

Critical Environment Technologies

**AST-ICD-W INDUSTRIAL CARBON
DIOXIDE ANALOG TRANSMITTER**



INSTALLATION / OPERATION MANUAL

REV: B FEB-25-2004

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IMPORTANT NOTICE

READ AND UNDERSTAND THIS OPERATION MANUAL PRIOR TO USING THIS INSTRUMENT.

THIS INSTRUMENT SHOULD BE INSPECTED AND MAINTAINED BY QUALIFIED AND TRAINED TECHNICIANS.

THIS INSTRUMENT HAS NOT BEEN DESIGNED TO BE INTRINSICALLY SAFE. FOR YOUR SAFETY, DO NOT INSTALL IT IN CLASSIFIED HAZARDOUS AREAS (EXPLOSION-RATED ENVIRONMENTS).

CAUTION: Disconnect power before servicing

INSTRUMENT SERIAL NUMBER: _____

PURCHASE DATE: _____

PURCHASED FROM: _____

WARRANTY POLICY

CRITICAL ENVIRONMENT TECHNOLOGIES CANADA INC. WARRANTS THIS INSTRUMENT TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF TWO YEARS FROM THE DATE OF PURCHASE. THE WARRANTY STATUS MAY BE AFFECTED IF THE INSTRUMENT HAS NOT BEEN INSTALLED AND MAINTAINED AS PER THE INSTRUCTIONS INDICATED IN THIS MANUAL OR HAS BEEN ABUSED, DAMAGED OR MODIFIED IN ANY WAY. THIS INSTRUMENT IS ONLY TO BE USED FOR PURPOSES STATED HEREIN. THE MANUFACTURER IS NOT LIABLE FOR AUXILIARY INTERFACED EQUIPMENT OR CONSEQUENTIAL DAMAGE.

DUE TO ONGOING RESEARCH, DEVELOPMENT AND PRODUCT TESTING, THE MANUFACTURER RESERVES THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT NOTICE. THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THIS DATA.

ALL GOODS MUST BE SHIPPED TO THE MANUFACTURER BY PREPAID FREIGHT. ALL RETURNED GOODS MUST BE ACCOMPANIED BY AN RMA NUMBER.

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1.0 GENERAL

The AST-ICD are analog transmitters with high quality, industrial grade, miniatur infrared sensors. They are supplied, as a standard in a water / dust tight, corrosion resistant polycarbonate enclosure. The infrared sensor is supplied with a microporous PTFE filter attached to provide splash protection only. This filter is not designed to provide protection to the sensor from application of pressurized water. Contact factory if this type of protection is required.

