Operation Manual

Rev. I | 2020.05

SCC Self Contained Controller

www.critical-environment.com

TABLE OF CONTENTS

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. For more information, refer to Sections *8 Calibration* and *10 Maintenance* of this manual.

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. As a reminder, 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.

All returned goods must be pre-authorized by obtaining a Returned Merchandise Authorization (RMA) number. All goods must be shipped to Critical Environment Technologies freight prepaid. Contact the manufacturer for an RMA number and procedures required for product transport.

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 must be accompanied with an RMA number.

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

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

You must include your Returned Merchandise Authorization (RMA) number, address, telephone number, contact name, shipping / billing information, and a description of the defect as you perceive it. You will be contacted with a cost estimate for expected repairs, prior to the performance of any service work. Pack the equipment well (in its original packing if possible), as we cannot be held responsible for any damage incurred during shipping to our facility. All incurred shipping charges, duties and taxes are your responsibility.

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

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

1.6 Revisions

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

All information contained in this manual is believed to be true and accurate at the time of printing. However, as part of its continuing efforts to improve its products and their documentation, the manufacturer reserves the right to make changes at any time without notice. Revised copies of this manual can be obtained by contacting CETCI or visiting **www.critical-environment.com**.

Should you detect any error or omission in this manual, please contact CETCI:

Critical Environment Technologies Canada Inc.
Unit 145, 7391 Vantage Way, Delta, BC, V4G 1M3, Canada
Toll Free: +1.877.940.8741
Telephone: +1.604.940.8741
Fax: +1.604.940.8745
Email: marketing@cetci.com
Website: www.critical-environment.com

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

2 INTRODUCTION

2.1 General Description

Thank you for purchasing our SCC Self Contained Controller. The SCC combines toxic and/or combustible gas detection with basic control functionality for non-hazardous, non-explosion rated, commercial applications.

Available in one or two channel configurations for monitoring toxic and/or combustible gas types by means of an electrochemical Carbon monoxide (CO) and/or Nitrogen dioxide (NO_2) sensor and/or one of three ESH-A Remote Sensors used to detect Hydrogen (H_2), Propane (C_3H_8) or Methane (CH_4). Monitoring of CO or NO_2 may also be achieved remotely by combining the SCC with a 4-20 mA LPT Transmitter such as the LPT-TCO or LPT-END.

The SCC features two alarm level, line voltage relays with field configurable time delays and trigger levels, field selectable internal audible alarm and an LED panel indicating power, channel alarm status and fault conditions. Automated calibration and other maintenance procedures are simple and easily performed in the field, and our proprietary Calibration Extending Firmware (CEF) takes into account the aging of the toxic sensors so that less frequent calibrations are required in less-critical applications such as parking garages/car parks.

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

2.2 Key Features

- Single or dual channel operation
- Internal and/or remote sensor configurations
- Six conduit entry ports
- Thermal resetting fuses
- LED light indicators for Power, CH1, CH2 and Fault
- Two 5-amps SPDT dry contact relays
- Configurable 4-20 mA input

- RoHS compliant circuit boards
- Standard water / dust tight, corrosion resistant enclosure (drip proof); IP54 certified with optional splash guard installed

3 INSTRUMENT SPECIFICATIONS

3.1 Technical Specifications

GAS TYPE
Carbon Monoxide (CO) 0 - 200 ppm range
Nitrogen Dioxide (NO_2) 0 - 10 ppm range
Combustible Gas (catalytic) Hydrogen (H_2), Methane (CH_4), Propane (C_3H_8), etc. 0 - 100 % LEL range

MECHANICAL	
Enclosure	ABS / Polycarbonate, rated UL94-5VA; IP54 rated with optional splash guard installed. Copper coated interior to reduce RF interference.
Weight	600 g (1.4 lb)
Size	254 mm x 218 mm x 109 mm (10.0" x 8.6" x 4.3")

ELECTRICAL	
Power Requirement Low Voltage Line Voltage	 16 - 30 VDC or 12 - 28 VAC, 10 W, Class 2 90 - 240 VAC, 50 - 60 Hz
Current Draw Low Voltage Line Voltage (110 VAC) Line Voltage (220 VAC)	 400 mA @ 24 VDC Approximately 90 mA Approximately 45 mA
Wiring	- 24VDC or 24VAC two-conductor shielded 18 awg stranded within conduit - VAC (line voltage) three-conductor (Line, Neutral, Ground) shielded 18 awg stranded within conduit
Circuit	ARM Cortex based analog signal processing board with jumpers for user interface.

Relays	Two SPDT dry contact relays, rated 5 amps @ 240 VAC
Distance	Maximum 61 m (200 ft) between controller and ESH-A Remote Sensorusing minimum 18 gauge wire. Refer to *Section 6.8.2 Wiring from SCC to an ESH-A Remote Sensor* for more information.
Fuses	Automatic resetting thermal

USER INTERFACE

Display	LED Panel indicating "POWER", "CH1" state, "CH2" state, and FAULT"
Audible Alarm	Internal audible alarm, rated 76 dB @ 3 m (10 ft)

ENVIRONMENTAL *(sensor dependent)*

Operating Temperature *(depends on sensor)*	-20°C to 40°C (-4°F to 104°F) or, -40°C to 40°C (-40°F to 104°F) with the optional internal heater installed
Operating Humidity	15 - 90% RH non-condensing

CERTIFICATION

Model: SCC-X-XXX
S/N: SCC1603I00010
Rating: 90-240 VAC, 50-60 Hz
16-30 VDC or 12-28 VAC, 10W, 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.

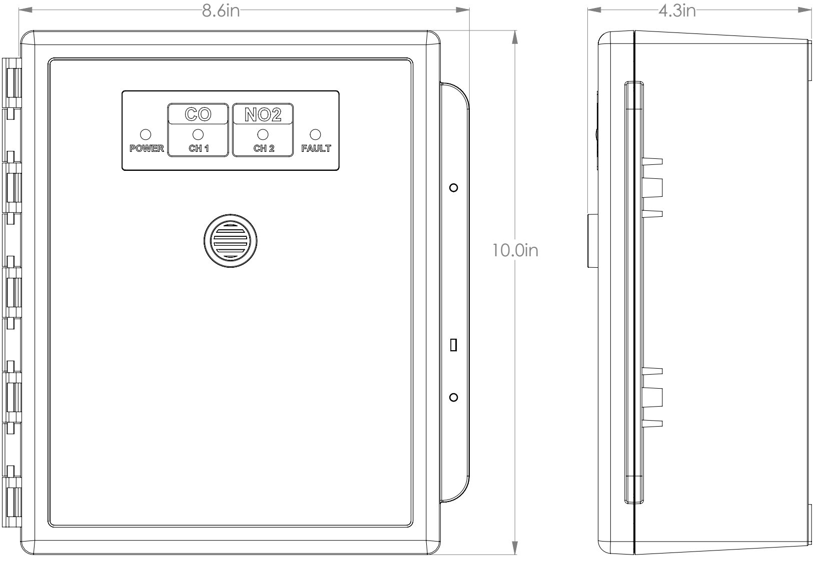
Conforms to: CSA-C22.2 No. 205-M1983 (R2009), UL508 (Edition 17):2007
Conforms to: EMC Directive 2004/108/EC, EN 50270:2006, Type 1, EN61010
Conforms to: FCC. This device complies with part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTES:

- System is configured such that all relays are "FAIL SAFE" (relay coils are always energized in non-alarm state).

- Relays are "common" to both channels (activated by either channel).

