

Introduction

The CO Transmitter uses an electrochemical sensor to monitor the carbon monoxide level and outputs a field-selectable 4-20 mA or voltage signal. The voltage signal may also be set to 0-5 or 0-10 Vdc. The sensing range and output may be scaled to either 100, 150, 300, 400 or 500 ppm via the on-board menu. A front panel LCD is standard to ensure easy setup and operation.

Other standard features include a back light for the LCD, a front panel test switch, status indication and an alarm buzzer. The test function may also be controlled remotely with a digital input signal. A three-key menu is implemented to allow local configuration of all device parameters.

Optional features include one or two alarm relays and RS-485 network communications configured for either ModBus or BACnet protocols.

Before Installation

Read these instructions carefully before installing and commissioning the CO Transmitter. Failure to follow these instructions may result in product damage. Do not use in an explosive or hazardous environment, with combustible or flammable gases, as a safety or emergency stop device or in any other application where failure of the product could result in personal injury. Take electrostatic discharge precautions during installation and do not exceed the device ratings.

Mounting

The CO duct type sensor installs on the outside of a return air duct with the sampling tube inserted into the duct. Use the included foam plug to prevent air from entering the enclosure through the conduit and causing an incorrect reading. Mount the sensor in an easily accessible location in a straight section of duct at least five feet from corners and other items that may cause disturbances in the air flow. Avoid areas with vibrations or rapid temperature changes.

The duct CO detector principal of operation is based on the Venturi effect of the probe that extends into the HVAC duct. Air flowing through the duct is forced into the vent holes on one side of the probe, into the enclosure, over the CO sensor and then is drawn back out of the enclosure via the probe vent holes on the opposite side.

Drill or punch a 1-1/8" or 1-1/4" hole in the duct at the preferred location and insert the probe into the hole to mark the enclosure mounting holes. Remove the unit and drill the four mounting holes. Clean all drilled holes of debris before mounting the device. Mount the enclosure to the duct with four sheet metal screws such that the duct air flow is parallel with the vent holes in the probe (i.e.: air flows directly into the probe holes). To prevent air leaks, ensure the gasket is compressed around the probe between the device enclosure and the air duct.

Open the cover by releasing the latch and connect the device according to the wiring instructions. After wiring and setup are complete, close and latch the cover. Secure it with two self-tapping screws in the holes provided.

Hardware Setup

The only hardware setup required is to select the analog output type with the pcb switch labelled **VOLT** and **mA**. Slide the switch to the correct position for the required output signal type, either 4-20 mA or 0-5/10 Vdc.

Power and Analog Output Wiring

Use 22 AWG shielded wire for all connections and do not locate the device wires in the same conduit with wiring used to supply inductive loads such as motors. Disconnect the power supply before making any connections to prevent electrical shock or equipment damage. Make all connections in accordance with national and local codes.

The wiring configuration depends on the specific model and the installed options. Follow the example wiring diagrams to determine the correct wiring. All models have the same terminal functions. This device has a half-wave type power supply so

the power supply common is the same as the output signal common. Therefore, several devices may be connected to one power supply and the output signals all share the same signal common. Use caution when grounding the secondary of an AC transformer or when wiring multiple devices so that the circuit ground point is the same on all devices and the controller.

In general, the transformer should NOT be connected to earth ground when using devices with RS-485 network connections.

This is a 3-wire sourcing device. All models require a 24 Vac/dc power supply to operate. Connect the positive dc voltage or the hot side of the ac voltage to the **ANALOG - PWR** terminal and the power supply common to the **ANALOG - COM** terminal. Note that the Analog COM terminal is NOT connected to the Relay COM terminals. The device is reverse voltage protected and will not operate if the power supply is connected backwards.

The linear output signal (either 4-20 mA or 0-5/10 Vdc) is available on the **ANALOG - CO** terminal. The signal is referenced to the Analog COM terminal. The 4-20 mA output signal operates in the Active mode and does not require a loop power supply. This means **the signal current is generated by the transmitter and must not be connected to a powered input or device damage will result.** This is the typical operating mode of a “three-wire device”. Ensure the controller Analog Input (AI) matches the CO Transmitter output signal type before power is applied. The current signal has a maximum load that it will drive and the voltage output has a minimum load. Follow the ratings in the Specification section or inaccurate readings may result. The power must be disconnected to change from VOLT to mA. The analog output CO signal is typically connected directly to the Building Automation System (BAS) and used as a control parameter or for logging purposes.

Remote Test Wiring

The CO Transmitter has a Test function that will test the analog output and the alarm relays which is initiated by pressing the front panel TEST switch. The Test function may also be initiated remotely by shorting the **TEST +** and **TEST -** terminals. Note that the TEST - terminal is connected to the Analog COM terminal. The TEST terminals should only be connected to a dry-contact digital output from the controller that is either shorted or floating open. Ensure no power is applied to the TEST terminals. The TEST terminals may also be connected to a remote switch. If desired, only one wire need be connected to the TEST + terminal and use the power supply COM as the return signal path.

