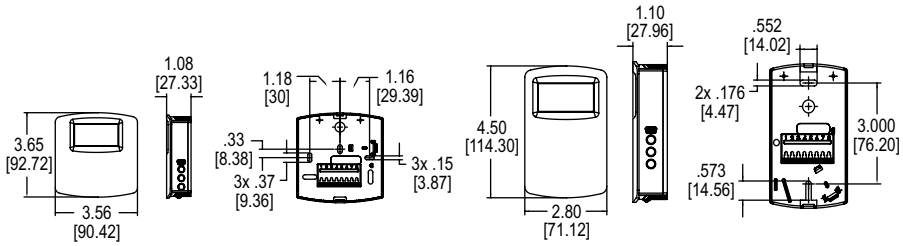
Series CDTA and CDTC Communicating Carbon Dioxide Detector

Specifications - Installation and Operating Instructions

European Style

North American Style



The **Series CDTA and CDTC Communicating Carbon Dioxide Detector** combines the function of several room sensors into a single, compact housing. Both the Series CDTA and the CDTC's parameters include carbon dioxide, temperature, and temperature set point with override while the CDTA also includes a humidity sensor. 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 CDTA and 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. The humidity parameter in the Series CDTA uses a capacitive polymer sensor and the temperature is measured using a 10KΩ thermistor sensor.

Optional local and remote displays are available to display any of the parameters. For applications in which the building occupants aren't familiar with CO_2 concentrations, the LCD can be programmed to display temperature, humidity (only for Series CDTA), 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.

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.

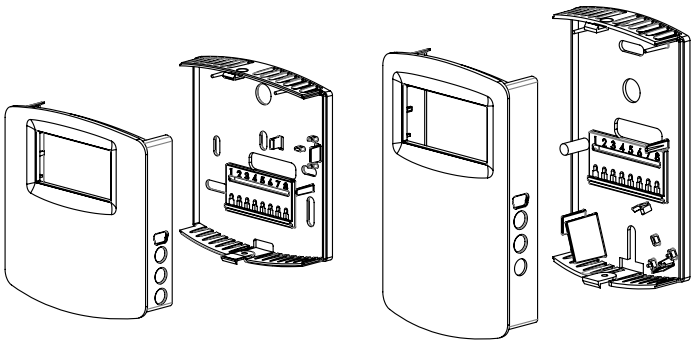


Figure 1: Removal of cover from back plate

SPECIFICATIONS	
Sensor: CO_2 : Single-beam, dual-wavelength NDIR; Humidity*: Capacitive polymer; Temperature: 10KΩ thermistor. **Range:** CO_2 : 0 to 2000 or 5000 PPM CO_2 (depending on model); Humidity*: 0 to 100% RH; Temperature: 32 to 122 °F (0 to 50 °C). **Accuracy:** CO_2: ±40 PPM ±3% of reading; RH*: ±2% (10 to 90% RH); Temperature: ±1°C @ 25°C. **Temperature Dependence (CO_2):** ±8 PPM / °C at 1100 PPM. **Non-Linearity (CO_2):** 16 PPM. **Pressure Dependence (CO_2):** 0.13% of reading per mm of Hg.	**Response Time (CO_2):** 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 / 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.
*Only the Series CDTA has humidity sensing capabilities.	

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 CDTA and 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.

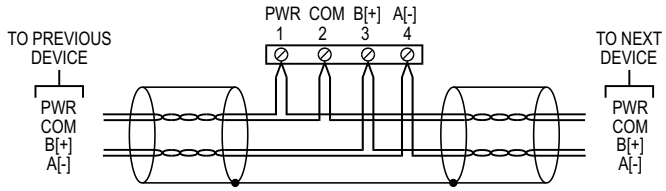


Figure 2: Common power supply wiring

When using a dedicated local power supply, wire the CDTA and 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 CDTA is an end device it has an on-board resistor that may be used. See DIP SWITCH SETTINGS to enable it.