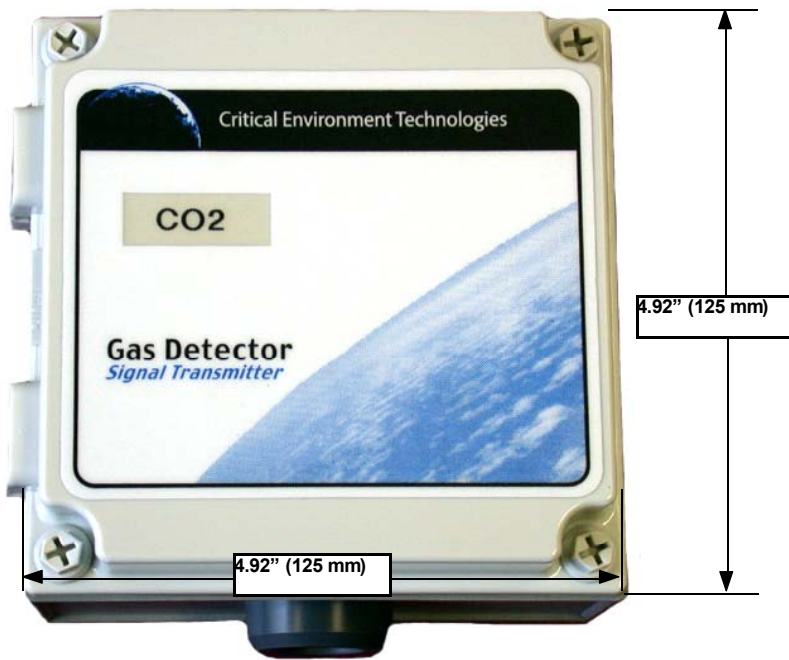
2.0 SPECIFICATIONS

Physical:	a) Dimensions: 4.92" (125 mm) Wide X 4.92" (125 mm) High X 2.92" (75 mm) Deep b) Weight: 11.8 ounces (335 grams)
Construction:	Water/dust tight, corrosion resistant polycarbonate with hinged, secured door and Lexan door label
Input Voltage:	12 to 30VDC
Input Power:	5W maximum
Output Signal:	Linear, analog 4 - 20 mA (10-bit resolution)
Display:	4 Digit, 7 Segment LCD
Adjustments:	4 only internal push-buttons for servicing
Environment:	a) Temperature: 0 deg. C. to + 40 deg. C (32 deg. F to 104 deg. F.) b) Humidity: 0 to 95% rH
Fuse:	500 mA slow blow glass fuse
Certifications:	Sensor head only: BASEEFA
RFI Protection:	The infrared sensor output is a low level signal to which a high gain is applied by the circuitry. For this reason, it is important to avoid the pickup of unwanted electric signals, either low frequency or RFI.
Circuit:	Micro-controller based design
Sensor Type:	Infrared: CO2 or Combustible Hydrocarbons
Response Time:	T90 = < 30 seconds
Resolution:	0.005% volume (50 ppm) at 25 deg. C.

3.0 SPECIFICATIONS, CONT'D.....

Warm Up Time:	30 seconds to specifications
Range:	0 - 5.0% volume CO2 0 - 5.0% volume Methane 0 - 100% volume Methane
Repeatability:	Zero: +/- 0.1% volume CO2 / Methane Span: +/- 0.1% volume CO2 / Methane
Long Term Drift:	+/- 0.05% volume CO2 per month
Temperature:	Operating: -20 deg. C. to +50 deg. C. (-4 deg. F. to 122 deg. F.)
Humidity:	0 to 95% rH non-condensing. Negligible effect at 3%

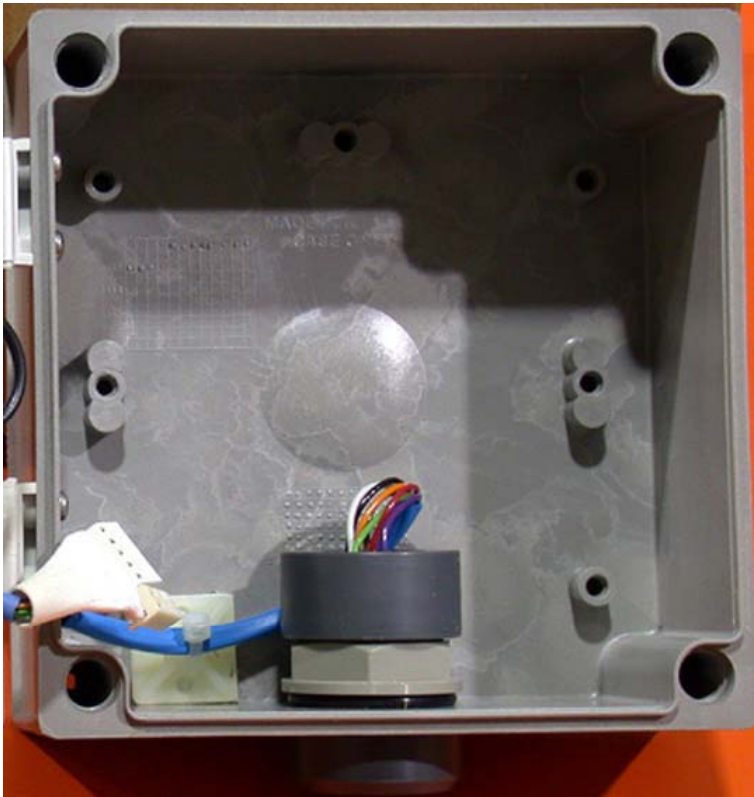
3.0 ENCLOSURE DIMENSIONS



4.0 INSTALLATION

Four 1/4" diameter holes are provided for mounting enclosure. They are accessed through the openings where the door closure screws reside. See photo below. The enclosure must be installed using these openings to avoid compromising the water tight integrity of the enclosure. Failure to properly install and seal the enclosure may void the warranty. Conduit entry openings drilled into enclosure base must be sealed with the proper water tight conduit hub.