Alarm Relay Wiring

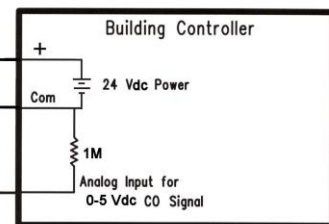
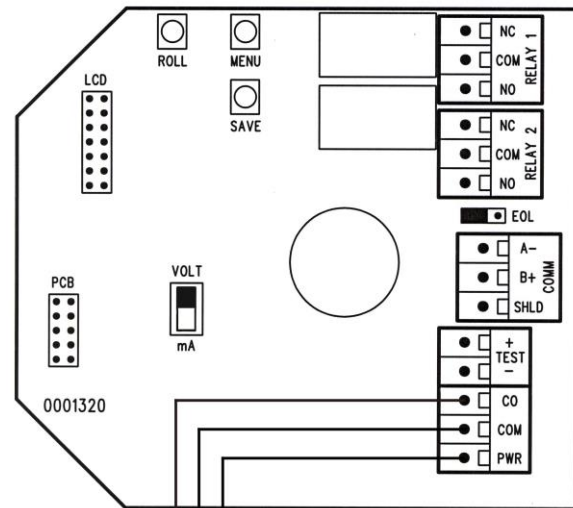
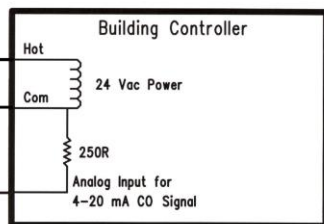
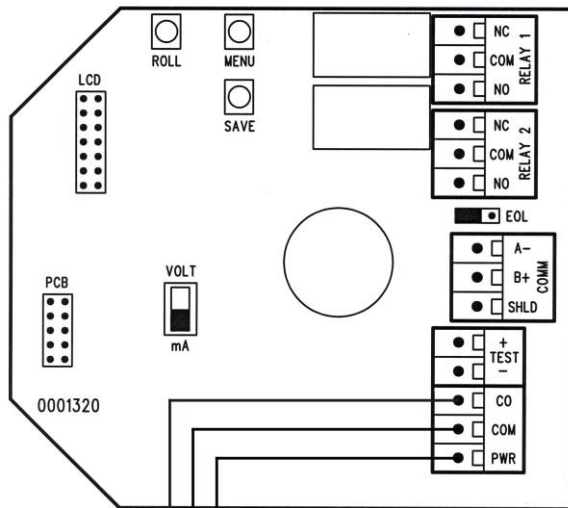
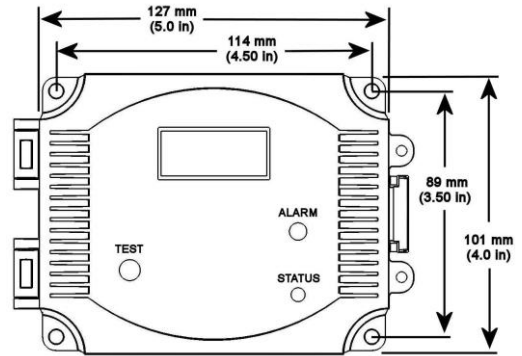
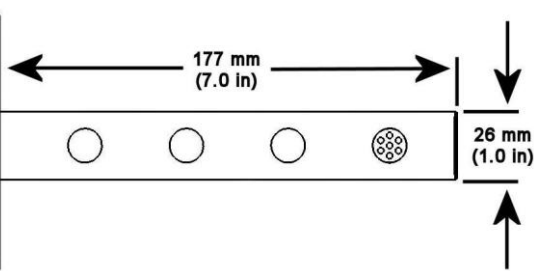
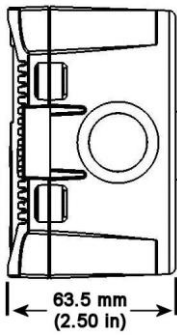
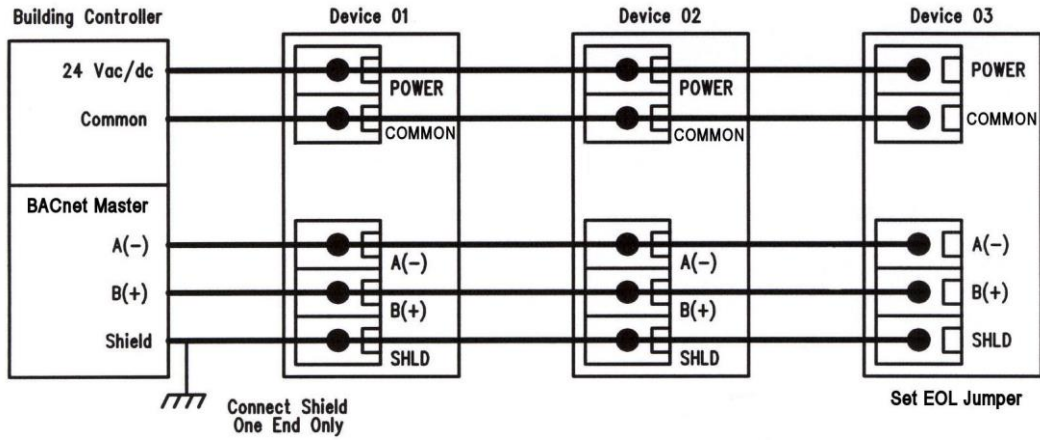
If equipped, the alarm relay outputs are available on the **NO**, **COM** and **NC** terminals for each relay. The relay COM terminals are NOT connected to the signal or power supply COM terminal nor to each other. The two relays are completely isolated and have both Normally Open (NO) and Normally Closed (NC) contacts. These signals can be used to directly control alarms, ventilation fans or may be connected to digital inputs of the BAS for status monitoring. Ensure any loads connected to the relays are within the relay ratings in the Specification section.

RS-485 Network Wiring

If the transmitter is equipped with RS-485 communication (either ModBus or BACnet), then the **COMM** terminals (**A-**, **B+** and **SHLD**) will also be available.

Connect the RS-485 network with twisted shielded pair to the terminals marked **A-**, **B+** and **SHLD**. The positive wire connects to **B(+)** and the negative wire connects to **A(-)** and the cable shield must be connected to the **SHLD** (shield) terminal on each device. If the device is installed at either end of the network, an end-of-line (EOL) termination resistor (121 ohm) should be installed in parallel to the A(-) and B(+) terminals. This device includes a network termination jumper and will connect the resistor correctly on the pcb. Simply move the pcb jumper to the **EOL** position and no external resistor is required. The ground wire of the shielded pair should be connected to earth ground at the end of the network and the master is not grounded. Do not run bus wiring in the same conduit as line voltage wiring.

A network segment is a single shielded wire loop run between several devices (nodes) in a daisy chain configuration. The total segment length should be less than 4000 feet (1220 meters) and the maximum number of nodes on one segment is 127 for BACnet or 255 for ModBus. Nodes are any device connected to the loop and include controllers, repeaters and sensors such as the CO Transmitter but do not include the EOL terminators. To install more devices, or to increase the network length, repeaters will be required for proper communication. The maximum daisy chain length (segment) depends on transmission speed (baud rate), wire size and number of nodes. If communication is slow or unreliable, it may be necessary to wire two daisy chains to the controller with a repeater for each segment.



Operation - Start-up

Verify that the CO Transmitter is properly wired according to the wiring diagrams and all connections are tight. Ensure the output switch is in the correct position for either voltage or mA. Apply power to the device.

The device will initially start up in warm-up mode which lasts for about two minutes. Immediately after applying power the LCD will display the software version number and begin a two minute countdown. If the product has a communication option installed it will also display the ModBus address and baud rate (for ModBus) or the MAC ID, device instance and baud rate (for BACnet). The alarm buzzer will also beep.

During the warm-up mode the alarm relays will be set to off, the LED will flash red, all communications are disabled, the key pad is disabled and the analog output will be set to it's minimum value.

Operation - Normal Mode

In normal operation the sensor will measure the CO level in the duct air and output a proportional value on the analog output which is scaled to the default range of 0-300 ppm. The CO reading will also be displayed on the LCD and updated in the communication value. If alarm relays are installed, the present CO reading is compared to the setpoints and appropriate action is taken if an alarm condition exists. The status LED on the front cover will be green to indicate normal operation.

Operation - Alarm Mode

The CO reading is compared to pre-set setpoints for alarms and if they are exceeded the device enters Alarm mode. The alarm reset back to Normal mode can be configured via the menu as either Automatic Reset or Manual Reset.

Automatic Alarm Reset (Default)

Two optional relays are used to indicate alarm conditions. The trip point, hysteresis and delay time of each relay can be programmed via the menu. For example, Relay 1 defaults to a 50 ppm trip point, 10 ppm hysteresis and 2 minute delay time. Relay 2 defaults to a 150 ppm trip point, 20 ppm hysteresis and 2 minute delay time. All of these values can be changed via the menu. In the example for Relay 1, a timer is started when the CO level exceeds 50 ppm (the trip level). If the level drops below 50 ppm before 2 minutes (the delay time) has expired then the relay is not activated. If the CO level exceeds 50 ppm for 2 minutes then the relay is activated. The relay will remain activated until the CO level drops below 40 ppm (trip level – hysteresis). This relay can be used to signal a “low alarm”. Relay 2 operates in the same manner and has independently programmable trip point, hysteresis and delay time. This relay can be used to signal a “high alarm”. The LCD will indicate the Alarm mode details and the LED will flash red.

