensor Cap	Diffuses the sample air from the inlet tubing over the sensor and exhausts it out the outlet tubing.
9	Vacuum Switch	Detects if the inlet is clogged and turns the pump off. May need adjusting if pump stops.
10	Filter Cartridge	Encases the sample air particulate filter.

1	Sample Draw Pump	Pump that draws in the sampled air.
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3.7 Available Gas Sensors

The cGas-SD is available with the following 4 series and 7 series toxic electrochemical gas sensors and IR refrigerant sensors. The sensors utilized in this device are accurate enough to measure to Occupational Health & Safety (OHS) hazardous levels for toxic gases.

4 Series Electrochemical Sensors	Part Number	Range	Lifespan
Carbon Monoxide (CO)	CGAS-SD-CO	0 - 200 ppm	~3 yrs
Hydrogen Sulphide (H ₂ S)	CGAS-SD-H2S	0 - 50 ppm	~2 yrs
Nitric Oxide (NO)	CGA-SD-NO	0 - 100 ppm	~2 yrs
Oxygen (O ₂)	CGAS-SD-O2	0 - 25% Vol	~3 yrs
Sulphur Dioxide (SO ₂)	CGAS-SD-SO2	0 - 20 ppm	~2 yrs

7 Series Electrochemical Sensors	Part Number	Range	Lifespan
Ammonia (NH ₃)	CGAS-SD-7NH3	0 - 500 ppm	~5 yrs
Carbon Monoxide (CO)	CGAS-SD-7CO	0 - 200 ppm	~5 yrs
Hydrogen Sulphide (H ₂ S)	CGAS-SD-7H2S	0 - 50 ppm	~5 yrs

IR Refrigerant Sensors	Part Number	Range	Lifespan
R22, R32, R123, R134A, R143A, R227ea, R404A, R407A, R407C, R407F, R410A, R417A, R422A, R422D, R427A, R434A, R438A, R442A, R448A, R449A, R450A, R452A, R453A, R454B, R507, R513A, R514A, 1234YF, 1234ZE, 1233ZD			
Replace gas type with preferred refrigerant gas to create part number	CGAS-SD-IR410A	0 - 2000 ppm R123 (0-500 ppm)	~5 yrs

IMPORTANT INFORMATION:

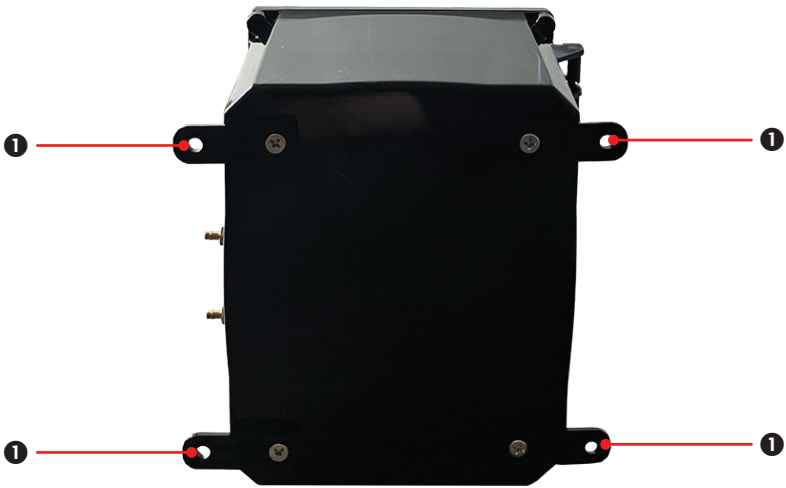
- The cGas-SD is engineered for use with sensors that offer long-term stability. As such, it does not support solid-state refrigerant sensors, which may not meet the required performance standards.
- For safety reasons, the cGas-SD is not intended for use with combustible gases such as methane or propane. These gases can pose ignition risks, and the materials used in the valves and diaphragm are not suited for prolonged exposure to them.
- The device is designed to operate in environments with oxygen concentrations up to 30%. Higher levels indicate an oxygen-enriched atmosphere, which can increase the risk of ignition and fire propagation.
- The integrated pump is not intrinsically safe and in the event of a blockage, the system may become pressurized, which could elevate the risk of combustion.
- The cGas-SD is not rated for use in classified hazardous areas.

4 INSTALLATION

4.1 Mounting the cGas-SD

The cGas-SD should be installed vertically and upright on a flat surface like a wall or a column. Do not mount it upside down, sideways or flat on the floor or other surface.

