

Installation Instructions

Indoor Air Quality CO₂ Sensor and Duct-Mounted Aspirator Box for use with Economizer (with solid-state controller)

Part # DNCBDIOX005A00

IMPORTANT: Read entire instruction before installing the sensor.

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

PACKAGE CONTENTS

QTY	CONTENTS
1	CO ₂ Sensor (33ZCSENC02)
1	Aspirator Box (33ZCASPC02)
2	Snap Bushing
4	Screw
1	Wiring Harness
2	Wire Tie

WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury and/or death.

Disconnect power supply and install lockout tag before attempting to install accessory.

GENERAL

This carbon dioxide sensor is designed to monitor carbon dioxide (CO₂) levels in the air and interface with the ventilation damper in an HVAC system using a patented automatic background calibration system. The system is a self-calibrated system that measures indoor CO₂ levels.

The CO₂ sensor utilizes single beam absorption infrared sensing technology that produces stable, reliable, and highly accurate carbon dioxide readings. The sensor measures CO₂ levels in the 0 to 10,000 parts per million (ppm) range (with a default range of 0 to 2000 ppm) and provides the reading as output in the form of an analog signal (4 to 20 mA or 0 to 10 vdc) or a discrete output (dry contact) based on an adjustable set point. The CO₂ level output can be used as input to a Network controller to control the ventilation damper position and ensure an adequate level of outside air in the building. This is one of several approved methods of controlling the indoor-air quality (IAQ) in a building and meet the requirements of local building codes and ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) standard 62-1999.

The CO₂ sensor input is used by the economizer controller to perform the demand controlled ventilation (DCV) function. The DCV function controls the outside air damper position in order to regulate indoor air quality.

The sensor is secured to a mounting plate by a locking screw. See Fig. 1. Power is supplied by running conduit through a knockout and wiring to the terminal blocks located on the sensor mounting bracket. A solid door is included to cover the digital display if required.

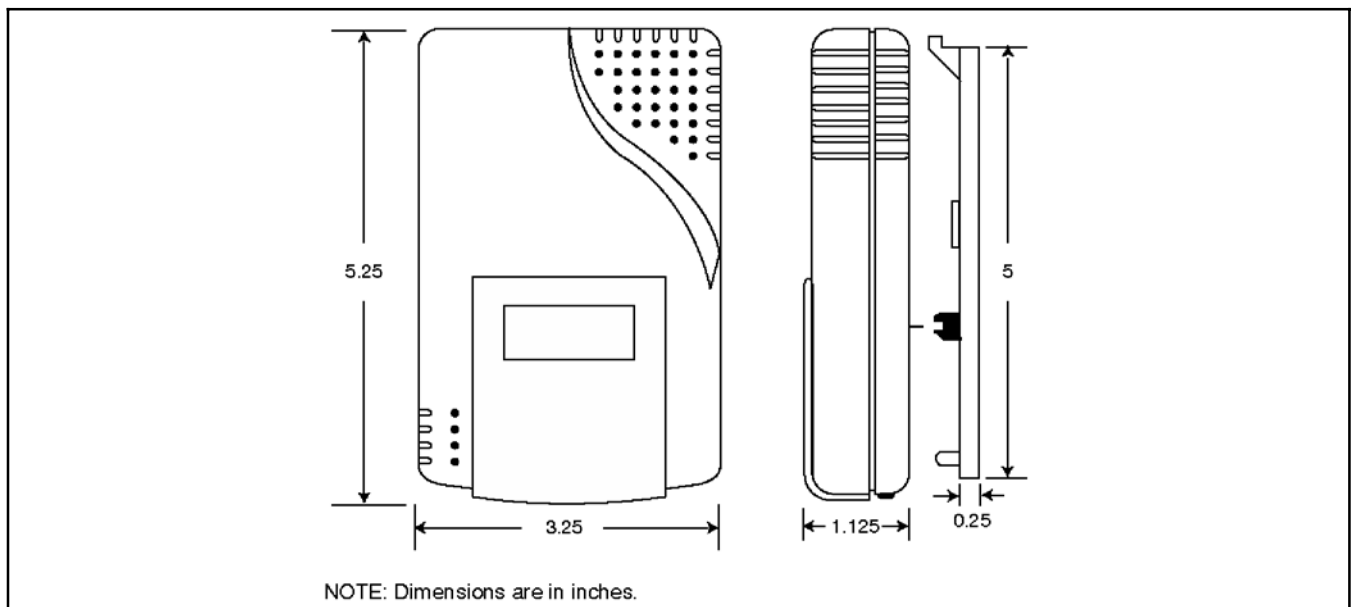


Fig. 1 - Fig. 1 - CO₂ Sensor Dimensions

USAGE

The CO₂ sensor is used with the economizer. When the sensor is wired to the economizer controller, the IAQ input can be used for demand control ventilation control based on the level of CO₂ measured in the space or return air duct.

