Critical Environment Technologies™

Operation Manual

Rev. A | 2022.03

CXT2 Explosion Proof Transmitter

www.critical-environment.com

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1 POLICIES

1.1 Important Note

Read and understand this manual prior to using this instrument. Carefully read the warranty policy, service policy, notices, disclaimers and revisions on the following pages.

This product must be installed by a qualified electrician or 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 is designed to be intrinsically safe and can be used in classified hazardous areas (explosion-rated environments). It has a Temperature Code T4 and CSA Certification for Class 1, Div 1 and Class 1 Div 2 locations.

Class 1, Div, 1, Groups A, B, C, D; Class 1, Zone 1, Group IIC, T4
Class 1, Div, 2, Groups A, B, C, D; Class 1, Zone 2, Group IIC, T4

Models with electrochemical sensor types CL2, NH3 and NO2 are Class 1, Div 2 and come with a splash guard.

INSTRUMENT SERIAL NUMBER:

_____

PURCHASE DATE:

_____

PURCHASED FROM:

_____

1.2 Warranty Policy

- Disconnect power before servicing
- Supply: 24VDC

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

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

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

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

1.3 Service Policy

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

Repairs are warranted for 90 days after date of shipment (sensors have individual warranties). Should your instrument require non-warranty repair, you may contact the distributor from whom it was purchased or you may contact CETCI directly.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods, regardless of reason, must be accompanied with an RMA number. If the product is deemed repairable, for liability reasons, CETCI will perform all necessary repairs to restore the instrument to its full operating condition.

For our full Terms and Conditions of Sale and other policies, including RMA Request, please visit https://www.critical-environment.com/about/policies

1.4 Copyrights

1.5 Disclaimer

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

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 at the following address:

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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 CXT2 Explosion Proof Transmitter The CXT2 Explosion Proof transmitter is a single channel Transmitter that reliably and accurately monitors toxic, oxygen, combustible, VOC or CO_2 gas concentrations in classified hazardous areas. It can be connected to a controller (FCS), a control panel or a BAS / BMS / DDC system.

The colour, backlit LCD display changes with alarm status. Navigation through the menu is driven by a magnetic keypad and the user can change alarm set points, instrument configurations and enter into maintenance mode for non-intrusive calibration without opening the enclosure. The security menu allows entry of an authorization code to lock critical parameters.

It features non-volatile memory to store historical monitoring and calibration data and the real-time clock and calendar flag all alarm and calibration events. The CXT2 has the latest Smart Sensor technology and provides sensor life indications and smarter gas detection

with simplified solutions and easy calibration. An optional Arctic Heater for low temperature applications is available.

2.2 Features

- Single channel, internal or remote
- Remote sensor mount up to 4,000 ft. / 1,219 m
- Generation 2 smart sensors compatible for increased signal stability
- Reliable, accurate monitoring of toxic or combustible gases in potentially explosive or harsh environments
- 4 - 20 mA analog or Modbus® digital outputs
- 3 programmable relays rated for 5 amp at 30 VDC or 240 VAC (digital models)
- Large, color backlit LCD that changes with alarm status
- Sensor life indication
- Heated elements available for extremely low temperatures
- Menu driven magnetic keypad and non-intrusive calibration
- Displays values in bar graphs or 30 minute onboard data trends
- Security menu with authorization code access to lock critical parameter

2.3 Safety Information

READ BEFORE INSTALLATION AND APPLYING POWER.

The following symbols are used in this manual to alert the user of important instrument operating issues:

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions.

This symbol is intended to alert the user to the presence of dangerous voltage within the instrument enclosure that may be sufficient magnitude to constitute a risk of electric shock.

WARNINGS:

WARNING: EXPLOSION HAZARD - DO NOT REPLACE FUSE UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

WARNING: EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

Use a properly rated CERTIFIED AC power (mains) cable installed as per local or national codes.

A certified AC power (mains) disconnect or circuit breaker should be mounted near the controller and installed following applicable local and national codes. If a switch is used instead of a circuit breaker, a properly rate CERTIFIED fuse or current limiter is required to be installed as per local or national codes. Markings for positions of the switch or breaker should state (I) for on and (O) for off.

Clean only with a damp cloth without solvents.

Equipment not used as prescribed within this manual may impair overall safety.

3 INSTRUMENT SPECIFICATIONS

3.1 Technical Specifications

GAS TYPE	
Electrochemical	Ammonia (NH_3), Carbon Monoxide (CO), Chlorine (Cl_2) Hydrogen (H_2), Hydrogen Sulphide (H_2S), Nitrogen Dioxide (NO_2), Oxygen (O_2), Sulphur Dioxide (SO_2)
Infrared	Carbon Dioxide (CO_2), Butane (C_4H_{10}), Ethanol or Dimethyl Ether (C_2H_6O), Hexane (C_6H_{14}), Methane (CH_4), Propane (C_3H_8), Propylene (C_3H_6), Toluene (C_7H_8)
Catalytic Bead	Acetylene (C_2H_2), Butane (C_4H_{10}), Ethanol or Dimethyl Ether (C_2H_6O), Ethylene (C_2H_4), Hydrogen (H_2), Heptane (C_7H_{16}), Isopropy Alcohol (C_3H_8O), Methane (CH_4), Propane (C_3H_8), Pentane (C_5H_{12})
Remote Sensor	Catalytic Methane (CH_4), Propane (C_3H_8)
PID	VOCs

MECHANICAL	
Enclosure	Aluminum with epoxy paint
Size	12.7 x 20.3 x 12.83 cm / 5 x 8.0 x 5.05 in
Weight	3 kg / 6.5 lbs

ELECTRICAL	
Power Requirement	10 - 30 VDC, 250 mA @ 24 VDC, <6.5 watts with relay board (all relays energized)
Wiring	Digital: 4-conductor, 12 AWG stranded, shielded network wiring (daisy-chain) Analog: 3-conductor, 16 AWG stranded, shielded
Wire Guage	Digital 4-conductor 2 x 12 AWG + 2 X 24 AWG (Belden 9841 or equivalent)

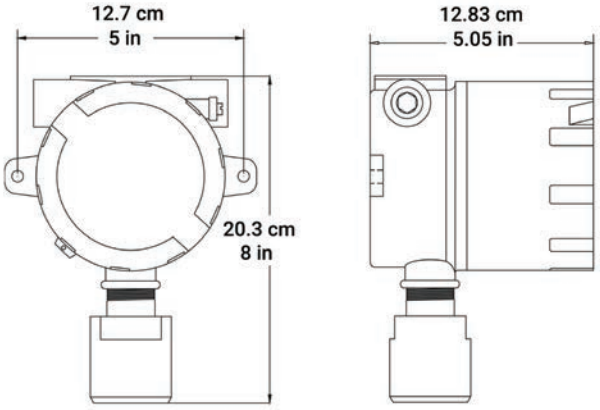
INPUT / OUTPUT	
Outputs	Analog - 4-20 mA (3-wire 4-20 mA current source 750 ohms max with nominal 24VDC power supply) Digital - Modbus® RS-485 master/slave ports
Relays	Three programmable Form C (SPDT) relays rated for 5 amp at 30 VDC or 240 VAC resistive alarm relays (digital models)

USER INTERFACE	
Display	5.4 x 3.1 cm / 2.1 x 1.2 in 64 x 128 pixel LCD graphic display for gas readings, 30 minute trend, bar graphs, engineering units, and RGB colour backlight for alarm status
Security Mode	Locks out critical parameters, offers password protection
Calibration	Non-intrusive calibration
Magnetic Wand	For operation and menu navigation

ENVIRONMENTAL (sensor dependant)	
Operating Temperature	-40°C to 60°C (-40°F to 140°F)
Operating Humidity	0 - 95% RH for IR sensors 0 - 85% non-condensing for electrochemical sensors

CERTIFICATION
Class 1, Div, 1, Groups A, B, C, D; Class 1, Zone 1, Group IIC, T4 Class 1, Div, 2, Groups A, B, C, D; Class 1, Zone 2, Group IIC, T4