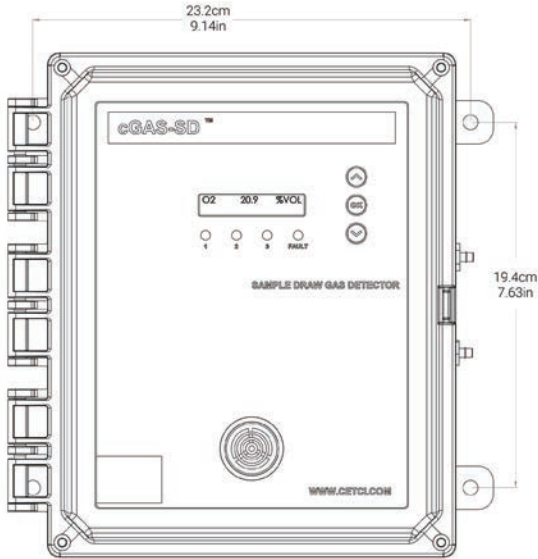
This instrument should be mounted outside the target gas area, at a viewable height, with soft sample tubing running from the cGas-SD monitor and the target area to be monitored.



NUMBER	FEATURE
1	Mounting holes provided in the hanging brackets

The hanging brackets come from the factory uninstalled. They are easily afixed to the enclosure using a screw driver. You can choose to install them vertically or horizontally on the enclosure. Image above shows them installed horizontally.

Once the hanging brackets are firmly attached, secure the cGas-SD using the four 0.175in / 4.4mm diameter mounting holes provided in the brackets. The maximum head diameter is 0.32in / 8mm, use a #8 or 4 mm screw.



When drilling the conduit entry point, drill either at the top or the bottom of the enclosure, being careful not to drill behind or too close to the metal plate inside the enclosure.

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

4.2 Sample Draw Tubing

The cGas-SD does not come with sample tubing. It must be purchased separately. The type of gas, as well as the diameter and length of the tubing, will influence the airflow rate. To ensure optimal performance, keep the sample tubing between the sample point and the inlet port as short as possible.

p/n: CET-8000-CKFT: Standard flexible Tygon polymer tubing (3/16" ID x 5/16" OD), 15 m / 50 ft roll, recommended for all models except the CGAS-SD-7NH3.

p/n: CET-8000-CTRL: Teflon lined sample draw tubing (3/16" ID x 5/16" OD), 15 m / 50 ft roll, for use with the CGAS-SD-7NH3 sample draw system. Ammonia is somewhat sticky and can be absorbed by the standard tubing, slowing the gas flow to the sensor and resulting in inaccurate gas level readings.

4.2.1 Maximum Length of Tubing

The device has been tested with a maximum tubing length of 15 m / 50 ft. Using tubing longer than this is not recommended. For the best response, the sample tubing between the sample point and the inlet port should be kept as short as possible. The air flow rate should remain between 0.5 - 1 LPM.

4.3 Sensor Warm up Time

Sensors go through a burn in period at our factory prior to shipping so they are ready for operation upon arrival, after a warm up period. The length of warm up time will depend on the type of gas, sensor type, environment, and other factors. As a general rule, CET suggests that upon power-up, all sensors be left to warm up for a minimum of 24 hours to stabilize before they can be considered to provide accurate gas readings.

NOTES:

- After installing a cGas-SD with an Ammonia sensor, it should be left to warm up for at least 48 hours.
- After installing a cGas-SD with an Oxygen sensor, leave it to warm up for 24 hours before looking at the readings. If after a minimum of 24 hours the gas reading is not 20.9%, you should do a span calibration.
- If the cGas-SD is being installed in an environment that is greater than +/- 10 degrees from ambient (22°C (71.6°F) then a calibration should be done in that same temperature range.

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

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.

4.4 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.

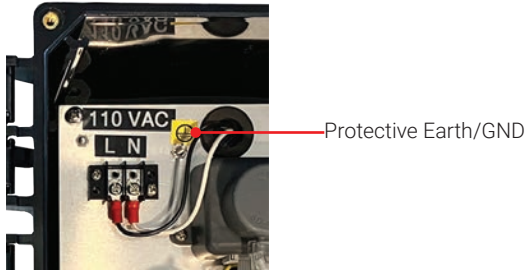
There are some installation procedures that will reduce the likelihood of getting faulty readings:

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 may interfere with the response of the gas detectors.

4.5 Line Voltage Wiring Connections

The cGas-SD Self-Contained Controller comes configured to operate on line voltage supply power.

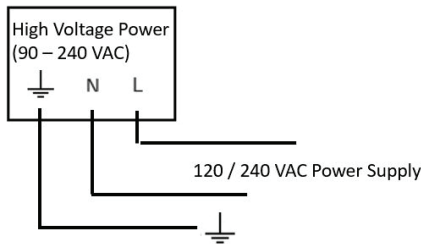
When installing, the incoming Protective Earth/GND needs to be secured before attaching other Ground lines to the same stud.



Connect the line voltage field wiring to the Incoming Line Voltage Barrier Strip. Refer to Section 3.6 Interior System Layout (Right side) for the location of the Primary Field Wiring Terminal.

- 120/240 VAC power supply to L
- Neutral to N
- Ground to the Protective Earth Ground just to the right of the terminal, indicated with the Protective Earth symbol.

These power connections should be supplied with a minimum 3-conductor, 18 AWG stranded wiring. All wiring should be run in EMT (or better) conduit properly grounded (earth or safety).