3.2 Enclosure Dimensions



4 SENSOR SPECIFICATIONS

4.1 SCC Internal Sensor Specifications

Carbon Monoxide (CO)

Type	Electrochemical
Range	0 - 200 ppm
Sensor Response Time (T_{90})	60 seconds
Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity	5 - 95% RH non-condensing
Operating Pressure	80 - 120 kPa
Operating Pressure Atmospheric	N/A
Resolution	0.5 ppm
Accuracy	No data available
Repeatability	< 2% of signal

Maximum Zero Shift	N/A
Clean Air Output Drift	< 10 ppm equivalent per year
Expected Life Span	~6 years in air (under normal conditions)
Calibration	Every 6 months or once a year (depending on application)
Cross Sensitivity	H_2S @ 20 ppm = < 0.1 ppm NO_2 @ 10 ppm = < 0.1 ppm Cl_2 @ 10 ppm = < 0.1 ppm NO @ 50 ppm = < 5 ppm SO_2 @ 20 ppm = < 0.1 ppm H_2 @ 20°C (68°F) @ 400 ppm = < 60 ppm C_2H_4 @ 400 ppm = < 25 ppm NH_3 @ 20 ppm = < 0.01 ppm

Nitrogen Dioxide (NO_2)

Type	Electrochemical
Range	0 - 10 ppm
Sensor Response Time (T_{90})	< 30 seconds
Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity	15 - 90% non- condensing
Operating Pressure	Atmospheric ± 10%
Resolution	0.02 ppm
Accuracy	No data available
Repeatability	< 2% of signal
Maximum Zero Shift	± 0.2 ppm equivalent
Long Term Drift	< 2% signal loss / month
Clean Air Output Drift	< 2% signal loss / year
Expected Life Span	~5 - 6 years in air (under normal conditions)
Calibration	Every 6 months (depending on application)

Cross Sensitivity	H_2S @ 20 ppm = < -40 ppm Cl_2 @ 10 ppm = 100 ppm NO @ 50 ppm = < 0.5 ppm SO_2 @ 20 ppm = < -2.5 ppm CO @ 400 ppm = < 0.1 ppm H_2 @ 400 ppm = < 0.1 ppm C_2H_4 @ 50 ppm = < 0.1 ppm NH_3 @ 20 ppm = < 0.1 ppm CO_2 @ 5% volume = < 0.1 ppm

4.2 Remote LPT Transmitter Sensor Specifications

The LPT-TCO has an internal Carbon Monoxide sensor and the LPT-END has an internal Nitrogen Dioxide sensor. Both sensors are identical to the CO and NO internal SCC sensor specifications listed above.

4.3 ESH-A Remote Sensor Specifications

Combustibles (e.g. CH_4, H_2, C_3H_8)	
Type	Catalytic
Range	0 - 100% LEL
Sensor Response Time (T_{90})	< 30 seconds from 0 - 100% LEL
Operating Temperature	-20°C to 40°C (-4°F to 104°F)
Operating Humidity	20 - 90% non- condensing
Resolution	1% LEL
Accuracy	No data available
Long Term Drift	N/A
Expected Life Span	~5 years
Calibration	Every 6 months (depending on application)
Cross Sensitivity	Any combustible gas

NOTES:

- Some of the above sensors have cross sensitivities to other gases (interfering gases). Please refer to the sensor specification chart before ordering a specific sensor if your application may have some of the interfering gases present.

4.4 Calibration Extending Firmware (CEF) and Sensor Aging

SCC systems with integral electrochemical sensors have been programmed with our CEF. This firmware takes into consideration the aging of the electrochemical CO and NO_2 sensors so that less frequent calibrations are required in less-critical applications such as parking garages. The system tracks the age of the sensor and automatically compensates for the reduced output of the sensor as it ages.

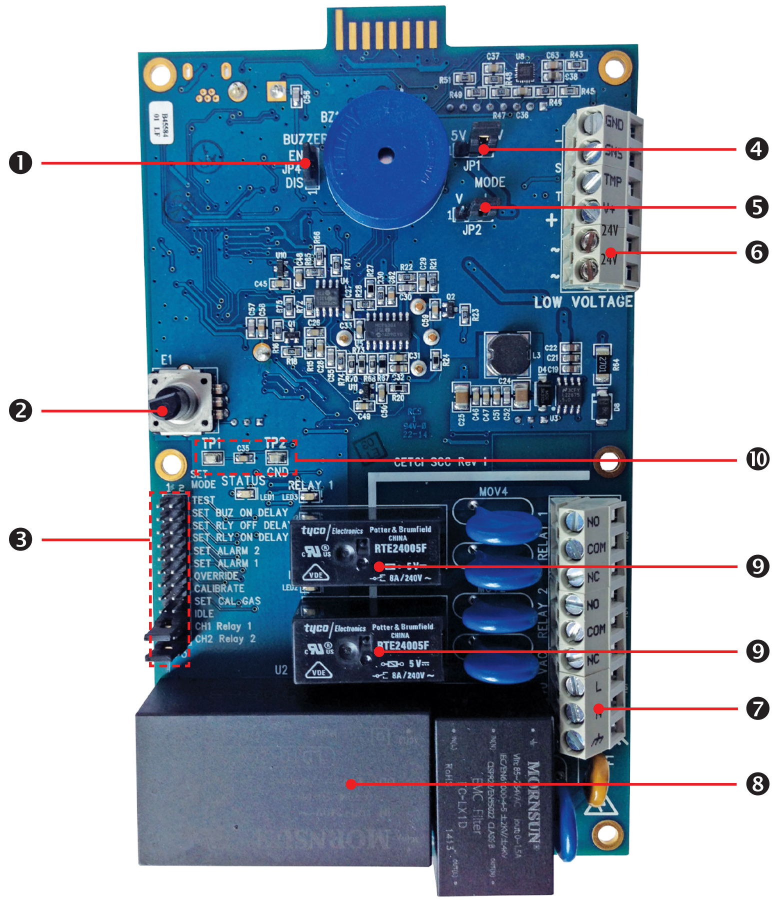
5 FEATURES

5.1 Front Exterior Enclosure

NUMBER	FEATURE	FUNCTION
❶	Power LED	Indicates unit power.
❷	Sensor Channel LEDs	Indicates channel alarm status.
❸	Fault LED	Indicates unit fault condition.
❹	Sensor Opening	To monitor diffused air and gas.
❺	Door Screws	Secures door.

❻	Secure Tag Opening	For securing door with zip tie or dated tag.
❼	Magnetic Calibration Trigger point	To enter calibration for Channel 1
❽		To enter calibration for Channel 2

5.2 Interior System Layout



NUMBER	FEATURE	FUNCTION
❶	JP4	Buzzer enable / disable
❷	Rotary Encoder E1	Used for setting values in conjunction with jumpers.

❸	JP3 Config / Cal / Test Jumpers	Used to select different configuration and calibration modes.
❹	JP1 Remote Sensor Voltage	Selects the voltage used to power remote sensor; 5 V, 24 V.
❺	Jumper JP2	Select voltage or current loop remote sensor.
❻	Low Voltage Wiring Terminal (TB3)	For low voltage power connections and remote sensor hookup.
❼	High Voltage Wiring Terminal (TB1)	For high voltage power connections and relay hookups.
❽	Power Supply Transformer	Provides low VDC power from 120 or 240 VAC input.
❾	Dry Contact Relays	For high & low alarm.
❿	Test Points TP1 TP2	Monitoring config values with a voltmeter.

6 INSTALLATION

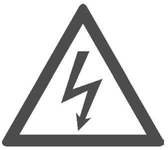
6.1 General Safety Warnings

The SCC is intended for indoor use, permanently mounted at breathing zone height (4 to 6 ft above ground) in parking garages and light industrial applications. It should be protected from extreme weather conditions.

The SCC requires no assembly and virtually no maintenance other than regular calibration of the integral and/or remote sensors and ensuring that excess water or dust is 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

Warning High Voltage. Indicates hazardous voltage may be present in the area inside the SCC enclosure marked with this symbol.



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

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

Be aware that the SCC enclosure has a 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 System Installation

The SCC should be installed on a flat vertical surface using the four 0.175" (4.4 mm) diameter mounting holes provided to maintain water tight status. There are also four areas that can be drilled out for mounting to a double gang electrical box.

There are six conduit entry points for the standard mounting setup (against a flat surface). Three entry points are located along the top of the enclosure and three are located along the bottom. These points must be drilled out as needed. If mounting to a double gang electrical box there is an entry point provided that must also be drilled out of the back of the enclosure. Refer to Section *6.6 Standard Enclosure Mounting Components*.