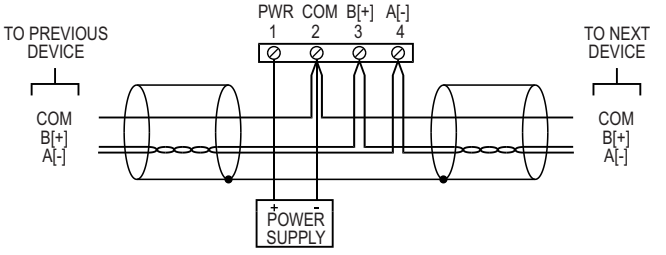


Figure 3: Local power supply wiring

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SETUP AND DIP SWITCH CONFIGURATION

Use DIP Switch SW2 to configure the RS-485 MAC address of the device. The address assignment is determined by adding the values for each of the switches that are in the ON position Table 1 below.

Switch Position	1	2	3	4	5	6	7	8
Address Value	128	64	32	16	8	4	2	1

Table 1: Address value for each switch position

The CDTA and 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.

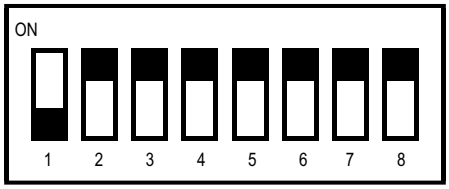

Figure 4: DIP switch SW2 (center-left)

Use DIP Switch SW1 (see Figure 5) to configure other hardware and software options per Table 2 below.

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 Resister	120Ω between A[-] and B[+]	Open

Table 2: DIP switch menu options

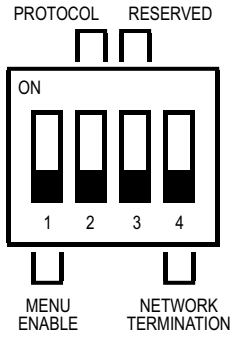

Figure 5: DIP switch SW1 (bottom-center)

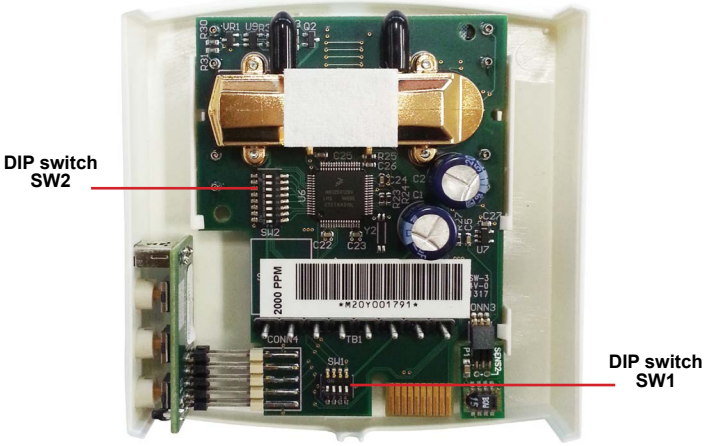

Figure 6: Internal view of transmitter

AUTO SERIAL CONFIGURATION

Auto serial configuration enables the device to determine the baud rate, parity and stop bits directly from the serial traffic. This allows a device to be quickly and easily deployed after a valid RS-485 MAC address is chosen. Note that the auto configuration procedure assumes a serial configuration appropriate to the selected protocol as follows:

SUPPORTED SERIAL CONFIGURATIONS				
Protocol	**Supported Baud Rates**	**Data Size**	**Parity**	**Stop Bits**
BACnet	9600 19200 38400 57600 76800 115200	8	None	1
Modbus® – RTU			Even Odd	1
			None	2

Table 3: Supported serial configurations

If this is not the case, then the serial communication must be configured manually in the setup menu.

To activate auto serial configuration, set a valid RS-485 MAC address using DIP switch SW2, connect the serial bus and power wires, and apply power. The device will power up and begin examining the serial bus for communication.

When Modbus® is selected, and the device is setup offline or away from the main network, it is necessary to generate traffic in order to configure the serial communication. Attempting to read input registers is a good method to generate traffic. Note that while serial configuration is in progress, the device may not respond to requests. The device may require multiple read requests to complete the serial configuration process.

The auto serial configuration process will complete once a message addressed to the device is received and processed successfully. The serial configuration parameters are then saved to non-volatile storage and loaded by default each time the device starts. If the serial configuration of the bus changes, a power cycle of the device is required to restart the Auto Serial Configuration process.