When installing, the incoming Protective Earth/GND needs to be secured before attaching other Ground lines to the same stud.

Total max power consumption of all connected devices is 20 watts.

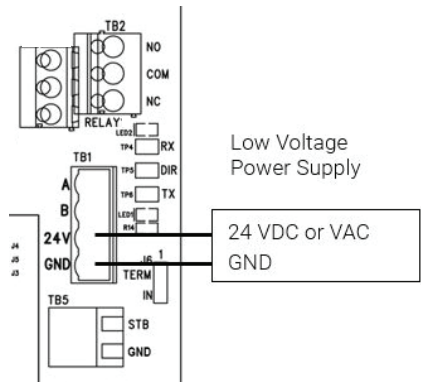
4.6 Low Voltage Wiring Connections

The cGas-SD comes configured to operate on Line Voltage supply power but can be reconfigured in the field to operate on low voltage supply power.

All wiring should be run within properly grounded (earth or safety) conduit. 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-SD. Building code requires low voltage wiring not to be within the same conduit as line voltage wiring.

To wire 24 VAC/VDC, remove the Red and Black wires from the Primary Field Wiring Terminal and terminate them with the provided wire nut. Then wire the 24V supply directly into the 24V and GND terminals on the Primary Field Wiring Terminal. Refer to Section 3.5 Interior System

Layout (Left side) for the location of the Primary Field Wiring Terminal.



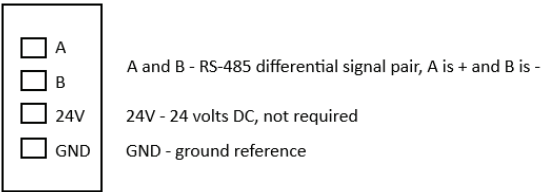
A class 2 or better transformer must be used. The stated max current draw of the cGas-SD in this mode is 0.5A.

Double check wiring connections prior to powering connected remote sensors or transmitters.

NOTE: WARRANTY MAY BE VOID IF DAMAGE OCCURS TO CIRCUIT BOARD COMPONENTS FROM THE USE OF SOLID CORE WIRE ATTACHED DIRECTLY TO THE WIRING TERMINALS. When using solid core wiring for distribution (in the conduit), use stranded wire pigtails 14-18 awg within the enclosure to connect to the circuit board. The rigidity of solid-core wire can pull a soldered terminal strip completely off a circuit board and this will not be covered under the warranty.

4.7 Wiring to a Building Automation System (BAS)

The Primary Field Wiring Terminal is also where the WAN network wiring is used to connect the cGas-SD to a Building Automation System (BAS) or other type monitoring system or control panel. Refer to Section 3.5 Interior System Layout (Left side) for the location of the Primary Field Wiring Terminal.



The wiring between the cGas-SD and a controller or BAS/DDC or multiple cGas-SD devices, should be 4-conductor shielded 16 awg stranded within conduit in a network wiring (daisy-chain) configuration. Suggested 4-conductor, 16 AWG, shielded stranded wire cable types are AlphaWire 79220, Belden 5202FE 008500 or equivalent.

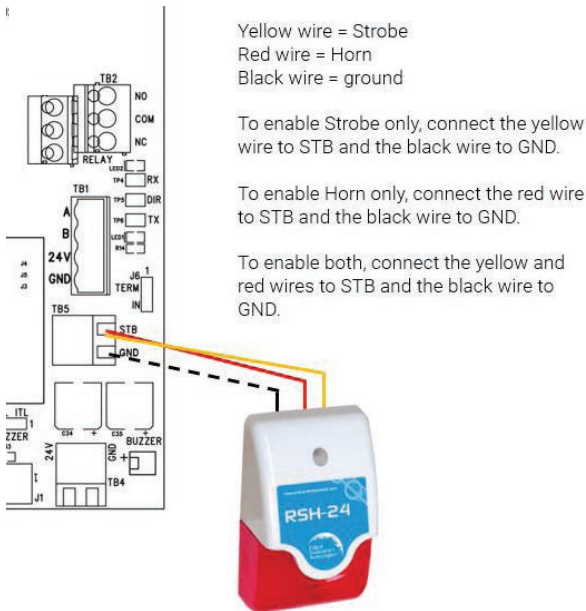
Wire shielding must be connected at each device and taped off so it cannot cause a short on the circuit board when the door is closed. The wire shielding should be connected to earth ground close to the primary supply connection only and must have a contiguous connection

throughout the network. It should be left taped and floating at the last device in the network.

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

4.8 Wiring to a Remote Strobe/Horn

The cGas-SD has a horn/strobe terminal for connecting a remote 24 VDC horn and/or strobe combination (ie. RSH-24V-R, RSH-24V-B or RSH-24V-A), 0.5 Amps max.



Alternatively, the remote horn/strobe can be connected to one of the cGas-SD relays, especially if multiple remote horn/strobes are needed. Note: This method requires a separate power source as the relays DO NOT supply power.