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

Care should be taken to ensure that the face of the SCC is not obstructed in order to maximize the sensor's exposure to the environment being monitored.

When finished installing or servicing it is recommend you perform a bump test to ensure the unit and all relays are working properly.

6.4.1 Wet Environment Considerations

If the SCC is to be installed in a potential hose-down application or any application whereby liquid could be directed towards the sensor opening, the SCC 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 SCC 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 controllers and detectors have been designed to reduce the effects of these interferences and we meet CSA FCC and CE requirements for these type of devices. However there are still circumstances and levels of interference that may cause our equipment to respond to these interferences and cause them to react as if there has been gas detected.

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

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

6.5 Sensor Mounting Heights

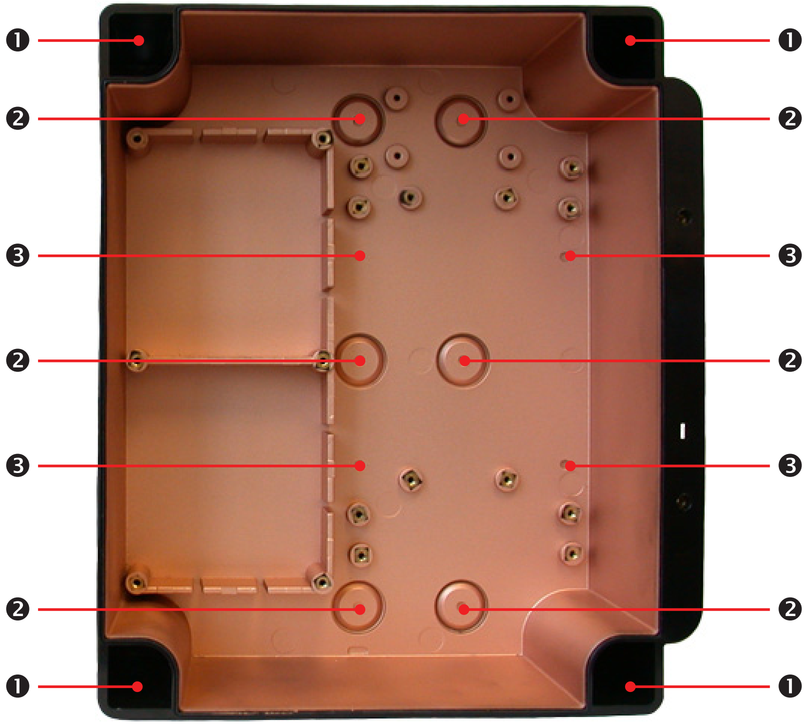
The sensor mounting height depends on the density of the gas relative to air. Heavier than air gases should be detected 6 inches from the floor, lighter than air gas sensors should be placed on or near the ceiling, and gases which have a density close to that of air should have sensors installed in the "breathing zone" 4 - 6 feet from the floor. The breathing zone refers to the area 4 - 6 feet from the floor, where most human breathing takes place. This is a good default location for sensors, as many gases are often well dispersed in air.

GAS	APPLICATIONS / TYPES	SUGGESTED MOUNTING HEIGHT
Carbon Monoxide (CO)	Gas engine exhaust	4 - 6 ft above the floor
Nitrogen Dioxide (NO_2)	Diesel engine exhaust	4 - 6 ft above the floor
Propane (C_3H_8)	Propane fuel	6" above the floor
Hydrogen (H_2)	Lead acid battery charging rooms/ stations	On or near the ceiling
Methane (CH_4)	Buildings built on landfill sites	On or near the ceiling

NOTE: CETCI considers 4 - 6 ft from the floor as the "Breathing Zone".

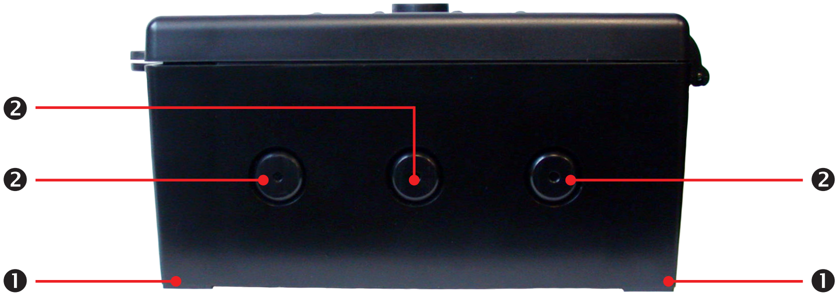
6.6 Standard Enclosure Mounting Components

6.6.1 Enclosure Interior Base



NUMBER	FUNCTION
❶	Molded-in mounting holes
❷	Conduit entry (6 entries on base)
❸	Alternative mounting holes

6.6.2 Enclosure Top and Bottom



NUMBER	FUNCTION
❶	Molded-in mounting holes
❷	Conduit entry (3 entries on top and on bottom)

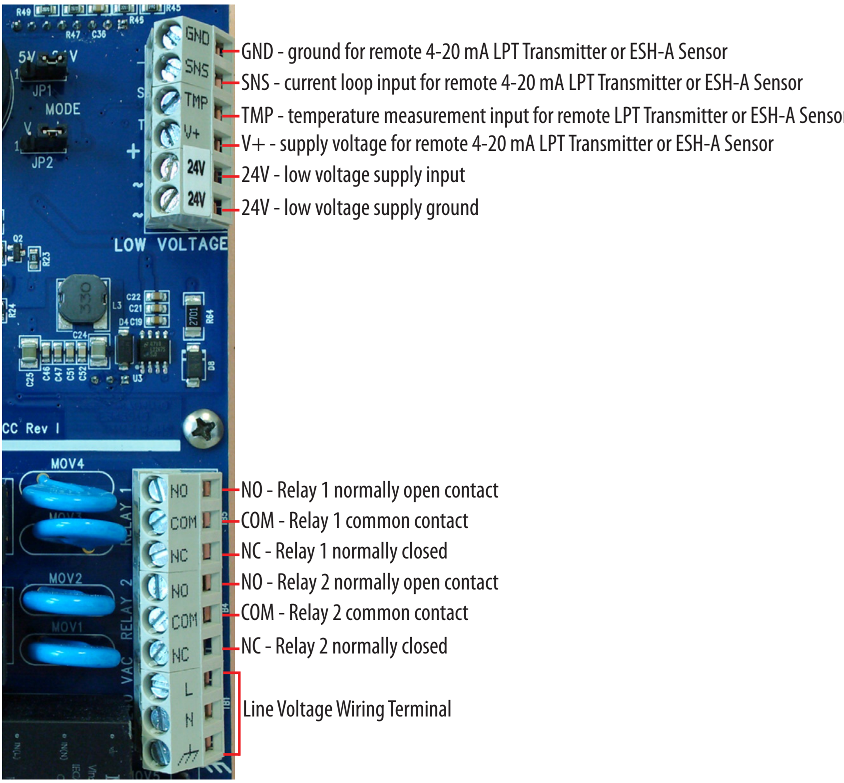
6.7 Wiring Power Connections

Drill out one or more of the PVC conduit entry hole plugs located on the top, bottom or back of the SCC enclosure base. Refer to *Section 6.6 Standard Enclosure Mounting Components*.

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 SCC. Low voltage wiring must not be within the same conduit as line voltage wiring.

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 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.

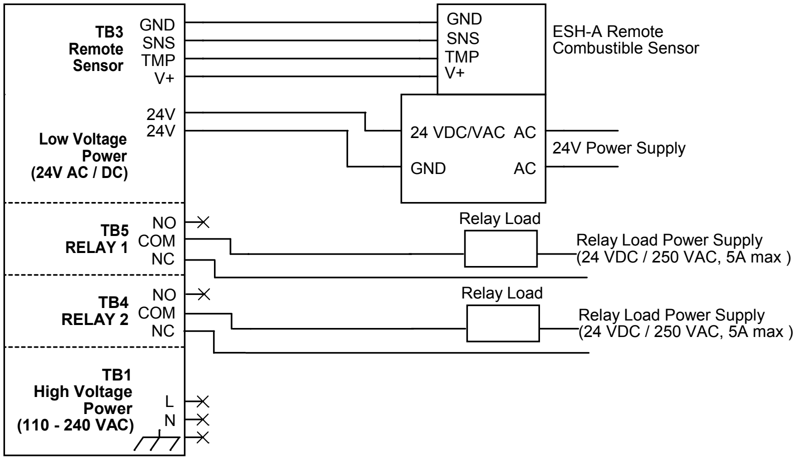
The SCC provides screw down wiring terminals connecting a remote 4-20 mA LPT transmitter or ESH-A Remote Sensor. Terminal blocks are also provided to connect to the two 5A / 250 VAC - 30 VDC relays.