USER INTERFACE

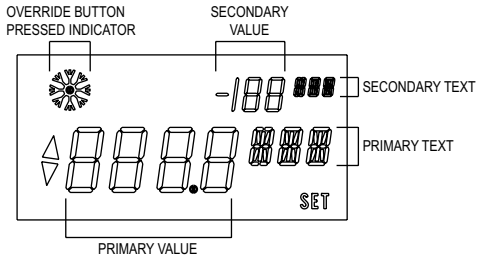

Figure 7: Display layout

Home Screen

For models with the LDC 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 snow flake symbol is displayed momentarily to indicate the button was pressed.

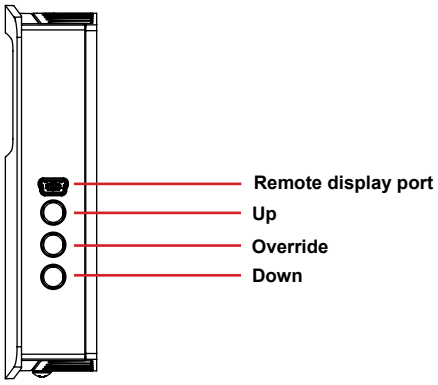

Figure 8: Side view of transmitter

Setup Menu
The setup menu provides a means to configure the device locally. The setup menu can only be entered if the Menu Enable switch is in the on position and a display is present (local or remote). To enter the setup menu, press and hold the UP and DOWN buttons for at least 3 seconds or until the display changes.

The setup menu contains a scrollable list of values that can be changed. Use the UP and DOWN buttons to scroll through the available values. The scrollable list is circular to allow continuous scrolling in either direction.

A value can be modified by first scrolling to the desired value, then press and hold the UP and DOWN buttons for at least 0.5 seconds, or until to word SET is displayed. The value can now be changed with the UP and DOWN buttons. Numerical values are displayed in the primary value area of the display with the current units in the primary text area. Some settings are text based and only show values in the primary text area. When the desired value is reached, press and hold the UP and DOWN buttons for 0.5 seconds to store the value in non-volatile memory and return to the setup menu.

The setup menu will timeout and return to the home screen after 30 seconds of inactivity. The setup menu can also be exited manually by a press and hold of the DOWN button for 0.5 seconds.

SETUP MENU VALUES			
Value	**Description**	**Value**	**Description**
DSP	Home screen configuration	OFT	Temperature offset
UNI	Units selection	OFC	CO_2 offset
SOL	Set point low limit temperature	AUT	Auto serial configuration
SOH	Set point high limit temperature	BAU	Baud rate selection
BAR	Typical barometric pressure	PAR	Parity selection
CAL	CO_2 calibration process	STP	Stop bits selection
OFH*	Relative humidity offset	RST	Reset to factory defaults
*Only the Series CDTA has humidity sensing capabilities.			

Table 4: Setup values

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**
“CH”*	CO_2 concentration	“PPM”	Relative humidity	“%”
“CT”	CO_2 concentration	“PPM”	Temperature	““C” or ““F”
“HT”*	Relative humidity	“%”	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”		
“H”*	Relative humidity	“%”		
“C”	CO_2 concentration	“PPM”		
*Only the Series CDTA has humidity sensing capabilities.				

Table 5: Display values

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)

Table 6: Unit values

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 press and holding of either 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°

Table 7: Set point for low temperature limit

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 press and holding of either 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°

Table 8: Set point for high temperature limit

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

Table 9: Average atmospheric carbon dioxide value

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)

Table 10: Elevation/barometric pressure compensation

CO_2 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 CO_2 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.

Relative Humidity Offset (OFH)
This value, allows the relative humidity to be adjusted by a fixed amount to match another calibrated measurement. The display shows the current relative humidity value plus any previous offset value.

RHU			
Default Value	**Minimum Value**	**Maximum Value**	**Increment**
0%	-30%	30%	0.1%

Table 11: RH offset value

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°

Table 12: Temperature offset value

CO_2 Offset (OFC)
This value allows the CO_2 Concentration to be adjusted by a fixed amount to match another calibrated measurement. The display shows the current CO_2 concentration value plus any previous offset value.

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

Table 13: CO_2 offset value

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

Table 14: Automatic baud rate value

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

Table 15: Serial parity value

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

Table 16: Serial baud rate value

Stop Bits Selection (STP)
This value provides the selection of the desired serial stop bits. This value is only visible when he value of AUT is “OFF”

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

Table 17: Serial stop bits value

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.