4.9 Relay Connections

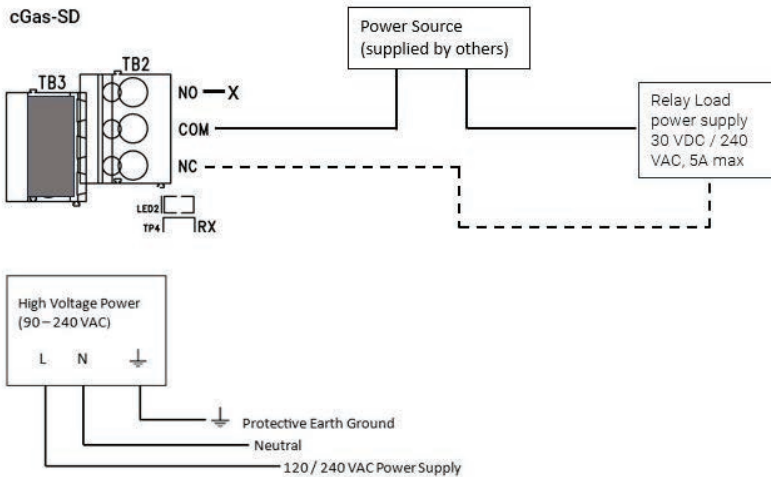
The cGas-SD has one usable internal dry contact relay that is designed to operate fan starters or coils to control equipment that draws no more than 5 amps @ 240 V start-up and / or operational current.

The system relay is SPDT (single pole, double throw) thereby providing one set of usable dry contacts for that relay. Because the cGas-SD systems are designed to be fail-safe, any equipment to be controlled by the system relay 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 non-alarm state for failsafe operation.**

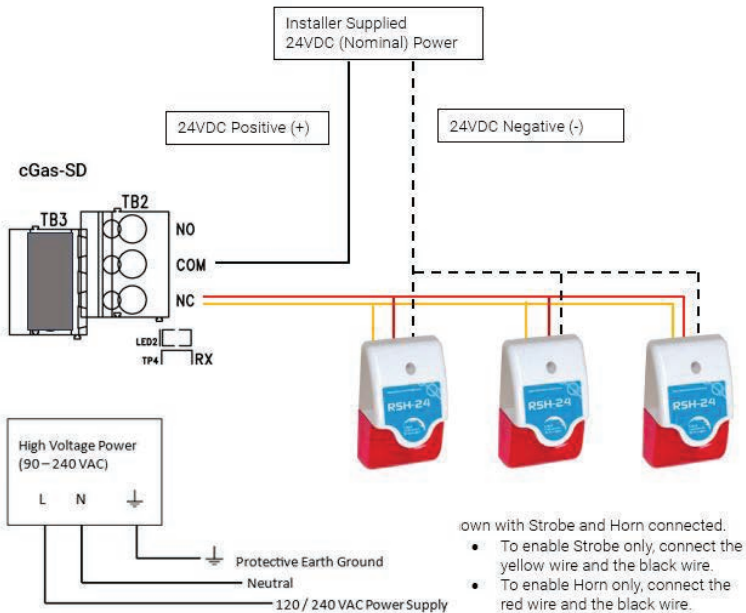
NOTE: WARRANTY MAY BE VOID IF DAMAGE OCCURS TO CIRCUIT BOARD COMPONENTS FROM THE USE OF SOLID CORE WIRE ATTACHED DIRECTLY TO THE WIRING TERMINALS.

When using solid core wiring for distribution (in the conduit), use stranded wire pigtailed 14-18 awg within the enclosure to connect to the circuit board. The rigidity of solid-core wire can pull a soldered terminal strip completely off a circuit board and this will not be covered under warranty.



The system does not provide any power from these terminals. Dry contacts operate like a switch to simply activate (switch on) or de-activate (switch off) equipment to be controlled, such as fan starters.

Wiring Multiple Remote Strobe/Horn Devices to the Relay



5 SYSTEM START-UP CHECKS

After installation, perform the following start-up checks to ensure the system is installed and configured properly. Subsequent checking and/or testing of some components like the vacuum switch, flow rate and sample draw tubing should be part of the routine maintenance schedule.

5.1 Test for Air Leaks

It is important to make sure that the sample draw tubing is securely sealed around the fittings and not leaking air. Use a little liquid soap on the outer surface of the end of the tubing to help it slip onto the fitting easily. It is recommended that two people conduct this test; one person blocks the open end of the inlet tubing and the other watches the flow meter.

- If the flow meter shows 0 and the pump stalls and the alarm activates, the line is properly sealed.
- If you see any flow and the pump continues running, the tubing is not securely fastened and there is a leak somewhere.

5.2 Test the Vacuum Switch / Pump Shut Off

The vacuum switch is intended to shut off the pump in case of a blockage in the inlet tubing. If the inlet tube becomes blocked and/or the filter becomes dirty, the display will show Flow Alarm, the buzzer will sound and the pump will shut off.

