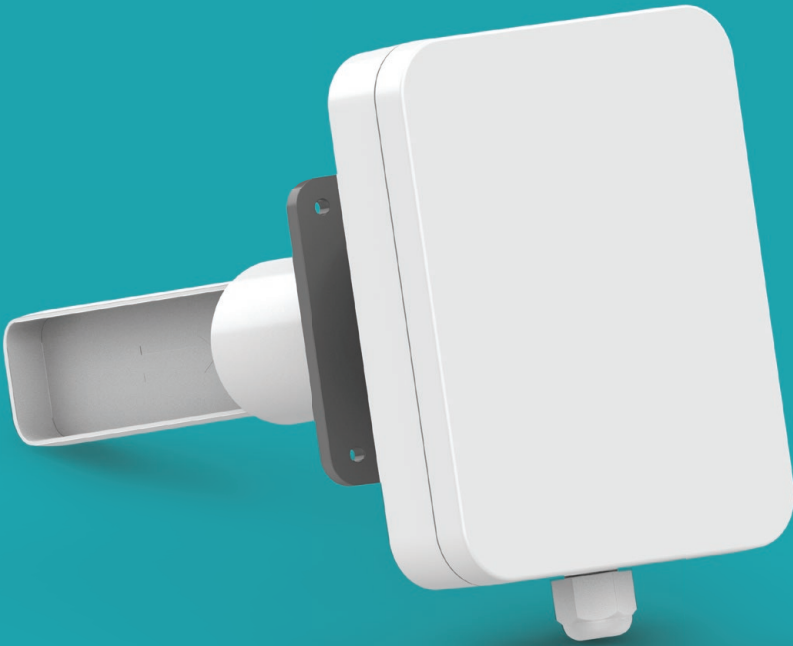


AcuCO2™ DM Series

Duct Mount Carbon Dioxide Sensor
Installation Guide



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Please read this manual carefully before installation, operation, and maintenance of the AcuCO2 DM duct mount carbon dioxide sensor.

The information contained in this document is believed to be accurate at the time of publication, however, Accuenergy assumes no responsibility for any errors which may appear here and reserves the right to make changes without prior notice as part of continuing improvements. Please ask the local representative for the latest product specifications before ordering.

The following symbols in this manual appear throughout this documentation, in addition to electrical warning of danger or safety risk during the installation and operation of the sensors.



Electric Shock Symbol: Carries information about procedures that must be followed to reduce the risk of electric shock and danger to personal safety.



Safety Alert Symbol: Information about circumstances that, if not considered, may result in injury or death.



Alert Symbol: Indicates the operation may lead to device malfunction or potential data loss.



Notice Symbol: Advance notice providing additional information before an action is taken by the user.

Installation and maintenance of the AcuCO2 DM duct mount carbon dioxide sensor shall only be performed by qualified, competent professionals who have received training and have experience with high voltage and current devices.

Accuenergy shall not be responsible or liable for any damage caused by improper sensor installation and/or operation.

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Introduction

Overview

The AcuCO2 DM Series monitors carbon dioxide concentration levels in ductwork of a building's HVAC system. The sensor utilizes non-dispersion infrared (NDIR) technology to detect CO₂, sending gas levels to a controller, which enables demand-controlled ventilation. The data provided by the sensor is the foundation in controlling indoor air quality, ensuring adequate fresh air, and lower energy usage by reducing unnecessary ventilation.

The AcuCO2 DM sensor has both a 0-10 VDC and 4-20 mA output with a 0 to 2,000 / 2,500 / or 5,000 PPM span based on model selection. The AcuCO2 comes standard with an IP65 rated enclosure, four self-capture screws, and sealed cover providing superior moisture and dust protection, as well as a gasketed mounting flange enabling adjustable probe insertion and sealed connection to ductwork.



ALERT: When using a 24VAC power supply with the AcuCO2 DM, it is strongly recommended to power the unit with an independent, dedicated, UL-listed Class 2 transformer.



ALERT: Do not place the transmitter in a dirty environment to avoid dust accumulation in the CO₂ sensor and affect the measurement accuracy.



ALERT: AcuCO2 DM cannot be mounted in a pool room or used for any application where corrosive chemicals are present.



ALERT: The AcuCO2 DM must be powered OFF during installation and wiring. Failure to do so may result in damage to the sensor.

Calibration

The AcuCO2 has a built-in automatic baseline correction algorithm (ABC logic) to create a maintenance free solution for the lifespan of the sensor greater than 15 years typically. Regular calibration is not required in applications where the sensor can periodically monitor CO₂ levels close to outside air's background levels (approximately 400 PPM) after normal business hours when the building is not occupied.