BACNET

NOTICE BACnet installations should comply with ANSI/ASHRAE Standard 135-2010 BACnet A Data Communication Protocol for Building Automation and Control Networks, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2010

NOTICE Communications wiring must be in a daisy-chain fashion. Star connections and T connections are not permitted

BACnet Object Overview
The device supports the following objects:

SUPPORTED BACNET OBJECTS				
Object Type	**Dynamically Creatable**	**Dynamically Deletable**	**Object Identifier**	**Object Name**
Device	No	No	607xxx	CDTA IAQ
Analog Input	No	No	AI1	CO_2 concentration
Analog Input	No	No	AI2	Relative humidity*
Analog Input	No	No	AI3	Temperature
Binary Value	No	No	BV1	Override
Binary Value	No	No	BV2	Use SI units
Analog Value	No	No	AV1	Set point
Analog Value	No	No	AV2	Set point low limit
Analog Value	No	No	AV3	Set point high limit
Analog Value	No	No	AV4	Dew point
Analog Value	No	No	AV5	Wet bulb
Analog Value	No	No	AV6	Specific enthalpy
Analog Value	No	No	AV7	Display mode
Analog Value	No	No	AV8	CO_2 Offset
Analog Value	No	No	AV9	Barometric pressure
Analog Value	No	No	AV10	Relative humidity offset*
Analog Value	No	No	AV11	Temperature offset
*Only the Series CDTA has humidity sensing capabilities.				

The default object identifier is 607xxx, where **xxx** is replaced by the MS/TP MAC address set by DIP switch SW2. The object identifier value will change as the MS/TP MAC address changes. However, if a specific object identifier is written via BACnet, then that value is stored and changes to the MS/TP MAC address will no longer affect the object identifier. Similarly, the default object name includes 607xxx. The object name will reflect the current object identifier. If a specific object name is written via BACnet, then that value is stored and changes to the object identifier will no longer affect the object name.

APDU Timeout values are rounded to the nearest second (1000ms). Values less than 500 will be rounded to 0 and Number of APDU Retries will be set to 0.

BACnet Objects

Device Object

Property	Default Value	Property Data Type	Access
Object Identifier	607xxx	BACnetObjectIdentifier	Read/Write
Object Name	“CDTA IAQ 607xxx”	CharacterString(32)	Read/Write
Object Type	DEVICE(8)	BACnetObjectType	Read
System Status	Operational(0)	BACnetDeviceStatus	Read
Vendor Name	“Dwyer Instruments, Inc.”	CharacterString	Read
Vendor Identifier	607	Unsigned	Read
Model Name	“CDTA-???0-???”	CharacterString	Read
Firmware Revision	“?.?”	CharacterString	Read
Application Software Version	“?.?”	CharacterString	Read
Location		CharacterString(32)	Read/Write
Description	“All-in-One CO2/RH/Temp/SetPoint”	CharacterString(32)	Read/Write
Protocol Version	1	Unsigned	Read
Protocol Revision	12	Unsigned	Read
Protocol Services Supported	See PICS	BACnetServicesSupported	Read
Protocol Object Types Supported	See Table 2	BACnetObjectTypesSupported	Read
Object List	See Table 2	BACnetArray	Read
Active COV Subscriptions		List of BACnetCOVSubscription	Read
Maximum APDU Length Supported	480	Unsigned	Read
Segmentation Supported	NO_SEGMENTATION (3)	BACnetSegmentation	Read
APDU Timeout	6000	Unsigned	Read/Write
Number of APDU Retries	3	Unsigned	Read/Write
Max Master	127	Unsigned	Read/Write
Max Info Frames	1	Unsigned	Read/Write
Device Address Binding	Empty	BACnetAddressBinding	Read
Database Revision	1	Unsigned	Read
Serial Number (1000)		CharacterString	Read

Analog Input – CO_2 Concentration
This object represents the current CO_2 concentration reading in parts per million. This object supports COV subscriptions to allow easy monitoring of changing values.

Property	Default Value	Property Data Type	Access
Object Identifier	AI1	BACnetObjectIdentifier	Read
Object Name	“CO2 Concentration”	CharacterString	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Parts-per-million (96)	BACnetEngineeringUnits	Read
COV Increment	50	Real	Read/Write

COV Increment Value:

Default Value	Minimum Value	Maximum Value	Increment
50 PPM	1 PPM	1000000	1 PPM

Analog Input – Relative Humidity, CDTA only
This object represents the current relative humidity reading in percent. This object supports COV subscriptions to allow easy monitoring of changing values.