3.2 Enclosure Dimensions



4 SENSOR SPECIFICATIONS

Single Channel Analog Transmitter	Internal Electrochemical Sensor	Single Channel Modbus Transmitter
CXT2-A-NH3-S	Ammonia (NH_3) sensor (0 - 500 ppm)	**CXT2-D-NH3-S**
CXT2-A-CO	Carbon monoxide (CO) sensor (0 - 1,000 ppm)	**CXT2-D-CO**
CXT2-A-CL2-S	Chlorine (Cl_2) sensor (0 - 10 ppm)	**CXT2-D-CL2-S**
CXT2-A-H2	Hydrogen (H_2) sensor (0 - 2,000 ppm)	**CXT2-D-H2**
CXT2-A-H2S	Hydrogen sulphide (H_2S) sensor (0 - 500 ppm)	**CXT2-D-H2S**
CXT2-A-NO2-S	Nitrogen dioxide (NO_2) sensor (0 - 99.9 ppm)	**CXT2-D-NO2-S**
CXT2-A-O2	Oxygen (O_2) sensor (0 - 25% volume)	**CXT2-D-O2**
CXT2-A-SO2	Sulphur dioxide (SO_2) sensor (0 - 99.9 ppm)	**CXT2-D-SO2**
	Internal Infrared Sensor	
CXT2-A-IC4H10	Butane (C_4H_{10}) sensor (0 - 100% LEL)	**CXT2-D-IC4H10**
CXT2-A-ICO2	Carbon dioxide (CO_2) sensor (0 - 5% volume)	**CXT2-D-ICO2**
CXT2-A-IC2H6	Ethane (C_2H_6) sensor (0 - 100% LEL)	**CXT2-D-IC2H6**
CXT2-A-IC2H6O	Ethanol or Dimethyl Ether (C_2H_6O) sensor (0 - 100% LEL)	**CXT2-D-IC2H6O**
CXT2-A-IC6H14	Hexane (C_6H_{14}) sensor (0 - 100% LEL)	**CXT2-D-IC6H14**
CXT2-A-ICH4	Methane (CH_4) sensor (0 - 100% LEL)	**CXT2-D-ICH4**
CXT2-A-IC8H18	Octane (C_8H_{18}) sensor (0 - 100% LEL)	**CXT2-D-IC8H18**
CXT2-A-IC3H6	Propylene (C_3H_6) sensor (0 - 100% LEL)	**CXT2-D-IC3H6**
CXT-2A-IC3H8	Propane (C_3H_8) sensor (0 - 100% LEL)	**CXT2-D-IC3H8**
CXT2-A-IC7H8	Toluene (C_7H_8) sensor (0 - 100% LEL)	**CXT2-D-IC7H8**
CXT2-A-IDFV-S	Diesel Fuel Vapours sensor (0 - 100% LEL)	**CXT-D-IDFV-S**
	Internal Catalytic Sensor	
CXT2-A-CC3H6O	Acetone (C_3H_6O) sensor (0 - 100% LEL)	**CXT2-D-CC3H6O**
CXT2-A-CC2H2	Acetylene (C_2H_2) sensor (0 - 100% LEL)	**CXT2-D-CC2H2**
CXT2-A-CC4H10	Butane (C_4H_{10}) sensor (0 - 100% LEL)	**CXT2-D-CC4H10**
CXT2-A-CC2H6O	Ethanol or Dimethyl Ether (C_2H_6O) sensor (0 - 100% LEL)	**CXT2-D-CC2H6O**
CXT2-A-CC2H4	Ethylene (C_2H_4) sensor (0 - 100% LEL)	**CXT2-D-CC2H4**
CXT2-A-CC7H16	Heptane (C_7H_{16}) sensor (0 - 100% LEL)	**CXT2-D-CC7H16**
CXT2-A-CH2	Hydrogen (H_2) sensor (0 - 100% LEL)	**CXT2-D-CH2**
CXT2-A-CC3H8O	Isopropyl alcohol (C_3H_8O) sensor (0 - 100% LEL)	**CXT2-D-CC3H8O**
CXT2-A-CCH4	Methane (CH_4) sensor (0 - 100% LEL)	**CXT2-D-CCH4**
CXT2-A-CCH4O	Methanol (CH_4O) sensor (0 - 100% LEL)	**CXT2-D-CCH4O**
CXT2-A-CC3H8	Propane (C_3H_8) sensor (0 - 100% LEL)	**CXT2-D-CC3H8**
CXT2-A-CC5H12	Pentane (C_5H_{12}) sensor (0 - 100% LEL)	**CXT2-D-CC5H12**

	Internal PID Sensor	
CXT2-A-PID	PID gas sensor (specify target gas and range at time of order)	**CXT2-D-PID**
	Remote Catalytic Sensor	
CXT2-A-R-CH2	Hydrogen (H_2) sensor (0 - 100% LEL)	**CXT2-D-R-CH2**
CXT2-A-R-CCH4	Methane (CH_4) sensor (0 - 100% LEL)	**CXT2-D-R-CCH4**

5 INSTALLATION INSTRUCTIONS

Upon power-up, the sensor in the CXT2 should be left to warm up for 24 hours prior to considering the gas readings to be accurate. Ammonia and Oxygen sensors should be left to warm up for 48 hours.

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

5.1 Sensor Location

Factors such as air movement, gas density in relation to air, emission sources and environmental variables affect correct sensor location. Air movement by fans, prevailing winds and convection should be carefully evaluated to determine if a leak is more likely to raise gas levels in certain areas within the facility. Vapor density of a gas determines if it will rise or fall in air when there are no significant currents. Lighter than air gases should have the monitors mounted 12 - 18 inches (30 - 45 centimeters) above the potential gas leak and heavier than air gases should be the same distance below the point of leakage. Even though the CXT2 is designed for rugged service, sensors should be protected from water, snow, shock, vibration, and dirt.

5.2 Mounting the Enclosure

After you have determined the appropriate location for the CXT2, install the detector to a wall or bracket using the predrilled mounting flanges with I.D. 0.25 on 5 in / 12.7 cm centers. If conduit is rigid and able to support the weight of the universal detector, the mounting bolts may be omitted.

Modular design simplifies the installation of the CXT2. A top Display Assembly is mounted with captive thumbscrews and is easily removed to access field-wiring terminals. An optional Alarms/Modbus board mounts piggyback to the back of the Display Assembly. The enclosure is equipped with two threaded, ¾" NPT conduit fitting outlet and pre-drilled mounting flanges.

WARNING: Qualified personnel should perform the installation according to applicable electrical codes, regulations and safety standards. Insure that correct cabling and seal fitting practices are implemented.

WARNING: The sensor should never be installed pointing upwards.

5.3 Mounting Heights (Sensor Dependent)

The sensor mounting height depends on the density of the gas relative to air. Heavier than air gases should be detected 6 in / 15 cm from the floor, lighter than air gas sensors should be placed on or near the ceiling, and gases which have a density close to that of air should have sensors installed in the "breathing zone" 4 - 6 ft / 1.2 - 1.8 m from the floor. The breathing zone refers to the area 4 - 6 ft / 1.2 - 1.8 m from the floor, where most human breathing takes place. This is a good default location for sensors, as many gases are often well dispersed in air.

5.4 Transmission Range: 4 - 20 mA Signals

The distance 4 - 20 mA signals can travel is dependent upon several factors including the cable gauge, DC power supply voltage level and input impedance of the receiving device.

NOTE: CXT2 transmitters have 4 - 20 mA input resistance of 100 ohms.

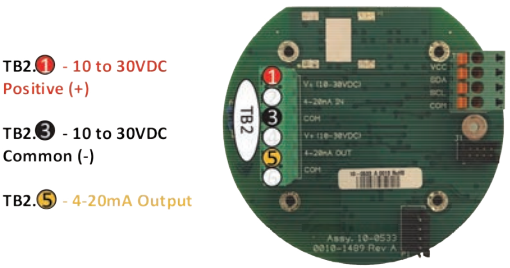
5.5 System Grounding

Direct grounding of the CXT2 enclosure via a good electrical connection to a well designed grounding system is essential. This will protect the system, reduce the damage that can occur during lightning strikes and reduce noise.

5.6 3-Wire 4 - 20 mA Mode Installation

Modular design simplifies the installation of the CXT2 Transmitter. A top display assembly is mounted with captive thumbscrews and is easily removed to access field-wiring terminals. Option boards mount to the back of the display assembly, and power, input and output wires mount to the power supply board.

The CXT2 is 10-30VDC powered and has a dedicated 4-20mA output terminal. Connect the 10-30VDC Positive wire to terminal TB2.1. Connect the 10-30VDC Negative (Common) wire to terminal TB2.3. Connect the 4-20mA signal wire to terminal TB2.5 on the I/O Board.



