

Carbon Dioxide (CO₂) Gas Transmitters



I-CDD3

DESCRIPTION

Self-calibrating room and duct mounted transmitters provide digitized readings representing 0-2,000 ppm Carbon Dioxide (CO₂) over serial, multi-drop networks through standard BACnet® or Modbus protocols. Available options include temperature and relative humidity sensors, an LCD display, local setpoint adjustment, momentary override switch, and relay output.



APPLICATION

To economically sense the concentration of Carbon Dioxide (CO₂) in air for a wide variety of commercial applications, such as demand-controlled ventilation in buildings, schools, theaters, etc., and to transmit the reading to Building Automation System (BAS), direct digital controller (DDC), or other control device through use of a simple, 2-wire, RS-485 interconnection and industry standard BACnet®- or Modbus-MS/TP protocols. I-CDD3 provides for the addition of temperature only or temperature and relative humidity sensing/transmitting, local display of the measurement value(s) adjustment and display of the control setpoint, momentary override switch, and relay output (contact closure when CO₂ reading is above setpoint).

FEATURES

- Non-dispersive infrared (NDIR) sensing technology
- Self-calibrating
- 2-wire RS-485 multidrop comm. w/ BACnet-MS/TP or Modbus (RTU or ASCII) protocol
- 0-2,000 ppm CO₂
- 0-100% RH sensor (opt.)
- 32 to 95°F sensor (opt.)
- 2-line x 8-character LCD (opt.)
- Local setpoint adjustment (opt.; room only)
- Momentary override (opt.; room only)
- SPST-NO relay output (opt.)
- Integrated end-of-line termination resistor

SPECIFICATIONS

Electrical

Power supply 20-28 VAC/DC (non-isolated half-wave rectified)

Power consumption
 - base config. 80 mA max. @ 24 V
 - with all options 140 mA max. @ 24 V

Protection circuitry Reverse polarity and overvoltage protected

Sensor Performance

Gas detected Carbon Dioxide (CO₂)
 Sensor element Non-dispersive infrared (NDIR)
 Gas sampling method Diffusion
 Coverage area 1000 ft² (100 m²), typical
 Range 0-2000 ppm CO₂
 Accuracy ±75 ppm at 1000 ppm @ 72°F (22°C)
 Temperature dependence 0.2% FS per °C
 Stability < 2% FS over sensor life
 Life expectancy 15 years, normal service
 Pressure dependence 0.13% of reading/mm Hg
 Altitude correction Programmable from 0-5000 ft via BACnet® or Modbus
 Response time < 2 minutes per 90% step change
 Warm-up time < 2 minutes

Calibration interval

- w/auto-cal enabled (default) ≥ 5 years
 - w/auto-cal disabled (rec. for 24/7 occupancy) 2.5 years

Environmental

- temperature 32°F to 122°F (0°C to 50°C)
 - humidity 0 to 95% RH, non-condensing

Physical

Wire connection Screw terminal block
 Wire size Min. 22 AWG (0.3 mm²), Max. 14 AWG (2.1 mm²)

Room

- dimensions (H x W x D) 4.7 x 3.3 x 1.15 in. (119 x 84 x 29 mm)
 - weight 0.35 lbs. (0.16 kg)
 - color White

Duct

- dimensions (H x W x D) 3.95 x 5.7 x 2.5 in. (100 x 145 x 63 mm)
 - w/probe 1 in. (25.4 mm) diameter and 7 in. (177 mm) length
 - weight 1.25 lbs. (0.57 kg)
 - color Black

SPECIFICATIONS

Interface

BACnet® interface
 - 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 3),
 63 devices max. per daisy chain

Modbus interface

- 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, 19200, 38400, 57600, 76800
 or 115200

- slave address range Locally set to:
 0-64 (factory default is 1),
 32 devices max. per daisy chain

Warranty

1 year material and workmanship

OPTIONS

Temperature Signal

Sensing element 10K thermistor, ± 0.4°F (± 0.2°C)
 Resolution 0.2°F (0.1°C)
 Range 32°F to 95°F (0°C to 35°C)