The buzzer alarm defaults to a 150 ppm trip point and 5 minute delay time and can be programmed similarly to the relays. When the trip point is exceeded for a time longer than the delay time, then the buzzer will sound until the CO level falls below the trip point. The buzzer operates independently of the relay alarms and can be disabled via the menu. If enabled, and the device is in Alarm mode, pressing the TEST switch will "silence" the buzzer only. Buzzer silence will only hold until the alarm condition is cleared so the next CO setpoint alarm will activate the buzzer again.

Manual Alarm Reset

In this case, the alarm relays will activate the same way as described above but will not automatically reset to Normal Mode when the CO level drops below the trip level - hysteresis value. In order to reset the relay alarms to Normal Mode the user must also press the TEST switch on the front cover (or activate the remote TEST input). If the CO level is below the alarm level AND the TEST switch is pressed, then the relay alarms will return to the Normal Mode.

The Manual Reset also applies to the buzzer alarm. If the buzzer alarm is active, pressing the TEST switch will "silence" the buzzer. If the buzzer alarm was active but the CO level has been reduced below the trip point, then the TEST switch must be pressed to reset the buzzer alarm to the Normal Mode.

Operation - Test Mode

The Test mode function is disabled by default, it must be enabled via the menu to operate. To initiate the Test function during normal operation, either press and hold the TEST switch for 1 second or activate it remotely by shorting the TEST + to TEST – (COM). This will cause the Status LED to blink red, the analog output to go to 100% and both relays to activate. The buzzer will also beep once every 15 seconds if enabled and the LCD will indicate the Test mode and the remaining time. The Test function will continue for 5 minutes (default) and then the device will reset to normal operation. The Test function can

be cancelled by pressing the TEST switch a second time. Test mode cannot be activated if the device is in Fault, Alarm or Re-Cal modes of operation, only in Normal mode. The Test function is useful to verify the output and alarm relay operation and the Test time can be programmed via the menu.

Operation - Fault Mode

The Fault mode function is disabled by default, it must be enabled via the menu to operate. The Fault function will monitor the CO sensor lifetime and indicate when the CO sensor should be replaced. If the device determines that the sensor has reached the end of its useful life and that replacement is necessary it will enter Fault mode. This will cause the Status LED to blink red and the buzzer to beep once every 10 minutes. The LCD will periodically show "Sensor Fault". The Fault mode can be disabled via the menu or enabled at any time. If enabled, and the device is in Fault mode, pressing the TEST switch will "silence" the buzzer due to the Fault alarm only. Buzzer silence due to the Fault alarm will hold until the Fault condition is reset via the menu. The buzzer may still activate due to a CO setpoint alarm if enabled.

Operation - Re-Cal Mode

The Re-Cal mode function is enabled by default, it must be disabled via the menu if it is not required. The Re-Cal function will monitor the device and indicate when the CO sensor should be re-calibrated. If the device determines that the sensor requires re-calibration it will enter Re-Cal mode. This will cause the Status LED to blink red and the buzzer to beep once every 10 minutes. The LCD will periodically show "ReCal Required". If enabled, and the device is in Re-Cal mode, pressing the TEST switch will "silence" the buzzer due to the ReCal alarm only. Buzzer silence due to the ReCal alarm will hold until the ReCal condition is reset via the menu. The buzzer may still activate due to a CO setpoint alarm if enabled.

Network Communication

Some details of the device setup can be found in the User Menu section. Specific ModBus or BACnet protocol information is included in a separate document if the communication option is installed on the product.

Operation - User Menu

The device has several parameters that can be configured locally via the User menu using the keypad and LCD. All parameters default to typical values but the installer may want to change some values. In some cases, such as the device network address, the installer **MUST** change the settings before operation. Any changes made are saved in non-volatile memory and are restored in case of a power loss. Only the menu items relevant to the device model will be shown. The menu can be accessed at any time after the warm-up mode and if there is 5 minutes of inactivity the menu will close and normal operation will continue. Note that the TEST switch has no affect when the User menu is in use.

The menu has several items as shown below. To enter the menu, press and release the <MENU> key. This will enter the User menu step 1, pressing the <MENU> key a second time advances to step 2. Each press of the <MENU> key advances the menu item. No values are saved or changed by using the <MENU> key. The <ROLL> key is used to make changes to program variables by scrolling through the available options. Holding the <ROLL> key pressed will scroll through some options at a faster rate. When a value is changed, use the <SAVE> key to save it to memory and advance to the next menu item. The first column below shows what will be displayed on the LCD, including the default value.

- | | |
|-------------------------|---|
| <MENU> | Press and release the <MENU> key to enter the User menu |
| 1. CO Range
0-300ppm | Press the <ROLL> key to scroll through the available options. The CO sensing range and output scale can be changed to 0-100ppm, 0-150ppm, 0-300ppm, 0-400ppm or 0-500ppm. Press the <SAVE> key to save any change. The factory default CO Range is 0-300ppm. |
| <MENU> | |
| 2. Buzzer
Enable | Use the <ROLL> key to enable or disable the buzzer alarm. When disabled, the buzzer will not sound if the buzzer trip point is exceeded. The buzzer will still beep on startup and will still beep for a fault alarm (if enabled). Press <SAVE> to save the setting. The factory default is Enable. |
| <MENU> | |
| 3. Buzzer
Trip 150 | Use the <ROLL> key to scroll through the available options. The buzzer alarm trip point may be set from 20 to 500 ppm in 10 ppm increments. Press <SAVE> to save the setting. The factory default is 150 ppm. This item will not be shown if the buzzer is disabled. |

<MENU>

- 4. Buzzer** Use the <ROLL> key to scroll through the available options. The buzzer delay may be set from 0 to 10 minutes in 1 minute increments. Press <SAVE> to save the setting. The factory default is 5 minutes. This item will not be shown if the buzzer is disabled.
Del 5Min

<MENU>

- 5. Buzzer** Use the <ROLL> key to toggle the buzzer ON or OFF. This item will not be shown if the buzzer is disabled.
Test OFF

<MENU>

- 6. Relay 1** Use the <ROLL> key to scroll through the available options. The relay 1 alarm trip point may be set from 20 to 500 ppm in 10 ppm increments. Press <SAVE> to save the setting. The factory default is 50 ppm. This item will not be shown if relay 1 is not installed.
Trip 50

<MENU>

- 7. Relay 1** Use the <ROLL> key to scroll through the available options. The relay 1 hysteresis may be set from 10 to 100 ppm in 5 ppm increments. Press <SAVE> to save the setting. The factory default is 10 ppm. Note that the maximum value may be limited by the trip point value. This item will not be shown if relay 1 is not installed.
Hyst 10