5.7 RS-485 Modbus® Board Wiring

This board is required in the digital CXT2-D gas detectors.

The RS-485 board adds a single Modbus master port and a single Modbus slave port.
For the Modbus master port, connect your Modbus communication wires to terminals TB1.A and TB1.B, and connect your shield wire to TB1.SHLD.

For the Modbus slave port, connect your Modbus communication wires to terminals TB2.A and TB2.B, and connect your shield wire to TB2.SHLD.

Note that there are two sets of terminals labeled TB2.A and TB2. B. This allows you to connect multiple CXT2 gas detectors in series. Each CXT2 represents an RS-485 slave and must have a unique Remote ID address (slave address). It is also important to note that wiring should be daisy chained as opposed to a star pattern for reliable operation. The manufacturer recommends using shielded twisted pair cable such as Belden 3106A.

TB1 – RS485 Modbus Master Port

TB2 – RS485 Modbus Slave Port

5.8 Relay Board Wiring

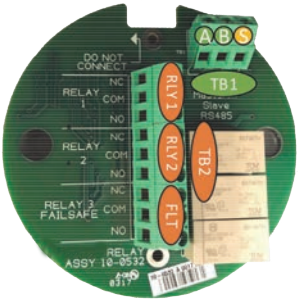
The CXT2 relay board includes three programmable relays and a single programmable RS-485 Modbus master or slave port. The relay labeled "FAILSAFE" is set up as a failsafe Fault relay by default but can be configured as a programmable relay in the Relay Settings menu. It is possible to use only the relays, only Modbus or both.

The relay terminals are labeled NO (Normally Open), NC (Normally Closed) or C (Common, or pole). These designators correspond to the shelf, or de-energized, state of the relays. When a relay is in Failsafe mode, it is energized when the alarm condition is not met, and therefore its action is reverse of the designators.

For the RS-485 Modbus master/slave port, connect your Modbus communication wires to terminals TB1.A and TB1.B, and connect your shield wire to TB1.SHLD.

TB1 – RS485 Modbus Master/ Slave Port

TB2 – Relay Terminals



5.9 Remote Sensor Installation

The CXT2-A-R and CXT2-D-R requires the device to be equipped with a relay board or an RS-485 Modbus® board. The remote sensor board communicates to the CXT2 by utilizing one of the RS-485 communication ports located on either of those boards.

A remote sensor can be mounted up to 4,000 ft / 1,219 m away from the CXT2 transmitter.

Make sure the CXT2 and remote sensor are powered off. Remove the lid of each device.

Refer to the diagram on the next page and complete the following steps:

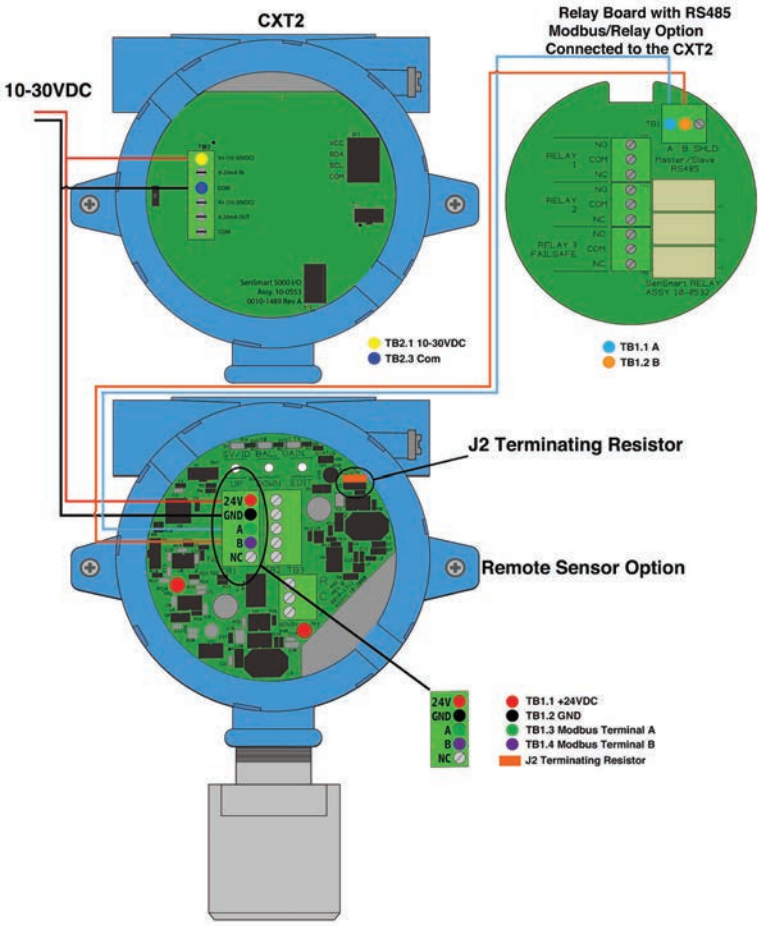
Step 1
Connect (24V) TB.1.1 on the Remote sensor board to the10-30VDC power supply on the CXT2 I/O board (TB2.1). (Either double up wires on TB2.1 or connect to the shared power supply (TB2.1).

Step2
Connect 10-30VDC Ground (GND) (TB1.2) wires to power terminal COM (TB2.2).

Step3
Connect 10-30VDC Ground (GND) (TB1.2) wires to power terminal COM (TB2.3).

Step 4
Connect Modbus Terminal A (TB1.3) from the remote sensor board to terminal A1 on the Relay Board (TB1.1).

Step 5
Connect Modbus Terminal B (TB1.4) from the remote sensor board to terminal B1 on the Relay Board (TB1.2).



5.9.1 Remote Sensor Configuration

When configuring the remote sensor ensure both the CXT2 transmitter and the remote sensor device are easily accessible, as some steps require actions to be performed in a timely manner.

On the CXT2 transmitter:

1. Swipe Edit on the transmitter using a magnet
2. Swipe Down until Comm Settings is highlighted
3. Swipe Edit to enter the Comm Settings menu
4. Swipe Edit to enter the Comm 1 Settings menu
5. Swipe Edit until display shows Remote Sensor

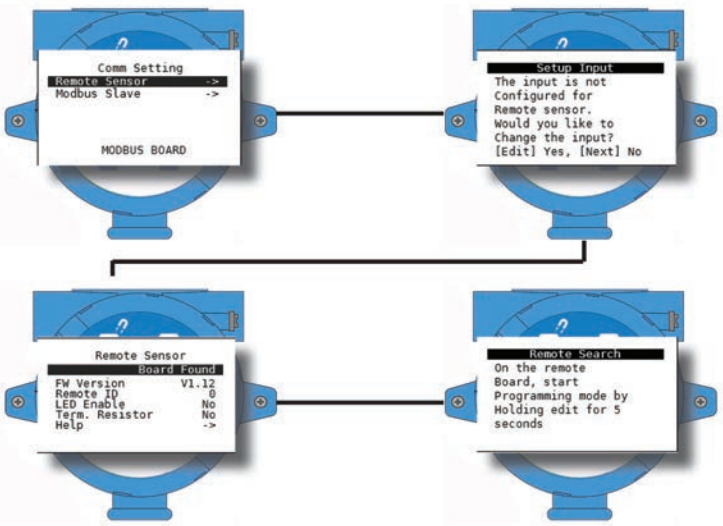
6. Swipe Down to highlight Board Setup
7. Swipe Edit to enter Search mode

On the remote sensor:

1. Hold Edit Button on 10-2080 Remote Sensor Board
2. until the Board Setup Menu is displayed on the transmitter
3. LED will fade in and out on the remote board.

On the CXT Transmitter:

1. Highlight Set Remote ID on transmitter
2. Swipe Edit to Set Remote ID
3. Swipe Edit to save Remote ID settings
4. Highlight Exit Program Mode
5. Swipe Edit to exit program mode



To finalize the process, replace the display, tighten thumb screws and replace the enclosure lid. Apply power to unit and observe power up screen. After the warm up period, observe gas type and gas concentration on screen. Using the magnet wand, swipe Down Key on the display. Follow on-screen prompts to perform calibration. Refer to Section 8 Calibration for more information.