Property	Default Value	Property Data Type	Access
Object Identifier	AI2	BACnetObjectIdentifier	Read
Object Name	“Relative Humidity”	CharacterString	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/ Write
Units	Percent-relative-humidity (29)	BACnetEngineeringUnits	Read
COV Increment	2	Real	Read/ Write

COV Increment Value:

Default Value	Minimum Value	Maximum Value	Increment
2%	0.1%	99.9%	0.1%

Analog Input – Temperature
This object represents the current temperature reading in degrees Celsius or Fahrenheit depending on the value of the Units property. This object supports COV subscriptions to allow easy monitoring of changing values. Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AI3	BACnetObjectIdentifier	Read
Object Name	“Temperature”	CharacterString	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-Celsius (62) or Degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read/Write
COV Increment	2 (3.6)	Real	Read/Write

COV Increment Value:

Default Value	Minimum Value	Maximum Value	Increment
2°C (3.6°F)	0.5°C (0.3°F)	49.9°C (89.9°F)	0.1°C/°F

Analog Value – Set Point
This object represents the desired set point temperature in degrees Celsius or Fahrenheit depending on the value of the Units property. Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV1	BACnetObjectIdentifier	Read
Object Name	“Set Point”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	22(72)	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-Celsius (62) or Degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read/Write

Present Value: The set point value is normally set by the local user with the buttons, but the set point can be written directly from BACnet.

Default Value	Minimum Value	Maximum Value	Increment
22°C (72°F)	Set point low limit	Set point high limit	1°C/°F

Analog Value – Set Point Low Limit
This object represents the minimum allowed set point temperature in degrees Celsius or Fahrenheit depending on the value of the Units property. Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV2	BACnetObjectIdentifier	Read
Object Name	“Set Point Low Limit”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	20(68)	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-Celsius (62) or Degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read/Write

Present Value: If a new value written to this property is higher than the set point present value, then the set point present value will be set to the new value.

Default Value	Minimum Value	Maximum Value	Increment
20°C (68°F)	0°C (32°F)	Set Point High Limit	1°

Analog Value – Set Point High Limit
This object represents the maximum allowed set point temperature in degrees Celsius or Fahrenheit depending on the value of the Units property. Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV3	BACnetObjectIdentifier	Read
Object Name	“Set Point High Limit”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	35(95)	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-Celsius (62) or Degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read/Write

Present Value: If a new value written to this property is lower than the set point present value, then the set point present value will be set to the new.

Default Value	Minimum Value	Maximum Value	Increment
35°C (95°F)	Set Point Low Limit	50°C (122°F)	1°

Analog Value – Dew Point
This object represents the current calculated dew point temperature in degrees Celsius or Fahrenheit depending on the value of the Units property. Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV4	BACnetObjectIdentifier	Read
Object Name	“Dew Point”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-Celsius (62) or Degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read/Write

Analog Value – Wet Bulb
This object represents the current calculated wet bulb temperature in degrees Celsius or Fahrenheit depending on the value of the Units property. Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV5	BACnetObjectIdentifier	Read
Object Name	“Wet Bulb”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-Celsius (62) or Degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read/Write

Analog Value – Specific Enthalpy
This object represents the current calculated specific Enthalpy in kilojoules per kilogram or BTUs per pound dry air depending on the value of the Units property. Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV6	BACnetObjectIdentifier	Read
Object Name	“Specific Enthalpy”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Kilojoules-per-kilogram dry-air (149) or BTUs-per-pound dry-air (24)	BACnetEngineeringUnits	Read/Write

Analog Value – Display Mode
This object represents the current display configuration. Changing this value changes the information displayed to the user.

Property	Default Value	Property Data Type	Access
Object Identifier	AV7	BACnetObjectIdentifier	Read
Object Name	“Display Mode”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	7	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	No-units (95)	BACnetEngineeringUnits	Read

Present Value: The value written to this property should be a whole number. The value maps to the Home Screen Configuration (DSP) value as follows:

Present Value	DSP Value	Primary Value	Primary Text	Secondary Value	Secondary Text
7*	“CH”	CO_2 Concentration	“PPM”	Relative Humidity	“%”
6	“CT”	CO_2 Concentration	“PPM”	Temperature	“°C” or “°F”
5*	“HT”	Relative Humidity	“%”	Temperature	“°C” or “°F”
4	“TS”	Temperature	“°C” or “°F”	Set Point	“°C” or “°F”
3	“S”	Set Point	“°C” or “°F”		
2	“T”	Temperature	“°C” or “°F”		
1*	“H”	Relative Humidity	“%”		
0	“C”	CO_2 Concentration	“PPM”		
*Only the Series CDTA has humidity sensing capabilities.					