6.7.1 AC and DC Low Voltage Power Wiring to the SCC

If supplying 24 VAC or VDC, connect both lines from your power supply to both “24V” terminals on connector TB3 located at the top right of the circuit board.

Wiring Example (24V)

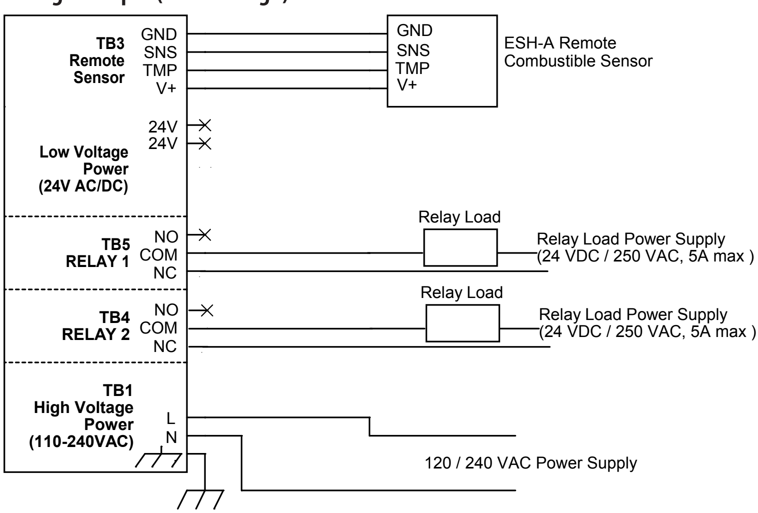


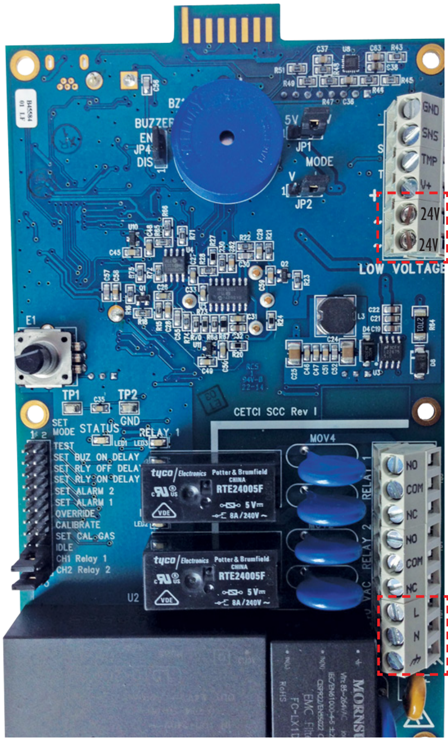
A class 2 or better transformer must be used. The stated max current draw of the SCC in this mode is 0.5 A.

6.7.2 AC Line Voltage Power Wiring to the SCC

If supplying line voltage (110 - 240 VAC), connect L1 to L on TB1 located at the bottom right of the board. Connect L2 to N and earth ground to the chassis ground terminal on the same block.

Wiring Example (Line Voltage)





If supplying 24 VAC / VDC operational power, pull two wires suitable for low voltage from power source to both terminals labeled 24 V on block TB3.

If supplying line voltage, wire to terminals L, N and earth ground on block TB1.

6.8 Wiring Connections from SCC to a Remote Device

The SCC provides screw down wiring terminals for connecting:

- A remote 4-20 mA LPT Low Power Transmitter
- An ESH-A Remote Sensor

Confirm voltage requirements of device and set JP1 and JP2 correctly.

Terminal blocks are also provided to connect to the two 5A / 250 VAC - 24 VDC relays. The relays do not supply power. (See Section *6.10 Relay Connections* for more information.)

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 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.

6.8.1 Wiring SCC to a Remote 4-20 mA LPT Transmitter

NOTE: Check the positions of jumpers JP1 and JP2 before powering up a setup with a remote LPT transmitter. **Make sure JP1 is set to 24V and JP2 is set to I (current).** Refer to *Section 7.4 Jumpers* to determine the appropriate positions. Incorrect positions of the jumpers will result in the remote transmitter not turning on and the SCC will require a restart.

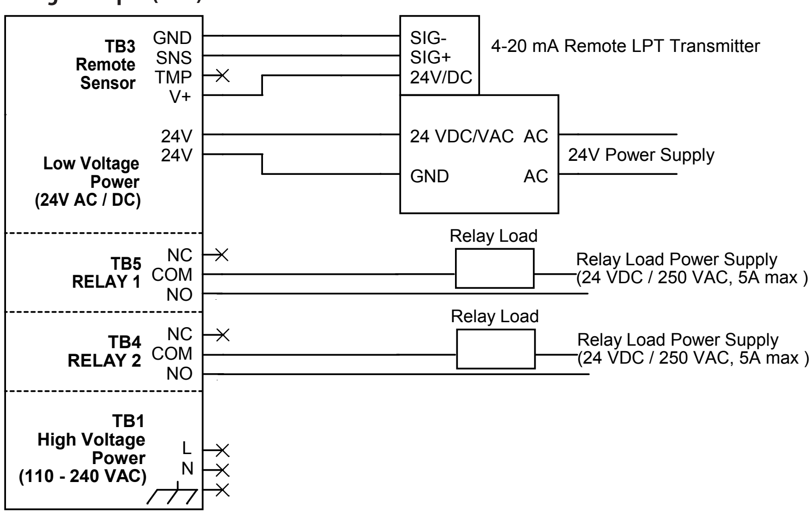
To connect the SCC to the LPT use terminal block TB3 located at the top right of the circuit board. Connect the remote transmitter using a three-wire setup: connect the 24V to the V+, the SIG+ to the SNS and the SIG- to the GND positions of TB3.

Three-conductor, 16 - 18 gauge wire / cable must be shielded when connecting to a remote analog transmitter. Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires.

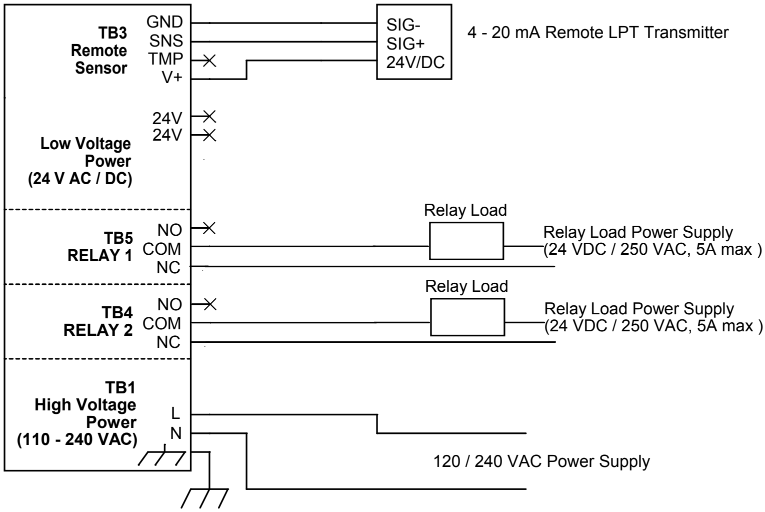
NOTE: DO NOT use solid-core wire for connection to wiring terminal strip. Any damage caused by using solid-core wire will void warranty. Use stranded wire ONLY.

NOTE: CETCI does not recommend a two-wire connection between the SCC and LPT.

