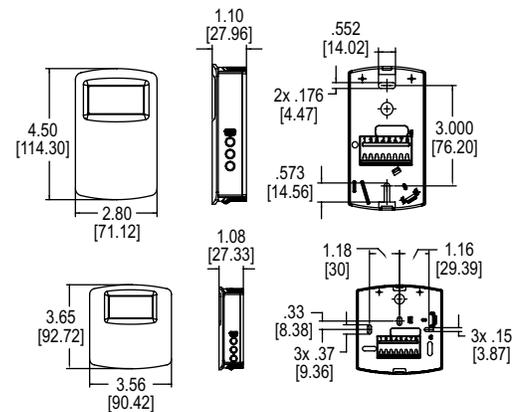




Series CDTC Communicating Carbon Dioxide Sensor

Specifications - Installation and Operating Instructions



The **Series CDTC Communicating Carbon Dioxide Sensor** combines the function of several room sensors into a single, compact housing. Parameters include carbon dioxide, temperature, and temperature set point with override. By having field selectable Modbus® and BACnet Communications, only four wires are needed for power and the communication signal. The communicating detectors can be daisy chained together to further reduce installation cost. In order to reduce the set up time, the RS-485 MAC address is set up using on-board DIP switches. A second set of DIP switches are used to select whether output is Modbus® RTU or BACnet MS/TP communication protocols and to limit access to the set up menu. Models are available in two housing styles, and an integral LCD display is optional.

Like our Series CDT Carbon Dioxide Transmitter, the Series CDTC uses a Single Beam Dual Wavelength Non-Dispersive Infrared (NDIR) sensor to measure the carbon dioxide level. This technology can be used in installations that will be occupied 24 hours per day. For improved accuracy, the transmitter can be field calibrated to the environmental conditions of the installation. Also, the barometric pressure can be programmed to correct for altitude.

Optional local and remote displays are available to display any of the parameters. For applications in which the building occupants aren't familiar with CO₂ concentrations, the LCD can be programmed to display temperature or temperature set point instead.

INSTALLATION

WARNING Disconnect power supply before installation to prevent electrical shock and equipment damage. Make sure all connections are in accordance with the job wiring diagram and in accordance with national and local electrical codes. Use copper conductors only.

NOTICE Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present.

NOTICE Do not exceed ratings of this device, permanent damage not covered by warranty may result.

SPECIFICATIONS

Sensor: CO₂: Single-beam, dual-wavelength NDIR.
Range: CO₂: 0 to 2000 or 5000 PPM CO₂ (depending on model); Temperature: 32 to 122 °F (0 to 50 °C).
Accuracy: CO₂: ±40 PPM ±3% of reading; Temperature: ±1°C @ 25°C.
Temperature Dependence (CO₂): ±8 PPM / °C at 1100 PPM.
Non-Linearity (CO₂): 16 PPM.
Pressure Dependence (CO₂): 0.13% of reading per mm of Hg.
Response Time (CO₂): 2 min for 99% step change.
Temperature Limits: 32 to 122°F (0 to 50°C).
Humidity Limits: 10 to 95% RH (non-condensing).
Power Requirements: 10-42 VDC or 10-30 VAC.
Power Consumption: Average: 0.5 watts; Peak: 1.2 watts.
Device Load: 1/8 unit load.
Output: 2-wire RS-485, Modbus® RTU or BACnet MS/TP communication protocol.
Weight: 4.4 oz (125 g).
Agency Approvals: BTL, CE.

MOUNTING

1. Push tab on top and bottom of cover and lift cover from back plate (See Figure 1).
2. Select the mounting location, away from diffusers, lights or any external influences.
3. Mount transmitter on a vertical surface to a standard electrical box using the two #6 M2C type screws provided.
4. Pull wires through sub base hole and make necessary connections.
5. Reattach cover to base plate.

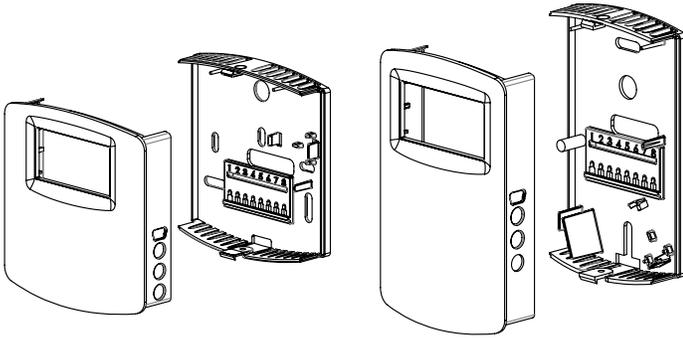


Figure 1: Removal of cover from back plate

WIRING

NOTICE Wiring should comply with Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems, TIA/EIA-485-A-1998, Telecommunications Industry Association, 1998.