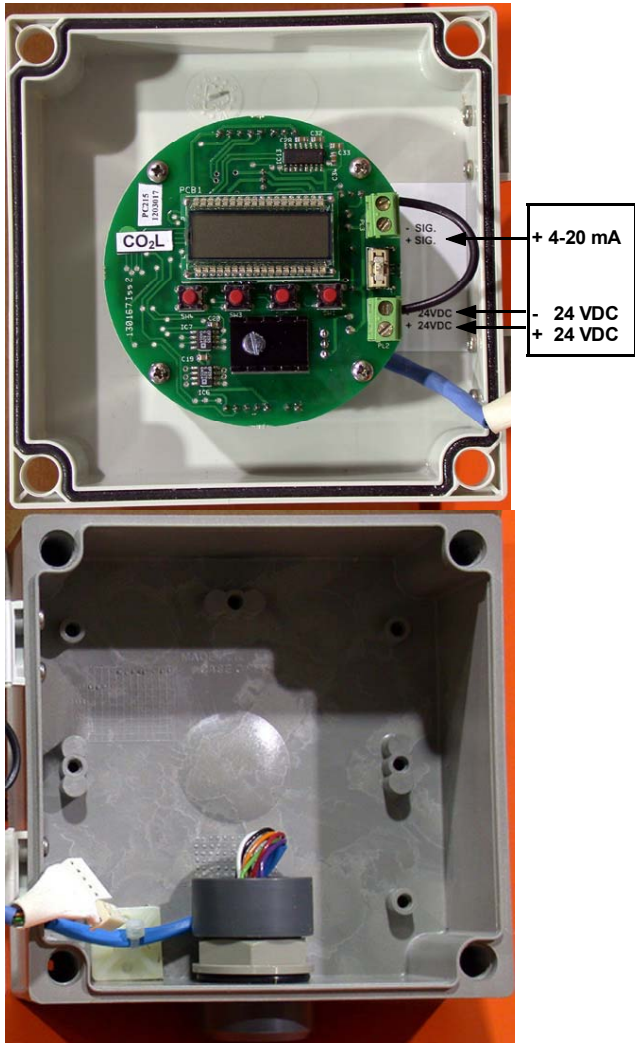
Enclosure base photo:



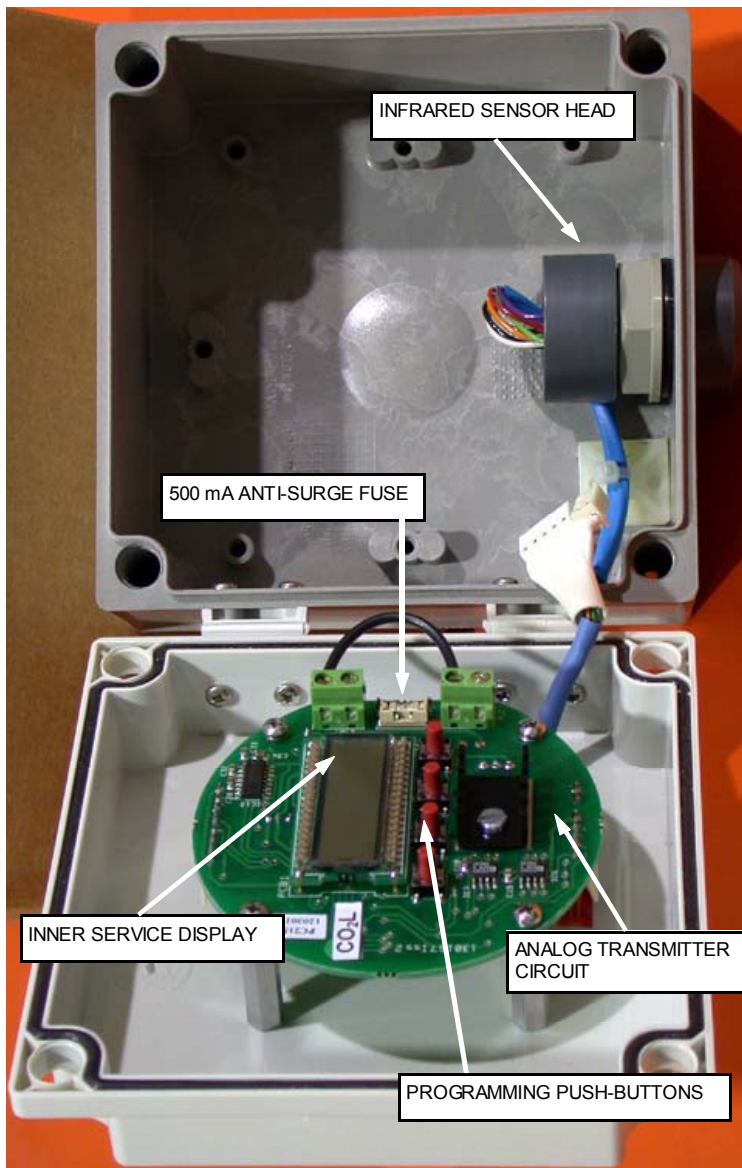
TO MAINTAIN WATER TIGHT INTEGRITY OF ENCLOSURE, USE MOUNTING HOLES INDICATED. IF ADDITIONAL HOLES ARE REQUIRED, THEY MUST BE PROPERLY SEALED. FAILURE TO PROPERLY INSTALL ENCLOSURE OR SEAL ANY EXTRA OPENINGS MAY VOID WARRANTY.