Wiring Example (24V): Remote LPT Transmitter



Wiring Example (Line Voltage): Remote LPT Transmitter



Voltage supplied by the controller to the remote analog LPT Low Power Transmitter should measure approximately 24 VDC nominal. If these voltages are not attained after installation, the wrong gauge wire may have been used or the wiring run is too long.

6.8.2 Wiring from SCC to an ESH -A Remote Sensor

Each ESH-A is given the same serial number as the device it is being connected to. Make sure to connect the ESH-A to the SCC that has the same serial number or the system won't work.

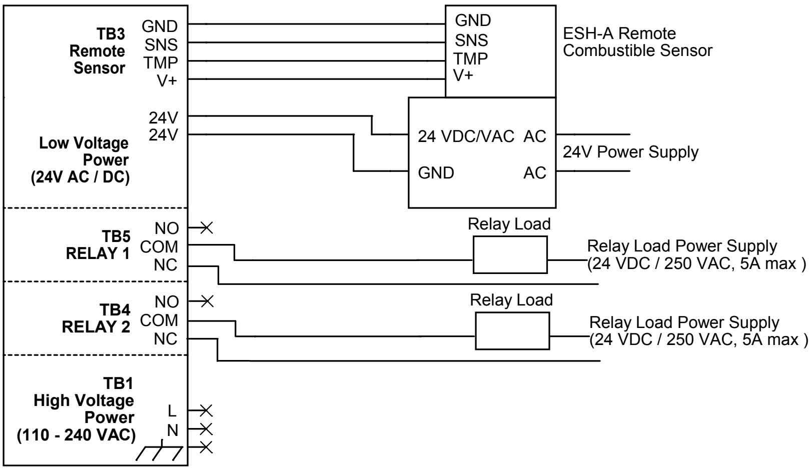
NOTE: Check the positions of jumpers JP1 and JP2 before powering up a setup with a remote sensor. **Make sure JP1 is set to 24V and JP2 is set to I (current).** Refer to *Section 7.4 Jumpers* to determine the appropriate positions. Incorrect positions of the jumpers will result in the remote transmitter not turning on and the SCC will require a restart.

To connect an ESH-A remote sensor, use terminal block TB3 located at the top right of the circuit board. Connect the ESH-A using a four-wire setup: connect the V+ to the V+, the SNS to the SNS and the GND to the GND and the TMP to the TMP positions of TB3.

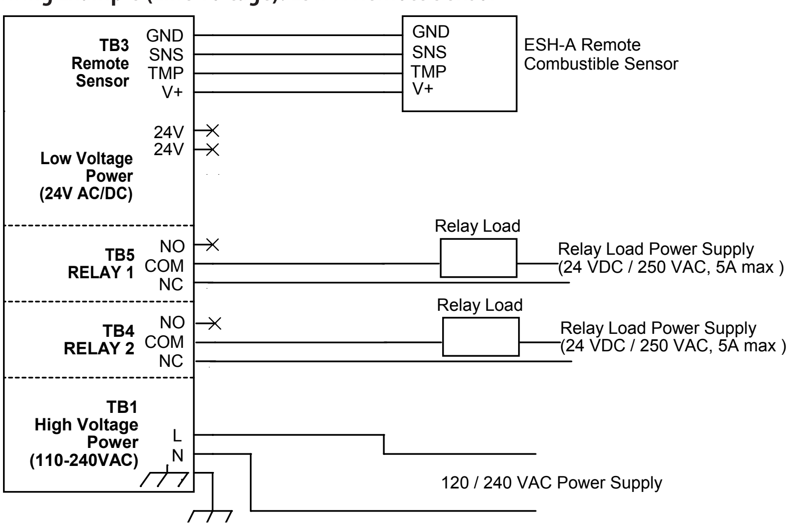
Four-conductor, 16 - 18 gauge, shielded cable wire in a separate conduit from all other wiring is required between the SCC and the ESH-A remote sensor. Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires.

Maximum distance between the SCC and an ESH-A Remote Sensor should not exceed (61 m) 200 ft of wire connecting the two together.

Wiring Example (24V): ESH-A Remote Sensor



Wiring Example (Line Voltage): ESH-A Remote Sensor



6.9 Incorrect Wiring Examples (IMPORTANT)

It is important to make sure you connect the power and CETCI's remote devices to the SCC correctly to avoid damaging the SCC and/or the remote devices and putting yourself at risk of electrocution.

- If supplying 24 VAC/VDC to any other port on TB3 other than the 24 V connection you risk damaging the DCC.
- Building wiring (L or N) connected anywhere on TB3 will destroy the SCC. It also creates the risk of electrocution because high voltage will exist outside the marked high voltage area.
- Building wiring (L or N) connected to the earth ground on TB1 will destroy the circuit board and cause a short in the system.
- In most instances, if you incorrectly connect a remote transmitter, such as an LPT, to the SCC, the LPT will not power up and the SCC will eventually go into fault. For example, if the LPT SIG- wire is connected to the SCC V+ on TB3 and LPT 24V wire is connected to SCC GND, the LPT will not power up and SCC will eventually go into fault.
- If the ESH-A signal line connected to SCC TMP on TB3 will result in the ESH-A powering up but the SCC will not receive a signal and will eventually go into fault.

NOTE: If connecting third party remote devices, consult that manufacturer's wiring instructions. CETCI is not responsible for incorrectly wiring third party devices and warranty may not cover resulting damage from incorrectly wired third party devices.

6.10 Relay Connections

The SCC has two dry contact relays that are designed to operate fan starters or coils to control equipment that draws no more than 5 amps start-up and /or operational current.

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.

The system relays are SPDT (single pole, double throw) thereby providing one set of usable dry contacts for each relay. Because the SCC series systems are designed to be fail-safe, any equipment to be controlled by the system relays should be wired to the "NC" (Normally closed) and "COM" (Common) terminals. **The relay coils are normally energized in non-alarm state for failsafe operation.**

7 OPERATION

7.1 System Operation

The SCC continuously monitors gas concentrations on the configured channels. In the event of a gas build up in excess of the level set for ALARM 1, RELAY 1 will be triggered and the front LED for the appropriate channel will change from GREEN to AMBER. If an ON DELAY has been set, the LED will change colour and blink but the relay will remain unchanged until the time delay has expired, at which time the relay will "trip" and the LED will change from flashing amber to solid amber. If the gas level falls below the set ALARM level before the delay has finished, the alarm will be cancelled and the delay will be reset for the next alarm.

Similarly, if the gas level builds up to a level in excess of the level set for ALARM 2, RELAY 2 will be triggered, and the LED for the appropriate channel will change from AMBER to RED. In addition to the above, ALARM 2 will also trigger the audible alarm, if enabled.

When the gas level drops below the appropriate alarm threshold the RELAYS and LEDS will return to the state of the next lowest alarm point. If an OFF delay has been set, the LED will remain in its current colour and the relay will stay tripped for the duration of the relay OFF delay.

The current gas level can be monitored at any time during normal operation by using a volt meter connected to test pins TP1 and TP2. These pins will show a voltage from 0 - 4 V indicating the current gas level read by the channel selected using the channel select jumpers on JP3. To relate the voltage to a gas level reading refer to Section 7.5 or use the following equation:

[Voltage Reading / 4 V] x [Sensor Full Scale Range] = Gas Reading

or

[Gas Reading / Sensor Full Scale Range] x [4 V] = Voltage Reading

Example: For a CO sensor with a full scale range of 200 ppm and a test point voltage reading of 0.8 volts, the gas level would be [0.8 V / 4 V] x [200 ppm] = 40 ppm.

Upon application of power the power LED will turn solid on and the channel LED for each installed channel will blink Green. All alarms are disabled for two minutes for a system warm up period. After the warm up period, the system may exhibit gas alarm condition(s) if one or both of the sensors has not completely stabilized during the warm up period. This is normal and the length of time the gas alarms exist is dependent upon the length of time since the unit was last powered up and the state of the environment it is installed in. After warm up, only the green power LED and the green channel LED for each installed channel illuminate indicating normal operation and the relays are energized indicating normal "Fail-safe" NO ALARM status.

