Critical Environment Technologies Canada Inc.

AST-ICD-W / AST-IHC-W
INDUSTRIAL INFRARED ANALOG SENSOR/TRANSMITTERS

INSTALLATION / OPERATION MANUAL

REV: C JUNE-14-2017

145, 7391 Vantage Way Delta, BC V4G 1M3
Canada Phone: 604-940-8741 Fax: 604-940-8745
www.critical-environment.com

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 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:

_____

WARRANTY POLICY
• Disconnect power before servicing

Critical Environment Technologies Canada Inc. (CETCI), also referred to as the manufacturer, warrants this instrument, (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.** The sensors have a warranty period of **one year on a pro-rated basis from the date of purchase from our facility**. If the product should become defective within this warranty period, we will repair or replace it at our discretion.

The warranty status may be affected if the instrument has not been used and maintained per the instructions 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 pre-authorized by obtaining a Returned Merchandise Authorization (RMA) number. Contact the manufacturer for a number and procedures required for product transport.

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

Always 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.

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

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.

COPYRIGHTS

DISCLAIMER

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

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

It is CETCI policy that all wiring be within properly grounded (earth or safety) conduit.

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:

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

INDEX

1.0 GENERAL

The AST-ICD and the AST-IHC are analog transmitters with high quality, industrial grade, miniature infrared sensors. They are supplied, as a standard, in a water / dust tight, corrosion resistant ABS enclosure. The infrared sensor is supplied with a micro porous 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: 165 mm W x 156 mm H x 92 mm D (6.5 in W X 6.125 in H X 3.625 in D) b) Weight: 8.6 ounces (244 grams)
Construction:	Water/dust tight, NEMA 4X, IP66, corrosion resistant ABS with hinged, secured door, copper coated interior to reduce RF interference
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: -20° C. to 50° C (-4° F to 122° F) b) Relative Humidity: 0 to 95%
Fuse:	500 mA slow blow glass fuse
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: CO_2, Combustible Hydrocarbons
Response Time:	CO_2: T90 = < 30 seconds Hydrocarbons / CH4: T90 = < 30 seconds
Resolution:	See table on next page

2.0 SPECIFICATIONS, CONT'D…..

Warm Up Time: 30 seconds to specifications

Additional Specifications:

SENSOR	RANGE	RESOLUTION	ZERO REPEATABILITY	SPAN REPEATABILITY	LONG TERM ZERO DRIFT
AST-ICD					
CO2	**0 - 5.0% Volume**	**1% of Measuring range**	**+/- 50 ppm @ 20 deg. C.**	**+/- 50 PPM @ 20 DEG. C.**	**+/- 50 ppm / month**
CO2	**0 - 20% Volume**	**1% of Measuring range**	**+/- 1% of full scale @ 20 deg. C.**	**+/- 2% OF FULL SCALE @ 20 deg. C.**	**+/- 1% of full scale / month @ 20 deg. C.**
CO2	**0 - 100% Volume**	**1% of Measuring range**	**+/- 1% of full scale @ 20 deg. C.**	**+/- 2% OF FULL SCALE @ 20 deg. C.**	**+/- 1% of full scale / month @ 20 deg. C.**
AST-IHC					
Hydro-carbons	**0 - 100% LEL**	**1% of Measuring range**	**+/- 1% LEL @ 20 deg. C.**	**+/- 2% LEL @ 20 deg. C.**	**+/- 1% LEL / month @ 20 deg. C.**
CH4	**0 - 5% Vol-ume (0 - 100% LEL)**	**1% of Measuring range**	**+/- 1% LEL @ 20 deg. C.**	**+/- 2% LEL @ 20 deg. C.**	**+/- 1% LEL / month @ 20 deg. C.**
CH4	**0 - 100% Volume**	**1% of Measuring range**	**+/- 1% LEL @ 20 deg. C.**	**+/- 2% LEL @ 20 deg. C.**	**+/- 1% LEL / month @ 20 deg. C.**
Jet Fuel vapours	**0 - 100% LEL**	**1% of Measuring range**	**+/- 1% LEL @ 20 deg. C.**	**+/- 2% LEL @ 20 deg. C.**	**+/- 1% LEL / month @ 20 deg. C.**