<MENU>

- 8. Relay 1** Use the <ROLL> key to scroll through the available options. The relay 1 delay may be set from 0 to 10 minutes in 1 minute increments. Press <SAVE> to save the setting. The factory default is 2 minutes. This item will not be shown if relay 1 is not installed.
Del 2Min

<MENU>

- 9. Relay 1** Use the <ROLL> key to toggle relay 1 ON or OFF. This item will not be shown if relay 1 is not installed.
Test OFF

<MENU>

- 10. Relay 2** Use the <ROLL> key to scroll through the available options. The relay 2 alarm trip point may be set from 20 to 500 ppm in 10 ppm increments. Press <SAVE> to save the setting. The factory default is 150 ppm. This item will not be shown if relay 2 is not installed.
Trip 150

<MENU>

- 11. Relay 2** Use the <ROLL> key to scroll through the available options. The relay 2 hysteresis may be set from 10 to 100 ppm in 5 ppm increments. Press <SAVE> to save the setting. The factory default is 20 ppm. Note that the maximum value may be limited by the trip point value. This item will not be shown if relay 2 is not installed.
Hyst 20

<MENU>

- 12. Relay 2** Use the <ROLL> key to scroll through the available options. The relay 2 delay may be set from 0 to 10 minutes in 1 minute increments. Press <SAVE> to save the setting. The factory default is 2 minutes. This item will not be shown if relay 2 is not installed.
Del 2Min

<MENU>

- 13. Relay 2** Use the <ROLL> key to toggle relay 2 ON or OFF. This item will not be shown if relay 2 is not installed.
Test OFF

<MENU>

- 14. TestMode** Use the <ROLL> key to disable or enable the test mode. The factory default is Disable. When disabled, the Disable
TEST switch or TEST input will not initiate the test function. When enabled, pressing the TEST switch will initiate the test function. Note that the test mode will only function if the device is operating in the Normal mode, the test function cannot be initiated if any alarm is present. Press <SAVE> to save the setting.
- <MENU>
- 15. TestMode** Use the <ROLL> key to scroll through the available options. The test mode operating time may be set from Time 5
1 to 15 minutes in 1 minute increments. Press <SAVE> to save the setting. The factory default is 5 minutes. This item sets how long the test mode will operate when the TEST switch is pressed. This item is not shown if the test mode is disabled.
- <MENU>
- 16. Fault Md** Use the <ROLL> key to select Enable, Disable or Reset. When disabled, the device will not sound the Disable
buzzer or provide LCD and status LED indication when the sensor life is exceeded. When enabled, the fault alarm will activate to indicate the sensor life is exceeded. Press <SAVE> to save the setting. The factory default is Disable. If it is set to Reset and <SAVE> is pressed, then the fault condition is cleared, the life-time timer is reset and fault mode is set back to it's default of disable. It may be enabled again.
- <MENU>
- 17. Fault Md** Use the <ROLL> key to set the fault mode timer to 3, 4, 5 or 6 years. The factory default is 3 years. This Time 3yr
item is not shown if the fault mode is disabled. Press <SAVE> to save the setting. If the desired time has already been exceeded, then it cannot be selected.
- <MENU>
- 18. ReCal Md** Use the <ROLL> key to select Enable, Disable or Reset. When disabled, the device will not sound the Enable
buzzer or provide LCD and status LED indication when the sensor requires re-calibration. When enabled, the ReCal alarm will activate to indicate the sensor requires re-calibration. Press <SAVE> to save the setting. The factory default is Enable. If it is set to Reset and <SAVE> is pressed, then the ReCal condition is cleared, the ReCal timer is reset and ReCal mode is set back to it's default of Enable. This can be used if the CO sensor is required to be re-calibrated at known intervals.
- <MENU>
- 19. ReCal Md** Use the <ROLL> key to set the ReCal mode timer to 1, 2 or 3 years. The factory default is 1 year. This Time 1yr
item is not shown if the ReCal mode is disabled. Press <SAVE> to save the setting. This is used to set the CO sensor re-calibration interval.
- <MENU>
- 20. Alarm Md** Use the <ROLL> key to set the Alarm Mode to Auto or Manual. The factory default is Auto. This setting Auto
controls how the relay alarms and the buzzer alarm resets back to Normal mode. For the Auto setting, the device will reset the alarms automatically once the CO level drops below the set alarm thresholds. For the Manual setting, the CO level must be below the alarm thresholds AND the user must press the TEST switch on the device to reset the alarms. Press <SAVE> to save the setting.
- <MENU>
- 21. 0 Filter** Use the <ROLL> key to enable or disable the zero filter. When enabled, the device will filter low ppm Enable
readings such that 0-5 ppm CO will display and output 0 ppm. When disabled, 0-5 ppm will display and output actual 0-5 ppm. Press <SAVE> to save the setting. The factory default is Enable. Note that this should be set to Disable when doing a ZERO gas calibration.
- <MENU>
- 22. Display** Use the <ROLL> key to toggle the setting to either CO Value or Status. When set to CO Value, the actual CO Value
CO Value
ppm value of the CO reading will be displayed on the LCD. When set to Status, the ppm value will not be displayed only the device operating status. Press <SAVE> to save the setting. The factory default is CO Value.

<MENU>

- 23. BackLite Enable** Use the <ROLL> key to enable or disable the LCD backlight. When enabled the backlight is always on and when disabled it never lights. Press <SAVE> to save the setting. The factory default is Enable.

<MENU>

- 24. Out Type 0-5 Vdc** Use the <ROLL> key to toggle the voltage output type to either 0-5 Vdc or 0-10 Vdc. Press <SAVE> to save the setting. The factory default is 0-5 Vdc. Note that this item is only shown if the pcb switch is in the VOLT position. Also note that the output type can only be changed by disconnecting the power to the unit.

<MENU>

- 25. Output Test OFF** Use the <ROLL> key to scroll through the available options. The output and display depends on the output type configuration. For 4-20 mA output the settings are OFF/4/8/12/16/20 mA, for 0-5 Vdc output they are OFF/0/1/2/3/4/5 Vdc and for 0-10 Vdc output they are OFF/2/4/6/8/10 Vdc. This can be used to test the output signal.

<MENU>

The next steps are only shown if the ModBus communication protocol is installed.

- 26. ModBus Addr 01** Use the <ROLL> key to select a unique slave address from 1-255. Press <SAVE> to save the change. The factory default ModBus slave address is 1. Each device on the network must have a unique address.

<MENU>

- 27. BaudRate 9600** Use the <ROLL> key to select a baud rate of 300, 600, 1200, 2400, 4800, 9600 or 19200. Press <SAVE> to save the setting. The factory default ModBus baud rate is 9600.

<MENU>

- 28. TranMode RTU** Use the <ROLL> key to toggle between RTU and ASCII modes. Press <SAVE> to save the setting. The factory default ModBus transmission mode is RTU.

<MENU>

- 29. Parity None** Use the <ROLL> key to select a parity value of None, Odd or Even. Press <SAVE> to save the setting. The factory default ModBus parity bit is None.