5.0 WIRING THE TRANSMITTER

Use four conductor, 16 to 20 gauge stranded, shielded cable to wire the transmitter to the control, device. Two wires make up the VDC power supplied and two wires make up the 4-20 mA signal loop. See photo below. Note: The positive (+) 24VDC power connection should be made using a wiring crimp connection gently pushed onto the fuse holder spade connection indicated below.



6.0 INTERIOR LAYOUT PHOTO



7.0 TRANSMITTER OPERATION

Before applying power to transmitter, carefully double check all wiring connections. Damage from incorrect wiring is not covered under warranty. Once power has been applied to the transmitter, an initialization procedure is automatically performed. This procedure will be indicated on the display as follows:

- 8.8.8.8** All segments on the LCD are tested and displayed
- 2.0.4C** The software version installed is indicated
- DYNE** The sensor gas type is indicated
- CO2L** The display then flashes with three vertical dots

The sensor head is now operational and the current CO2 value will be displayed on the inner LCD display module. The transmitter will constantly output a signal representing the current CO2 value. 4.0 mA representing "0" ppm and 20.0 mA representing 5.0% volume CO2 (50,000 ppm).

Note-1: Any CO2 values measured below 1000 ppm will not be indicated on the inner LCD display. The display indicates CO2 in percent volume scale (0 to 5.0 % volume). Example: 3000 ppm is indicated as 0.3% volume.

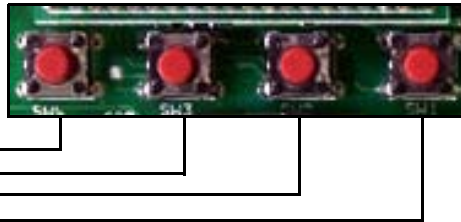
Note-2: Do not attempt calibration procedure until sensor has stabilized and acclimatize to it's environment for a period of at least 30 minutes.

8.0 SOFTWARE FEATURES

The menu system featured within the transmitter allows all calibration and configuration activities to be performed by the user.

Keypad Functions:

Button	Function
1	Menu Open / Close
2	Enter
3	Next (increment)
4	Previous (decrement)



Menu-1 - Sensor Zero: Refer to calibration section of manual for details

Menu-2 - Sensor Span: Refer to calibration section of manual for details

Menu-3 - Sensor FSD: This menu function allows the user to change the full scale measurement range of the sensor. The analog output must be re-calibrated if the FSD has been changed. Refer to calibration section of manual for details.

8.0 SOFTWARE FEATURES

To change the FSD use the following procedure:

- 1) Press button-1 to open menu system
- 2) Using the "NEXT " (button-3) and/or "PREVIOUS" (button-4), select menu option "E:3"
- 3) Press ENTER (button 2)
- 4) Using the increment (3) and decrement (4) buttons, adjust the FSD to the required level.
- 5) Press enter (button-2) Note: Pressing button-1 rather than button-2, at this point, exits this menu function without changing the FSD.
- 6) Assuming a change has been made, press button-1 to close the menu system.

Menu-4 - Output Zero (4 mA): Refer to calibration section of manual for details

Menu-5 - Output Span (20 mA): Refer to calibration section of manual for details.

Menu-8 - Sensor Selection: This menu function allows the selection of the sensor type being utilized. This is set up at the factory. DO NOT MODIFY THIS.

Menu-9 - Engineer Diagnostics: This menu function is for the use of trained CETCI technicians only. It is a view only feature.

Menu-12 - Cross Reference: This menu function applies only to the miniature combustible hydrocarbon sensor.

This menu function is used to allow the user to calibrate the sensor with a commonly available gas (eg. Methane or Propane) but use the unit to detect a different gas (eg. Methanol or acetone, etc.). This is achieved by adjusting the cross-reference factor according to the difference in signal that is detected for the calibration gas compared to the target gas.

- 1) Press button-1 to open menu system
- 2) Using the Next and Previous buttons, select menu option "E:12"
- 3) Press enter (button-2)
- 4) Using the Increase and Decrease buttons, set the required cross-reference factor. Consult manufacturer for cross-reference factors.
- 5) Press enter (button-2) to store new value. Pressing button-1 rather than button-2, at this point, exits this menu feature without saving any changes
- 6) Assuming a change has been made, press button-1 to close the menu system.