The DNCBDIOX005A00 CO₂ sensor and aspirator box are used with the DNECOMZR008C00, 020A02, 021A02, 024A02, 025A02, 046A00, 047A00 and are used on the following units:

UNIT	
PGH036-300	PAS072-300
PAH036-300	PHS072-120
PHH036-180	PGE036-300
PGS072-300	PAE036-300

The accessory CO₂ sensor can be used on all rooftop units with a factory-installed or accessory economizer. The DNCBDIOX005A00 kit contains one 33ZCSENCO2 sensor and one 33ZCASPCO2 aspirator box. The 33ZCASPCO2 is a self-contained aspirator box accessory that houses the sensor for duct mount installations and is used to measure CO₂ levels in ductwork. An internal mounting bracket secures the base of the CO₂ sensor inside the aspirator box.

INSTALLATION

Step 1 - Sensor Location — See Fig. 1 for CO₂ sensor dimensions. This accessory package also includes an aspirator box. See Fig. 2 for aspirator box dimensions.

For sensor and aspirator box installation locations see Figures 3, 4, and 5.

NOTE: For PGH/PAH180-300, PGS/PAS180-300, and PHH150-180 units, the sensor and aspirator box can also be installed in the return air duct if desired.

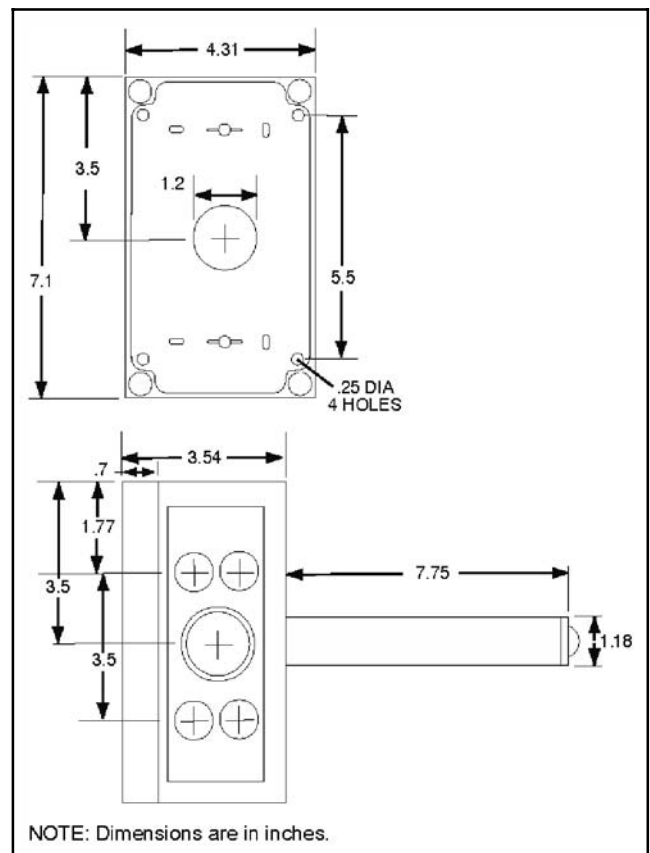


Fig. 2 - Aspirator Box Accessory (Part No. 33ZCASPCO2) and Dimensions

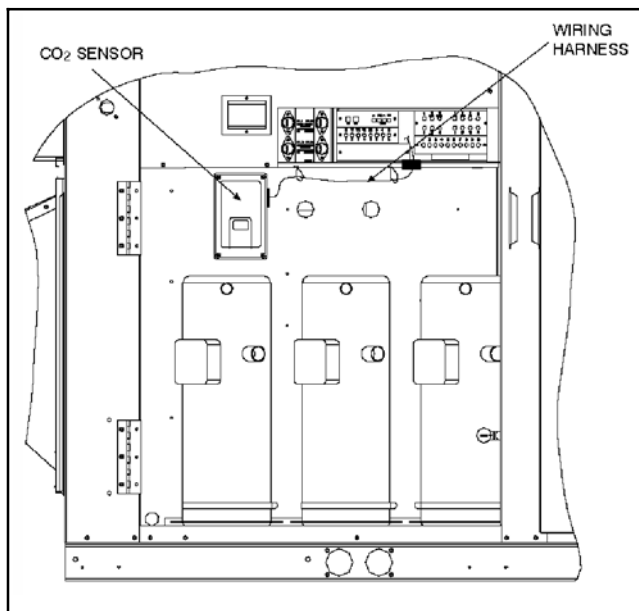


Fig. 3 - CO₂ Sensor Location - PGH/PAH210-300
(Sensor and aspirator box are installed in the return air section of unit)

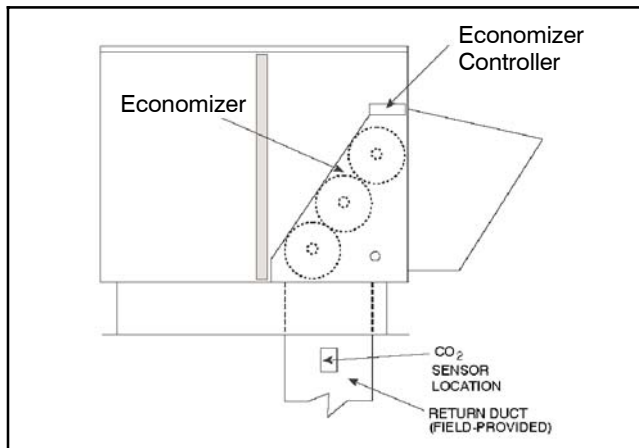


Fig. 4 - CO₂ Sensor Location - PGH/PAH036-150, PGS/PAS072-150, PHH036-120
(Sensor and aspirator box are installed in the return air duct)

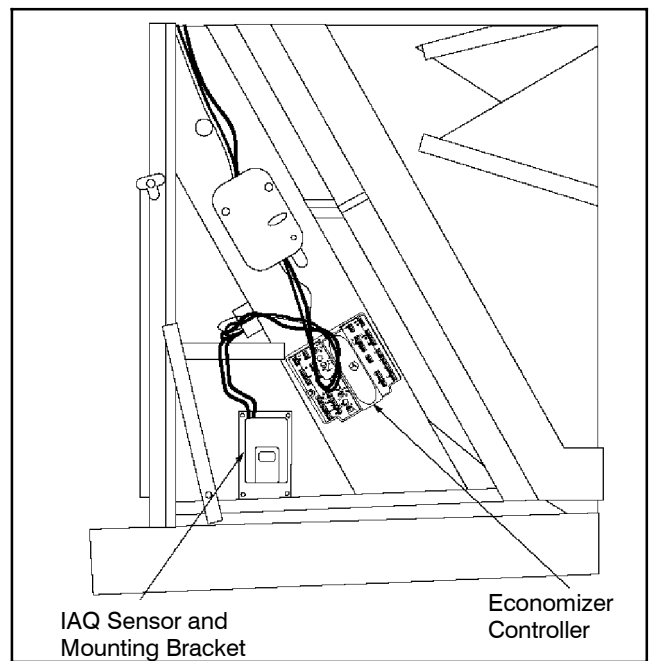


Fig. 5 - CO₂ Sensor Location - PGH/PAH155-180, PGS/PAS180-300, PHH150-180
(Sensor and field fabricated bracket are installed in the return air section of economizer)

Step 2 - The CO₂ sensor wiring has the following requirements:

NOTE: For PGH/PAH210-300 units, wiring is completed using the harness supplied with the accessory and the harness factory-installed in the unit. No additional wiring is needed.