<MENU>

- 30. StopBit 1** Use the <ROLL> key to toggle the stop bit setting between 1 and 2 (*for some configurations the value is fixed*). Press <SAVE> to save the setting. The default ModBus stop bit setting is 1.

<MENU>

- 31. CRC Mode A001** Use the <ROLL> key to set the CRC value to A001 (CRC-16 reverse), 1021 (CITT), 8005 (CRC-16), or 8408 (CITT reverse), then <SAVE> the value. The default RTU mode CRC polynomial is 0xA001.

<MENU>

- 32. Delay Minimum** Use the <ROLL> key to change the value from Minimum to 50, 100, 150, 200, 250, 300 or 350mS, then <SAVE> the value. The factory default ModBus slave response delay is Minimum (*minimum delay means just more than 3.5 character time delays, 4ms for 9600 baud rate, for example*).

<MENU>

The next steps are only shown if the BACnet communication protocol is installed.

33. BACnet Press the <ROLL> key to select a unique network address from 0-127, then <SAVE> the value. The
 Addr 4 factory default BACnet MAC address is 4.

<MENU>

34. BaudRate Use the <ROLL> key to select a baud rate of 9600, 19200, 38400 or 76800, then <SAVE> the value. The
 9600 factory default BACnet baud rate is 9600.

<MENU>

35. Menu Press <SAVE> to exit the menu and return to normal operation or <MENU> to repeat the menu.
 Exit

Calibration

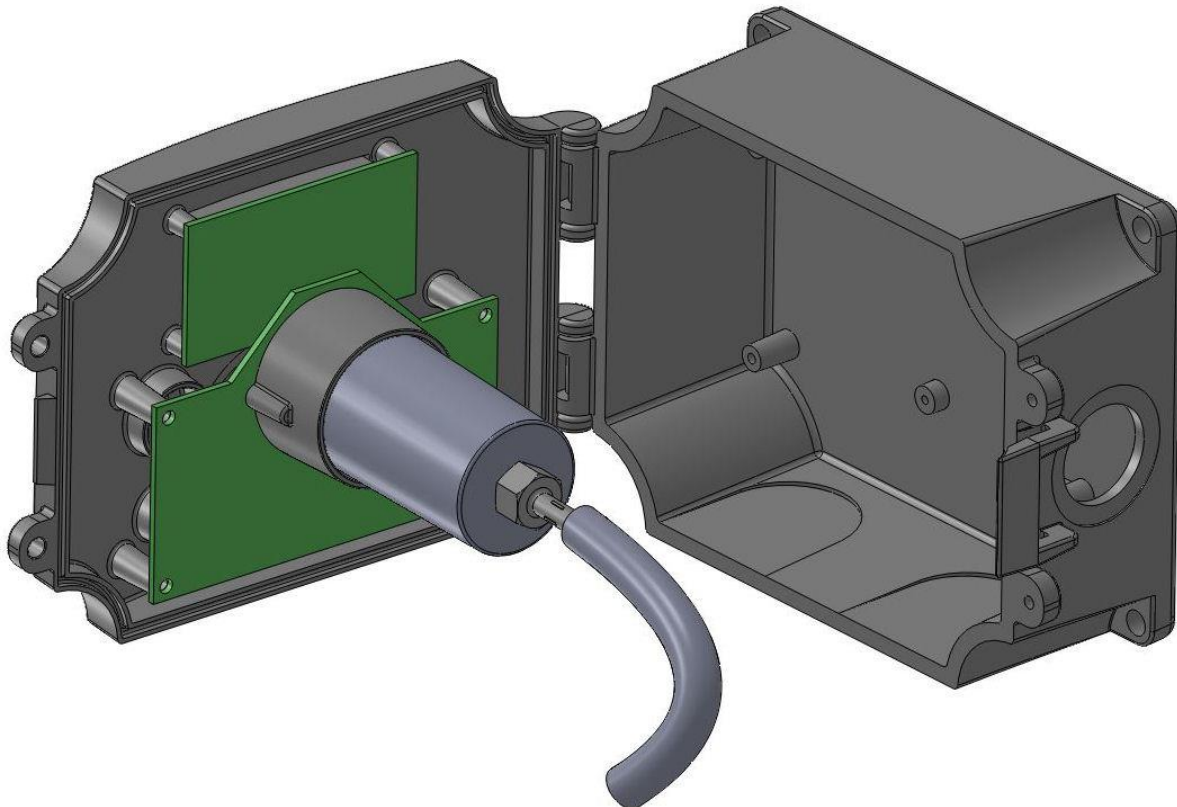
The CO transmitter features a cover mounted sensor pcb that is pre-calibrated. This means that the entire sensor pcb can simply be replaced with a new calibrated pcb if desired without having to remove the enclosure and the main processor board. This sensor swap can be completed in seconds. Simply unplug the device ribbon cable connection, remove the old sensor pcb, install the new pcb and reconnect the ribbon cable. There is no need to make any adjustments or apply gas to the transmitter using the sensor swap method. **In this case, the Fault Mode should be reset if it is enabled.**

The device may also be calibrated or verified with CO gas if required. This requires a field calibration kit consisting of a bottle of gas (250 ppm CO in air for example), a tank pressure regulator with flow restrictor and the necessary tubing with a calibration cap to cover to the sensor. Calibration can be done at 20-27 °C.

The device cover must be opened to perform an actual calibration or to simply verify the operation. In this case, the gas calibration cap attaches to the sensor fixture inside the cover. The sensor must be continuously powered for at least 1/2 hour prior to calibration. Calibrate the sensor first in clean air with no CO gas present. Simply adjust the ZERO pot on the sensor board until a 4 mA (or 0 Vdc) output is obtained and the LCD displays 0 ppm. Note that the "0 Filter" menu item should be disabled to set the 0 ppm. The ZERO and SPAN pots are located on the edge of the cover sensor pcb and are clearly marked on the pcb.

Then attach the gas supply. Turn the regulator on/off knob fully off and attach it to the 250 ppm gas bottle and firmly tighten it by hand. Moisten the sponge and squeeze out any excess water. Place the sponge in the cap so that it will not touch the sensor but does not plug the hole in the side of the cap. Attach the cap to the fixture over the sensor. If the gas cap is too loose on the fixture, simply place a wrap of electrical tape around the cap to tighten it up. Slowly turn the valve knob on the regulator to let the gas begin flowing.