5.10 Sensor Installation and Replacement

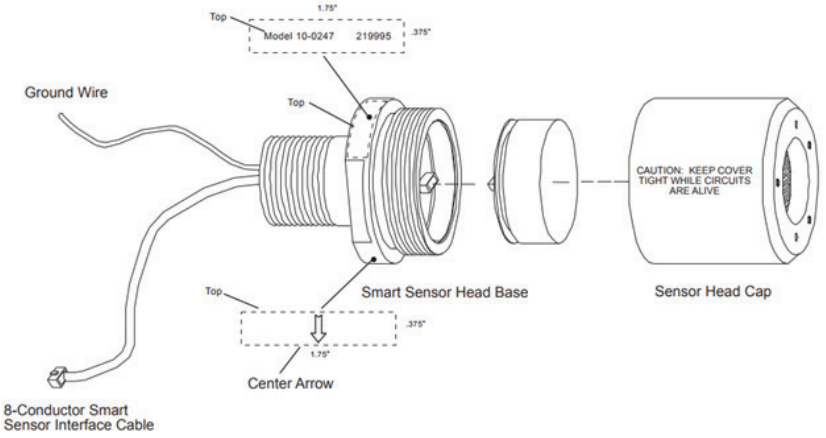
The CXT2 uses Gen II Smart Sensors. These sensors come factory installed and provide our highest level of performance with increased accuracy and signal to noise ratio. The 8-conductor Smart Sensor interface connector attaches to the J1 connector on the base board, and the detector detects the type of sensor automatically. This makes it easier than

ever to switch from any of our electrochemical Smart Sensors to any of our bridge (infrared, catalytic bead and PID) Smart Sensors without having to reconfigure wiring.

Prior to performing sensor replacement ensure the area has been declassified.

When a sensor has reached its end of life, it is necessary to replace the sensor. To install a new sensor, remove the sensor head cap, remove the old sensor assembly and align the alignment arrows on the new sensor assembly with the sensor head body. Press the sensor assembly toward the sensor head body until it has fully seated in the connector. The sensor board should be flush with the edge of the sensor head body when fully seated. Reinstall the sensor head cap and follow the on-screen prompts to upload the sensor settings into the gas detector.

IMPORTANT: Sensor assembly must be **fully inserted** into the sensor head body when tightening the sensor head cap. Failure to do so could result in damage to the sensor and/or the sensor head body.

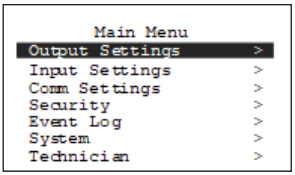


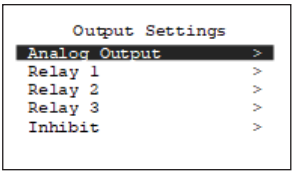
6 MENU NAVIGATION

All CXT2 configuration variables are stored in its menu database. Many menu items will contain default values from the factory and require changes to better match a user's particular application. CXT2 menus may be configured from the magnetic keypad.

6.1 Output Settings / Alarm Outputs

The Alarm Outputs Menu is accessed via the Main Menu, and is used to configure the mapping of the three programmable relays to the alarm setpoints, and relay configuration items such as Acknowledge, Failsafe and Override.



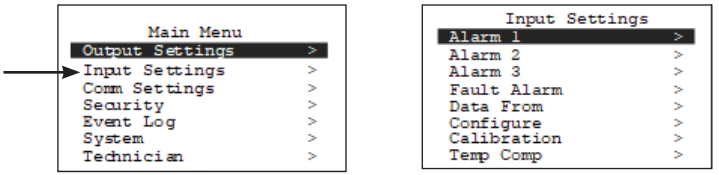


Menu Item	Setting and Description
Analog Output	**Fault mA** Allows the user to configure the mA output when the detector is in the Fault condition. This is useful to indicate a fault condition on the connected control device. **Cal mA** Allows the user to configure the mA output when the detector is in Cal Mode. This is useful to indicate a calibration condition on the connected control device.
Relay 1, 2, 3	**Source** The Source setting can be set to Alarm 1, Alarm 2, Alarm 3, Fault, Cal Mode, Cal Zero, Cal Span or Disabled. This setting determines which condition must be met in order for the relay to actuate. **Failsafe** When set to Yes, Failsafe means the relay de-energizes during alarm and energizes with no alarm. This is useful for signaling an alarm on a loss of power. The dedicated Fault relay is always Failsafe. **Acknowledge** When set to Yes, Acknowledge means the UP/RESET key will set the relay to its normal state even if the alarm condition still exists. This can be useful for silencing audible devices driven from the relay. **Refresh** When enabled, this feature refreshes the relay for acknowledged alarms if the indicated time elapses and the alarm condition still exists. **State** Indicates the current state of the relay.

Inhibit	**Fault mA** The inhibit feature allows the user to inhibit outputs during a designated time period. Once the timer has been started all outputs will be blocked until the time has expired. **Start Inhibit** Starts the inhibit timer **Stop Inhibit** Stops the inhibit timer **Timer (s)** Indicates the time remaining on the inhibit timer in seconds

6.2 Input Settings

The Input Settings Menu provides access to user configurable input parameters. This includes Alarm settings for all three alarms, access to the data from menus (where you can adjust sensor settings for various types of sensors including sensor voltage for bridge type sensors), input configuration settings including tag name, engineering units and inCal mA, calibration span value, and the Temperature compensation table.



Menu Item	Setting and Description
Setpoint (Alarm 1, 2, 3 and Fault)	Setpoint enters the engineering unit value where the alarm will trip. It may be negative, and trip when monitored values fall out of range in this direction.
Latching (Alarm 1, 2, 3)	Setting Latching to YES causes the alarm to remain active even after the condition is gone, and to reset only when the UP/RESET key is swiped from a data display.
Trip (Alarm 1, 2, 3)	Set Trip to HIGH to have the alarm trip when the value goes above the setpoint. Set to LOW to trip when the value falls below the setpoint.
On Delay (sec) (Alarm 1, 2, 3)	On Delay allows entering a maximum 10 second delay before this alarm becomes active. This is useful for preventing spurious alarms by brief spikes beyond the alarm setpoint.
Off Delay (min) (Alarm 1, 2, 3)	Off Delay allows entering a maximum 120-minute delay before clearing an alarm after the alarm condition is gone. This is useful for continuing an alarm function, such as operation of an exhaust fan, for a period of time after the alarm condition clears.

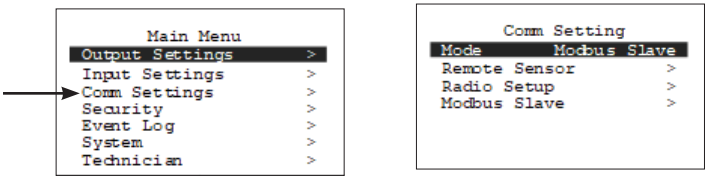
Deadband % (Alarm 1, 2, 3)	Deadband allows forcing low values to continue to read zero. This is useful when there are small amounts of background gases that cause fluctuating readouts above zero. The highest amount of Deadband allowed is 5%.
Color (Alarm 2, 3)	Selecting Color changes the color associated with the particular alarm. Options are Red, Blue, Purple and Orange.
Enabled (Alarm 3)	Set to YES to enable Alarm 3 and NO to disable.
Data From (certain menu items only show up depending on the input type)	Source determines the type of sensor installed in the detector. E.g. bridge, electrochemical, etc. Remote Sensor set to Yes indicates that the sensor is installed remotely with Remote sensor option. Min and Max Raw set the range of the input to the A/D converter. Normally set to 800/4000. Useful when the sensor's output doesn't provide a full range signal. Remote ID is where the Modbus slave's ID number is entered. Alias is the register number which defines the location of the variable representing the input value of the Modbus data received through the communication ports. Interface assigns which communication port the Modbus slave is connected to and the detector will get its data from. Filter (second) sets the number of seconds over which samples are averaged. Byte Order determines WORD and BYTE alignment of data at the remote Modbus transmitter when sending this 4-byte IEEE floating point values. Polarity determines the polarity of the sensor. Heater Enabled determines if the sensor heater is turned on or off. Heat (degC) is the thermostat setting of the sensor. Set Voltage set's the voltage being supplied to bridge type sensors.

