CD-Pxx-00-0 Series Duct Mount CO_2 Transmitter

Installation Instructions

CD-Pxx-00-0

Part No. 24-9601-0, Rev. B
Issued December 6, 2010
Supersedes February 24, 2006

Refer to the QuickLIT Web site for the most up-to-date version of this document.

North American Emissions Compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Installation

IMPORTANT: The CD-Pxx-00-0 Duct Mount CO_2 Transmitter is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the transmitter could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the transmitter.

Parts Included

The duct mount CO_2 transmitter is shipped assembled. It consists of three main parts: base and Printed Circuit Board (PCB), cover, and mounting flange with four screws (for probe depth adjustment). A conduit adaptor is also included.

Dimensions

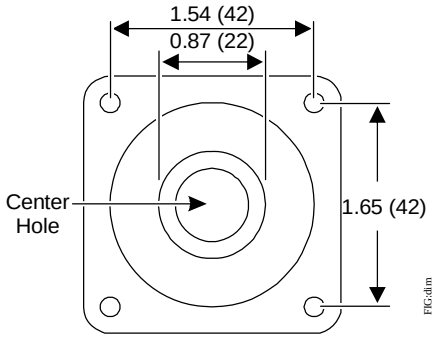

Figure 1: Mounting Holes on the Flange Dimensions in. (mm)

Mounting

Location Considerations

When selecting a location for the transmitter, note the following:

- The transmitter is designed for duct mounting in any position.
- The probe is best mounted in the return airstream.
- The device should penetrate the duct by a minimum of 3.0 in. (76.2 mm) to ensure the sensing part of the element is fully in the airstream.
- The transmitter should be placed in an area free of condensation.

The transmitter is duct mounted using a flange. The mounting flange adjusts the distance between the probe and the inner duct wall. Fasten the mounting flange with the four screws as follows:

1. Loosen the probe retention screw, and separate the flange from the assembled unit.
2. Drill a hole 7/8 to 1 in. (22 to 25 mm) diameter in the duct for the transmitter's probe.

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3. Using the mounting flange as a template centered on the hole, drill four 1/8 in. (3.18 mm) holes for the mounting screws positioned as in Figure 1.
4. Fasten the mounting flange onto the duct using the four screws provided.
5. Insert the probe a minimum of 3.0 in. (76.2 mm), and tighten the probe retention screw on the mounting flange.

Wiring

Power Supply Requirements

The transmitter requires a 24 VAC/VDC, Class 2 power supply maintaining voltages of 18 to 30 VDC or 20 to 30 VAC. Although the power input includes a halfwave rectifier, we recommend using a DC supply to avoid excessive current peaks (current consumption: peak, 170 mA; average, 85 mA).

24 VAC Power Supply Connections

When more than one transmitter is connected to one 24 VAC transformer, a common loop is formed at the controller, and the risk of a short circuit increases.

All commons must be at the same potential.

Note: To avoid a short circuit, isolate the 24 V power supply by providing a separate transformer for each transmitter as shown in Figure 2.

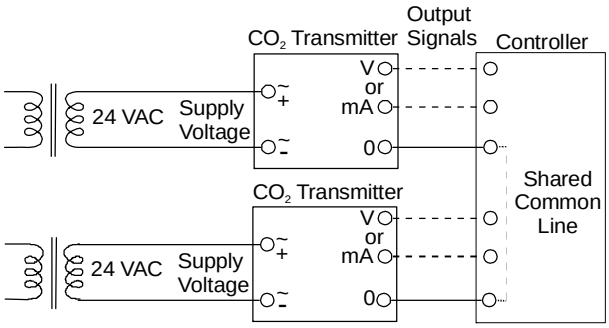

Figure 2: Connecting Separate AC Supplies (Recommended)

If several transmitters share one transformer, the phase (~) must always be the same at each transmitter to maintain polarity and avoid a short circuit via a shared common line at the controller, as shown in Figure 3.