The vacuum switch is factory calibrated prior to shipping. However, it should be tested prior to use and recalibrated if necessary and subsequent testing of the vacuum switch should be part of the routine maintenance schedule.

To test, restrict the flow of air of the INLET tubing by capping it or pinching it together. The pump should shut off within 20-30 seconds. The display should show Flow Alarm and the alarm should sound. If the pump doesn't shut off within the specified time, call our Technical Support Department

To restart the pump, press the OK button for 5 seconds then release. It is best to wait 10-30 seconds after the pump initially shuts off as the error signal from the vacuum switch takes a few seconds to go away.

5.3 Check the Flow Rate

Check to ensure the flow rate is properly adjusted after the sample draw tubing has been connected to the inlet port (and exhaust line if used). There is no automatic detection of a decreased flow rate. The length of tubing will affect the flow rate, requiring adjustment of the flow meter. Too much or too little air flow to the pump will cause the diaphragm to vibrate more creating more noise.

The flow rate can be checked by looking at the flow meter inside the unit and adjusted by turning the knob until the desired rate is displayed. The flow rate should remain between 0.5 - 1.0 LPM.

5.4 Check for Loose Components

- Check to ensure pump diaphragm caps are tight. They are shipped from the factory tightly installed but vibration could potentially partially loosen them. If they are loose, they could allow the diaphragm to float slightly and that will increase the vibration and create more noise level.
- Check to ensure pump securing bolts are tight. Vibration over time can loosen them causing excessive vibration noise from the pump.
- After installation, power up and testing, tighten the door screws to prevent rattling from vibration.

5.5 Test Menu Functions

5.5.1 Test Digital Output

To test the connection and configured responses between the cGas-SD and the DDC/BAS you can manually enter a gas reading value of your choice (within the range of the sensor) to be sent over the digital network.

Enter passcode 2020 and press OK.

Enter Passcode
2020

Navigate to the Testing parent menu and press OK.

Choose Menu
>Testing

To test the channel reading navigate to the Test Reading menu item. Enter the desired output

value and press OK.

Test Reading 0 PPM CO	Test Reading >100 PPM CO
--------------------------	-----------------------------

Press OK to confirm the value is correct.

Confirm? >100 PPM CO	N >Y	Test Reading 100 PPM CO
-------------------------	---------	----------------------------

The test will start as soon as you press OK to confirm. To stop the test, press any button.

5.5.2 Test Analog Output

Testing the analog output allows you to determine if the installation was successful. The test forces the cGas-SD 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).

NOTE: The factory configured default entry is 4 mA. If the analog output type has been changed to voltage, the default entry is 0.0 volts.

NOTE: The minimum and maximum output values are 0 to 30 mA (or 0 to 10 volts).

Enter passcode 2020 and press OK.

Enter Passcode 2020

Navigate to the Testing parent menu and then to the Test AO menu item and press OK.

Choose Menu >Testing

Enter the desired analog output value and press OK.

Test AO 4.0 mA	Test AO >14.0 mA
-------------------	---------------------

Press OK to confirm the value is correct.

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

The test will start as soon as you press OK to confirm. To stop the test, press any button.

5.5.3 Recalibrate 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-SD 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 Output 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).

Enter passcode 2019 and press OK.

Enter Passcode
2019

Navigate to the Analog Outputs parent menu and press OK.

Choose Menu
>Analog Outputs

Navigate to the Cal AO 4.0 mA item menu and use the UP and Down buttons to adjust the AD count number as required.

Cal AO 4.0mA
355

Cal AO 4.0mA
>0500

Press OK to confirm.

Confirm ?	N
>500	>Y

Press OK 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.

5.5.4 Test Relay, Buzzer and/or Strobe

NOTE: Before testing the relay, buzzer or strobe, 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.

Enter passcode 2020 and press OK.

Enter Passcode
2020

Navigate to the Testing parent menu and then to the Selected Relay menu item and press OK.

Choose Menu
>Testing

Choose the relay you want to test by pressing OK and selecting it.

- Relay
- Buzzer
- Strobe

Selected Relay
Relay 1

Selected Relay
>Buzzer

Navigate to the Test RLY: menu item and change Untripped to Tripped and press OK. You will hear a soft click and the relay will activate accordingly, respecting its failsafe setting. Or the internal buzzer will sound if you are testing the buzzer, or the strobe will turn on.

Test RLY: Buzzer
Untripped

Test RLY: Buzzer
>Tripped

To stop the relay test, press any button. You will hear a soft click and the relay will deactivate, the buzzer will go quiet or the strobe will turn off.

Test RLY: Buzzer
>Untripped

NOTE: The OFF Delay will apply if it is set.

6 BASIC SYSTEM OPERATION

The cGas-SD is a sample draw system intended for monitoring a selection of toxic gases, oxygen and refrigerants. It has a pump that pulls air from the target location through the tubing, in through the inlet port and over the sensor. The air is then exhausted through the outlet port. If the gas readings are higher than a specified set point, the cGas-SD will go into alarm. It can operate as a standalone system or connect to another controller, control panel or BAS / BMS / DDC system.