In normal indoor air quality (IAQ) applications, ABC logic correction and accuracy is defined after minimum 3 weeks of continuous operation to establish lowest background readings when building is considered unoccupied. Sensor must remain in operation during this period to apply correction factor, properly adjust baseline, and compensate for any sensor drift performed by the ABC logic.

ALERT: Rough handling, transportation, and aging might result in a reduction of sensor accuracy and cause sensor drift outside automatic baseline correction functionality.

ALERT: AcuCO2 DM sensor should not be used in continuously occupied buildings or those with constant elevated CO2 levels, where sensor drift would not be accurately corrected. Examples would include prisons, hospitals, and greenhouses.

Dimensions

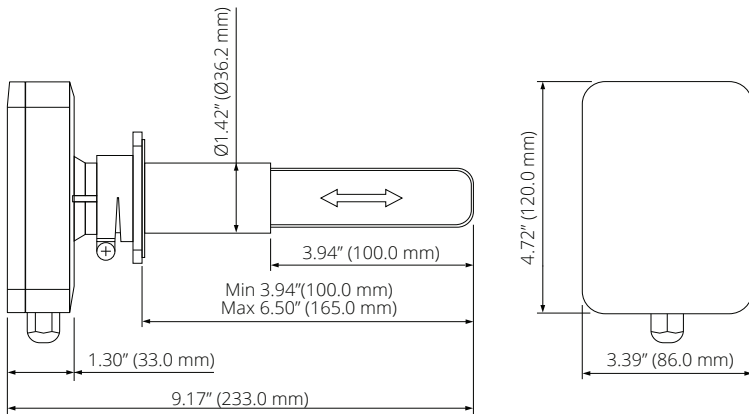


Figure 1 AcuCO2 DM Front and Side Views

Installation

Step 1: Choose the Optimal Mounting Location

The sensor probe should be mounted at the center of the duct, when possible, where the least amount of stratification is present.

1. Ensure the sensor is mounted away from any sources of air turbulence or obstructions such as filters, heating/cooling coils, dampers, and so on. Turbulent air will cause inaccurate CO₂ readings.
2. The sampling probe should be placed 3 to 5 duct diameters away from any potential obstructions or 90° duct bends.
3. Locate sensor so the airflow runs perpendicular to one side of the sampling probe.
4. Mount the sensor on the side or top of the ductwork to prevent potential condensation from entering the sensor and causing damage.
5. Avoid mounting the AcuCO₂ DM in close proximity to vibrating equipment or surfaces. Excessive vibration may cause inaccurate CO₂ readings and damage to sealed connections.
6. Sensor must be mounted on a flat surface to ensure sealed connection. Choose location that supports proper sensor orientation. Refer to diagram below.

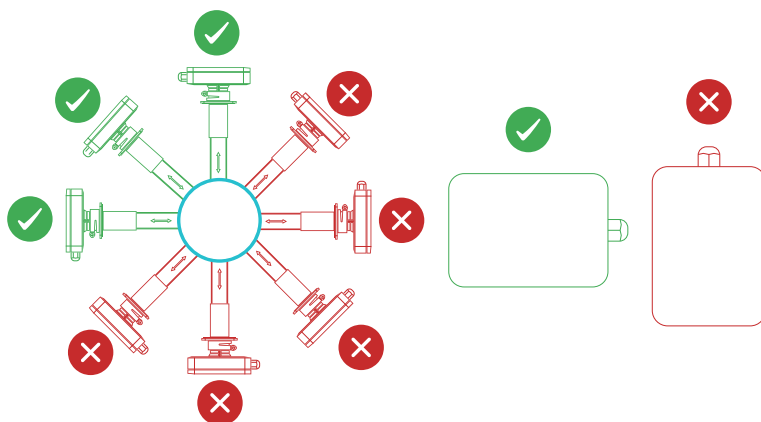


Figure 2 AcuCO₂ DM Sensor Orientation

Step 2: Separate Front Cover

1. To open the front cover of the AcuCO2 DM, locate the four self-capture screws at each corner on the back of the enclosure. Completely loosen each of the screws, but screws will remain attached to the enclosure.
2. Remove the front cover to reveal the electrical terminals. Connect the wiring according to the instructions in Step 3.