	Set Balance adjusts the balance of a catalytic bead sensor and must only be adjusted with ZERO gas on the sensor. Set PGA is the adjustment that matches the input signal range to the detectors input signal conditioning circuits. Marker used to detect special modes of operation from analog inputs, which some monitors use to indicate special modes of operation, such as calibration mode.
Configure	Tag is a 16-character ASCII field typically used to describe the monitored point by user tag number or other familiar terminology. E. Units or engineering units may have up to 10 ASCII characters, and is usually factory configured based on sensor type. Zero defines the reading to be displayed when the output is 4mA (0%) Span defines the reading to be displayed when 20mA (100%) is the output. Decimal Points sets the resolution of the displayed reading, and may best to zero, one or two. Block Negative blocks negative values from being display (Displays 0). Deadband (%) allows forcing low values to continue to read zero. This is useful when there are small amounts of background gases that cause fluctuating readouts above zero. The highest amount of Deadband allowed is 5%. Note: Deadband affects all outputs as well as the local reading. Warmup (m) defines the time allotted for sensor warmup. During this time output s will be held at a zero value and relays will stay in their normal state. Cal Purge (m) determines the amount of time the transmitter will stay in calibration mode after calibration is complete as the sensor returns to normal state.

Calibration	Zero Setpoint is set to the zero value. Span Setpoint is set to the calibration gas value, typically 50% of full scale. Cal Gain reflects the change made when calibrating. Gain Offset reflects the change made when calibrating. Gain Unity is to reset the Gain and Offset back to default (1 and 0 respectively) Calibrate is used to calibrate sensors. Temp Comp allows the user to adjust the gain and offset that is applied to sensors to compensate for temperature drift. Factory supplied sensors are preprogrammed with these values which are automatically uploaded from the Smart Sensor.

6.3 Com Settings

The Com Settings Menu provides access to the settings for the Modbus configuration, when installed.

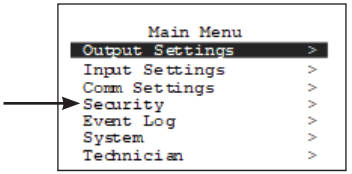


Menu Item	Setting and Description
Mode	Determines the mode of operation for the communication port.
Remote Sensor	Set Remote ID is where the Modbus slave's ID number is entered. LED Enable is to enable the serial communication LED. Term. Resistor is to enable the terminating resistor.

Radio Setup	Network is where the network is selected from A-Z. System ID is to assign the device a unique ID Hop Channel is set to match the server's Hop Channel Mode is for switching between WaveCast and Legacy mode. Power is the level of power for communicating with the selection of 10mW, 100mW, 200mW, 1W. Hand Shaking Wakeup is the amount of time set between normal transmitting TX Retries is the amount of times the transmitter will try to transmit after failing to TX Config is how often the transmitter will send the config information packet to the server Protocol is for picking between the WaveCast and Legacy network protocol
Modbus Slave (when installed)	Baud Rate allows users to set the data rate of the communication port. The options include 9600, 19200, 38400, 57600 and 115200. Parity is a bit that is added to ensure that the number of bits with the value "1" in a set of bits is even or odd. Parity bits are used as the simplest form of error detecting within code. The default is None. Remote ID is where the Modbus slave's ID number is entered. Byte Order determines WORD and BYTE alignment of data at the remote Modbus transmitter when sending this 4-byte IEEE floating point values. LED Enable enables the RX and TX LEDs to flash green on valid transmit and receive transmissions. For ports configured as master, the RX LED will flash red if there is a Comm Error or if an exception is received. Slave ports will cause the RX LED to flash red under the same conditions but can also cause the TX LED to flash red if an invalid function code is received or if the wrong register is given.

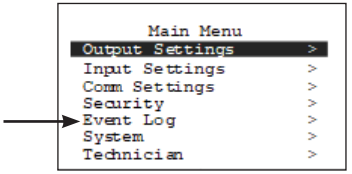
6.4 Security Menu

Allows the user to enter a passcode to restrict access to some settings



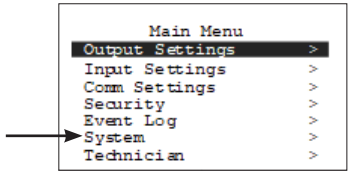
6.5 Event Log Menu

The Event Log allows the user to view a list of recent events logged in the transmitter, and to clear the log. Events are logged in a first in first out manner. A real time clock and calendar feature is included.



6.6 System Menu

User adjustable items which effect the entire gas detector, and are not specific to either channel.

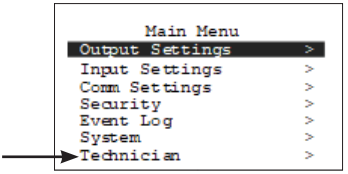


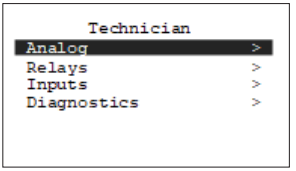
Menu Item	Setting and Description
Version	The version of firmware installed on the gas detector.
Name	The user defined name of the gas detector. Swipe edit to change.
Date	Current Date. Swipe edit to change.

Time	Current time on 24 hour clock. Swipe edit to change.
Set Contrast	This menu allows the user to adjust the display's contrast to make it lighter or darker

6.7 Technician Menu

The Technician Menu provides access to a variety of useful troubleshooting screens to view ADC reading, Discrete I/O, Current input, Sensor life and access to the diagnostics mode for testing analog outputs, relay function and LED operation.





Menu Item	Setting and Description
Analog	Selecting Analog displays the current output from the analog output terminals in mA.
Input	Displays the current input to the detector. Items displayed include input source, A/D counts, and display value.
Diagnostics	The Diagnostics Menu is entered by swiping the edit key, entering the technician's sequence (4 swipes of the UP key) and then swiping the edit key again. Analog Output The Analog Output Diagnostics Menu is useful for troubleshooting the wiring of the analog output terminals. While in the menu, swipe the up and down keys to raise and lower the output from 0mA to 24mA. LED Test Swiping Edit on the LED Test menu causes the two LEDs on the display to alternate on and off and change colors between red and green.

7 OPERATING INSTRUCTIONS

7.1 General Setup

Swiping a magnetic wand past the Edit key, from any of the Data Display screens, displays the Main Menu. The Up and Down keys maneuver the selection bar up and down and Edit selects the highlighted item to enter the sub-menus. All items with a sub-menu are indicated by a right facing arrow at the end of the line. To edit menu item values, swipe the Edit key, and use the Up and Down keys to edit the value. Once the desired value is entered, swipe the Edit key again to save the value. Swipe the Next key to reverse out of a sub-menu.

IMPORTANT: Some values require a Technician Sequence to be entered to change their values. This is to prevent the operator from inadvertently changing the values. When prompted to "Enter technician sequence:" simply swipe the Up key four times to unlock the value for editing.

After ensuring proper installation, apply power to the gas detector and verify the detector has begun startup.

NOTE: Once the detector is on the data screen, you may notice high or low values out of the full-scale range. These values should quickly return to the zero-gas value if no gas is present. No false alarms should be indicated at this time as the zero-gas value will be transmitted by the detector during the user-defined warmup delay period (up to 5 minutes).

Using the magnetic interface, navigate the menus to ensure:

- Alarm levels for Alarm 1, 2 and 3 are set to the desired value
- Time and date are set correctly
- Engineering units are set to the desired value
- Calibration span gas value is set to the value of the calibration gas that will be used to perform initial calibration
- Calibration marker is set to the desired value (this is the value the output will be held at during calibration and the calibration purge delay)

NOTE: If the CXT2 has relays, they should also be set up at this time. When no relays are installed, alarms are indicated only by the display color and/or alarm LEDs.

After sensor has stabilized, perform routine sensor calibration. See Section 8 Calibration.

7.2 Normal Operation

During normal operation the sensor data is displayed on one of three data display screens as shown below. To cycle through the data display screens, use a magnet and swipe the Next key until the desired screen is reached.

7.3 Fault Condition

The Fault alarm is used to indicate a condition when there is a failure from the sensor or an out of range state has been reached. It is recommended to set the fault alarm level to -10% of the span value. For example, if an H2S sensor is installed with a span value of 100, the fault should be set at -10, or if an oxygen sensor is installed with a span value of 25, the fault setting should be -2.5.

If relays are installed, the Fault relay is always Failsafe. This is necessary for the relay to de-energize in the event there is a loss of power, so that a Fault will be indicated.

If relays are not installed, a Fault condition will only be indicated by the display color changing to red and/or the red Fault LED flashing.

7.4 Alarm Conditions

The CXT2 gas detector allows the user to select the color associated with a certain alarm level. Options include yellow, orange, red, blue and purple. Alarm 1 is always set to yellow, and the Fault alarm is always set to Red.