The regulator will restrict the flow rate to the specified 200 ml/min and the sponge will ensure the gas is in the right humidity range. Wait for 5 minutes and then adjust the SPAN pot on the sensor board until the output and LCD reads 250 ppm. Close the valve on the tank and take the cap off from the sensor. Calibration is complete. **In this case, the ReCal Mode should be reset if it is enabled.**



Specifications

Measurement	Electrochemical
Sample Method	Diffusion
Measurement Range	0-100, 150, 300, 400 or 500 ppm (selectable)
Accuracy	± 5 ppm or ± 5% of reading (whichever is greater) 0-50 °C (32-122 °F), 15-90 %RH
Operating Conditions	-20-50 °C (-4 -122 °F), 15-90 %RH, 0.9-1.1 atm
Stability	< 5% signal loss/year
Response Time	< 60 seconds for 90 % step change
Power Supply	24 Vdc ± 20% or 24 Vac ± 10% (non-isolated half-wave rectified)
Consumption	100 mA max (with all options on)
Protection Circuitry	Reverse voltage protected, output limited and transient protected
Output Signal	4-20 mA active, 0-5 or 0-10 Vdc (selectable)
Output Drive Capability	450 ohms max for current output, 10 Kohm min for voltage output
LCD Display	1 ppm resolution, 1.4" w x 0.6" h (35 x 15 mm) alpha-numeric 2 line x 8 characters with backlight
Status LED	Two color (red/green) on front panel
Test Switch	Performs I/O tests, front panel and remote connection
Buzzer alarm	85db @ 10 feet
Buzzer Trip Point	Programmable 20-500 ppm in 10 ppm increments
Buzzer Delay	Programmable 0-10 minutes in 1 minute increments
Wiring Connections	Screw terminal block (14 to 22 AWG)
Enclosure	5.0"w x 4.0"h x 2.55"d (127 x 101 x 65 mm)
Duct Probe	7" (177 mm) long x 1" (25.4 mm) diameter
Agency Approvals	Sensor is UL Recognized for ANSI/UL-2034 and UL-2075, E240671
Optional Relay	
Outputs	Form C contacts (NO and NC), 5 Amps @ 250 Vac, 5 Amps @ 30 Vdc
Relay 1 Trip Point	Programmable 20-500 ppm in 10 ppm increments
Relay 2 Trip Point	Programmable 20-500 ppm in 10 ppm increments
Relay Hysteresis	Programmable 10-100 ppm in 5 ppm increments
Relay Delay	Programmable 0-10 minutes in 1 minute increments
Optional ModBus	
Hardware	2-wire RS-485
Software	Native ModBus MS/TP protocol (RTU or ASCII)
Baud Rate	Locally set to 300, 600, 1200, 2400, 4800, 9600 or 19200
Slave Address Range	Locally set to 1-255 (factory default is 1)
Optional BACnet	
Hardware	2-wire RS-485
Software	Native BACnet MS/TP protocol
Baud Rate	Locally set to 9600, 19200, 38400 or 76800
MAC Address Range	Locally set to 0-127 (factory default is 4)

Network Communication

The device parameters must be set before connection to the network and will ensure each device will have a unique MAC address and Device Instance for startup. On startup, the MAC address is appended to the Device Object : Vendor Identifier to create the unique Device Instance (Device Object : Object Identifier). Once connected to a network, the Device Object : Object Identifier can be written to any unique value via BACnet and then the MAC address will no longer be appended to the value. Once set, all parameters are saved in non-volatile memory. The local menu and LCD are used to set the BACnet MAC device address (0-127) and the baud rate. The factory defaults are address 4 and 9600 baud.

Note that the BACnet network can be used to query values and change parameters of the device only, it cannot be used to implement a control system. As such, the BACnet object list contains no event driven object types, only query type objects.

Using the BACnet system software, only map the point objects that are installed and required. Excessive point mapping will lower the network performance. On the CO Transmitter some objects will not have any meaning if the hardware option is not installed. For example, AV 6 (Relay 2 Setpoint) will not be functional if there is no Relay 2 installed on the pcb. To reduce network traffic, these points should not be polled.

The CO Transmitter has 31 BACnet objects to identify the device, read current values, configure the device, control the alarm setpoints, etc. There are five standard supported BACnet object types as shown below.

Object Type	Dynamically Creatable	Dynamically Deletable	Object Identifier	Object Name
Device	No	No	381004	CO Detector 004
Analog Input	No	No	AI 1 AI 2	CO Sensor Value Temperature
Analog Value	No	No	AV 1 AV 2 AV 3 AV 4 AV 5 AV 6 AV 7 AV 8 AV 9 AV 10 AV 11 AV 12 AV 13	Buzzer Setpoint Buzzer Delay Relay 1 Setpoint Relay 1 Hysteresis Relay 1 Delay Relay 2 Setpoint Relay 2 Hysteresis Relay 2 Delay Test Mode Time Output Test Fault Mode Time ReCal Mode Time Temperature Offset
Binary Value	No	No	BV 1 BV 2 BV 3 BV 4 BV 5 BV 6 BV 7 BV 8 BV 9	Buzzer Enable/Disable Fault Mode Enable/Disable Fault Mode Reset Display Mode Backlight Enable/Disable Test Mode Enable/Disable ReCal Mode Enable/Disable ReCal Mode Reset Temperature Units
Binary Input	No	No	BI 1 BI 2 BI 3 BI 4 BI 5 BI 6	CO Status Buzzer Status Relay 1 Status Relay 2 Status Test Mode Status Fault Status

BACnet Trouble-shooting

This device operates as a slave and will not communicate unless a master sends a request for information, then it will answer. If the device does not communicate properly, first check that the communication wires are not reversed. Then check communication parameters set in the menu.

The default MAC address is 4 and each device must have a unique address to communicate properly. Use the menu to change the address to a unique number for each unit. Ensure the device object name and object identifier are unique on the entire BACnet network, not just on the MS/TP sub-net. Both of these properties are writable.

The device automatically selects a device object name for itself using the format `CMD_CO_Detector_xxx`, where `xxx` is the MS/TP MAC address (000 to 127) as set in the menu. If this name is changed by writing to the device `Object_Name` property via BACnet, then the MAC number will no longer be appended to the object name.

The CO Transmitter also selects a device object identifier for itself using the format `381xxx`, where `xxx` is the MS/TP MAC address (000 to 127) as set by the menu. If this ID is changed by writing to the device `Object_Identifier` property via BACnet, then the MAC number will no longer be appended to the object ID.

Ensure the application software is not set to poll the devices too frequently. For example, if the software is polling the devices every 500 mS, the network could be heavily congested with the network traffic and may not operate reliably. A slower polling rate such as 5 to 10 seconds will usually produce better results on a typical network segment.

Use care when setting the MS/TP MAC address and the device object `Max_Master` property since both can have a significant effect on the network efficiency. Some MAC address and `Max_Master` combinations will operate more efficiently than others. MAC addresses should be selected sequentially, starting at the lowest possible value.

For example, on a five node segment, the MAC addresses should be set to 1, 2, 3, 4 and 5. In this case, if the `Max_Master` property value is left at the 127 default, then there will be a lot of wasted time on the network polling for masters that are not present. In this example, the five CO nodes should be set such that `Max_Master` is equal to 5. The `Max_Master` value initially defaults to 127 so that any master can be found when the CO2 device first starts.

The BACnet Device object allows configuration of the CO Transmitter. Device object properties are shown below.