RH Signal

Sensing element Thermoset polymer based capacitive
 Accuracy ± 2% RH
 Range 0-100% RH, non-condensing
 Resolution 1% RH
 Hysteresis ± 3% RH
 Response Time 15 seconds, typical
 Stability ± 1.2% RH, typical,
 @ 50% RH in 5 years

Relay Output

Contact rating Form A (N.O.), 2 Amps @ 140 VAC,
 2 Amps @ 30 VDC

Relay programming

- trip point 500-1500 ppm via BACnet® or Modbus
 - hysteresis 25-200 ppm via BACnet® or Modbus

Digital Display

- type LCD w/ backlight
 - displays 2 lines, 8 characters; scrolls between ppm CO₂, % RH and °C temperature
 - size (H x W) 0.6 x 1.4 in. (15 x 35 mm)
 - backlight Enabled/disabled via keypad
 - resolution 1 ppm for CO₂
 1% RH for humidity
 1°F (1°C) for temperature

Override Switch

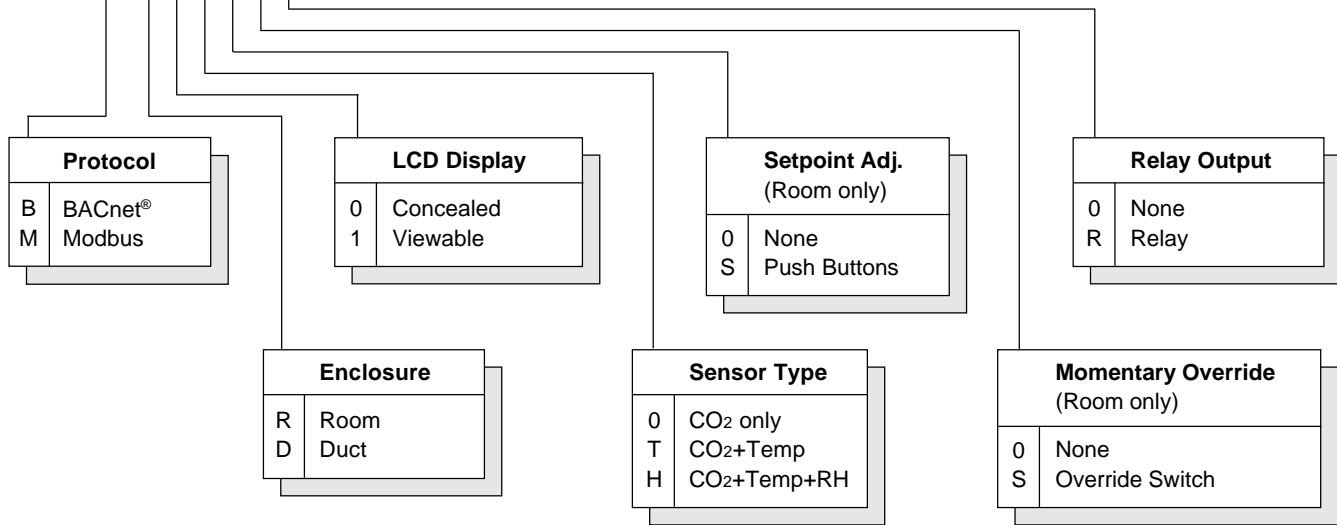
“Only for room enclosure” Front panel push-button, available as BACnet® object or ModBus register

Setpoint Control

“Only for room enclosure” Front panel push-button, available as 0-100% as BACnet® object or ModBus register

ORDERING INFORMATION

I-CDD3X - X X X X X X



Example:

I-CDD3B - R1HSS0,

configuration includes:

Room CO₂/RH/TEMP with LCD, setpoint adjustment, override switch and BACnet® communication