Analog Value – CO_2 Offset
This object represents the CO_2 Concentration offset value (OFC).

Property	Default Value	Property Data Type	Access
Object Identifier	AV8	BACnetObjectIdentifier	Read
Object Name	“CO2 Offset”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Parts-per-million (96)	BACnetEngineeringUnits	Read

Present Value: This value allows the CO_2 Concentration to be adjusted by a fixed amount to match another calibrated measurement.

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

Analog Value – Barometric Pressure
This object represents the typical barometric pressure at the install location (BAR). Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV9	BACnetObjectIdentifier	Read
Object Name	“Barometric Pressure”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	1013 (29.9)	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Hectopascals(133) or Inches-of-Mercury (61)	BACnetEngineeringUnits	Read/Write

Present Value: 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.

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)

Analog Value – Relative Humidity Offset, CDTA only
This object represents the Relative Humidity Offset value (OFH).

Property	Default Value	Property Data Type	Access
Object Identifier	AV10	BACnetObjectIdentifier	Read
Object Name	“Relative Humidity Offset”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Percent-relative-humidity (29)	BACnetEngineeringUnits	Read

Present Value: This value allows the relative humidity to be adjusted by a fixed amount to match another calibrated measurement.

Default Value	Minimum Value	Maximum Value	Increment
0%	-30%	30%	0.1%

Analog Value – Temperature Offset
This object represents the Temperature Offset value (OFT). Note that the Units property is writable. Changing the Units value in this object will change the Units used by the entire device.

Property	Default Value	Property Data Type	Access
Object Identifier	AV11	BACnetObjectIdentifier	Read
Object Name	“Temperature Offset”	CharacterString	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-Celsius (62) or Degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read/Write

Present Value: This value allows the temperature to be adjusted by a fixed amount to match another calibrated measurement.

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

Binary Value – Override
This object represents the value of the override state. A press of the override button can only set the override state to ACTIVE. The override button will not toggle the override state. The override state can only be set to INACTIVE via BACnet. This object supports COV subscriptions to allow easy monitoring of the override state. Every press of the override button will send a COV notification to subscribers regardless of the current override state. This ensures subscribers are notified even if the state is already ACTIVE.

Property	Default Value	Property Data Type	Access
Object Identifier	BV1	BACnetObjectIdentifier	Read
Object Name	"Override"	CharacterString	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	0	BACnetBinaryPV	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write

Binary Value – Use SI Units
This object represents the current system of units in use by the device (UNI).

Property	Default Value	Property Data Type	Access
Object Identifier	BV2	BACnetObjectIdentifier	Read
Object Name	Use SI Units	CharacterString	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	Region Dependent	BACnetBinaryPV	Read/Write
Status Flags	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED(0)	BACnetReliability	Read
Out Of Service	FALSE (0)	Boolean	Read/Write

Present Value: This value affects the data on the display as well as the data read from the BACnet objects.

Region	Present Value	UNI Value	Description
North America (Default)	INACTIVE	"US"	US Customary Units (°F, inHg, BTU/lb dry-air)
Europe (Default)	ACTIVE	"SI"	International System Units (°C, hPa, kJ/kg dry-air)

BACnet Services

Device Communication Control Service (DM-DCC-B)

This device supports the Device Communication Control Service BIBB. The optional time duration in minutes is also supported. This device is configured with a password that must be provided to successfully execute this command. The password is "Dwyer".

Reinitialize Device Service (DM-RD-B)

This device supports the Reinitialize Device Service BIBB. The supported device states are COLDSTART and WARMSTART. All other states return error. This device is configured with a password that must be provided to successfully execute this command. The password is "Dwyer".

Subscribe COV Service (DS-COV-B)

This device supports the SubscribeCOV Service BIBB to allow easy monitoring of input data.
- Up to seven (7) concurrent subscriptions
- Confirmed and Unconfirmed COV Notifications
- Fixed lifetime value up to 86400 seconds (24 hours).
- Indefinite lifetime supported.

