

CD-Pxx-00-1 Series Duct Mount CO₂ Transmitter

Product Bulletin

CD-Pxx-00-1

Code No. LIT-216525

Issued December 6, 2010

Supersedes September 12, 2008

Refer to the [QuickLIT Web site](#) for the most up-to-date version of this document.

Johnson Controls offers a complete line of Carbon Dioxide (CO₂) transmitters for measuring and transmitting CO₂ levels, ranging from 0 to 2,000 parts per million (ppm), within Heating, Ventilating, and Air Conditioning (HVAC) applications. These compact, duct mounted devices offer a choice of 0 to 10 V or 0 to 20 mA output signals and feature an optional relay output with or without a digital display. Johnson Controls® CO₂ transmitters are easy to install and to operate.

The silicon-based CARBOCAP® sensor delivers high accuracy and long-term measurement stability (±100 ppm) over a five-year period without calibration. The diffusion-aspirated, single-beam, dual-wavelength sensor structure is remarkably simple. It consists of an infrared (IR) source, a sample cell, an IR detector, and a tunable interference filter that enables measurements at two wavelengths. Reference measurements made using a tunable interference filter eliminate the typical weakness of dual-beam sensors and permits shifting the optical pass band electronically. This innovative design provides precise reference readings that eliminate the typically broad deviation expected from a traditional CO₂ sensor.



Figure 1: Duct Mount CO₂ Transmitter with Conduit Adaptor and Mounting Flange

Table 1: Features and Benefits

Features	Benefits
Energy Savings from DCV Strategies	Offer potential for 10 to 70% energy savings.
CARBOCAP® Single-Beam, Dual-Wavelength Design	Provides superior performance compared to other technologies.
CARBOCAP Silicon, Micro-machined Construction	Provides reliable CO ₂ measurement in duct environments.
Calibration Reliability	Offers 5 years of reliable calibration.
Adjustable Duct Probe Depth	Permits optimal placement of sensing tip in a duct.
Extended (Optional) Features	Offer relay output for fan control.

Product Overview

This transmitter uses a completely new CO₂ sensing technology. The silicon based CARBOCAP sensor provides stability and reliability.

The CARBOCAP sensor operates in accordance with the single-beam, dual-wavelength method. This patented sensor has unique reference measurement capabilities, offering excellent stability over both time and temperature. The monolithic Fabry-Perot Interferometer (FPI) chip utilizes the optical, mechanical, and electronic properties of silicon at the same time.

The transmitter is factory set to measure CO₂ levels up to 2,000 (ppm). It requires a Class 2, 24 VDC/VAC power source and generates an output signal proportional to the CO₂ level detected. The duct mounted CO₂ transmitter series offers:

- standard CO₂ transmitter
- transmitter with relay output

IMPORTANT: The CD-W00-00-1CO₂ 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.

These compact, devices are designed to work:

- in standalone mode
- in support of Demand Control Ventilation (DCV)
- with fresh air and Indoor Air Quality (IAQ) systems
- as part of any integrated Building Automation System (BAS)
- with rooftop air handling Economizer controls systems

- connected to Metasys® system or the AD-DME series

Calibration

Johnson Controls CO₂ transmitters are calibrated using certified gases for the following:

- output signal (0 to 10 V) proportional to CO₂ concentration (0 to 2,000 ppm)
- altitude range of 0 to 1,969 ft (0 to 600m) above sea level without compensation
- relay output trigger point set for 1,000 ppm (in models featuring the optional relay output)

CARBOCAP Technology

Johnson Controls is licensed to integrate the new, silicon based CARBOCAP CO₂ sensor into HVAC or Building Automation Systems. This sensor has several advantages: high accuracy, excellent stability, negligible temperature dependence, and ease of installation.

The structure of the diffusion aspirated, single-beam dual-wavelength sensor is remarkably simple. It consists of an Infrared (IR) source, a sample cell, a tunable interference filter, and an IR detector. The tunable interference filter enables measurements at two wavelengths. As a result, references are measured accurately, without the typically broad tolerances inherent in dual-beam sensors.

Dust, water vapor, and most chemicals do not affect the measurement accuracy of the sensor. No special software compensation patches are required.

Packaging Innovation

Johnson Controls offers the industry's first duct mount package that is Underwriters Laboratories, Inc. (UL) Listed and requires no separate hardware. This product includes a strain relief/conduit adapter for connecting to standard 1/2 in. fittings. The CARBOCAP sensor is not affected by typical airflow rates encountered in ducts or rooftop air handlers.