Connecting the Conduit Adaptor

1. Align the nut with the opening inside the enclosure, and hold it in place.
2. Insert the adaptor body into the transmitter conduit opening.
3. Manually tighten the adaptor into the nut, turning in a Clockwise (CW) direction (see Figure 4).

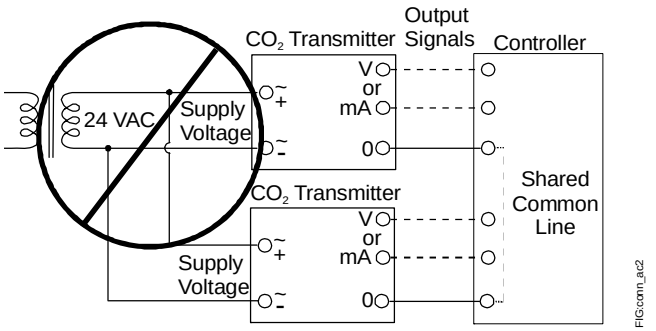

Figure 3: Connecting One AC Supply to Several Transmitters (Not Recommended)

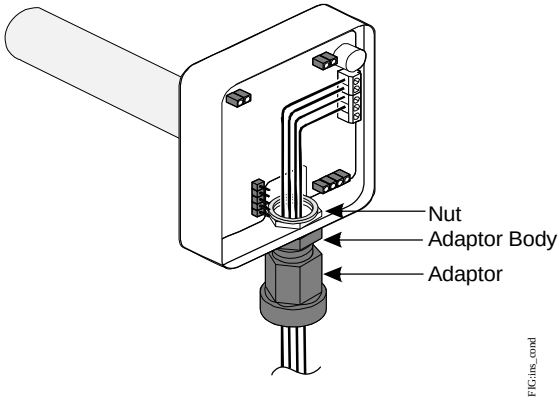

Figure 4: Inserting the Conduit Adaptor

IMPORTANT: Do not overtighten the conduit adaptor. Overtighting the conduit adaptor may damage or displace the PCB.

4. Insert the wires through the conduit adaptor body opening.
5. Tighten the adaptor onto the adaptor body by turning the adaptor in a CW direction.

Wiring the PCB

To wire the PCB's input and output connections:

1. Open the transmitter cover.
2. Insert the wire carefully through the conduit adaptor and then strip 1/4 in. (6.35 mm) of the wire insulation to prepare the wire for connection to the terminal block.
3. Connect the 24V supply between the positive (⎓) and negative (⎓) terminals as shown in Figure 5.

Configuring the Output

The transmitter is capable of generating either voltage or current output. To select, refer to Figure 5 and:

1. Connect the common wire to Terminal 0.

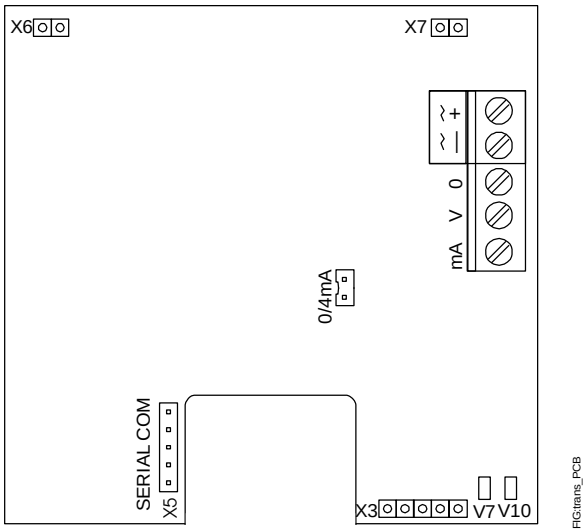

Figure 5: Transmitter PCB

2. Connect the other wire to:
   - Terminal V (for voltage output)
   - Terminal mA (for current output) and configure the pins marked 0/4mA as follows:
     - 4 to 20 mA: connect the jumper so that it shorts the pins (default)
     - 0 to 20 mA: disconnect (do not discard) the jumper
3. If the unit has an optional relay accessory, follow the procedure described in the *Wiring the Relay* section and then reposition the cover.