7.2 Test Functions

To enter test mode move the jumper on JP3 from IDLE to TEST. When in test mode the buzzer will beep three times (if jumper enabled on JP4) and the test points will output 4 volts. The external LEDs will cycle to test their function, watch for both red and green on the channel LEDs if damage is suspected. To test Relay 1, turn the Rotary Encoder E1 clockwise in a slow and controlled manner until the test points output 3 volts and Relay 1 produces an audible click (de-energizing) with its corresponding internal LED turning off. To test Relay 2, turn the Rotary Encoder E1 counter clockwise in a slow and controlled manner until the test points output 2 volts and the relay produces an audible click (de-energizing) with its internal LED turning off.
Test mode will exit after 5 minutes of no activity or once the jumper is removed from the test position. Upon exit the unit will return to standard measurement mode. The SCC cannot enter test mode if an alarm level is detected on either channel.

NOTE: Relay ON delays do NOT apply in test mode, however Relay OFF delays will apply when test mode times out or the jumper is removed if the relays were tested (tripped) they will remain so after test mode for the duration of their respective OFF delay.

7.3 Internal Audible Alarm Operation

The SCC contains an audible alarm linked to the second alarm point for each installed channel. The buzzer will sound once the gas for a specific channel passes the second set point (Channel LED shows red). If the configurable buzzer on delay has been set the delay will begin counting down the moment the set point is reached. If the gas level drops below the set point before the delay completes the buzzer will not sound. The buzzer can be enabled and disabled using the jumper on JP4. The buzzer is enabled by default.

7.4 Jumpers

There are three single jumper positions (JP1, JP2 and JP4) and one bank of 12 jumpers (JP3).

The first single jumper position JP1 located at the top right corner of the board sets the voltage (5 V / 24 V) used to power a remote sensor. JP2 located directly below JP1 sets whether or not a voltage or current loop signal is received from the ESH-A remote sensor or remote analog LPT transmitter. The last single jumper position JP4 is located near the top left of the board and is used to enable / disable the internal audible alarm buzzer.

The jumper bank JP3 provides the ability to monitor and configure a wide range of values. In order to set these values you will need a 10mV resolution Voltmeter. Clip the voltmeter leads to the test points TP1 and TP2. To start a configuration, place one jumper on the channel / relay select position CH1 Relay1 or CH2 Relay 2 and place the other jumper on the function position you want to configure:

POSITION NAME	FUNCTION
TEST	Puts the unit into test mode (see Section *7.2 Test Functions*)
SET BUZ ON DELAY	Configure internal audible alarm ON delay
SET RLY OFF DELAY	Configure selected Relay OFF delay
SET RLY ON DELAY	Configure selected Relay ON delay
SET ALARM 2	Set selected channel alarm 2 level
SET ALARM 1	Set selected channel alarm 1 level
OVERRIDE	Used during calibration to override a zero or span value that is out nominal range
CALIBRATE	Begin the calibration procedure
SET CAL GAS	Adjust the gas concentration used in calibration
IDLE	Jumper default position (no connection)
CH1 Relay 1	Select CH1 or Relay 1
CH2 Relay2	Select CH2 or Relay 2

To end a configuration and save the changes, move the jumper from the function position back to the IDLE position. The other jumper can remain on the channel / relay select position.

IMPORTANT: During normal operation, one jumper should rest in one of the channel / relay select positions (CH1 Relay1 or CH2 Relay 2) and the other should rest in the IDLE position.

Refer to Section *5.2 Interior System Layout for jumper locations.*

7.5 Adjusting Alarm Set Points

Equipment Required: Voltmeter 10 mV resolution

The SCC is configurable as a single or dual channel detector/controller and has two gas alarm set points for each channel. Almost all installations of the SCC will use the factory default alarm set points.

Default set points are as follows:

SENSOR / GAS	MEASURMENT RANGE	LOW ALARM (ALARM 1) SET VOLTAGE	HIGH ALARM SET VOLTAGE	
CO	0 - 200 ppm	25 ppm / 0.50 VDC	100 ppm / 2.00 VDC	default
NO_2	0 - 10 ppm	0.7 ppm / 0.28 VDC	1.5 ppm / 0.60 VDC	default
C_3H_8	0 - 100% LEL	10% LEL / 0.8 VDC	20% LEL / 1.60 VDC	default

NOTE: Alarm values for CH_4 and H_2 are the same as for C_3H_8.

To change an alarm point place one jumper on the CH1 Relay 1 or CH2 Relay 2 position (depending which channel you are configuring) and place the other jumper on either SET ALARM 1 or SET ALARM 2 depending on the alarm you wish to set. Once the jumpers are in position the test points TP1 and TP2 will show a voltage corresponding to the current alarm point. Turn Rotary Encoder E1 to increase or decrease the level. To save the setting return the jumper to the IDLE position.

The alarm points change in 1% FSR increments. That is for a CO sensor with a 200 ppm full scale reading each Rotary Encoder E1 click will change the alarm point by 2 ppm. Use the equation in Section *7.1 System Operation* to determine the correct voltage reading.

NOTE: Alarm 1 is "low alarm" and Alarm 2 is "high alarm" by default. The set points can be changed so that Alarm 1 is higher than Alarm 2. However, LED and relay behaviour will not change, i.e. once alarm point 2 is reached, Relay 2 will trip and the channel LED will show red, regardless of whether alarm point 1 has been reached.

7.6 Setting Relay ON / OFF Delays

The SCC comes with configurable ON and OFF delays for each relay. For a description of the operation of these delays see Section *7.1 System Operation* and Section *7.4 Jumpers*.

To set a delay first ensure the channel/relay select jumper is on the correct position for the relay to be configured. To set a delay, place one jumper on the CH1 Relay 1 or CH2 Relay 2 position (depending which channel you are configuring) and place the other jumper on either SET RLY ON DELAY or SET RLY OFF DELAY depending on the delay you wish to set. Once the jumpers are in position the test points TP1 and TP2 will output a voltage corresponding to the current time delay. The voltage is related to the delay using the following equation:

[Current Delay / Max Delay] x [4 V] = Test Point Voltage
or
[Test Point Voltage / 4 V] x [Max Delay] = Current Delay

Each relay can be configured with one ON Delay (maximum 20 minutes) and one OFF Delay (maximum 20 minutes). The factory default setting for both relays are 2 minute ON Delay and 5 minute OFF Delay .

Turn Rotary Encoder E1 to increase or decrease the desired delay. The Rotary Encoder E1 changes the delay time in 10 second increments. To save the changes, move the jumper on the SET RLY DELAY position back to IDLE.

7.7 Setting Buzzer ON Delay

To set the ON delay for the internal audible/buzzer place the IDLE jumper on SET BUZ ON DELAY on JP3. The test points will then output the current buzzer delay based on the equations described in Section *7.6 Setting Relay ON / OFF Delays*. The max delay for the buzzer is 15 minutes and the Rotary Encoder E1 increments it in 10 second steps. To save the setting return the jumper to the IDLE position.

NOTE: The buzzer delay is local to the buzzer and applies regardless of the channel causing the alarm.

8 CALIBRATION

8.1 Calibration Specifications

8.1.1 Gas

Calibration span gases should have at least ± 5% accuracy and have a current date stamp. Gas generators should have a current dated cell installed. Service personnel should flow zero emissions air or 20.9% volume O_2 (scrubbed of hydrocarbons) before attempting to null adjust toxic gas sensors. In some cases N_2 can be substituted for zero air. Contact CETCI for clarification.

Every SCC controller is calibrated in a chamber by true diffusion method prior to leaving our facility. This method more closely emulates actual “real world” conditions. Field calibration using gas cylinder, regulator and hose directing span gas into the sensor may result in slightly higher readings. It is important to note that the type of gas mixture, how old the gas is and what temperature it has been stored at will also affect repeatability during field calibration.

8.1.2 Regulators & Flow

Calibration gases that are lighter than or the same weight as air (ie. CO) should be flowed at 0.5 LPM. Gases heavier than air (NO_2, etc.) should be flowed between 0.5 and 1.0 LPM. Fixed flow regulators provide more accuracy.