9.0 SENSOR CALIBRATION

Sensor Calibration: This menu function allows the user to calibrate the sensor. Ensure that the correct sensor type is selected in the configuration prior to calibration.

Note: The sensor is factory calibrated and should not have to be calibrated for approximately one year.

Sensor Zero Adjustment:

- 1) Press button-1 to open menu system
- 2) Using the Next and Previous buttons (buttons 3 & 4), select menu option E:1
- 3) Press ENTER (button-2)
- 4) Ensure sensor is in a zero-gas environment
Note: CO2 sensors cannot be zeroed in air due to the background level of CO2 present. 100% Nitrogen (N2) must be flowed for at least 2 minutes.
- 5) Press ENTER (button-2) to zero sensor and "--" will be displayed to confirm the sensor zero has been performed.
Note: Pressing button-1 rather than button-2, at this point, exits the zero function without performing a zero adjustment.
- 6) Assuming a change has been made, press button-1 to close the menu system.
Note: The zero factor will be momentarily displayed on exit.

Sensor Span Adjustment:

- 1) Press button-1 to open menu system
- 2) Using the Next and Previous buttons (buttons 3 & 4), select menu option E:2
- 3) Press ENTER (button-2)
- 4) Apply a known concentration of gas (applicable to sensor type) at a flow rate of between 0.5 and 1.0 LPM. Allow time for the sensor to respond (2 to 3 minutes).
- 5) Using the Increase and Decrease buttons (buttons 3 & 4), set the value to match that of the span gas being flowed

9.0 SENSOR CALIBRATION, CONT'D.....

- 6) Press ENTER (button-2) to span sensor and "--" will be displayed to confirm the sensor span has been performed.
Note-1: Pressing button-1 rather than button-2, at this point, exits the span function without performing a span adjustment.
Note-2: Wait until the reading is stable before pressing button-2 to span the sensor
- 7) Assuming a change has been made, press button-1 to close the menu system.
Note: The zero factor will be momentarily displayed on exit. The zero factor will be momentarily displayed on exit.
- 8) Remove span gas, procedure is finished.

Suggested calibration span gas concentrations

Carbon dioxide: 2 to 3% volume

Combustible Hydrocarbons: 20 to 50% LEL Methane (CH₄)
 20 to 50% LEL Propane (C₃H₈)
 50 to 100% Volume Methane (CH₄)

* Span gas concentrations are dependent upon which sensor is used

9.1 ANALOG OUTPUT CALIBRATION

The analog output is that of a current source. In order to calibrate the output it is necessary to monitor the output signal. Connect a digital multi-meter in series with the analog output. Set the meter range for 4.0 to 20.0 mA.

Note: The analog output is factory set and should not have to be calibrated unless the user suspects it may be inaccurate.

Analog Output Zero

- 1) Monitor the current sourced from the analog output of the transmitter
- 2) Press button-1 to open menu system
- 3) Using the Next and Previous buttons (buttons 3 & 4), select menu option E:4
- 4) Press ENTER (button-2)
- 5) Using the INCREASE AND DECREASE buttons (buttons 3 & 4), adjust the output to 4.0 mA.

9.1 ANALOG OUTPUT CALIBRATION, CONT'D.....

6) Press ENTER (button-2)

Note: Pressing button-1 rather than button-2, at this point, exits the zero function without performing a zero calibration adjustment.

7) Assuming a change has been made, press button-1 to close the menu system.

Note: The zero factor will be momentarily displayed on exit.

Analog Output Span

1) Monitor the current sourced from the analog output of the transmitter

2) Press button-1 to open menu system

3) Using the Next and Previous buttons (buttons 3 & 4), select menu option E:5

4) Press ENTER (button-2)

5) Using the INCREASE AND DECREASE buttons (buttons 3 & 4), adjust the output to 20.0 mA.

6) Press ENTER (button-2)

Note: Pressing button-1 rather than button-2, at this point, exits the span function without performing a span calibration adjustment.

7) Assuming a change has been made, press button-1 to close the menu system.

Note: The analog output span factor will be momentarily displayed on exit.

10.0 MAINTENANCE

Routine Inspection and Calibration

It is advisable to periodically inspect the sensor head. It can be cleaned with a damp cloth. DO NOT USE ANY CLEANING COMPOUNDS OR SOLVENTS TO CLEAN SENSOR HEAD. Inspect the sensor to ensure it has not been damaged or obstructed.

Calibration Frequency

A calibration frequency of one year is suggested for best performance. Cleaner environments may require less frequent calibrations. It is recommended that a calibration procedure include both zero and span as indicated in this manual.