When powered up, the LCD display of the cGas-SD will turn on and rotate through several info screens that differ depending on the configuration of the device. The cGas-SD will be visible on the controller / BAS / DDC system during the power up countdown and will output a default value to prevent alarms until the system is fully powered up. After that time, the system may exhibit gas alarm condition(s) if the sensor has not gone through the recommended warm up time. The time it takes for a sensor to warm up and stabilize is dependent on several factors.

NOTE: It is important to make sure that the tubing is securely sealed around the inlet and outlet fittings and not leaking air. If needed, use a little liquid soap on the outer surface of the end of the tubing to help it slip onto the fitting easily. To test for a leak, block the other end of the tubing with your finger. If the pump stalls and the alarm comes on, the line is sealed. If the pump keeps running, the tubing is not fastened properly.

The vacuum switch is intended to shut off the pump in the case of a blockage in the INLET tubing. If the INLET tube becomes blocked and/or the filter becomes dirty, the display will show Flow Alarm, the buzzer will sound and the pump will shut off. Remove the blockage or replace the dirty air filter. To restart the pump press any button to delatch the relay controlling it. It is best to wait 10-30 seconds after the pump initially shuts off as the error signal from the vacuum switch takes a few seconds to go away.

NOTE: The vacuum switch is factory calibrated prior to shipping and should function properly upon arrival. However, it should be tested prior to using the system. Refer to Section 5.2 Vacuum Switch / Pump Shut Off Testing for more information.

6.1 General Info Screens

Pressing the UP or DOWN buttons during normal operation allows you to scroll through a series of information screens showing the model name and firmware version; the gas type and AD counts; the communications ID number, gas type and gas level.

6.2 Navigating the Menu Structure

The three programming push-buttons on the outside of the enclosure are used to navigate through the cGas-SD menu structure. Refer to 3.3 Exterior Enclosure Features for location photo.

Push-Button Operation

The UP and DOWN buttons are used to scroll through screens, menus or setting choices depending on the screen displayed. The OK button is used to initiate menu operation, choose a setting or confirm a choice depending on the screen displayed.

Numeric Entry

On any screen where a number will be directly entered (such as passcode entry) the following operation applies. Numbers are entered left to right 1 digit at a time with an underline/cursor indicating the digit currently being edited. Use the UP/DOWN buttons to change the currently selected digit. Press OK to move to the next digit. Except for where you enter the passcode, all other settings requiring numeric entry will be followed with a Yes/No confirmation once the entire number is entered incase any mistakes were made.

6.2.1 Accessing the Menu with Passcodes

From any normal operation screen press OK to bring up the passcode entry screen. Enter one of the following passcodes using the Numeric Entry method described in the previous section.

- Service Passcode: 2020
- Admin Passcode: 2019

NOTE: Service Passcode 2020 is ideal for service technicians or anyone who only needs quick access to Testing and Calibration.

The menu structure is broken into the following 3 levels:

- Top Menu
- Parent Menu
- Menu Items

The Top Menu will allow you to choose a Parent Menu that lists specific settings and operations that you want to access. For example, Testing, Calibration, Alarm, Relays, etc. Navigate to the desired Parent Menu and press OK.

Once in a Parent Menu a list of available Menu Items are shown. Each Menu Item will have a title on the top line and the current setting on the bottom line. Use the UP/DOWN buttons to scroll through the available Menu Items. The Menu Items that are displayed will depend on your device's configuration as well as the selected channel or relay.

Pressing OK on any Menu Item screen will add a > to the bottom line. This indicates that you are now able to change the setting. Use the UP/DOWN buttons to change the value and OK to select. Once a selection is made the > will disappear indicating that you are back in the Parent Menu.

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

NOTE: Except when conducting test functions, the gas detection and alarm reactions of the cGas-SD will continue to function as normal during menu use.

6.3 Display Settings

The LCD display can display up to 2-lines of 16-characters. After warm-up and upon normal operation, the display will show the current gas level reading for each channel that it has been configured.

6.3.1 Adjust Display Brightness

The brightness of the display can be changed in increments of 10. The factory default is 50 (50%). You cannot enter a number higher than 100. Entering a value of 0 turns the backlight off completely but with ambient light the text can still be read on the display.

Enter passcode 2019 and press the OK button.

Enter Passcode

2019

Navigate to the Display parent menu, press OK. Navigate to the Brightness menu item and press OK.

Choose Menu

>Display

Brightness

50

Choose the desired numeric value and press OK.

Brightness

>100

Brightness

100

6.3.2 Display Configurations

The factory default display setting is Normal, which displays the gas type, gas reading and gas units for configured channels. The information can be reduced to just the gas type by changing the setting to the minimal mode display.

Normal

CO 0 PPM

Minimal

CO

Enter passcode 2019 and press the OK button.

Enter Passcode

2019

Navigate to the Display parent menu, press OK. Navigate to the Display Type menu item and press OK.