NOTICE Use electrostatic discharge precautions (e.g., use of wrist straps) during installation and wiring to prevent equipment damage.

When using a common power supply, wire the CDTC as shown in Figure 2, using two twisted pair conductors. One pair is to be used for B[+] and A[-]. The other pair is to be used for power and common. This configuration is not suitable for AC supplies. Use a DC supply only. Care should be taken that there are not too many devices powered from the same supply as voltage drops will occur in the wiring. If you have many devices, or have long cable runs, the local supply configuration may be a better choice.

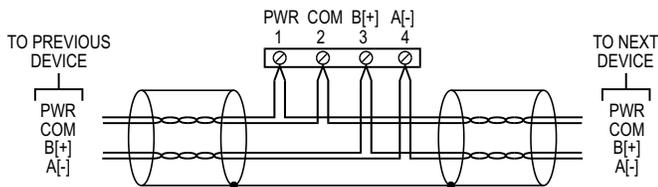


Figure 2: Common power supply wiring

When using a dedicated local power supply, wire the CDTC as shown in Figure 3, using a twisted pair and a single conductor. The pair is to be used for B[+] and A[-]. The single conductor is to be used for common. Both AC and DC supplies are suitable for this configuration.

In either configuration, the B[+] and A[-] lines must be terminated at both ends with a 120 Ω resistor. If the CDTC is an end device, it has an on-board resistor that may be used. See DIP SWITCH SETTINGS to enable it.

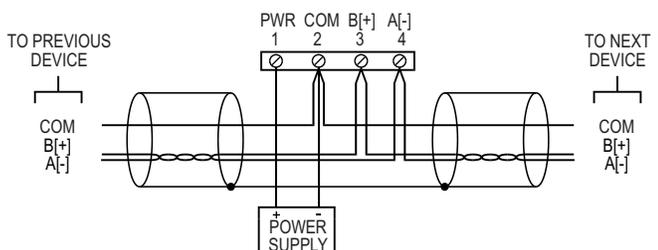


Figure 3: Local power supply wiring

DIP SWITCH CONFIGURATION

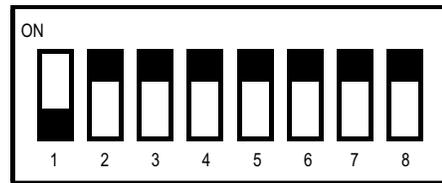


Figure 4: DIP switch SW2 (center-left)

The CDTC comes from the factory with all of the DIP switches, except position 1, in the ON position as shown in Figure 4 below. The address of the transmitter would be 127 as it would be $64+32+16+8+4+2+1 = 127$. Another example would be if the address desired was 008, the only DIP switch position in the ON position would be position 5.

A valid address depends on the protocol selected. Valid BACnet addresses range from 0 to 127. Valid Modbus® addresses range from 1 to 247. A valid and unused address should be set before connecting to an existing network. The device will not function properly if an invalid address is set. During the power up sequence, the LCD (if present) will display the RS-485 address as the primary value with "ADR" as the primary text and either "BAC" to indicate BACnet or "MOD" to indicate Modbus® as the secondary text. If the RS-485 MAC address is invalid, the invalid value is shown as the primary value with "ERR" as the primary text.

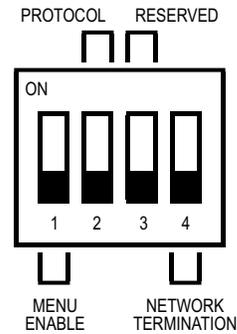


Figure 5: DIP switch SW1 (bottom-center)

Use DIP Switch SW1 (see Figure 5) to configure other hardware and software options.

Switch	On	Off
1 – Menu Enable	Access to the setup menu is enabled	Access to the setup menu is disabled
2 – Protocol	Modbus®	BACnet
3 – Reserved		
4 – Terminating Resistor	120Ω between A[-] and B[+]	Open