MODBUS®

NOTICE Modbus® installations should comply with Modbus® Communication Protocol over Serial Line Specification and Implementation Guide V1.02, Modbus® Organization, Inc., 2006

NOTICE Communications wiring must be in a daisy-chain fashion. Star connections and T connections are not permitted

Modbus® Functions
The CDTA and CDTC supports the following functions.

Function Name	Function Code
Read Holding Registers	03
Read Input Registers	04
Write Single Register	06
Write Multiple Registers	16

Modbus® Registers

Input Registers
The String data type is read as a stream of ASCII characters with the first character sent in the MSB of the first register and the second character sent in the LSB of the first register and so on. If the string is shorter than the allotted size, the remaining bytes will be zero padded.

INPUT REGISTERS			
Register	**Description**	**Data Type**	**Range**
0001	CO2 Concentration in PPM	Unsigned 16bit integer	
0002*	Relative Humidity in 0.1%	Unsigned 16bit integer	0 – 1000
0003	Temperature in 0.1°C or °F	Signed 16bit integer	
0004	Dew Point Temperature in 0.1°C or °F	Signed 16bit integer	
0005	Wet Bulb Temperature in 0.1°C or °F	Signed 16bit integer	
0006	Specific Enthalpy in 0.1 kJ/kg dry air or BTU/lb dry air	Signed 16bit integer	
0007	CO2 Measurement Status	Unsigned 16bit integer	0 – OK 1 – Not Installed 2 – Not Functional
0008*	Humidity Measurement Status	Unsigned 16it integer	0 – OK 1 – Not Installed 2 – Not Functional
0009	Temperature Measurement Status	Unsigned 16bit integer	0 – OK 1 – Not Installed 2 – Not Functional
0010	Set Point Status	Unsigned 16bit integer	0 – OK 1 – Not Installed
1000 – 1009	Model Number String	String	"CDTA-???0-???"
1010 – 1015	Serial Number String	String	
1016 – 1018	Firmware Version String	String	"?.?"
*Only the Series CDTA has humidity sensing capabilities.			

Holding Registers
The holding registers allow the device to be completely configured remotely after being connected the Modbus® network.

The Override State register indicates if the override button has been pressed. The override button only sets the Override State register to 1. The Override State register must be written with a value of 0 to return it to the non-asserted state.

The Reboot Device register allows a Modbus® master to remotely request this device to perform a warm reset. When a value of 1 is written to this register, the device will respond with success. The reset will take place approximately 5 seconds after the command was received. Writing a value of 0 to this register has no effect.

HOLDING REGISTERS				
Register	**Description**	**Data Type**	**Value**	**Range**
0001	Override State	Unsigned 16bit integer	0 – 1	0 or 1
0002	Set Point Temperature in 1°C or °F	Unsigned 16bit integer	0 – 50 (32 – 122)	0 – 50°C (32 – 122°F)
0003	Set Point High Limit Temperature in 1°C or °F	Unsigned 16bit integer	0 – 50 (32 – 122)	0 – 50°C (32 – 122°F)
0004	Set Point Low Limit Temperature in 1°C or °F	Unsigned 16bit integer	0 – 50 (32 – 122)	0 – 50°C (32 – 122°F)
0005	CO2 Offset in PPM	Signed 16bit integer	±500	±500
0006	Typical Barometric Pressure in 1hPa or 0.1inHg	Unsigned 16bit integer	677 – 1016 (200 – 300)	677 – 1016hPa (20.0 – 30.0 inHg)
0007*	Relative Humidity Offset in 0.1%	Signed 16bit integer	±300	±30.0%
0008	Temperature Offset in 0.1°C or °F	Signed 16it integer	±300	±30.0°C/°F
0009	Display Mode	Unsigned 16bit integer	0 – 7	See Table 3
0010	System of units selection	Unsigned 16bit integer	0 – 1	0 – US Customary 1 – SI
0500	Reboot device	Unsigned 16bit integer	0 – 1	0 – Do nothing 1 – Warm Reset
*Only the Series CDTA has humidity sensing capabilities.				

MAINTENANCE/REPAIR
Upon final installation of the Series CDTA and CDTC, no routine maintenance is required. The Series CDTA and 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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