When an alarm level is reached, the display will change to the user defined color and the alarm level will flash on the display. If Latching is turned on, the alarm will stay enabled until the user acknowledges the alarm, even if the alarm condition has cleared.

7.5 Channel States

Priority	Channel State	Screen Color	Description
1	MFG	Green	State when performing manufacturers checkout process
2	Diagnostic	White	Not visible since it is a menu item
3	Inhibit	Green	Used in PGA/Balance/Voltage screens
4	Corrupted	Red	Sensor Memory is corrupted
5	Sensor Error	Red	Sensor is found/valid, but failed to read information from the sensor
6	Type Error	Red	Sensor mismatch, and user failed to accept the sensor
7	No Sensor	Red	Sensor is not found
8	Cal Needed	Red	A calibration of the sensor is required
9	Comm Error	Red	Indicates timeout or invalid reply from Modbus or wireless device

10	I/O Error	Red	Indicates a failure to communicate between I/O board electronics
11	Config Error	Red	Indicates interface for Modbus/wireless is configured for something else
12	Warmup	Green	Indicates the detector is in the user defined warmup time period
13	Overrange	Current Alarm Color	Indicates the sensor is reading over the maximum allowable range
14	Cal Zero	Pink	Indicates calibration mode
15	Cal Span	Pink	Indicates calibration mode
16	Cal Purge	Pink	Indicates the detector is in the user defined cal purge time period
17	Fault	Red	Indicates a fault condition exists
18	Alarm 3	User Programmed	Indicates the Alarm 3 condition exists
19	Alarm 2	User Programmed	Indicates the Alarm 2 condition exists
20	Alarm 1	Yellow	Indicates the Alarm 1 condition exists

8 CALIBRATION

8.1 Preparation

Calibration is the most important function for ensuring correct operation of the Universal Series of gas detectors. The CAL MODE is designed to make calibration quick, easy and error free, and a successful Zero and Span calibration requires only four keystrokes. The 4-20mA output transmits 3mA during the calibration, and 4mA during calibration purge to prevent alarms. After 5 minutes of inactivity the gas detector will exit calibration mode automatically.

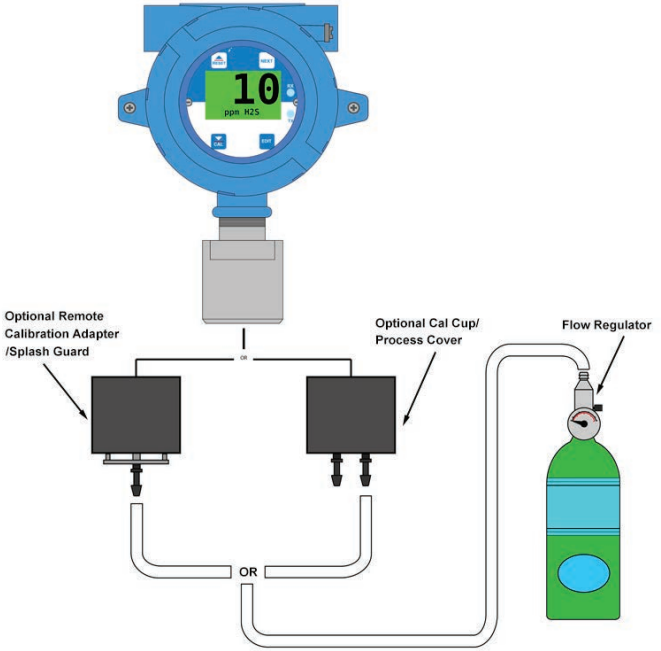
CETCI recommends performing calibrations immediately prior to placing a gas detector in service and any time a new sensor is installed. For routine calibrations, every 6 months (more often if sensor is known to have been exposed to gas for extended periods of time).

Periodic bump tests are recommended if detector has potentially been exposed to incompatible gases to ensure correct operation.

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

Follow these calibration guidelines to ensure proper operation of your CXT2 gas detector:

- Calibration accuracy is only as good as the calibration gas accuracy. CETCI recommends calibration gases with NIST (National Institute of Standards & Technology) traceable accuracy to increase the validity of the calibration.
- Do not use a gas cylinder beyond its expiration date.
- Calibrate a new sensor before use.
- Allow the sensor to stabilize before starting calibration (approximately 5 minutes).
- Calibrate on a regular basis. (CETCI recommends once every 3 months, depending on use and sensor exposure to poisons and contaminants.)
- Calibrate only in a clean atmosphere, which is free of background gas.
- Calibrate in the same temperature range the device will be monitoring gas in.
- Calibrate on a regular schedule. CETCI recommends once every 6 months, depending on use and sensor exposure to poisons and contaminants. Always follow application regulations and local guidelines.



Prior to beginning your calibration make sure you have the following items:

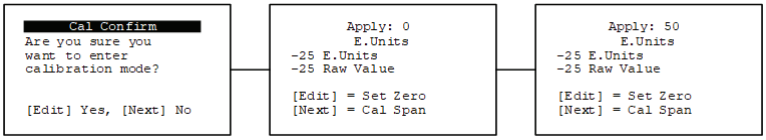
- A cylinder of calibration gas with concentration equal to the SPAN GAS VALUE setting (typically choose a value at 50% of full scales)
- A cylinder of Zero Air (unless you are confident there is no target gas potentially present in the area)
- A flow regulator, a fixed flow of 0.5 LPM is recommended for more applications, but some instances may require a 1.0 LPM fixed flow regulator
- A Calilbration Cup or Calibration Adaptor
- Sufficient length of flexible tubing to connect the regulator to the calibration adaptor

8.2 Zero and Span Calibrations

Use the following step-by-step procedure to perform Zero and Span calibrations.

Note: A fixed flow of 0.5LPM is recommended for most applications, but some instances may require a 1.0LPM fixed flow regulator.

The first three steps must be performed before the timer in the bottom right corner expires, 15 seconds, otherwise the CXT2 will exit back to the Data Display Screen.



Step 1:
Enter Calibration mode from any of the Data Display Screens by swiping the Down/Cal key.

Step 2:
Swipe the Edit key to enter Cal Mode.

Step 3:
Apply a clean Zero Gas using the Calibration Cup or be sure there is no background target gas in the monitored area. After the reading is stable, swipe the Edit key to set the Zero Calibration. To skip the Zero calibration, and go to the Span calibration, swipe the Next key.

Once a message that the Zero calibration was completed successfully has been displayed, proceed to the next step.

Step 4:
Apply the correct, as indicated, span gas (Figure 9). After the reading is stable, swipe the Edit key to set the Span Calibration. To skip the Span Calibration, swipe the Next key.

When a message that the Span Calibration was completed successfully is displayed, the gas detector will exit back to the Data Display Screen.

Step 5:
Remove the calibration gas. Once the Cal Purge Delay has expired, normal alarm and relay functionality will be restored.

WARNING: The SPAN gas used must match the value specified since this is what the CXT2 will indicate after a successful SPAN calibration. The Cal Span Value may be edited if it becomes necessary to apply a different gas concentration.

Calibration history records are logged and may be viewed in the Sensor Information.

8.3 Bump Test

Also known as a functionality test, a bump test is not meant to test the accuracy of the detector, and no calibration settings are changed during the test.

To perform a bump test, briefly expose the sensor to a gas of known concentration (above the Low Alarm set point), and check to ensure the display reading increases to a value within tolerance of the concentration applied and check for alarm actuation. If the sensor does not perform as expected, CETCI recommends performing a routine calibration and/or replacing the sensor. If the alarm does not perform as expected check the detector's alarm settings.

NOTE: A bump test, when performed correctly, is meant to check both sensor and alarm functionality. This results in expected alarms, and proper precautions should be taken.

8.4 Remote Sensor Calibration

When monitoring lighter than air gases like hydrogen or methane, a CXT2 can be configured with a remote sensor that is mounted near or on the ceiling, while the main CXT2 remains mounted at viewing height. In order to calibrate the remote sensor, a remote calibration adapter is screwed into the sensor and a long length of tubing is attached (1/4 in / 6.35 mm, Teflon tubing is recommended for most gases). The tubing remains permanently attached to the calibration adapter and the other end remains available to be attached to a cylinder of gas during the calibration process.

Calibration is performed at the main CXT2 that is mounted at eye level.

Step 1:
Enter Calibration mode from any of the Data Display Screens by swiping the Down/Cal key.