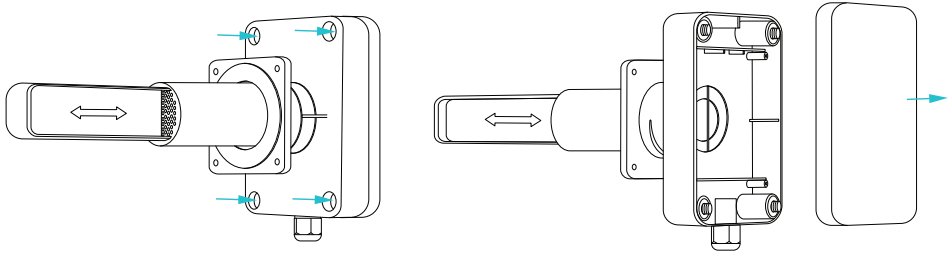


Figure 3 AcuCO2 DM Removing Front Cover

Step 3: Electrical Wiring



ALERT: When using 24VAC power source with the AcuCO2 DM, it is strongly recommended to power the unit with an independent, dedicated, UL-listed class 2 transformer.



ALERT: The AcuCO2 DM transmitter has an isolated power supply module internally. The ground for the power supply is isolated from the ground for the output signal. Four wires are required when powering with AC power supply. The ground of the power supply and output signals are isolated to reduce the impact of power supply noise.



ALERT: The transmitter can be a 3-wire connection if using 24VDC power supply. The “C” Terminal (GND of the output signal) and “N” Terminals (GND of the N input power supply) must be shorted. Refer to “Figure 6: AcuCO2 DM Wiring Diagram, 3-wire Non-Isolated Grounds”.



ALERT: If sharing a 24VAC transformer with other equipment such as controllers, or transmitters, an improper polarity will cause damage to the sensor.



ALERT: Do not mix half and full-wave rectified devices when powering with AC voltage. The AcuCO2 DM is full-wave rectified.



ALERT: If using shielded cable, ground the shield only at the controller end. Grounding both ends can cause a ground loop.



NOTE: Accuenergy recommends using 18 to 22 AWG twisted pair wires or shielded cable for signal connections. This applies to both power supply and analog output wiring.



NOTE: Watertight M12 (similar to PG7) cord grip installed (0.48" knockout hole when M12 removed).

Not observing these recommendations may damage the product and void the warranty.

Once the front cover is removed, feed the power supply and signal wiring through the M12 cable gland. The AcuCO2 DM sensor features push-button terminal blocks, which utilize a spring clamp mechanism to secure wires.

1. To connect the wire, push in the button to open the corresponding spring.
2. Insert the wire into the terminal, and then release the button, allowing the spring to clamp the wire.
3. To remove the wire, push in the button to open the spring, allowing the wire to be pulled out. Refer to Figure 4 for details.
4. Review the wiring installation, and make sure all terminals are connected properly and secure.
5. Once wiring is completed replace and fasten cover to enclosure prior to mounting sensor to duct.

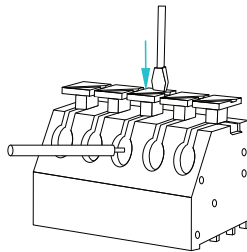


Figure 4 AcuCO2 DM Push Button Terminal Block

The AcuCO2 DM carbon dioxide output has both a 0-10VDC and 4-20mA signal. The two parallel signal outputs give linear signal DC voltage or current corresponding to 0 to 2,000 / 0 to 2,500 / or 0 to 5,000 PPM measurement range. Locate the wiring terminals for the selected output and connect the AcuCO2 DM as shown in the following figures:

Table 1 AcuCO2 DM Wiring Terminals

24V Power GND (N)	24V Power Supply (L)	Analog Signal COM (C)	Analog Signal (I)	Analog Signal (V)
To Power Supply Ground	21.6~ 26.4 VAC/VDC	To Controller Analog Common	4 to 20 mA (4-Wire Isolated GND)	Not Used
To Power Supply Ground	21.6~ 26.4 VAC/VDC	To Controller Analog Common	Not Used	0 to 10 VDC (4-Wire Isolated GND)
To Power Supply Ground	21.6~ 26.4 VDC	Shorted To Power Supply Ground	4 to 20 mA (3-Wire Non-isolated GND)	Not Used
To Power Supply Ground	21.6~ 26.4 VDC	Shorted To Power Supply Ground	Not Used	0 to 10 VDC (3-Wire Non-isolated GND)

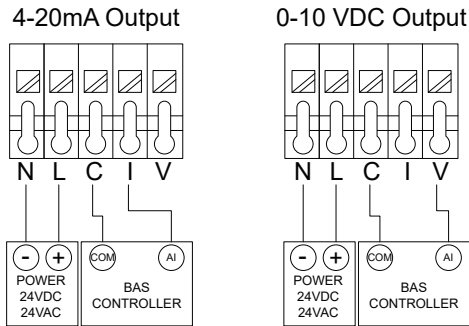
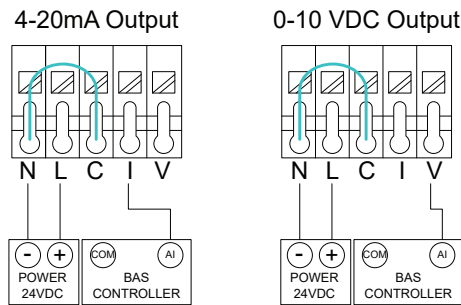