Choose Menu

>Display

Display Type

Normal

Choose the preferred display setting and press OK.

Display Type

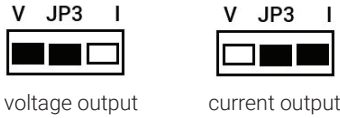
>Minimal

Display Type

Minimal

changed to voltage in the field using jumpers.

Find JP3 on the board and move the jumpers as indicated by the black area for current and voltage.



6.5.2 Set Analog Output Type

The factory default analog output type is current. The analog output type can be changed from current to voltage and vice versa in the field.

NOTE: Make sure the jumper is in the correct position for the output you are choosing. See previous section.

Enter passcode 2019 and press the OK button.

Enter Passcode 2019

Navigate to the Analog Outputs parent menu and press OK.

Choose Menu >Analog Outputs

Navigate to the Set AO Type menu item and change the Current (mA) to Voltage (V). Press OK.

Set AO Type >Current (mA)

Set AO Type Voltage (V)

If you want 0-10 volt output, you are finished. If you want 2-10 volt output or other values you need to set the analog output range. Refer to Section 6.5.3 Set Analog Output Range.

6.5.3 Set the Analog Output Range

The factory default analog output for the cGas-SD is 4-20 mA. The default voltage output value is 0-10 volts. The output range can be changed, for example to 0-20 mA or 2-10 volts. The maximum level of output for voltage is 10 volts and the maximum for current output is 23 mA.

Enter passcode 2019 and press the OK button.

Enter Passcode 2019

Navigate to the Analog Outputs parent menu and press OK.

Choose Menu >Analog Outputs

Navigate to Set AO Zero menu item. Press OK and enter the value as required.

Set AO Zero >0

Set AO Zero >02.0 V

Press OK to confirm the value is correct.

Confirm?		N
>02.0 V		>Y

Navigate to Set AO Range menu item. Press OK and enter the value as required.

Set AO Range
>10

Set AO Range
>08.0 V

Press OK to confirm the value is correct.

Confirm?		N
>08.0 V		>Y

Set AO Range
8.0 V

The Set AO Zero value is the current or voltage at which the device signals no (zero) gas. The Set AO Range value is the current or voltage at which the device signals maximum gas.

NOTE: When changing the AO limits the firmware automatically calibrates itself to the new limits. If the values aren't as accurate as desired, refer to Section 5.5.3 Recalibrate the Analog Output.

6.5.4 Set Analog Output Mode

The factory default analog output mode is PEAK with the analog output following a single channel. You can set the analog output to OFF which will result in a 4mA 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 unit. Or you can set the analog output mode to STEP which is useful for controlling variable speed fans (VFD) and electrically commutated motors (ECM) used in many applications including variable refrigerant flow (VRF) systems.

Mode Settings:

- PEAK - factory default, the analog output is attached to the channel through priorities
- STEP - the analog output can be configured with 5 steps to output a specific real world value (mA or V) when triggered by Low, Mid, High alarms or a Fault or when no alarms are present (None)
- OFF - the analog output will have 4mA current output

NOTE: If the analog output mode is OFF, the cGas-SD will still detect gas and display readings. It will not send an analog signal back to the controller but will send the digital output signal.

NOTE: While in Step Mode the analog output will take NO ACTION during a Fault unless a step has been set to react to the Fault flag. The factory default setting is Step4: 20mA output on any Fault.

Enter passcode 2019 and press the OK button.

Enter Passcode
2019

Navigate to the Analog Outputs parent menu and press OK.

Choose Menu

>Analog Outputs

Navigate to the Set AO Mode menu item and press OK. Choose the mode desired and press OK.

Set AO Mode

>PEAK

Set AO Mode

STEP

6.5.5 PEAK Mode

In the single channel cGas-SD the default PEAK mode setup results in the analog output tracking the gas reading in a basic 1:1 setup where 0 concentration = 4mA and max concentration = 20mA. For an oxygen reading of 20.9% the analog output will be 17.4 mA.

To change STEP Mode to PEAK mode, enter passcode 2019 and press the OK button.

Enter Passcode

2019

Navigate to the Analog Outputs parent menu and press OK.

Choose Menu

>Analog Outputs

Navigate to the Set AO Mode menu item and press OK. Choose the mode desired and press OK.

Set AO Mode

>STEP

Set AO Mode

PEAK

6.5.6 Configuring AO STEP Mode

For the analog output there are 5 steps that can be configured with an analog output value and set to be activated by the following step flags:

- None - the step is active when no alarm or fault is present and outputs the configured value
- Low - the step is triggered on the Low Alarm and outputs the configured value
- Mid - the step is triggered on the Mid Alarm and outputs the configured value
- High - the step is triggered on the High Alarm and outputs the configured value
- Fault - the step is triggered on a Fault and outputs the configured value
- Unused Step - the step is not being used, it is completely disabled

Each step number takes precedence over the step before it regardless of the output value with step 5 being the highest precedence and step 1 being the lowest.

