**Series CDT and CDTR Wall Mount Carbon Dioxide/Temperature Transmitter**

**Specifications - Installation and Operating Instructions**

**Series CDT and CDTR Wall Mount Carbon Dioxide Temperature Transmitters** accurately monitor the CO₂ concentration and temperature in schools, office buildings, and other indoor environments to help achieve LEED® certification. Additionally, the Series CDTR also measures ambient relative humidity. For increased sensor life, a single-beam dual-wavelength non-dispersive infrared (NDIR) sensor is used to automatically correct the measurement in both occupied and unoccupied buildings against aging effects. The single-beam dual-wavelength sensor technology provides the highest level of accuracy compared to Automatic Baseline Correction methods, which can unintentionally shift the calibration based on CO₂ levels and barometric pressure conditions. In order to achieve a higher level of accuracy, the Series CDT includes digital barometric pressure adjustment and the ability to field-calibrate the sensor.

Universal outputs allow users to select the transmitter output to be 4 to 20 mA, 0 to 5 VDC, or 0 to 10 VDC to work with virtually any building management controller. An optional relay with user adjustable set points can be used to control exhaust fans, open actuated windows or dampers, or signal a light or horn.

For applications that require visual indication, the Series CDT and CDTR can be ordered with an integral LCD display or the Model A-449 remote LCD display that can plug into the mini-connector port on the side of the transmitter. Both the CDT and CDTR can be configured to display temperature only, CO₂ only, or CO₂ and relative humidity together. The CDTR can also display relative humidity or CO₂ and relative humidity together. Push buttons are standard on the transmitters for access to the menu structure, but the transmitter can be ordered without the buttons. To prevent tampering, the action of the buttons can be locked out using an internal jumper selection. Menu items that can be accessed include: engineering units, relay output set points, display configuration, transmitter output scaling, ambient barometric pressure and field calibration of the transmitter.

Single-beam dual-wavelength sensor advantages:
- Automatically corrects for aging effects in occupied and unoccupied buildings
- Perfect for hospitals and manufacturing plants that are occupied 24 hours per day
- Measures actual unfiltered light intensity directly
- Eliminates error from incorrect assumptions of gas concentration in theoretical logic assumption methods

**Specifications**

- **Range:** CO₂: 0 to 2000 or 0 to 5000 ppm (depending on model); RH: 0 to 100% (for units configured with humidity output); Temperature: 32 to 122°F (0 to 50°C);
- **Accuracy:** ±40 ppm ±3% of reading; RH: ±2% (for units configured with humidity output); Temperature: ±1°C @ 25°C
- **Temperature Dependence:** ±8 ppm / °C at 1100 ppm
- **Non-Linearity:** 16 ppm.
- **Pressure Dependence:** 0.13% of reading per mm of Hg.
- **Response Time:** 2 minutes for 99% step change.
- **Humidity Limits:** 10 to 95% RH (non-condensing).
- **Temperature Limits:** 32 to 122°F (0 to 50°C);
- **Pressure Dependence:** 0.13% of reading per mm of Hg.
- **Power Consumption:** Average: 2 watts; Peak: 3.75 watts.
- **Sensors:** Single-beam, dual-wavelength NDIR.
- **Output:** Current: 4 to 20 mA (max 500 Ω); Voltage: 0 to 5 VDC or 0 to 10 VDC (min 500 Ω); Relay: SPST NO 2A @ 30 VDC; RTD or thermistor per r-t curves (depending on model).
- **Weight:** 5.6 oz (158.8 g).

**Installation**

- **WARNING** Disconnect power supply before installation to prevent electrical shock and equipment damage.
- **CAUTION** 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.
- **CAUTION** Use electrostatic discharge precautions (e.g., use of wrist straps) during installation and wiring to prevent equipment damage.
- **CAUTION** Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present.
- **CAUTION** Do not exceed ratings of this device, permanent damage not covered by warranty may result.
- **NOTICE** Upon powering the transmitter, the firmware version will flash on the display. A warm up period of 30 minutes is required for the transmitter to adjust to the current CO₂ concentration.
- **NOTICE** Self calibration feature of the transmitter requires exposure to normal outdoor equivalent carbon dioxide level once every thirty days.

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MOUNTING
1. Push tab on 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.

WIRING
Use maximum 18 AWG wire for wiring to terminals. Refer to Figure 5 for wiring information.

Selection of Current and Voltage Outputs
Prior to wiring, verify that the current/voltage selection jumpers (PJ1, PJ2, and PJ5) are set to the desired output type. Refer to Figure 2 to locate the selection jumpers. See Figure 3 for diagram of the current/voltage selection jumper. For voltage output selection, the output can be 0 to 10 VDC, 0 to 5 VDC, 2 to 10 VDC or 1 to 5 VDC. See Figure 4 for the type of voltage output selection jumper (PJ5).

Remote Display
For models that are ordered without an integral LCD display, remote display Model A-449 can be used to display the temperature, humidity, and carbon dioxide. The mini USB plug of the remote display plugs into the receptor on the side of the housing. After a short warm up time, the display will begin to show the current temperature and carbon dioxide measurements unless configured by the user to show humidity and carbon dioxide, only temperature, only humidity, or only carbon dioxide.

EDITING MENU PARAMETERS
Before any adjustment can be made to the transmitter, the Menu Lockout Jumper (PJ4) must be set to the "On" position (See Figure 6).