Figure 5 AcuCO2 DM Wiring Diagram, 4-wire Isolated Grounds



NOTE: Jumper wire required between “N” and “C” terminals

Figure 6 AcuCO2 DM Wiring Diagram, 3-wire Non-Isolated Grounds (24VDC Only)

Step 4: Mount CO2 Sensor

The provided flange is required for installation, as it provides a sealed connection to ensure proper functionality, and enables adjustable probe insertion. The flange should be installed on the side or top of the duct. Mount on flat surface with proper sensor orientation – Refer to Figure 2 for details.

1. Drill a 1-1/2" (38mm) diameter hole in the duct for sampling probe insertion.
2. Align the central opening of the mounting flange with the prepared hole for the sensor probe.
3. Fasten the mounting flange with the four ST2.9*16mm self-tapping screws provided and then insert the probe into the duct.
4. Ensure sampling probe intake is perpendicular to the airflow. The intake can be either side of the sampling probe, so flow direction does not matter.
5. Insert the AcuCO2 DM into the fixed flange. Adjust the probe a minimum depth of 4" (100mm) and maximum of 6.5" (165mm). Use the remaining screw to tighten the flange clamp to secure probe. The duct connection will be air-tight after installation. Refer to Figure 7 for details.

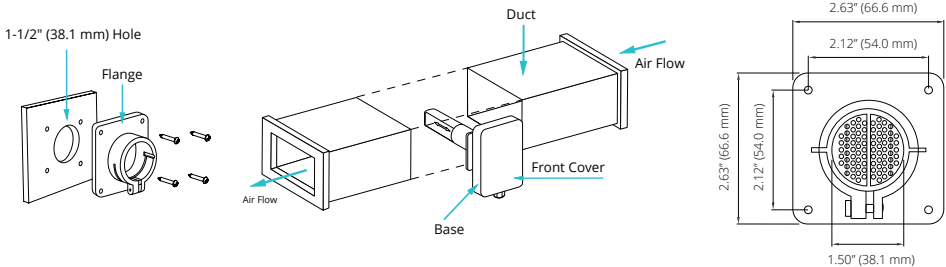


Figure 7 Duct Mount with Flange



NOTE: Over-tightening screws may cause damage to mounting flanges so use caution when fastening. Mount the CO2 sensor on a flat surface on side or top of the ductwork to prevent potential condensation from entering the sensor and causing damage.

Technical Specifications

Electrical	
Power Supply	21.6~ 26.4 VAC or VDC
Transmitter Output	Output 1: 0~10VDC (4 Wires) Output 2: 4~20mA (4 Wires)
Output Load	≤500Ω (Current), ≥2KΩ (Voltage)
Operating Current	≤60mA
Standby Current	≤20mA
Performance	
Sensing Method Type	Non-Dispersion Infrared (NDIR)
Accuracy	± 30ppm and ±3% at 400-2500ppm Range @ 0~50°C (32~122°F) ± 40ppm and ±3% Above 2500-5000ppm Range @ 0~50°C (32~122°F) 0~85%RH (Non-Condensing) Automatic Baseline Correction
CO2 Measurement Range	0~2,000, 0~2,500, or 0~5,000 PPM
Response Time	≤30s
Warm Up Time	≤180s
Sampling Frequency	1 Second
Resolution	1 PPM
Life Span	≥15 Years
Environmental	
Operating Temperature Range	-10~50°C (14~122°F) @ 0~95%RH (Non-Condensing)
Storage Temperature	-20~70°C (-4~158°F) @ 0~95%RH (Non-Condensing)
Mechanical	
Mounting	4-Screw Duct Mount Flange with Adjustable Probe and Set Screw
Wiring Connection	Push Button Terminal Blocks (4 Wire Isolated Grounds)
Weight	220g (0.49lbs)
Certifications/Warranty	
Enclosure Material	Fire Retardant Polycarbonate (UL94V-0)
Protection	IP65
Agency Approvals	CE, RoHS Addendum ab to ASHRAE Standard 62.1-2022 (AcuDCO2-DM-02 Only)
Warranty	5 Years

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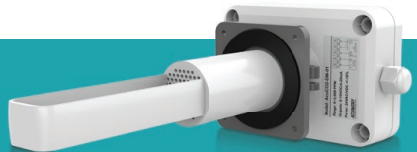


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Specs Subject To Change Without Notice.