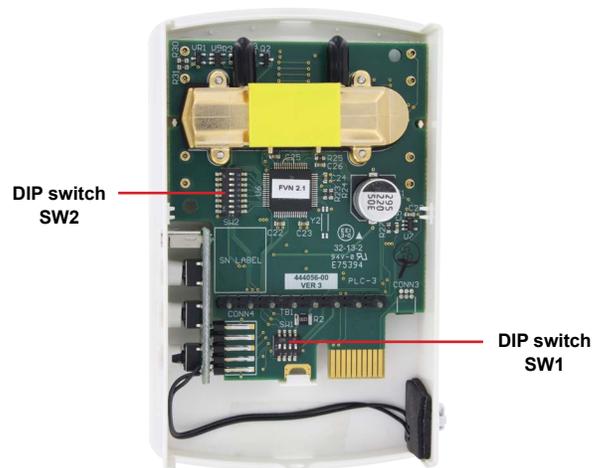


Figure 6: Internal view of transmitter

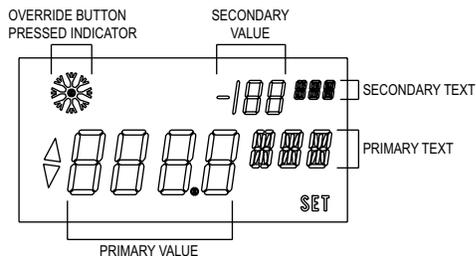


Figure 7: Display layout

Home Screen

For models with the LCD display option, or when using the A-449A remote display tool, the home (idle) screen displays up to two measured values and is the steady state of the device. The information displayed on the home screen can be changed by the "DSP" value in the setup menu.

Set Point

When idle, a single press of either the UP or DOWN button will display the current set point value with the selected units displayed as the primary text. Additional presses of the UP or DOWN buttons will increase or decrease the set point value by 1 degree. A press and hold of the UP or DOWN button will initiate continuous changing of the set point value. The set point display will timeout and return to the home screen after 5 seconds of inactivity. At this point the new set point value is stored in non-volatile memory. The range of the set point value can be configured with "SOH" and "SOL" values in the setup menu. A display is not required to change the set point value.

Override

When on the home screen or when changing the set point, the override button (middle button) can be pressed. When the override button is pressed in these states, a snowflake symbol is displayed momentarily to indicate the button was pressed.

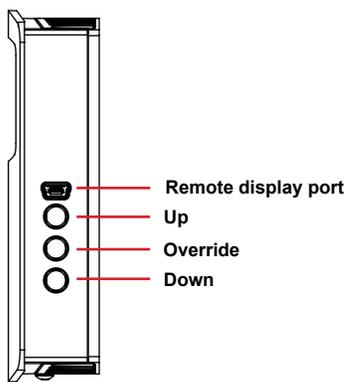


Figure 8: Side view of transmitter

Accessing Parameter Setup Menu

In order to access the parameter menu, press and hold the UP and DOWN buttons for 3 seconds. Once in the parameter menu, pressing the UP or DOWN buttons will cycle through the parameters. To change any of the parameters, press both the UP and DOWN arrow buttons simultaneously. The word "SET" will display in the lower right hand corner of the display. The UP or DOWN buttons can be used to change the value of the parameter. Press both the UP and DOWN buttons simultaneously to store the values. In order to go back to the home screen, press and hold the DOWN button for 3 seconds.

Home Screen Configuration (DSP)

This value controls what information is displayed on the home screen.

DSP				
Setting Value	Primary Value	Primary Text	Secondary Value	Secondary Text
"CT"	CO ₂ concentration	"PPM"	Temperature	"°C" or "°F"
"TS"	Temperature	"°C" or "°F"	Set point	"°C" or "°F"
"S"	Set point	"°C" or "°F"		
"T"	Temperature	"°C" or "°F"		
"C"	CO ₂ concentration	"PPM"		

Units Selection (UNI)

This value controls the units that data is displayed in.

UNI	
Setting Value	Description
"US"	US customary units (°F, in Hg)
"SI"	International system units (°C, hPa)

Set Point Low Limit Temperature (SOL)

This value sets a lower limit on the current set point value. The set point low limit value is a numerical setting that supports continuous change (increment/decrement) by pressing and holding either the UP or DOWN button. If the new set point low limit temperature is higher than the current set point temperature, then the set point temperature will be set to the new set point low limit temperature.

SOL			
Default Value	Minimum Value	Maximum Value	Increment
20°C (68°F)	0°C (32°F)	Set point high limit	1°

Set Point High Limit Temperature (SOH)

This value sets an upper limit on the current set point value. The set point high limit value is a numerical setting that supports continuous change (increment/decrement) by pressing and holding either the UP or DOWN button. If the new set point high limit temperature is lower than the current set point temperature, then the set point temperature will be set to the new set point high limit temperature.

SOH			
Default Value	Minimum Value	Maximum Value	Increment
35°C (95°F)	Set point low limit	50°C (122°F)	1°

Average Atmospheric Carbon Dioxide Value (AAC)

This parameter sets the value at which the sensors automatic background calibration will reference. The factory setting is derived from research from the National Oceanic and Atmospheric Administration (NOAA).