NOTE:

1. Power requirements: 18 to 30 vac RMS 50/60 Hz; 18 to 42 vdc polarity protected/dependent; 1.75 VA maximum, 275 VA peak at 24 vdc.
2. All system wiring must be in compliance with all applicable local and national codes.
3. Unit 24-v or a separate 24 vac can be used to supply power to the sensor. If a separate 24 vac power supply is used, its secondary cannot be grounded.
4. All sensor wiring should be color coded for ease of maintenance and service. Two wires are required.
5. A two-wire cable is required to wire the dedicated power supply for the sensor. The two wires should be connected to the power supply and terminals 1 and 2. See Fig. 6 and Table 1.
6. A second separate pair of wires is required for the sensor output. This pair of wires should be connected to terminals 7 and 8 for a voltage output or to terminals 6 and 7 for mA output. For a normally open dry contact, use terminals 3 and 4 or for a normally closed dry contact use terminals 4 and 5. See Table 1.

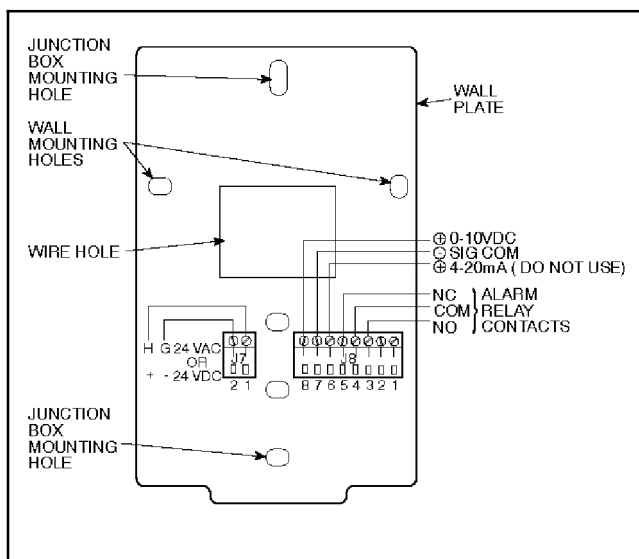


Fig. 6 - CO₂ Sensor Wiring Diagram

TABLE 1 - CO₂ Sensor Terminal Block Designations

Jumper	Terminal Number	Terminal Block Designations
J7 Power Input	AC 2	G (24 VAC – dedicated power supply)
	AC 1	H (24VAC)
	DC 2	G (24 DC–)
	DC 1	H (24 DC+)
J8 Power Input	8	0 to 10 VDC
	7	SIG COM
	6	4 to 20 mA (Do not use)
	5	NC (Alarm Relay Contact)
	4	COM (Alarm Relay Contact)
	3	NO (Alarm Relay Contact)
	2	Not Used
	1	Not Used

Step 3 - Mounting the Sensor

PGH/PAH210-300 Units – To mount the sensor and aspirator box, perform the following procedure.

1. Shut off unit power supply and install lockout tag.
2. Open the hinged compressor section door and secure door.
3. Find the plug located above compressor C1. If the unit does not have a third compressor, the sensor is installed to the left of compressor B1. Remove the plug and discard. Cut a hole in the insulation located behind the partition. See Fig. 3.
4. Prepare the aspirator box for mounting by removing the four screws from the Plexiglas cover.
5. Remove the CO₂ sensor from the mounting plate.
6. Attach the mounting plate to the standoffs in the aspirator box enclosure by using the 4 screws provided.

7. Hold the aspirator box vertically with the terminal blocks at the bottom and install a snap bushing into the conduit hole located on the right-hand side of the aspirator box at the bottom. See Fig. 2 for details.

8. Route wiring harness from the economizer controller to the sensor mounting location. See Fig. 3. Be sure to route the harness through the bottom of the mounting plate and through the snap bushing.

9. Remove the plastic plug from the unit partition. Mount the aspirator box to the partition, using four sheet metal screws provided. Verify that the 3 circular holes on the inlet tube are facing downward.

10. Caulk the snap bushing to make certain that the aspirator box is completely sealed and attach the CO₂ sensor to the mounting plate inside the aspirator box.

11. Connect the plug on the CO₂ sensor wiring harness to plug PL-18 on the unit wiring harness. See Fig. 6 and Table 1 for wiring information.

12. Because the return air section is at a zero or negative static pressure relative to ambient air, it is vital that the aspirator box be completely sealed. This includes areas where the control wiring enters the box. Once the aspirator box is mounted, the return air will enter through the round inlet holes, circulate through the sensor chamber and exhaust through the rectangular slots on the other side of the tube.

13. Replace the Plexiglas cover and secure the economizer panel.

14. Remove lockout tag and restore power to unit.

15. Configure the base unit for use with the accessory. See Configuration section on page 5.

PGH/PAH036-150, PGS/PAS072-150, PHH036-120 Units – To mount the sensor and aspirator box, perform the following procedure.