Wiring the Relay

Model CD-PR0-00-0 is shipped with a relay module. To wire the relay, see Figure 6, and attach the relay wires to the relay PCB's two screw terminals.

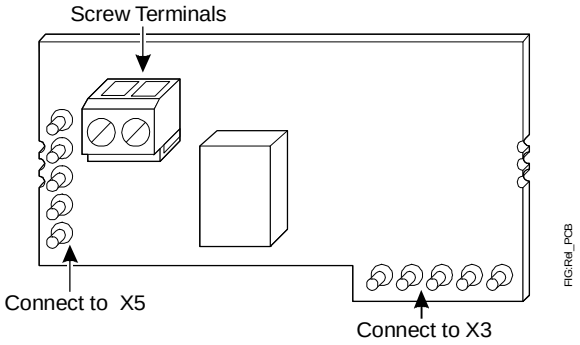

Figure 6: Relay PCB

The relay has two setpoint values: the On level and the Off level. These levels provide hysteresis and desired control function. The On level must be higher than the Off level. When CO_2 concentration is increasing; the relay closes at the On level, and the relay opens when concentration is reduced to the Off level.

Note: The default relay setpoints are 1,000 ppm On and 950 ppm Off. Change these settings by entering new values using the Relay Setpoint Software ACC CD S.

Setup and Adjustments

Commissioning

Johnson Controls® Carbon Dioxide (CO_2) transmitters come from the factory calibrated for the following:

- output signal (0 to 10 V) proportional to CO_2 concentration (0 to 2,000 parts per million [ppm])
- altitude range of 0 to 1,969 ft (0 to 600 m) above sea level without compensation
- default relay output trigger point of 1,000 ppm

Altitude Compensation

The sensors are calibrated for an altitude of 984 ft (300 m) above sea level and are intended for applications within the range of 0 to 1,969 ft (0 to 600 m) without compensation.

For altitudes above 1,969 ft (600 m) where optimum accuracy of the CO_2 concentration measurement is essential, modify the Building Automation System (BAS) controller's Analog Input (AI) high range to compensate for sensor placement at other than the standard calibration altitude.

Note: For altitude compensation, only adjust the AI high range. The AI low range should remain at zero.

To modify the controller's AI, reset the 2,000 ppm value using the controller's Compensation Factor (CF) shown in Figure 7 or Figure 8 as follows:

Corrected Value = CF x 2,000

For example, if the sensor is situated at an altitude of 3,000 ft (914.4 m) above sea level, CF, from either Figure 7 or Figure 8, is 1.10.

The new value is calculated as follows:

Corrected Value = (1.10)(2,000 ppm) = 2,200 ppm

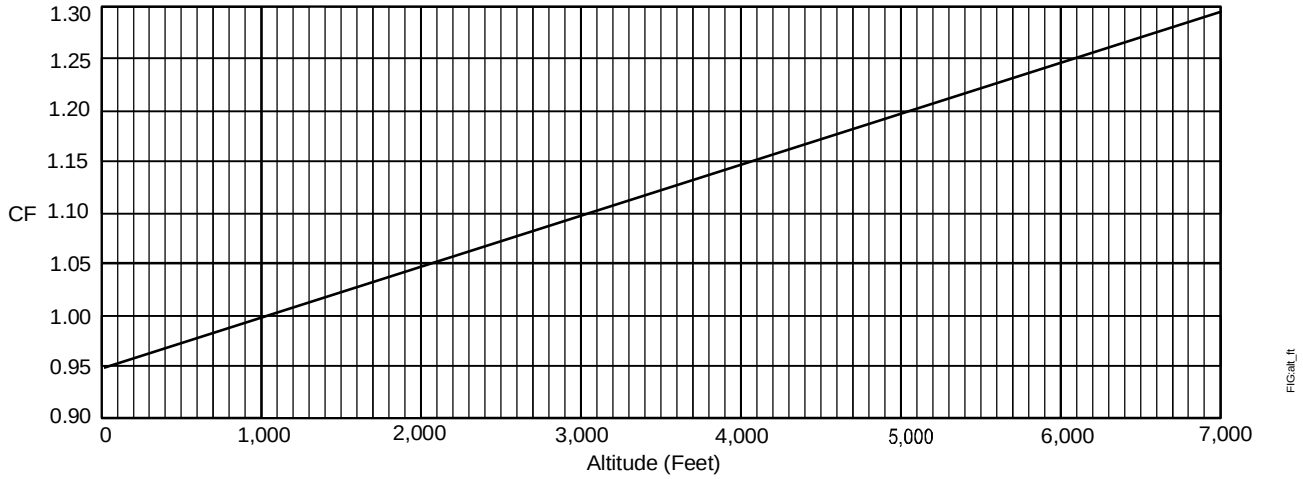

Figure 7: Altitude Compensation in Feet Above Sea Level

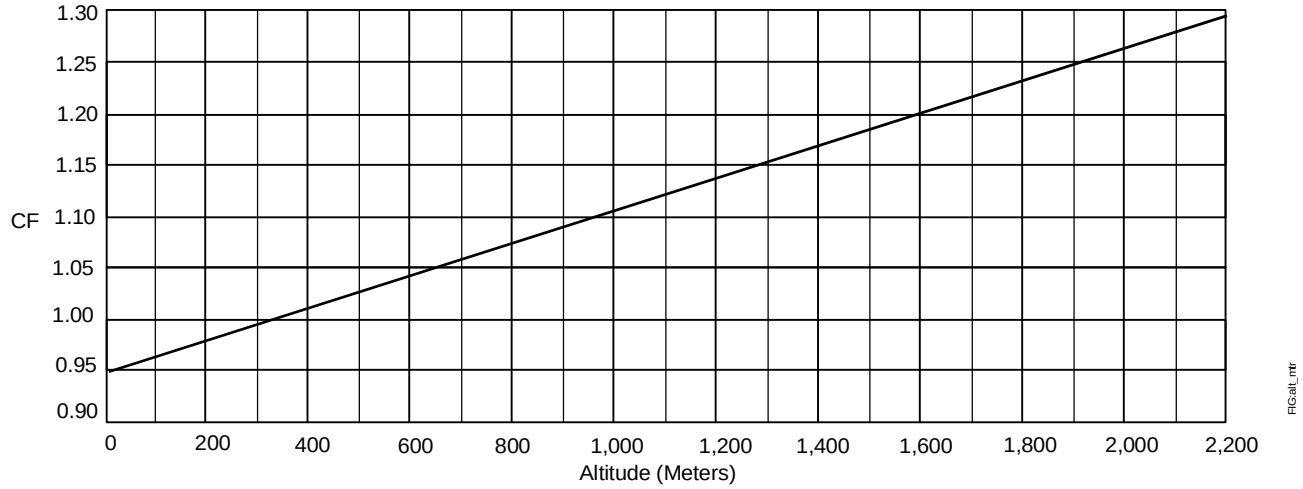

Figure 8: Altitude Compensation in Meters Above Sea Level

Troubleshooting

The transmitter is not field repairable.

In the event the unit is not functioning properly, perform the following to identify the symptoms and determine a solution; verify that:

1. the unit is mounted properly and the appropriate output jumper is selected
2. all wiring is correct
3. the power supply voltage level is 20 to 30 VAC or 18 to 30 VDC

Note: The diagnostic Light Emitting Diodes (LEDs) shown in the lower right-hand corner of Figure 5 indicate operational status:

- V7 lights up if the self-diagnostics procedure detects an abnormality.
- V10 pulses to indicate that the device is operational.

If the transmitter does not operate after completing these steps, replace the unit.