Step 2:
Swipe the Edit key to enter Cal Mode.

Step 3:
Apply a clean Zero Gas using the Calibration Cup or be sure there is no background target gas in the monitored area. After the reading is stable, swipe the Edit key to set the Zero Calibration. To skip the Zero calibration, and go to the Span calibration, swipe the Next key.

Once a message that the Zero calibration was completed successfully has been displayed, proceed to the next step.

Step 4:
Apply the correct, as indicated, span gas (Figure 9). After the reading is stable, swipe the Edit key to set the Span Calibration. To skip the Span Calibration, swipe the Next key.

When a message that the Span Calibration was completed successfully is displayed, the gas detector will exit back to the Data Display Screen.

Step 5:
Remove the calibration gas. Once the Cal Purge Delay has expired, normal alarm and relay functionality will be restored.

WARNING: The SPAN gas used must match the Cal Span Value specified in the CXT2. The Cal Span Value may be edited if it becomes necessary to apply a different SPAN gas concentration.

Step 6
When finished calibration, detach the tubing from the gas cylinder. If allowing diffusion to clear the tubing, the CXT2 may not return to a zero reading for several minutes. If using zero air with a 0.5 LPM regulator, expect to flow 5 seconds per 10 meter length before the CXT2 returns to a zero reading. When the reading reaches zero stop the air flow.
When tubing is clear of residual gas, attach a filter fitting to the end that was attached to the gas cylinder to protect it from clogging or other potential damage and coil or roll it up securely out of the way.

9 RS-485 MODBUS® CONFIGURATION

The CXT2 transmitter may be equipped with one of two RS-485 boards where the Relay board can be set up as master or slave, and the RS-485 Modbus board can be set up as master and slave (base 1).

The Modbus slave ports allow function code 3 (write coil), as well as function code 6, and 16 (write holding registers). These function codes can be used to write configuration parameters to the Universal Gas Detectors. Writing parameters that span multiple register (such as 32bit floating points) requires function code 16. All registers must be written at once.

The following table describes the Modbus slave database. Any portion of this data may be read by a Modbus master device such as a PC, PLC or DCS. Since the Modbus port is RS-485, multiple CXT2 transmitters may be multi-dropped onto the same cable.

9.1 System Registers

9.1.1 Input Registers

Tag	Address	Type	Function Code to Read	Function Code to Write	Size	Notes
Packed Status	31000	Unsigned Integer	4	N/A	1	0-OK 1- Alarm 1 2- Alarm2 3- Alarm3 4- Fault 5- Warmup 6- Inhibited 7- Zero Calibration 8- Calibration Span 9- Calibration Purge 10- Calibration Mode 11- Diagnostics Mode 12-Value Error (Calibration needed or Channel State Over range) 13-Sensor Error (Channel State Corrupted, Channel State Over range, Channel State Mismatch, Channel State No Sensor, Channel State Sensor Error, Channel State Comm Error, Channel state Scaling Error)

Analog Output	31001	Unsigned Integer	4	N/A	1	12-bit value; 800 = 4mA; 4000 = 20mA
Sensor Life	31009	Integer	4	N/A	1	16-bit signed integer 1 to 100 1 indicates Calibration Required
Temperature	31011	32-Bit Floating Point	4	N/A	2	16-bit integer 1 to 4095 scaled for - 55°C to +125°C
4-20mA(mA)	31210	32-Bit Floating Point	4	N/A	2	32-bit floating point
Bridge Supply(V)	31220	32-Bit Floating Point	4	N/A	2	32-bit floating point
Bridge Out(V)	31224	32-Bit Floating Point	4	N/A	2	32-bit floating point
Version	32002	Unsigned Integer	4	N/A	1	Factory use only
Boot Date	32006	Date	4	N/A	2	Last Power up date
Boot Time	32009	Time	4	N/A	2	Last Power up Time

9.1.2 Holding Registers

Tag	Address	Type	Function Code to Read	Function Code to Write	Size	Notes
Alarm Reset	40001	Command write 1 to activate	3	6	1	Write to acknowledge alarm
Set Unity	40002	Command write 1 to activate	3	6/16	1	
Start Inhibit	40003	Command write 1 to activate	3	6/16	1	
Stop Inhibit	40004	Command write 1 to activate	3	6/16	1	
Name	40010	Packed Character String	3	6/16	1	16-character ASCII text

Date	40020	Date	3	6/16	2	Current Data
Time	40023	Time	3	6/16	2	Current Time
Warmup Time	40027	Integer	3	6/16	1	Warm up delay (minutes)
Cal Purge Time	40028	Integer	3	6/16	1	Cal purge delay (minutes)
Block Negative	40029	Selection	3	6/16	1	0-Clear 1-Triggered 1 prohibits display of values < 0
Comm Mode	40030	Selection	3	6/16	1	0-Modbus slave 1-Remote sensor MODBUS serial port #1
Baud Rate	40031	Selection	3	6/16	1	0 -9600 1 - 19200 2 - 38400 3 - 57600 4 - 115200
Parity	40032	Selection	3	6/16	1	0- None 1- Even 2-Odd
Remote ID	40033	Integer	3	6/16	1	
Byte Order	40036	Selection	3	6/16	1	0-ABCD 1-CDAB 2-BADC 3-DCBA
Comm 1 LED Enable	40038	Selection	3	6/16	1	0-No 1-Yes
Comm 1 Term Resistor	40039	Selection	3	6/16	1	0-No 1-Yes
Comm 2 LED Enable	40048	Selection	3	6/16	1	0-No 1-Yes
Comm 2 Term Resistor	40049	Selection	3	6/16	1	0-No 1-Yes

9.2 Relay Registers

9.2.1 Input Registers

Tag	Address	Type	Function Code to Read	Function Code to Write	Size	Notes
Standard Relay 1 State	32020	Selection	4	N/A	1	0-Clear 1-Triggered
Standard Relay 2 State	32021	Selection	4	N/A	1	0-Clear 1-Triggered
Standard Relay 3 State	32022	Selection	4	N/A	1	0-Clear 1-Triggered
Warmup	32025	Selection	4	N/A	1	0-No 1-Yes
Standard Relay 1 Flashing	32026	Selection	4	N/A	1	0-No 1-Yes
Standard Relay 2 Flashing	32027	Selection	4	N/A	1	0-No 1-Yes
Standard Relay 3 Flashing	32028	Selection	4	N/A	1	0-No 1-Yes

9.2.2 Holding Registers

Tag	Address	Type	Function Code to Read	Function Code to Write	Size	Notes
Relay 1 Source	40106	Selection	3	6/16	1	0-Alarm 1 1-Alarm 2 3-Alarm 3 3-Fault 4-Cal Mode 5-Cal Zero 6-Cal Span 7-Disabled
Relay 1 Acknowledge	40107	Selection	3	6/16	1	0-No 1-Yes
Relay 1 Failsafe	40108	Selection	3	6/16	1	0-No 1-Yes
Relay 1 Refresh Time	40109	Integer	3	6/16	1	

Relay 2 Source	40116	Selection	3	6/16	1	0-Alarm 1 1-Alarm 2 3-Alarm 3 3-Fault 4-Cal Mode 5-Cal Zero 6-Cal Span 7-Disabled
Relay 2 Acknowledge	40117	Selection	3	6/16	1	0-No 1-Yes
Relay 2 Failsafe	40118	Selection	3	6/16	1	0-No 1-Yes
Relay 2 Refresh Time	40119	Integer	3	6/16	1	
Relay 3 Source	40126	Selection	3	6/16	1	0-Alarm 1 1-Alarm 2 3-Alarm 3 3-Fault 4-Cal Mode 5-Cal Zero 6-Cal Span 7-Disabled
Relay 3 Acknowledge	40127	Selection	3	6/16	1	0-No 1-Yes
Relay 3 Failsafe	40128	Selection	3	6/16	1	0-No 1-Yes
Relay 3 Refresh Time	40129	Integer	3	6/16	1	

9.3 Sensor Registers

9.3.1 Input Registers

Tag	Address	Type	Function Code to Read	Function Code to Write	Size	Notes
Send Sensor Life	40153	Selection	3	6/16	1	0-No 1-Yes
Contact Info String	40160	Packed Character String	3	6/16	1	16 ASCII characters (2 per register)
Security	40182	Selection	3	6/16	1	0-Unlocked 1-Locked