Property	Default Value	Property Data Type	Access
Object Identifier	381004	BACnetObjectIdentifier (numeric)	Read / Write
Object Name	CMD CO Detector 004	CharacterString (32)	Read / Write
Object Type	DEVICE (8)	BACnetObjectType	Read
System Status	OPERATIONAL (0)	BACnetDeviceStatus	Read
Vendor Name	Greystone Energy Systems	CharacterString	Read
Vendor Identifier	381	Unsigned16	Read
Model Name	CMD5B	CharacterString	Read
Firmware Revision	1.2	CharacterString	Read
Application Software Version	V1.0	CharacterString	Read
Location	150 English Dr, Moncton, NB	CharacterString (32)	Read / Write
Description	Greystone CO Gas Detector	CharacterString (32)	Read / Write
Protocol Version	1	Unsigned	Read
Protocol Revision	14	Unsigned	Read
Protocol Services Supported	See description below	BACnetServicesSupported	Read
Protocol Object Types Supported	See description below	BACnetObjectTypesSupported	Read
Object List	See description below	BACnetArray	Read
Max APDU Length Accepted	50, B'0000'	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
Device Address Binding	empty	BACnetAddressBinding	Read
Database Revision	0	Unsigned	Read
Property List		BACnetArray	Read

Object_Identifier Initial default number is 381004, where 381 is the vendor ID and 004 is the default network MAC address. When the MAC address is initially changed the value is updated and saved. For example, if the MAC address is set to 50 via the menu for startup, then the device instance will be set to 381050. This property is also writable via BACnet. If the Device:Object_Identifier is written to via BACnet then the MAC address is no longer appended to the vendor ID to create this value.

Object_Name Initial string is "CMD CO Detector 004" where 004 is the default network address. Can be written with a new string of maximum length of 32 characters and the value is saved. The "004" is the MAC address as set by the menu and is automatically changed if the MAC address is changed. Once written to via BACnet, the MAC address no longer gets appended to the value.

Protocol_Services_Supported readProperty, writeProperty, deviceCommunicationControl, who-Has, who-Is
Binary bit string = {00000000 00001001 01000000 00000000 01100000 0}

Protocol_Object_Types_Supported Analog_Input, Analog_Value, Binary_Input, Binary_Value, Device
Binary bit string = {10110100 10000000 00000000 00000000 00000000 00000000 00000000}

Object_List ((Device, Instance 4), (Analog Input, Instance 1), (Analog Value, Instance 1)(Analog Value, Instance 12), (Binary Value, Instance 1) (Binary Value, Instance 8), (Binary Input, Instance 1).....(Binary Input, Instance 6)

APDU_Timeout Value is 6000. Can be modified from 1 to 10,000.

Number_Of_APDU_Retries Value is 3. Can be modified from 1 to 10.

Max_Master Value is 127. Can be modified from 1 to 127.

Database_Revision Value is 0 to 255.

The analog input BACnet objects allows reading of CO and temperature sensor values. AI object properties are shown below.

Analog input object **CO Sensor Value** (Present_Value is current sensor reading in ppm. Resolution is 1 ppm)

Property	Default Value	Property Data Type	Access
Object Identifier	AI1 (Analog Input 1)	BACnetObjectIdentifier	Read
Object Name	CO_Sensor_Value	CharacterString (32)	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	current reading	Real	Read
Description	CO Level	CharacterString (32)	Read
Device Type	0-100, 150, 300, 400 or 500 ppm CO Sensor	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Units	parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog input object **Temperature** (Present_Value is current temperature sensor reading in °C or °F, resolution is 0.1°)
(The temperature units default to °C but can be changed to °F using BV9)

Property	Default Value	Property Data Type	Access
Object Identifier	AI2 (Analog Input 2)	BACnetObjectIdentifier	Read
Object Name	Temperature	CharacterString (32)	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	current reading	Real	Read
Description	Temperature	CharacterString (32)	Read
Device Type	Temperature Sensor	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Units	degrees-Celsius (62) or degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Note: The temperature reading will only be valid for space type products (sensor on front cover) when the product is mounted flat on a wall with the sensor facing the operator and the LCD to the top. Changing the position will create reading inaccuracies.

The temperature object will not give accurate duct temperature values for duct style products (air flow pickup tube on the rear of the enclosure).

The analog value BACnet objects allow configuration of the buzzer, relays, etc. AV object properties are shown below.

Analog value object (Present_Value defaults to 150 ppm. Can be set from 20 to 500 ppm. Resolution is 10 ppm)

Buzzer Setpoint

Property	Default Value	Property Data Type	Access
Object Identifier	AV1 (Analog Value 1)	BACnetObjectIdentifier	Read
Object Name	Buzzer_Setpoint	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	150	Real	Read / Write
Description	Buzzer Setpoint	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 5 minutes. Can be set from 0 to 10 minutes. Resolution is 1 minute)

Buzzer Delay

Property	Default Value	Property Data Type	Access
Object Identifier	AV2 (Analog Value 2)	BACnetObjectIdentifier	Read
Object Name	Buzzer_Delay	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	5	Real	Read / Write
Description	Buzzer Delay	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Minutes (72)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 50 ppm. Can be set from 20 to 500 ppm. Resolution is 10 ppm)

Relay1 Setpoint

Property	Default Value	Property Data Type	Access
Object Identifier	AV3 (Analog Value 3)	BACnetObjectIdentifier	Read
Object Name	Relay1_Setpoint	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	50	Real	Read / Write
Description	Relay1 Setpoint	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 10 ppm. Can be set from 10 to 100 ppm. Resolution is 5 ppm)
Relay1 Hysteresis

Property	Default Value	Property Data Type	Access
Object Identifier	AV4 (Analog Value 4)	BACnetObjectIdentifier	Read
Object Name	Relay1_Hysteresis	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	10	Real	Read / Write
Description	Relay1 Hysteresis	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 2 minutes. Can be set from 0 to 10 minutes. Resolution is 1 minute)
Relay1 Delay

Property	Default Value	Property Data Type	Access
Object Identifier	AV5 (Analog Value 5)	BACnetObjectIdentifier	Read
Object Name	Relay1_Delay	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	2	Real	Read / Write
Description	Relay1 Delay	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Minutes (72)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 150 ppm. Can be set from 20 to 500 ppm. Resolution is 10 ppm)
Relay2 Setpoint

Property	Default Value	Property Data Type	Access
Object Identifier	AV6 (Analog Value 6)	BACnetObjectIdentifier	Read
Object Name	Relay2_Setpoint	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	150	Real	Read / Write
Description	Relay2 Setpoint	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 20 ppm. Can be set from 10 to 100 ppm. Resolution is 5 ppm)
Relay2 Hysteresis

Property	Default Value	Property Data Type	Access
Object Identifier	AV7 (Analog Value 7)	BACnetObjectIdentifier	Read
Object Name	Relay2_Hysteresis	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	20	Real	Read / Write
Description	Relay2 Hysteresis	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 2 minutes. Can be set from 0 to 10 minutes. Resolution is 1 minute)
Relay2 Delay

Property	Default Value	Property Data Type	Access
Object Identifier	AV8 (Analog Value 8)	BACnetObjectIdentifier	Read
Object Name	Relay2_Delay	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	2	Real	Read / Write
Description	Relay2 Delay	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Minutes (72)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 5 minutes. Can be set from 1 to 15 minutes. Resolution is 1 min)
Test Mode Time

Property	Default Value	Property Data Type	Access
Object Identifier	AV9 (Analog Value 9)	BACnetObjectIdentifier	Read
Object Name	Test_Mode_Time	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	5	Real	Read / Write
Description	Test Mode Time	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Minutes (72)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 0. Can be set from 0 to 6. Resolution is 1)

Output Test

Property	Default Value	Property Data Type	Access
Object Identifier	AV10 (Analog Value 10)	BACnetObjectIdentifier	Read
Object Name	Output_Test	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read / Write
Description	Output Test	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	No-units (95)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 3 years. Can be set to 3, 4, 5 or 6 years).