AAC			
Default Value	Minimum Value	Maximum Value	Increment
Derived from NOAA	200 PPM	9999 PPM	1 PPM

Typical Barometric Pressure (BAR)

This value sets the typical barometric pressure for the location where the device is mounted. The factory setting is for standard pressure at sea level. Adjusting the barometric pressure gives a more accurate measurement, especially at higher elevations.

BAR			
Default Value	Minimum Value	Maximum Value	Increment
1013 hPa (29.9 inHg)	677 hPa (20.0 inHg)	1016 hPa (30.0 inHg)	1 hPa (0.1 inHg)

Temperature Offset (OFT)

This value allows the temperature to be adjusted by a fixed amount to match another calibrated measurement. The display shows the current temperature value plus any previous offset value.

OFT			
Default Value	Minimum Value	Maximum Value	Increment
0°	-30°	30°	0.1°

CO₂ Offset (OFC)

This value allows the CO₂ concentration to be adjusted by a fixed amount to match another calibrated measurement. The display shows the current CO₂ concentration value plus any previous offset value.

OFC			
Default Value	Minimum Value	Maximum Value	Increment
0 PPM	-500 PPM	500 PPM	1 PPM

Auto Serial Configuration (AUT)

This value enables or disables the automatic baud rate detection. If the device fails to communicate or the serial configuration is not one of the options in Table 3, then this value should be set to "OFF". The serial can then be configured manually.

AUT	
Setting Value	Description
"ON"	Auto baud enabled
"OFF"	Auto baud disabled

Parity Selection (PAR)

This value provides the selection of the desired serial parity. This value is only visible when the value of AUT is "OFF".

PAR	
Setting Value	Description
"NON"	No parity
"EVE"	Even parity
"ODD"	Odd parity

Baud Rate (BAU)

This value provides the selection of the desired serial baud rate. This value is only visible when the value of AUT is "OFF".

BAU	
Setting Value	Baud Rate
9.6 K	9,600
19.2 K	19,200
38.4 K	38,400
57.6 K	57,600
76.8 K	76,800
115.2 K	115,200

Stop Bits Selection (STP)

This value provides the selection of the desired serial stop bits. This value is only visible when the value of AUT is "OFF".

STP	
Setting Value	Description
1	One stop bit
2	Two stop bits

Reset To Factory Defaults (RST)

This value, when set to "YES", will reset all user settings to their default values and reset the device. This applies to all settings including BACnet writable settings.

CO₂ Calibration Process (CAL)

This value initiates a calibration sequence of the carbon dioxide sensor to a known gas value. Read the calibration instructions before using this feature. During calibration process be sure to hold the sensor in the vertical plane.

1. Remove the cover and board from back housing.
2. Attach calibration tubing from the gas pressure regulator to one of the nipples on the CO₂ sensor.
3. Attach the cover and board to the calibration fixture with power so that the power wires line up with terminals 1 and 2. Allow 30 minutes of warm up time before proceeding.
4. Flow zero reference gas at 0.3 SLPM for 5 minutes.
5. Press and hold the up and down buttons simultaneously for 5 seconds to enter the menu parameters. The display will show RON parameter.
6. Navigate the setup menu to the "CAL" value and press the enter button. SET will appear on display.
7. Press the down arrow for 3 seconds. When all dashes appear on the display, release the button. Wait 10 seconds (until SET disappears) to exit the menu parameter.
8. Flow the full scale reference gas at 0.3 SLPM for 5 minutes.
9. Repeat steps 5, 6 and 7.
10. Disconnect the power supply from the power source and remove the terminal block from the circuit board.
11. Remove tubing from sensor and re-attach the gas nipple cover to the sensor.
12. Re-attach the cover and board to the original back plate.

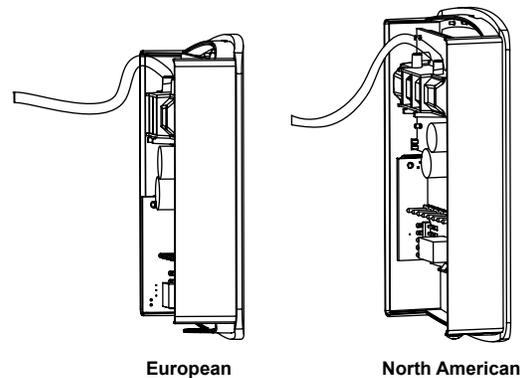


Figure 9: Calibration

MAINTENANCE/REPAIR

Upon final installation of the Series CDTC, no routine maintenance is required. The Series CDTC are not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.



This symbol indicates waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or retailer for recycling advice.

WARRANTY/RETURN

Refer to "Terms and Conditions of Sale" in our catalog and on our website. Contact customer service to receive a Return Materials Authorization number (RMA) before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

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