8.1.3 Adapters

The proper calibration adapter should be utilized to allow the gas to properly diffuse around the sensor. They are available from CETCI under part number **CET-7000-CAP**.

8.1.4 Calibration Frequency

- Parking garage detectors: Once every 12 months
- OHS applications: Once every 6 months (OHS: Occupational Health & Safety)

8.1.5 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.

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.

Required Equipment: Calibration Kit, Calibration gases
Optional: Digital multi-meter

Users can order the Calibration Kit, calibration accessories and / or gases (shipping restrictions may apply) from any CETCI authorized distributor or they can supply their own gas and equipment as long as the gas meets the minimum specifications.

8.1.6 Non-Intrusive Calibration

In dirty or wet applications calibration can be initiated without opening the unit by using the magnetic sensors included within the SCC. A magnet of sufficient strength will be required to trip the sensors. This magnet is included in the calibration kit (reference *Section 9.4 Calibration Kit*) and can also be ordered separately from CETCI under part number **CET-MW**.

To initiate calibration touch the magnet to the mark on the enclosure door. Both marks should be slightly below and to either side of the sensor opening. The left position initiates calibration of channel 1, the right position initiates calibration of channel 2. Once calibration has begun follow the steps below while watching the channel LED on the front of the enclosure. To cancel calibration simply repeat the magnet touch used to initiate the process.

NOTE: Overrides cannot be done non-intrusively. If an override is required the enclosure door will need to be opened so the OVERRIDE jumper can be accessed.

8.2 Set the Span / Calibration Gas Level

The calibration procedure within the SCC controller is jumper automated (there are no potentiometers to adjust). To achieve calibration the user must first set the concentration for the span gas to be used.

To set the span/calibration gas level, you must first determine or calculate the voltage value required. This setting is done using the 4 volt test points TP1 and TP2, which will show a voltage reading from 0 - 4 volts. To relate the voltage reading to a gas level reading use the following equation:

[Test Point Voltage / 4 V] x [Sensor Full Scale Range] = Span Gas Concentration

or

[Span Gas Concentration / Sensor Full Scale Range] x [4 V] = Test Point Voltage

The range of 0 - 4.0 VDC is equal to the full measurement range of the sensor. For example: You have a CO sensor with a standard measurement range of 0 - 200 ppm. The full scale range would be 200 ppm and if the test point voltage reading is 0.8 volts, the gas level would be [0.8 V / 4 V] x [200 ppm] = 40 ppm.

Ensure the channel select jumper on JP3 is set to the desired channel and move the other jumper from idle to "SET CAL GAS". The current level of the calibration gas will be indicated by the voltage output on the test points TP1 and TP2. Use the Rotary Encoder E1 to set the cal gas level to match the gas to be used. Once the calibration gas level has been set move the jumper from SET CAL GAS to the IDLE position.

8.3 Calibrating the Internal Sensor

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 the manual instructions carefully.

NOTE: The spanning procedure can be cancelled by moving the jumper from the CALIBRATE position to the IDLE position before spanning is finished. The controller will return to normal operation (solid green light on the front, internal LED off).

To calibrate the SCC's internal sensor the user must do the following:

Step 1:
Set the calibration gas concentration. Ensure the channel select jumper on JP3 is set to the desired channel and move the other jumper from idle to "SET CAL GAS". The level of the calibration gas will be indicated by the voltage output on the test points TP1 and TP2 (see the equation in Section *8.2 Set the Span/Calibration Gas Level*). Use the Rotary Encoder E1 to set the cal gas level to match the gas to be used. Once the calibration gas level has been set move the jumper from SET CAL GAS to the IDLE position.

Step 2:
Attach the regulator to the cylinder of zero air, insert calibration adapter into the sensor opening on the front of the enclosure door (see Section *8.4.1 Calibration Adapter* if the adapter will not fit). Open the regulator valve fully allowing zero air to flow over sensor for at least one minute.

Step 3:
Move the jumper on JP3 from "IDLE" to "CALIBRATE". The internal status LED will turn solid red and the front channel LED will blink orange/green, indicating calibration has started.

Step 4:
Once successfully zeroed, the internal LED will blink repeatedly and then pause with the LED off and continue with this pattern of repeated blinks and then a long off. This indicates that it is time to flow the gas. If this LED pattern does not happen, refer to Section *8.4.2 LED Pattern During Zeroing (Override)*.

NOTE: The new zero value is saved at this point. If all that is required is a new zero calibration remove the jumper from "CALIBRATE" back to "IDLE" (see Section *8.4.3 Zero Shift*). If the digital multi-meter leads are attached to test points TP1 and TP2, the voltage should be 0.0 VDC (see Section *8.4.4 Incorrect Voltage* if voltage is 4.0 VDC).

Step 5:
Attach regulator to span gas cylinder. Start flowing gas over the sensor.

NOTE: If no gas is detected after one minute, the controller returns to normal operation and the procedure will need to be performed from Step 2.

Step 6:
Once gas flow is detected, the internal LED pattern will change to repeated blink s followed by a long on. The test point voltage will follow the level of gas detected based on the previous calibration (see Section *8.4.4 Incorrect Voltage* if voltage is 4.0 VDC).

NOTE: If the LED starts blinking short off, long on and OVERRIDE will be required (see Section *8.4.5 Tech Override*).

Step 7:
Once gas is detected, spanning takes 2 minutes. If the digital multi-meter leads are attached to test points TP-1 and TP-2, the measured voltage will start moving towards the voltage calculated for the span gas value.

NOTE: If calibration is canceled at this point, the previous span value will be used in conjunction with the new zero value. CETCI is not responsible for incorrect calibration due to zero effect.

Step 8:
If spanning has been successful, the internal LED will blink with a short on and a long off for 5 minutes (see Section *8.4.6 New Sensor Installed*).

Step 9:
When the calibration is complete the Span value is saved. If you do not want the SCC go into high alarm after the calibration procedure completed, the gas should be removed before the jumper is returned to the "IDLE" position. The SCC has a 5 minute timer that will clear the calibration and this timer can be used to hold off the alarm until the gas levels have return to normal. To exit calibration, remove the jumper from the CALIBRATE position and return it to the IDLE position.

8.4 Trouble Shooting Calibration

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

8.4.1 Calibration Adapter & Cal Clip

Use a slight twisting motion as you gently push the calibration adapter into the sensor opening. If the calibration adapter 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 to hold the hose in place during calibration p/n: **CET-SGC**.

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

8.4.2 LED Pattern During Zeroing (Override)

If the gas level (possible residual gas) is too high but still within override range, the internal LED will blink repeatedly and then pause with a long on. This indicates that an override is needed. To override, move the channel select jumper to the OVERRIDE position. If the jumper is not moved to the OVERRIDE position within 30 seconds, the zeroing will be cancelled and the device will return to normal mode. After using the OVERRIDE position, the jumper should be returned to the channel selection position (CH1 RELAY 1, CH2 RELAY 2). If outside of the OVERRIDE range, the Fault LED will blink repeatedly until either the calibration jumper is removed or the main calibration timer (5 min) times out. If the override is successful, go to Step 4.

8.4.3 Zero Shift

If all that is desired is to do a zero calibration shift, remove the jumper from the calibrate position once the unit has confirmed a successful zero. A zero shift calibration is only done when the SCC is being installed for the first time. The reason for zero shift calibration is to compensate for the new environment in which the SCC is being installed.

8.4.4 Incorrect Voltage

When finished the calibration process, if the SCC is reading 4.0 VDC (or not the expect voltage), then either the span / calibration gas level wasn't calculated properly, or the SCC has failed a previous calibration and cannot calculate the expected voltage, or there has been a fault that the SCC cannot correct for. A reading of 4.0 volts is a permenant fault. Even if the device is re-powered, the sensor will no longer function or be detecting gas. You must have a successful calibration to return the sensor to proper operation. The volt reading after a successful calibration should be 0.8 to 2 volts. If a successful calibration is not possible, the sensor needs to be replaced. If replacing the sensor does not correct the fault, please contact our Technical Service Department at help@cetci.com.