Fault Mode Time

Property	Default Value	Property Data Type	Access
Object Identifier	AV11 (Analog Value 11)	BACnetObjectIdentifier	Read
Object Name	Fault_Mode_Time	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	3	Real	Read / Write
Description	Fault Mode Time	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Years (67)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present_Value defaults to 1 years. Can be set to 1, 2 or 3 years).

ReCal Mode Time

Property	Default Value	Property Data Type	Access
Object Identifier	AV12 (Analog Value 12)	BACnetObjectIdentifier	Read
Object Name	ReCal_Mode_Time	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	1	Real	Read / Write
Description	Recalibration Mode Time	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	Years (67)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Analog value object (Present Value defaults to 0 for no offset. Can be set from -10 to +10 Δ°F or -5.0 to +5.0 Δ°C)
Temperature Offset (Units depend on the device units, either °C or °F), (°C resolution = 0.5, °F resolution = 1)

Property	Default Value	Property Data Type	Access
Object Identifier	AV13 (Analog Value 13)	BACnetObjectIdentifier	Read
Object Name	Temperature Offset	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read / Write
Description	Temperature Offset	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	delta-degrees-Celsius (121) or Δ°F (120)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

The binary value BACnet objects allow basic control of the device I/O. Binary value object properties are shown below.

Binary value object (Present_Value is normally 1, set to 0 to disable the buzzer)

Buzzer Enable

Property	Default Value	Property Data Type	Access
Object Identifier	BV1 (Binary Value 1)	BACnetObjectIdentifier	Read
Object Name	Buzzer_Enable	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	ACTIVE (1)	BACnetBinaryPV	Read / Write
Description	Buzzer Enable	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present_Value is normally 0, set to 1 to enable the fault mode alarm)

Fault Mode Enable

Property	Default Value	Property Data Type	Access
Object Identifier	BV2 (Binary Value 2)	BACnetObjectIdentifier	Read
Object Name	Fault_Mode_Enable	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Fault Mode Enable	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present_Value is normally 0, set to 1 to reset the fault mode and it's timer)

Fault Mode Reset

Property	Default Value	Property Data Type	Access
Object Identifier	BV3 (Binary Value 3)	BACnetObjectIdentifier	Read
Object Name	Fault Mode Reset	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Fault_Mode_Reset	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present_Value is normally 1, set to 0 to suppress the CO reading)

Display Mode

Property	Default Value	Property Data Type	Access
Object Identifier	BV4 (Binary Value 4)	BACnetObjectIdentifier	Read
Object Name	Display_Mode	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	ACTIVE (1)	BACnetBinaryPV	Read / Write
Description	Display Mode	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present_Value is normally 1, set to 0 to disable the LCD backlight)

Backlight Enable

Property	Default Value	Property Data Type	Access
Object Identifier	BV5 (Binary Value 5)	BACnetObjectIdentifier	Read
Object Name	Backlight_Enable	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	ACTIVE (1)	BACnetBinaryPV	Read / Write
Description	Backlight Enable	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present_Value is normally 0, set to 1 to enable the test mode)

Test Mode Enable

Property	Default Value	Property Data Type	Access
Object Identifier	BV6 (Binary Value 6)	BACnetObjectIdentifier	Read
Object Name	Test_Mode_Enable	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Test Mode Enable	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present_Value is normally 1, set to 0 to disable the ReCal mode alarm)

ReCal Mode Enable

Property	Default Value	Property Data Type	Access
Object Identifier	BV7 (Binary Value 7)	BACnetObjectIdentifier	Read
Object Name	ReCal_Mode_Enable	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	ACTIVE (1)	BACnetBinaryPV	Read / Write
Description	Recalibration Mode Enable	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present_Value is normally 0, set to 1 to reset the ReCal mode and it's timer)

ReCal Mode Reset

Property	Default Value	Property Data Type	Access
Object Identifier	BV8 (Binary Value 8)	BACnetObjectIdentifier	Read
Object Name	ReCal_Mode_Reset	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Recalibration Mode Reset	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary value object (Present Value defaults to 0 (INACTIVE) for Celsius. Can be set to 1 (ACTIVE) for Fahrenheit)
Temperature Units

Property	Default Value	Property Data Type	Access
Object Identifier	BV9 (Binary Value 9)	BACnetObjectIdentifier	Read
Object Name	Temperature Units	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Celsius (0) or Fahrenheit (1)	CharacterString (32)	Read
Status Flags	{ false, false, false, false } (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

The binary input BACnet objects indicates the device status.

Binary input object (Present_Value is normally 0, will change to 1 if any alarm is present)
CO Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI1 (Binary Input 1)	BACnetObjectIdentifier	Read
Object Name	CO_Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	CO Status	CharacterString (32)	Read
Device Type	Indicates CO Alarm Status	CharacterString (32)	Read
Status Flags	{ false, false, false, false } (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read

Binary input object (Present_Value is normally 0, will change to 1 if the buzzer activates)
Buzzer Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI2 (Binary Input 2)	BACnetObjectIdentifier	Read
Object Name	Buzzer_Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	Buzzer Status	CharacterString (32)	Read
Device Type	Indicates Buzzer Alarm Status	CharacterString (32)	Read
Status Flags	{ false, false, false, false } (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read

Binary input object (Present_Value is normally 0, will change to 1 if relay1 activates)
Relay1 Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI3 (Binary Input 3)	BACnetObjectIdentifier	Read
Object Name	Relay1_Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	Relay1 Status	CharacterString (32)	Read
Device Type	Indicates Relay1 Alarm Status	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read

Binary input object (Present_Value is normally 0, will change to 1 if relay2 activates)
Relay2 Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI4 (Binary Input 4)	BACnetObjectIdentifier	Read
Object Name	Relay2_Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	Relay2 Status	CharacterString (32)	Read
Device Type	Indicates Relay2 Alarm Status	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read

Binary input object (Present_Value is normally 0, will change to 1 if the test mode is activated)
Test Mode Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI5 (Binary Input 5)	BACnetObjectIdentifier	Read
Object Name	Test_Mode_Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	Test Mode Status	CharacterString (32)	Read
Device Type	Indicates Test Mode Status	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read

Binary input object (Present_Value is normally 0, will change to 1 if the fault alarm is activated)
Fault Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI6 (Binary Input 6)	BACnetObjectIdentifier	Read
Object Name	Fault_Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	Fault Status	CharacterString (32)	Read
Device Type	Indicates CO Fault Status	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read