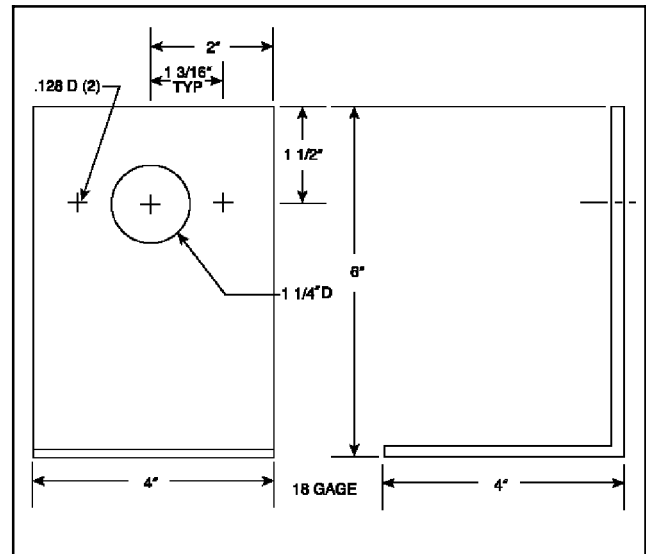
1. Shut off unit power supply and install lockout tag.
2. Remove filter access panel and economizer hood. Save all screws.
3. Prepare the aspirator box for mounting by removing the four screws from the Plexiglas cover.
4. Remove the CO₂ sensor from the mounting plate.
5. Attach the mounting plate to the standoffs in the aspirator box enclosure by using the 4 screws provided.
6. Hold the aspirator box vertically with the terminal blocks at the bottom and install a snap bushing into the conduit hole located on the right-hand side of the aspirator box at the bottom. See Fig. 2 for details.

7. Route wiring harness from the economizer controller to the sensor mounting location in the return air duct using metal clips and wire ties to organize and protect the harness. See Fig. 4.
8. Drill a 1.2-in. hole in the return air duct. See Fig. 2 for aspirator box dimensions. Mount the aspirator box to the duct, using four sheet metal screws provided. Verify that the 3 circular holes on the inlet tube are facing downward.
9. Caulk the snap bushing to make certain that the aspirator box is completely sealed and attach the CO₂ sensor to the mounting plate inside the aspirator box.
10. Route the wires through the patch plate on the economizer. Wire the harness to the sensor. See Fig. 6 and Table 1 for wiring information.
11. Because the return air section is at a zero or negative static pressure relative to ambient air, it is vital that the aspirator box be completely sealed. This includes areas where the control wiring enters the box. Once the aspirator box is mounted, the return air will enter through the round inlet holes, circulate through the sensor chamber and exhaust through the rectangular slots on the other side of the tube.
12. Ensure that the economizer can operate properly and that no wires will interfere.
13. Replace the Plexiglas cover.
14. Install economizer hood and filter access door.
15. Remove lockout tag and restore power to unit.
16. Configure the base unit for use with the accessory. See Configuration section on page 5.

PGH155-180, PGS/PAS180-300, PHH150-180
UNITS – To mount the sensor and aspirator box, perform the following procedure.

1. Shut off unit power supply and install lockout tag.
2. Remove filter access panel. Save all screws.
3. Fabricate the mounting bracket. See Fig. 7 for details.
4. Remove the CO₂ sensor from the mounting plate.
5. Attach the mounting plate to the field-fabricated mounting bracket by using the 4 screws provided.
6. Route wiring harness from the economizer controller to the sensor mounting location in the return air duct using metal clips and wire ties to organize and protect the harness. See Fig. 5.
7. Install the mounting bracket and sensor mounting plate in the unit return air section. See Fig. 5.
8. Route the wires through the patch plate on the economizer. Wire the harness to the sensor. See Fig. 6 and Table 1 for wiring information.
9. Attach the CO₂ sensor to the mounting plate.
10. Ensure that the economizer can operate properly and that no wires will interfere.

11. Replace filter access panel.
12. Remove lockout tag and restore power to unit.
13. Configure the base unit for use with the accessory. See Configuration section on page 5.