The compact design of the device requires only a small hole in the ventilation duct, which eliminates the problems associated with leaking gaskets. The enclosure reduces material and labor costs by offering

Energy Efficiency

Using the CO₂ transmitter duct probe results in considerable savings in installation, operation, and maintenance costs with no recalibration expenses.

Johnson Controls CO₂ transmitters, when used with BAS/Economizer controllers (featuring DCV strategies), can generate energy savings ranging up to:

- 20 to 40% in office buildings
- 20 to 60% in restaurants/light retail facilities
- 10 to 70% in educational/business settings

Dimensions

See Figure 2 and Figure 3 for CO₂ transmitter and mounting flange dimensions.

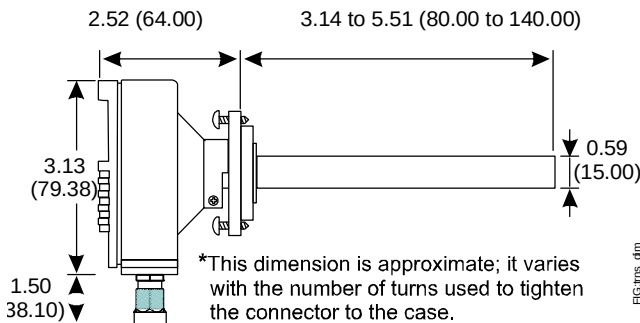


Figure 2: Transmitter Dimensions, in. (mm)

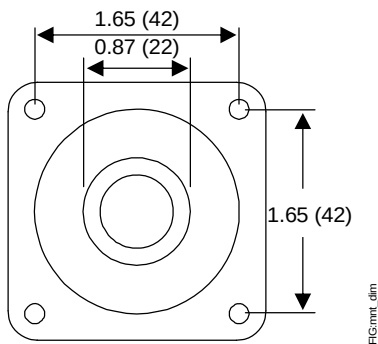


Figure 3: Mounting Flange Dimensions, in. (mm)

Table 2: CO₂ Transmitters

Product Code Number	Description
CD-P00-00-0	Duct Mount CO ₂ Transmitter
CD-PR0-00-0	Duct Mount CO ₂ Transmitter

Table 3: Replacement Parts for Duct Mount CO₂ Transmitters

Product Code Number	Description
ACC-CD-R	Relay Output Module for use in CD-P00-00-0 or CD-PR0-00-0
ACC-CD-CFK1	Conduit Adaptor Kit

Optional Feature

Relay Module

For applications where On/Off ventilation or fan control is required to provide fresh air, order the CD PR0 00 0 transmitter. This model includes a relay output module that plugs into the main Printed Circuit Board (PCB) offering a 30V, 0.5A Class 2 output with configurable On and Off trip points. Default On is 1,000 ppm, and default Off is 950 ppm.

Note: To redefine the relay On and Off trip points to suit the application, use the ACC CD S Relay Setpoint Software.

Repair Information

If the CD-Pxx-00-0 Series Duct Mount CO₂ Transmitter fails to operate within its specifications, replace the unit. For a replacement CO₂ transmitter, contact the nearest Johnson Controls representative.

Altitude Compensation

These devices are intended for an altitude range of 0 to 1,969 ft (0 to 600m) without compensation. To compensate for higher altitudes, refer to the installation instructions for this device.

Ordering Information

Contact the nearest Johnson Controls representative to order a CO₂ transmitter, and specify the desired product code number from Table 1. See Table 3 for replacement parts and Table 4 for accessories available for the duct mount CO₂ transmitter.

Table 4: Accessories for Duct Mount CO₂ Transmitters

Product Code Number	Description
ACC-CD-S	Relay Setpoint Software Kit; includes software and interface cable to reset the On and Off relay setpoints for CD-PR0-00-0
Y6531-0	Multiple Primary Transformer, 40 VA, 12-/208/230V Primary 24V Class 2 Secondary with Screw Terminals, Foot Mounting or 4 x 4 in. (101.6 x 101.6 mm) Plate

Technical Specifications

CD-Pxx-00-0 Series Duct Mount CO₂ 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)
	United States	UL Listed, CCN XAPX
	Canada	UL, Listed XAPX7
	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.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

United States Emissions Compliance

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.

Canadian Emissions Compliance

*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.*

**Building Efficiency**

507 E. Michigan Street, Milwaukee, WI 53202

*Metasys® and Johnson Controls® are registered trademarks of Johnson Controls, Inc.
All other marks herein are the marks of their respective owners. © 2010 Johnson Controls, Inc.*