INSTALLATION

Dimensions

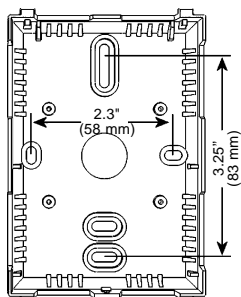


Fig. 1

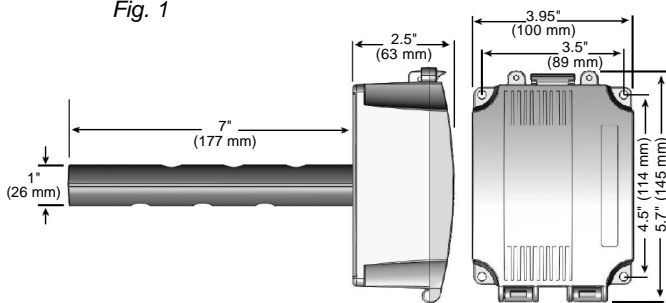


Fig. 2

Notes:

- Room sensor installs directly onto a standard electrical box and should be mounted five feet from the floor. Do not mount near doors, opening windows, supply air diffusers or other known air disturbances. (Fig. 1)
- Duct sensor installs on the outside of a return air duct, the sampling tube inserted into the duct. Use the included foam plug to prevent air from entering the enclosure through the conduit, which could cause incorrect readings. Mount the sensor at an easily accessible location in a straight section of the duct, at least five feet from corners or other items that might cause disturbances in the air flow. (Fig. 2)
- Avoid areas where the transmitter is exposed to vibrations or rapid temperature changes.
- Connect the 24 VAC/DC power supply to the terminals labeled POWER and COMMON. Use caution if 24 VAC power is used when one side of the transformer is earth-grounded. In general, the transformer should **not** be connected to earth ground when using devices with RS-485 network connections. This device is re-

- verse polarity protected and will not operate if connected backwards. (Fig. 3, 4 and 5)
- Connect the RS-485 network with twisted, shielded pair to the terminals marked A(-), B(+) and SHIELD. The positive wire connects to B(+), the negative wire to A(-), and the cable shield must be connected to the SHIELD terminal on every device. (Fig. 3, 4 and 5)
- Devices must be “daisy-chained” with the network connections entering and exiting each device separately. “T” or “drop” connections often cause network transmission errors. (Fig. 3, 4 and 5)
- If the device is installed at either end of an RS-485 network, an end-of-line (EOL) termination resistor (121 ohm) should be installed parallel to the A(-) and B(+) terminals. This device includes a jumper-selectable network termination resistor and will correctly connect the 121 ohm resistor to the PCB. (Fig. 3, 4 and 5)
- Use 22 AWG shielded wiring for all connections and do not run bus wiring in the same conduit as line voltage wiring or other wiring that would

Power and Network Wiring

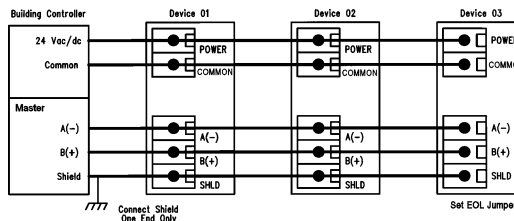


Fig. 3

Duct Transmitter

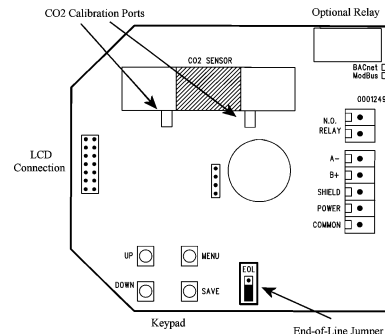


Fig. 4

Room Transmitter

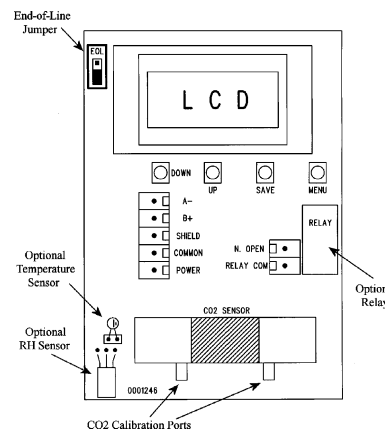


Fig. 5

switch power to highly inductive loads, such as contactors, coils and motors.

- The device parameters must be set before connection to the network. (Refer to “I-CDD3 [BACnet/Modbus] Carbon Dioxide [Room/Duct] Transmitter Installation and Operating Instructions” for complete instructions.)