3.0 ENCOSURE DIMENSIONS

4.0 INSTALLATION

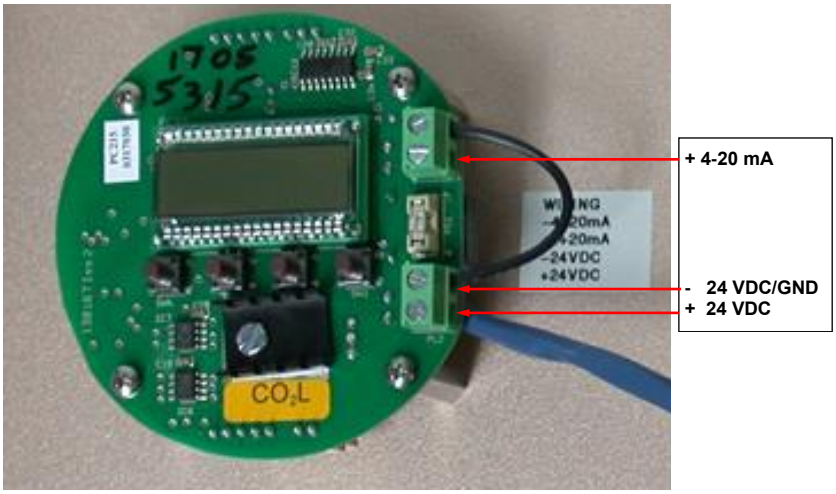
Includes stainless steel wall mounting hardware. Use the small screws to affix the metal brackets onto the back of the enclosure. The screws should not penetrate the interior of the enclosure. Use the bracket to affix the enclosure onto the wall (wall screws not included). The enclosure must be installed using this method to avoid compromising the water tight integrity of the enclosure. Conduit entry openings drilled into the enclosure base must be sealed with the proper water tight conduit hub. Failure to properly install and seal the enclosure may void the warranty.

Enclosure base photo:

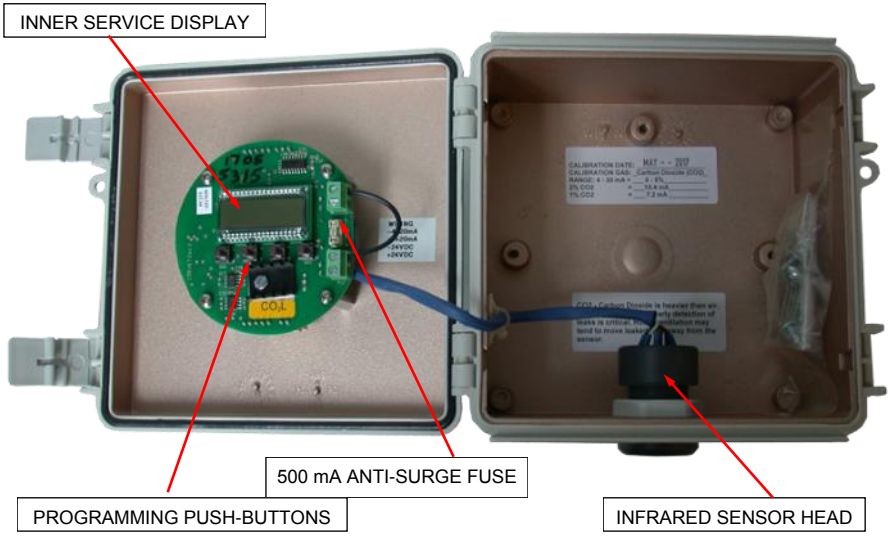
TO MAINTAIN WATER TIGHT INTEGRITY OF ENCLOSURE IN SPRAY DOWN APPLICATIONS, USE THE SPLASH GUARD TO PROTECT THE SENSOR.

5.0 WIRING THE TRANSMITTER

Use three conductor, 16 to 20 gauge stranded, shielded cable to wire the transmitter to the control, device. Two wires are for the VDC power supplied and one wire is for the 4-20 mA signal loop. See photo below. Note:



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 gas value will be displayed on the inner LCD display module. The transmitter will constantly output a signal representing the current gas value. 4.0 mA representing “0” ppm or % LEL or % volume and 20.0 mA representing full scale.

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

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 for 0 - 5% volume range
Carbon Dioxide: 10% volume for 0 - 20% volume range
Carbon Dioxide: 50% volume for 0 - 100% volume range
Carbon Dioxide: 2,000 to 2,500 ppm for 0 - 5,000 ppm range

Combustible Hydrocarbons:	50% LEL Methane (CH4) for 0 - 100% LEL
	50% LEL Propane (C3H8) FOR 0 - 100% LEL
	50% volume Methane (CH4) for 0 - 100% volume
	50% volume Propane (C3H8) for 0 - 100% volume
	50% LEL Propane (C3H8) for 0 - 100% LEL jet fuel

* 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.

Distributed by:
Kenelec Scientific Pty Ltd
1300 73 22 33
sales@kenelec.com.au
www.kenelec.com.au

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