There are 8 priorities to which each step can be set to reference. The priorities are not exclusive, each step could have the same priority number if desired. For the specified priority, for example, if the channel reporting to that priority goes into Low Alarm, the step set to that priority and the Low Alarm flag will show the output value.

The factory default priority settings are:

- Pri 1-5 track single channels 1-5
- All Channels report to Pri 8

Enter passcode 2019 and press the OK button.

Enter Passcode 2019

Navigate to the Analog Outputs parent menu and press OK.

Choose Menu >Analog Outputs

Navigate to the Pick AO Step menu item and choose the step (1 to 5) you want to configure.

Pick AO Step >1

Pick AO Step 5

Navigate to the Set Step Pri menu item and press OK. Choose the priority number (1 to 8, with 8 being the highest priority) you want the step to react to and press OK.

Set Step5 Pri >8

Navigate to the Set Step Flag menu item and press OK. Choose the flag (None, Low, Mid, High, Fault, Unused Step) within the priority that will trigger that step and press OK.

Set Step5 Flag >Low

Navigate to the Set Step Value menu item and press OK. Enter a real world value (mA or V) with 1 decimal place to output when the step is active and press OK.

Set Step Value >08.0 mA

Confirm?	N
>8.0 mA	>Y

NOTE: If the analog output is type is voltage the display will show the correct unit of measure (ie. 2.0 V).

7 TROUBLE SHOOTING

Noisy pump.

1. Check to ensure the cGas-SD enclosure is securely mounted to a flat wall surface.
2. Check to ensure the flow rate has been properly adjusted after sample line and exhaust line (if used) has been installed. A long sample line reduces flow rate and will require adjustment of the flow meter. Too much or too little air flow to the pump will cause the diaphragms to vibrate more creating more noise.
3. Check to ensure pump diaphragm caps are tight. They are shipped from the factory tightly installed but vibration could potentially partially loosen them. If they are loose they could allow the diaphragms to float slightly and that will increase the vibration and create more noise level.
4. Check to ensure pump securing bolts are tight. Vibration over time could have loosened them causing excessive vibration noise from the pump.
5. Check to ensure the white inlet filter is not plugged or partially plugged. This will reduce the air flow through the flow meter and can cause the pump to make more noise.

- 6. The pump diaphragms may need to be replaced. Contact your local authorized distributor or CET.

Pump stops working when you don't think it should. The vacuum switch may need adjusting if the pump turns off for no reason (tube isn't blocked, length of hose is no more than 50ft, not located in extreme temperatures, device was manufactured less than 5 years ago, etc.). To start the pump, gently turn the switch (screw) clockwise all the way and then back it off slowly while pressing the Enter button.

cGas-SD won't power up. (blank display) Is the power properly connected? Check the wiring connections. Refer to Section 4.5 Line Voltage or 4.6 Low Voltage Wiring Connections.

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, the factory default 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.

Error Codes. The error code will appear on the display in place of the units for a channel.

List of Possible cGas-SD Error Codes

CODE		DESCRIPTION
COMM	Communication Fault	The controller or BAS has not read the current gas concentrations in more than the preset time (default 5 minutes).
		Could be an address miss-matched between cGas-SD and controller / BAS. MAC value on MODbus or MAC value or Device ID on BACnet
		Check for wiring problems. A and/or B wires broken at somewhere in the network or ground connection between cGas-SD and controller / BAS (using cable shield as ground is not recommended).

F01	Negative Fault Reading	Check to make sure the smart sensor board is present and installed properly in the socket. If installed, the cGas-SD detects the sensor signal is too far below its zeroAD. May be caused by a sensor that is temperature or humidity sensitive or the device wasn't warmed up for a minimum 24 hours. After an appropriate warm up period, zeroing the sensor will normally resolve this.
F03 F07 F11 F12	Sensor Faults	cGas-SD cannot communicate with the sensor. Ensure the smart board is installed correctly. If unresolved, contact our Technical Support Department.
F02 F04 F09 F20	Smart Board Faults	Ensure the smart board is seated properly and installed on the correct side (left) if a single channel unit. If a power cycle does not resolve this, replace the sensor smart board.
F05	Error in reading Smart Board	cGas-SD detected an error in the smart board ID. Use "Write to Sensor" for the indicated channel (passcode 2019, Configuration menu).
F06	SB ID Mismatch	Firmware expected a different smart board than what is in the sensor socket. Confirm the correct smart board is installed in the correct socket. ie. CH1 gas should be in the left socket. When confirmed, if still in error, use "Write to Sensor" for the indicated channel (passcode 2019, Configuration menu).
F07	RH & Temp Fault	cGas-SD cannot communicate with the sensor. Ensure the smart board is installed correctly. If unresolved, contact our Technical Support Department.
F08	ADC COMM	This is a daughter board hardware failure. Contact our Technical Support Department.
F80-99	Internal Memory Faults	The cGas-SD has detected a critical memory failure of the main board. This can be corrected by bootloading a valid configuration onto the unit. If unresolved, contact our Technical Support Department.

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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