**Fig. 7 - Field-Fabricated Mounting Bracket -
PGH/PAH155-180, PGS/PAS180-300, and
PHH150-180 Units**

CONFIGURATION

The CO₂ sensor is shipped with factory configured settings for typical building control operation. The factory settings and adjustment parameters are shown Table 2.

The CO₂ sensor also has 9 preset standard voltage settings (STDSET) and one non-standard setting (NONSTD). These settings can be selected and configured using the keypad on the sensor. See Table 3 for available standard settings.

The CO₂ sensor offers non-standard custom settings for certain applications. The non-standard settings can be changed anytime after the sensor is energized. The variables that can be configured in this mode are: PPM Range, Scale (proportional or exponential), Output (V or mA), Output Range (V), Output Range (mA), Relay Setpoint, and Relay Hysteresis.

TABLE 2 - CO₂ Sensor Factory Settings

Adjustment	Range	Factory Setting
Altitude Above Sea Level	0–10,000 ft	0 ft.
Auto Background Calibration	On/Off	On
Select Standard Setting	1 to 9	1
Customize Setting		
PPM Range	0–10,000	0–2,000
Output Range	4–20mA/0–10V	4–20mA/0–10V
Proportional / Exponential Output	Select One	Proportional
Relay Setpoint	0–10,000 PPM	1000 PPM
Relay Hysteresis	0–10,000 PPM	50 PPM

Step 1 - Altitude Correction — The CO₂ sensor is calibrated at sea level altitude. Follow the steps below to adjust the altitude settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. The Altitude menu will appear. Use the Up/Down button to adjust to the proper altitude. The adjustments will increase or decrease in 500-ft increments.
3. Press Enter to set the value.
4. Press Mode to exit and resume normal operation.

Step 2 - Auto Background (On/Off) Calibration — The CO₂ sensor is factory set to On for Auto Background calibration (ABC). Follow the steps below to adjust the Auto Background calibration settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. The Altitude setting menu will appear first.
3. Press Mode to proceed to ABC Logic menu.
4. Use the Up/Down button to switch ABC Logic to On or Off.
5. Press Enter to set the value.
6. Press Mode to exit and resume normal operation.

Step 3 - Select a Preset Standard Setting (STDSET Menu) — The CO₂ sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. See Table 3. NOTE: Use setting 1 or 2 for ICP equipment. See Table 3.

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.

2. Press Mode 2 times. The STDSETMenu will appear.
3. Use the Up/Down button to select the preset number. See Table 3.
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

Step 4 - Optional — Select a Custom Setting (NONSTD Menu) — The custom settings can be changed anytime after the sensor is energized. Follow the steps below to change the non-standard settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode 2 times. The STDSETMenu will appear.
3. Use the Up/Down button to toggle to the NONSTD menu and press Enter.
4. Use the Up/Down button to toggle through each of the nine variables, starting with Altitude, until the desired setting is reached.
5. Press Mode to move through the variables.
6. Press Enter to lock in the selection, then press Mode to continue to the next variable.

Step 5 - Finish Installation — Finish the installation by sliding the cover over the menu keys and secure with the supplied screw.

Step 6 - Configure economizer Controller — Refer to the base unit installation instructions for information on adjusting the DCV set points of the economizer controller. Reconfiguration of the CO₂ sensor range may be required.

TABLE 3 - Sensor Standard Settings

Setting	Equipment	Output	Ventilation Rate (cfm/Person)	Analog Output	CO ₂ Control Range (ppm)	Optional Relay \ Setpoint (ppm)	Relay Hysteresis (ppm)
1	Interface w/Standard Building Control System	Proportional	Any	0-10V 4-20 mA	0-2000	1000	50
2		Proportional	Any	2-10V 7-20 mA	0-2000	1000	50
3		Exponential	Any	0-10V 4-20 mA	0-2000	1100	50
4	Economizer	Proportional	15	0-10V 4-20 mA	0-1100	1100	50
5		Proportional	20	0-10V 4-20 mA	0-900	900	50
6		Exponential	15	0-10V 4-20 mA	0-1100	1100	50
7		Exponential	20	0-10V 4-20 mA	0-900	900	50
8	Health & Safety	Proportional	—	0-10V 4-20 mA	0-9999	5000	500
9	Parking/Air Intakes/ Loading Docks	Proportional	—	0-10V 4-20 mA	0-2000	700	50

LEGEND
PPM — Parts Per Million