8.4.5 Tech Override

Once the readings have been taken, a 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 LED will flash (short off, long on). To override, move the channel select jumper to the OVERRIDE position. If the jumper is not moved to the OVERRIDE position within 30 seconds, the test point will output 4.0 V and will stay there until you move the jumper. During the override process, the voltage should move towards the reading related to your cal gas setting. If the voltage remains at 4.0 volts, refer to Section *8.4.4 Incorrect Voltage.* After using the

OVERRIDE position, the jumper should be returned to the channel select position (CH1 RELAY 1, CH2 RELAY 2).

If the sensitivity of the sensor is calculated out of range more than the OVERRIDE can compensate for, the internal LED will turn on solid, the front LED will turn off and the test points will output 4 V indicating the sensor cannot be calibrated. You can try to recalibrate, starting from Step 2, to confirm the procedure was followed correctly and this may correct the fault.

8.4.6 New Sensor Installed

During this 5 minute period if the jumper is not moved the unit can be told that a new sensor is being installed. This will set the reference sensitivity and original zero to those just calibrated. To indicate a new sensor installation turn the Rotary Encoder E1 counter clockwise 2 turns. The internal LED will turn solid to confirm new sensor values have been set.

NOTE: Only reset original sensor values when a new sensor is installed. This operation is NOT REVERSABLE. CETCI is not responsible for improper calibration or sensors that cannot be calibrated due to improper use of this function.

8.5 Calibrating a Second Internal Sensor

To calibrate a second internal sensor, if installed, follow the instructions in Section *8.3 Calibrating the Internal Sensor*. Make sure the channel select jumper is placed on the appropriate channel.

8.6 Calibrating a Remote LPT Transmitter

Calibration of a remote LPT transmitter should be done at the individual LPT transmitter. Make sure the channel select jumper is placed on the appropriate channel and follow the calibration procedure instructions in the LPT Operation Manual. Every device is shipped with its corresponding manual. An electronic copy of the manual can also be downloaded from https://www.critical-environment.com/support/technical-library/manuals

8.7 Calibrating an ESH-A Remote Sensor

There are two different processes for calibrating an ESH-A Remote Sensor. One process is for a new or replacement sensor and the other is for a properly functioning sensor. For either process, first ensure that the sensor has been continually powered for at least 24 hours.

8.7.1 Zero and Span Calibration of a Responsive ESH-A Remote Sensor (done at the SCC)

If the sensor does not need to be replaced and is responding correctly, the Zero and Span calibrations will need to be done at the controller or transmitter that the ESH-A is connected to. Make sure both the SCC and the ESH-A Remote Sensor are powered up and have warmed up for a 24 hour period prior to calibration. Place the channel select jumper on the SCC on the channel assigned to the ESH-A. Follow the instructions in *Section 8.3 Calibrating the Internal Sensor* **with the exception of applying the gas to the ESH-A sensor opening instead of the SCC sensor opening.**

8.7.2 Zero Calibration of a New or Replacement ESH-A Remote Sensor

If a new replacement sensor has been installed, the ESH-A will require a zero calibration of its sensor. This process will normally be required if the sensor has been replaced or there is concern that the sensor is not responding correctly.

Make sure the ESH-A Remote Sensor is powered up and has been warmed up for a 48 hour period prior to calibration.

1. Open the ESH-A Remote Sensor enclosure.
2. Move the jumpers from their resting position to JP1-1 and JP1-2 (bottom two jumper positions).
3. Apply the correct Null gas for the type of sensor installed, for a minimum of 2 minutes.
4. Attach a volt meter to TP1 and TP2.
5. Using the POT RN1 potentiometer (located on the left underside of the ESH-A board), adjust the voltage to read 0.40 VDC.
6. Verify that the voltage output from digital multi-meter leads attached to test points TP1 and TP2 on the SCC is reading 0.0 VDC. (a Zero and Span Calibration of the SCC will be required if this is not the case).
7. Return the jumpers to their original positions and close the ESH-A.
8. In the SCC, place the channel select jumper on the channel assigned to the ESH-A and follow the previously stated instructions for regular calibration outlined in Section *8.3 Calibrating the Internal Sensor* **with the exception that the gas should be applied to the ESH-A sensor opening instead of the SCC sensor opening.**

9 ACCESSORIES

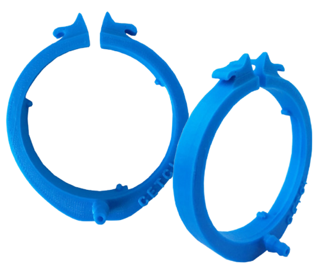
9.1 Splash Guard (Option: -S)

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

9.2 Calibration Adapter Clip "Cal Clip" (p/n: CET-SGC)

To calibrate an SCC with a factory installed splash guard (Option -S), attach the Cal Clip around the splash guard. The small barb hose fitting accommodates standard or Teflon tubing of 1/8" (3.175 mm) ID and 3/16" (4.762 mm) ID. The Cal Clip **must be removed during normal operation** or else the gas readings will not be accurate.



9.3 Magnetic Wand (p/n: CET-MW)

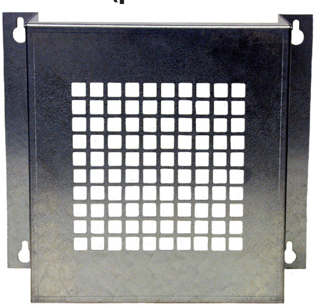
The magnetic wand is used for non-intrusive calibration, using the magnetic sensors on the front of the enclosure next to the sensor vent.

Lifts	½ lb solid steel
Size	2 5/8" X 1/4" Hexagon

9.4 Calibration Adapter Display (p/n: CDA)

A handheld, battery operated device with that attaches to the SCC to provide a multi-line display to use during calibration instead of having to use the built in method of reading/counting the LED blink patterns to determine the calibration steps. The slim design makes it easy to hold and a long cable allows for easy connection and operation. May be used to calibrate, bump test, set the ON/OFF Delays and set the alarm levels of the SCC.

9.5 Metal Protective Guard (p/n: SCS-8000-SPG)



The metal protective guard is made of heavy duty metal and helps to protect against abrasive damage, theft or vandalism to the transmitter. It is made from 16-gauge galvanized steel and has ½" (13 mm) 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	1.7 kg (3.8 lbs)
Size	254 mm W x 241 mm H x 121 mm D (10.0" W x 9.5" H x 4.8" D)

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

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

Calibration Kits and gases are available from the CETCI factory. Many gases, but not all are carried in inventory. Check with any CETCI authorized distributor for availability of specific gas types.

Gas cylinders cannot be shipped from Canada to other countries, including the USA.

10 MAINTENANCE

The SCC requires no assembly and virtually no maintenance other than regular calibration of the integral and/or remote sensors. 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. There are no serviceable elements other than the calibration instructions outlined in this manual. There are no replaceable components except the sensors.

The self-contained controller should be monitored for possible damaging conditions.

- The sensor vent 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 controller.
- If located in a working area, the front of the self-contained controller should be kept clear.
- If painting is to be conducted in the self-contained controller's location the controller needs to be protected from over spray and the sensor vent should not receive paint fumes – these fumes may damage and/or reduce the life of the sensor.

11 TROUBLE SHOOTING

SCC won't power up. (Outer LEDs off)
Is the power properly connected? Refer to *Section 6.7 and Section 6.8*. Check the connections.

The channel LED flashes red and the fault LED is ON
The SCC is in fault mode for the indicated channel. If re-calibrating the sensor fails it will need to be replaced. Depending on the sensor this can be done in the field or require a return to factory.

Outer LEDs flash four times then pauses
The SCC is in uninitialized mode. Return the SCC to factory.

SCC is constantly in alarm condition (Channel LED shows amber or red)
Sensor may be out of calibration, attempt to recalibrate. If calibration fails, contact support.

SCC Channel connected to a remote LPT transmitter constantly in alarm condition (Channel LED shows red)
JP2 may be removed or in the wrong position. For current loop applications JP2 should be set to I (Current).

Remote transmitter will not power up even though SCC is powered.
Check for short between V+, SNS and GND lines from SCC to remote transmitter.

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