Measurement Name	40401	Packed Character String	3	6/16	1	16 ASCII characters (2 per register)
E. Units	40423	Packed Character String	3	6/16	1	10 ASCII characters (2 per register)
PGA Gain	40433	Integer	3	6/16	1	Contact Factory
Zero Setpoint	42001	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Span Setpoint	42003	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Zero Value	42005	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Span Value	42007	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Fault Value	42009	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Alarm 1 Setpoint	42011	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Alarm 2 Setpoint	42013	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Alarm 3 Setpoint	42015	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Calibration Gain	42017	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt
Calibration Offset	42019	32-Bit Floating Point	3	6/16	2	Modbus 32-bit IEEE 754 Float-ing Pt

9.4 Channel Registers

9.4.1 Input Registers

Tag	Address	Type	Function Code to Read	Function Code to Write	Size	Notes
Alarm 1 Status	33017	Selection	4	N/A	1	0-No 1-Yes

Alarm 1 Flashing	33018	Selection	4	N/A	1	0-No 1-Yes
Alarm Status	33019	Selection	4	N/A	1	0-No 1-Yes
Alarm Flashing	33020	Selection	4	N/A	1	0-No 1-Yes
Alarm 3 Status	33021	Selection	4	N/A	1	0-No 1-Yes
Alarm 3 Flashing	33022	Selection	4	N/A	1	0-No 1-Yes
Fault Status	33023	Selection	4	N/A	1	0-No 1-Yes
Comm Error	33024	Selection	4	N/A	1	True if comm error
Config Error	33025	Selection	4	N/A	1	True if config error
I/O Error	33026	Selection	4	N/A	1	True if input/output error
Calibration Flag	33027	Selection	4	N/A	1	True if calibration in progress
Error Flashing	33030	Selection	4	N/A	1	True if channel error
Value	33065	32-Bit Floating Point	4	N/A	2	

9.4.2 Holding Registers

Tag	Address	Type	Function Code to Read	Function Code to Write	Size	Notes
Alarm 1 Latch	43001	Selection	3	6/16	1	0-No 1-Yes
Alarm 1 Trip	43002	Selection	3	6/16	1	0-High 1-Low
Alarm 1 On Delay	43003	Integer	3	6/16	1	Activation delay in seconds

Alarm 1 Off Delay	43004	Integer	3	6/16	1	Deactivation delay in minutes
Alarm 1 Deadband%	43005	Integer	3	6/16	1	Percent of scale
Alarm 2 Latch	43011	Selection	3	6/16	1	0-No 1-Yes
Alarm 2 Trip	43012	Selection	3	6/16	1	0-High 1-Low
Alarm 2 On Delay	43013	Integer	3	6/16	1	Activation delay in seconds
Alarm 2 Off Delay	43014	Integer	3	6/16	1	Deactivation delay in minutes
Alarm 2 Deadband%	43015	Integer	3	6/16	1	Percent of scale
Alarm 2 Color	43016	Selection	3	6/16	1	0-Red 1- Orange 2-Blue
Alarm 3 Latch	43021	Selection	3	6/16	1	0-No 1-Yes
Alarm 3 Trip	43022	Selection	3	6/16	1	0-High 1-Low
Alarm 3 On Delay	43023	Integer	3	6/16	1	Activation delay in seconds
Alarm 3 Off Delay	43024	Integer	3	6/16	1	Deactivation delay in minutes
Alarm 3 Deadband%	43025	Integer	3	6/16	1	Percent of scale
Alarm 3 Color	43026	Selection	3	6/16	1	0-Red 1- Orange 2-Blue
Alarm 3 Enabled	43027	Selection	3	6/16	1	0-No 1-Yes
Data From	43031	Selection	3	6/16	1	0-Sensor 1-Remote Sensor 2-4-20mA
Min Raw	43032	Unsigned Integer	3	6/16	1	Binary (800)

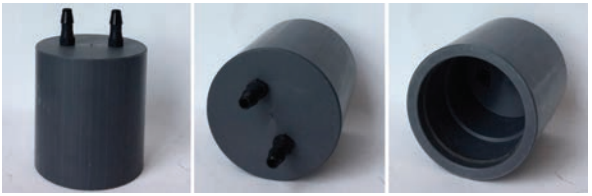
Max Raw	43033	Unsigned Integer	3	6/16	1	Binary (4000)
Remote ID	43034	Integer	3	6/16	1	Binary
Remote ID	43042	Integer	3		1	
Decimal Points	43079	Selection	3	6/16	1	Number of decimal points
Deadband(%)	43081	Integer	3	16	1	Modbus 32-bit IEEE 754 Floating Pt
Filter Count	43090	Integer	3	6/16	1	Binary ;0 to 60
Polarity	43092	Selection	3	6/16	1	Binary
Bridge Voltage	43093	32-Bit Floating Point	3	16	2	Modbus 32-bit IEEE 754 Floating Pt
Balance	43095	Integer	3	6/16	1	Binary
Heater Enabled	43096	Selection	3	6/16	1	0-No 1-Yes
Heater Setpoint	43097	32-Bit Floating Point	3	16	2	Modbus 32-bit IEEE 754 Floating Pt
Temp Comp -40C	43099	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp -30C	43103	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp -20C	43107	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp -10C	43111	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp 0C	43115	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp 10C	43119	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset

Temp Comp 20C	43123	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp 30C	43127	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp 40C	43131	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp 50C	43135	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Temp Comp 60C	43139	Temperature Comp	3	16	4	32-bit FP Gain ;32-bit FP Offset
Sensor Type	43143	Selection	3	6/16	1	0-None, 1-EC, 2-Bridge, 3-Low Power IR
Cal mA Setting	43145	32-Bit Floating Point	3	16	2	Modbus 32-bit IEEE 754 Floating Pt

10 ACCESSORIES

10.1 Calibration Cup / Calibration Adapter

The calibration cup is used during the calibration process to apply zero and span gas directly to the sensor. Slide the calibration cup over the sensor head and attach the tubing to one of the nozzles.



10.2 Splash Guard with Remote Calibration Port

The splash guard wtih remote calibration port protects the sensor head in wet environments. It can also be used for calibration when the remote sensor is mounted near or on the ceiling. Refer to Section 8.4 for more information.

10.3 Arctic Heater Option

CXT2 can be ordered with an arctic heater option for operation in extremely low temperatures. The option includes a 175 ohm 4-watt heater / temperature controller circuit mounted to the back of the power supply PCB (Figure 2-5) and an arctic smart sensor with a 1-watt heater / temperature controller for warming the sensor compartment. This is important since many electrochemical sensors have a low temperature rating of only -20C. If incoming 10-30VDC power is at least 24VDC, the arctic option extends CXT2 operation down to -55C.

IMPORTANT: Arctic CXT2's consume more power when it is cold! When temperature inside the CXT2 enclosure is below -25C the 175 ohm PCB heater is connected across the incoming DC power terminals and the 1-watt heater is connected across the CXT'2s internal 5VDC power supply when Sensor Temp is below the Setpoint. These additional loads must be considered when sizing the installation's DC power supply.

11 MAINTENANCE

The CXT2 Transmitter requires virtually no maintenance other than regular calibration of the sensor(s).

CETCI recommends performing calibrations at regular intervals to ensure proper functionality of the CXT2 gas detector. During routine calibration, CETCI recommends a visual inspection of sensor head, enclosure and conduit entries to check for cleanliness and physical integrity. Cleaning the detector is recommended when necessary but be aware that some cleaning compounds may be detected by an operational detector depending on the sensor type, so proper precautions should be taken.

12 TROUBLESHOOTING

THE CXT2 is not responding to Modbus queries.

- Verify the Slave ID is correct
- Verify the Modbus master is polling the correct alias
- Verify Modbus wires are connected to the correct terminals

The CXT2 is responding to gas but the controller is in fault.

- Verify the analog signal wire is connected to the correct terminal at the monitor.
- Verify the analog signal wire is connected to the correct terminal at the controller.
- Verify monitor's 4-20 mA output by disconnecting the signal wire and measure across 4-20 output (+) and common (-) .

The CXT2 is reading NO SENSOR.

- Remove senor head cover and verify the Smart Sensor module is fully engaged in the Smart Sensor connector.
- Verify the Smart Sensor connector is fully plugged into the Smart Sensor connection on the I/O board.

The CXT2 is failing calibration.

- Make sure the calibration gas is the proper concentration and gas type.
- Be sure to follow the calibration procedure.

NOTES

NOTES

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