ACCESSING MENU PARAMETERS
Step 1: To enter the menu structure, press and simultaneously for 5 seconds (display will show RON parameter).
Step 2: Press or to cycle between menu items.
Step 3: Press to edit the value for the displayed menu item (SET will appear on display).
Step 4: Press or to adjust the value of the menu item.
Step 5: Press to save the changes (SET will disappear).
Step 6: Repeat Steps 2 through 5 for each of the parameters.
Step 7: To exit the menu at any time, press and hold and simultaneously for 5 seconds or wait 10 seconds without pushing any buttons.

Optional relay can be used as either a dry contact or low voltage switched circuit up to 2 A at 30 VDC.
Menu Descriptions

RON  Relay on set point
Sets the CO₂ concentration which the optional relay is energized.
- Low limit: 0 PPM
- Factory setting: 1000 PPM
- High limit: 2000/5000 PPM (depending on model)

ROF  Relay off set point
Sets the CO₂ concentration which the optional relay is de-energized. Setting value lower than RON provides direct action for detecting high concentrations of CO₂. Setting value higher than RON provides indirect action for detecting low concentrations of CO₂. Either Δ or Δ on the LCD display will be lit to indicate when the relay is energized.
- Low limit: 0 PPM
- Factory setting: 950 PPM
- High limit: 2000/5000 PPM (depending on model)

DSP  Display configuration
Determines the LCD display configuration during normal operation. The LCD display can indicate the CO₂ concentration, temperature, relative humidity (CDTR only) and CO₂ concentration combined with temperature or relative humidity (CDTR only).

CH  CO₂ concentration and relative humidity (CDTR only)
CT  CO₂ concentration and temperature
C  CO₂ concentration only
T  Temperature only
H  Relative humidity only (CDTR only)

UNI  Units selection
Temperature and barometric pressure measurements can be displayed in US engineering units or SI engineering units. The factory default is to display US engineering units.
- US units: °F for temperature and in Hg for barometric pressure
- SI units: °C for temperature and hPa for barometric pressure

COL  CO₂ low output range
Sets the CO₂ concentration for the lowest output (4 mA or 0 VDC).
- Low limit: 0 PPM
- Factory setting: 950 PPM
- High limit: 2000/5000 PPM (depending on model)

COH  CO₂ high output range
Sets the CO₂ concentration for the highest output (20 mA, 5 VDC or 10 VDC).
When COH is set above COL, the transmitter is direct acting and the output will increase with an increase in CO₂ level. When COH is below COL, the transmitter is reverse acting and the output will increase with a decrease in CO₂ level.
- Low limit: 0 PPM
- Factory setting: 2000/5000 PPM (depending on model)
- High limit: 2000/5000 PPM (depending on model)

TOL  Temperature low output range (CDT with active temperature only)
Sets the temperature for the lowest output (4 mA or 0 VDC).
- Low limit: 32.0°F / 0.0°C
- Factory setting: 32.0°F / 0.0°C
- High limit: 122.0°F / 50.0°C

TOH  Temperature high output range (CDT with active temperature only)
Sets the temperature for the highest output (20 mA, 5 VDC or 10 VDC).
When TOH is set above TOL, the transmitter is direct acting and the output will increase with an increase in temperature. When TOH is below TOL, the transmitter is reverse acting and the output will increase with a decrease in temperature.
- Low limit: 32.0°F / 0.0°C
- Factory setting: 122.0°F / 50.0°C
- High limit: 122.0°F / 50.0°C

HOL  Humidity low output range (CDTR only)
Sets the temperature for the lowest output (4 mA or 0 VDC).
- Low limit: 0.0%
- Factory setting: 0.0%
- High limit: 100.0%

HOH  Humidity high output range (CDTR only)
Sets the temperature for the highest output (20 mA, 5 VDC or 10 VDC).
When HOH is set above HOL, the transmitter is direct acting and the output will increase with an increase in temperature. When HOH is below HOL, the transmitter is reverse acting and the output will increase with a decrease in temperature.
- Low limit: 0.0%
- Factory setting: 100.0%
- High limit: 100.0%

BAR  Barometric pressure
Sets the typical barometric pressure for the location where the transmitter 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. Refer to the elevation charts in Figure 9 for typical barometric pressures at a given elevation.
- Low limit: 20.0 in Hg / 600 hPa
- Factory setting: 29.9 in Hg / 1013 hPa
- High limit: 32.0 in Hg / 1100 hPa

CAL  Calibration
Calibrates the carbon dioxide sensor to a known gas value. Read calibration instructions before using this feature. Hold ( ) for 5 seconds.

CALIBRATING SENSOR
Step 1: Remove the cover as shown in Figure 1.
Step 2: Slide the calibration tubing through the slots on the back plate and attach to one of the nipples on the CO₂ sensor (See Figure 7).
Step 3: Carefully re-attach the cover to the back plate without pinching the tubing between the back plate and the cover.
Step 4: Follow the steps in the accessing parameter section to access the calibration parameter (CAL).
Step 5: Press the button.
Step 6: Flow zero reference gas at 0.3 SLPM for 5 minutes.
Step 7: Press and hold the button for 3 seconds.
Step 8: Flow the full scale reference gas at 0.3 SLPM for 5 minutes.
Step 9: Press and hold the button for 3 seconds.
Step 10: Exit the parameter menu.
Step 11: Remove cover as shown in Figure 1.
Step 12: Remove tubing from sensor and re-attach the gas nipple cover to the sensor.
Step 13: Re-attach the cover to the back plate.
MAINTENANCE/REPAIR
Upon final installation of the Series CDT and CDTR, no routine maintenance is required. The Series CDT and CDTR are not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN
Refer to "Terms and Conditions of Sales" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

Figure 7: Calibration

Figure 8: CDT Model Chart

Figure 9: CDTR Model Chart

Figure 10: Resistance vs Temperature