Testing the Relay Module

To confirm that the relay is operating correctly, perform the following procedure:

> **IMPORTANT:** To expose the sensing portion of the probe, loosen the probe retention screw, and remove the probe from the duct. After testing is complete, reinstall the probe, and tighten the probe retention screw.

1. Temporarily shut off power to the unit.
2. Temporarily remove wires connected to the relay screw terminal.
3. Connect a multimeter to the relay terminals.
4. Read the resistance level to determine whether the contacts are open or closed.
    - If the contacts are closed, replace the unit with the appropriate relay module, and restart this procedure.
    - If the contacts are open, apply power to the transmitter.
5. Determine whether the contacts are open or closed.
    - If the contacts are closed, the relay is functioning properly, and no further testing is necessary.
    - If the contacts are open, increase the CO_2 concentration by exhaling near the probe, looking for a change in the resistance value.
    - If no change is noted, confirm that the CO_2 concentration has been raised above the trip point.
        - Check the transmitter output signal with a voltmeter to make sure the signal has risen above the 1,000 ppm relay trip point.
        - If the output signal has not reached the trip point, it may be necessary to further increase the CO_2 concentration.
    - If the contacts are open after exceeding the trip point, replace the unit with the appropriate module, and restart this procedure.
6. Disconnect power to the transmitter.
7. Disconnect the multimeter from the relay terminals.
8. Reconnect the wires to the relay screw terminal.
9. Reconnect power to the transmitter.
10. Reposition the cover.

Repair Information

If the CD-Pxx-00-0 Series Duct Mount CO_2 Transmitter fails to operate within its specifications, replace the unit. For a replacement transmitter, contact the nearest Johnson Controls representative.

Technical Specifications

CD-Pxx-00-0 Series Duct Mount CO_2 Transmitter

Measuring Range		0 to 2,000 ppm CO_2
Accuracy at 77°F (25°C)		< ±[30 ppm CO_2 + 2.0% of reading] (includes manufacturing deviation and drift). All accuracy specifications reflect testing the transmitters using high-grade, certified gases. Transmitters are intended for an altitude range of 0 to 1,969 ft (0 to 600 m) above sea level without compensation
Non-Linearity		< 0.5% of Full Scale
Temperature of Dependence of Output		< 0.56% of Full Scale/F° (<0.1% of Full Scale/C°)
Long-Term Stability		< ±5.0% of Full Scale/5 Years
Response Time (0 to 63%)		1 Minute
Operating Temperature Range		23 to 113°F (-5 to 45°C)
Storage Temperature Range		-4 to 158°F (-20 to 70°C)
Humidity Range		0 to 85% non-condensing
Transmitter Output Signal CO_2		Jumper Selectable: 0 to 20 mA or 4 to 20 mA or 0 to 10 VDC (Default) Maximum Output Current: 25 mA; Maximum Output Voltage: 12.5 V Maximum 30 V, 0.5 A, Class 2
Recommended External Load		Current Output: Maximum 500 ohms Load Resistance Voltage Output: Minimum 1,000 ohms Load Resistance
Power Supply Range		20 to 30 VAC (18 to 30 VDC), Class 2
Power Consumption		< 2.5 W Average, 4.1 VA
Warm-up Time		< 5 minutes
Airflow Range		0 to 7,500 ft/Minute (0 to 2,286 m/Minute)
Duct Probe Material		Duct Probe Meets Plenum Rating Requirements of UL 1995, Heating and Cooling Equipment
Housing Material		ABS Plastic
Dimensions (H x W x D)		3-5/32 x 3-3/16 x 8 in. (80 x 81 x 204 mm)
Shipping Weight		0.3 lb (140 g)
Compliance	**United States**	UL Listed, CCN XAPX
	Canada	UL, LIsted XAPX7
CE	**Europe**	CE Mark – Johnson Controls, Inc., declares that the CD-Pxx-00-0 Duct Mount CO_2 Transmitters are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

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