

CO₂ Sensor Technical Guide



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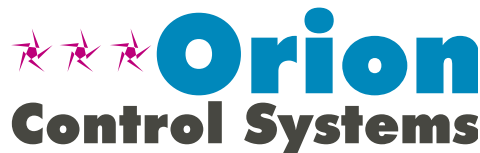
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PART NUMBER TABLE	
PART DESCRIPTION	ORION
Wall Mounted Space CO ₂ Sensor	OE256-01
Duct Mounted CO ₂ Sensor (RA or SA)	OE256-02
Digital Room Sensor Temp Only	OE217-00
Digital Room Sensor Temp & Humidity	OE217-01
Mounting Plate	BK000081
VCM-X E-BUS Controller	OE332-23E-VCMX



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Overview

The Wall Mounted Space CO₂ Sensor (OE256-01) is used for monitoring room CO₂ levels and is designed for permanent wall mounting in the conditioned space. It connects to the VCM-X E-BUS Controller (OE332-23E-VCMX) or RNE Controller (OE332-23E-RNE) by using TSDRSC modular prefabricated cable with RJ-45 connectors. It can be daisy-chained with the Digital Room Sensor (OE217-00 or OE217-01) or wired separately from the Orion Space Temperature Sensor (OE210, OE211, OE212, or OE213) for applications requiring both a room CO₂ sensor and room temperature sensor. See **Figure 1** for dimensions.

The OE256-02 Duct Mounted CO₂ Sensor is comprised of the OE256-01 CO₂ Sensor and the WattMaster Aspiration Box Assembly. It is used for sensing the current CO₂ level in the HVAC unit's return air stream. It is designed to be mounted in the return air of the HVAC unit and uses its integral aspiration box to sample the CO₂ level in the duct.

Some typical applications are:

- Controlling ventilation in a building where the occupancy varies frequently
- Controlling ventilation to ensure excess outdoor air is not causing energy waste
- Ensuring good air distribution throughout building zones
- Demand Control Ventilation

Features

The CO₂ Sensor provides the following:

- Uses the patented dual beam Non-Dispersive Infrared™ (NDIR) technology
- A very accurate and stable sensor guaranteed to maintain its accuracy due to infrared self-calibration feature of sensor
- Sensor accuracy of +/- 50 ppm @ 1000 ppm or 2% of the measured value
- Annual drift of +/- 2 ppm per year
- Measurement range of 0 to 2000 ppm
- LED under front cover shows active CO₂ sensing
- Addressable based on function within the system

Environmental Requirements

The CO₂ Sensor needs to be installed in an environment that can maintain a temperature range between 14°F and 122°F and a humidity range between 5% and 95% RH (non-condensing).

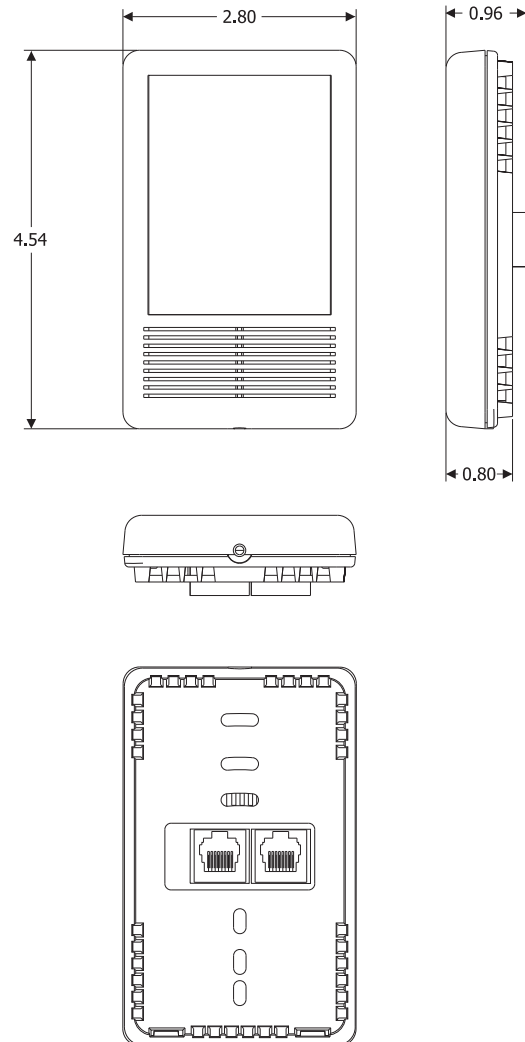


Figure 1: Wall Mounted CO₂ Sensor Dimensions

CO₂ SENSOR

Wall Mounted Space CO₂ Sensor Wiring to HVAC Unit Controller

Wall Mounting

The OE256-01 Wall Mounted Space CO₂ Sensor utilizes a sub-base mounting plate with a modular phone jack providing quick and easy mounting and wiring. The wall-mounted sensor's sub-base is compatible with standard junction boxes. A locking screw secures the assembly to the wall.

Optional Mounting Plate

Included with the Digital Room Sensor is a mounting plate that can be used, if necessary, to cover the sensor sheet rock opening. This mounting plate screws onto the back of the housing base. The mounting plate is then mounted and covers the recessed space in the wall. A locking screw secures the sensor to the wall. See **Figure 8, page 10** for dimensions.

Wiring to the HVAC Unit Controller

The OE256-01 Wall Mounted Space CO₂ Sensor connects to the VCM-X E-BUS or RNE Controller with the TSDRSC modular cable. It can be daisy-chained with the Digital Room Sensor (OE217-00 or OE217-01) or used separately from a Space Temperature Sensor (OE210, OE211, OE212, or OE213) for applications requiring both a room CO₂ sensor and room temperature sensor. Refer to **Figure 2** for instructions (VCM-X E-BUS Controller shown).

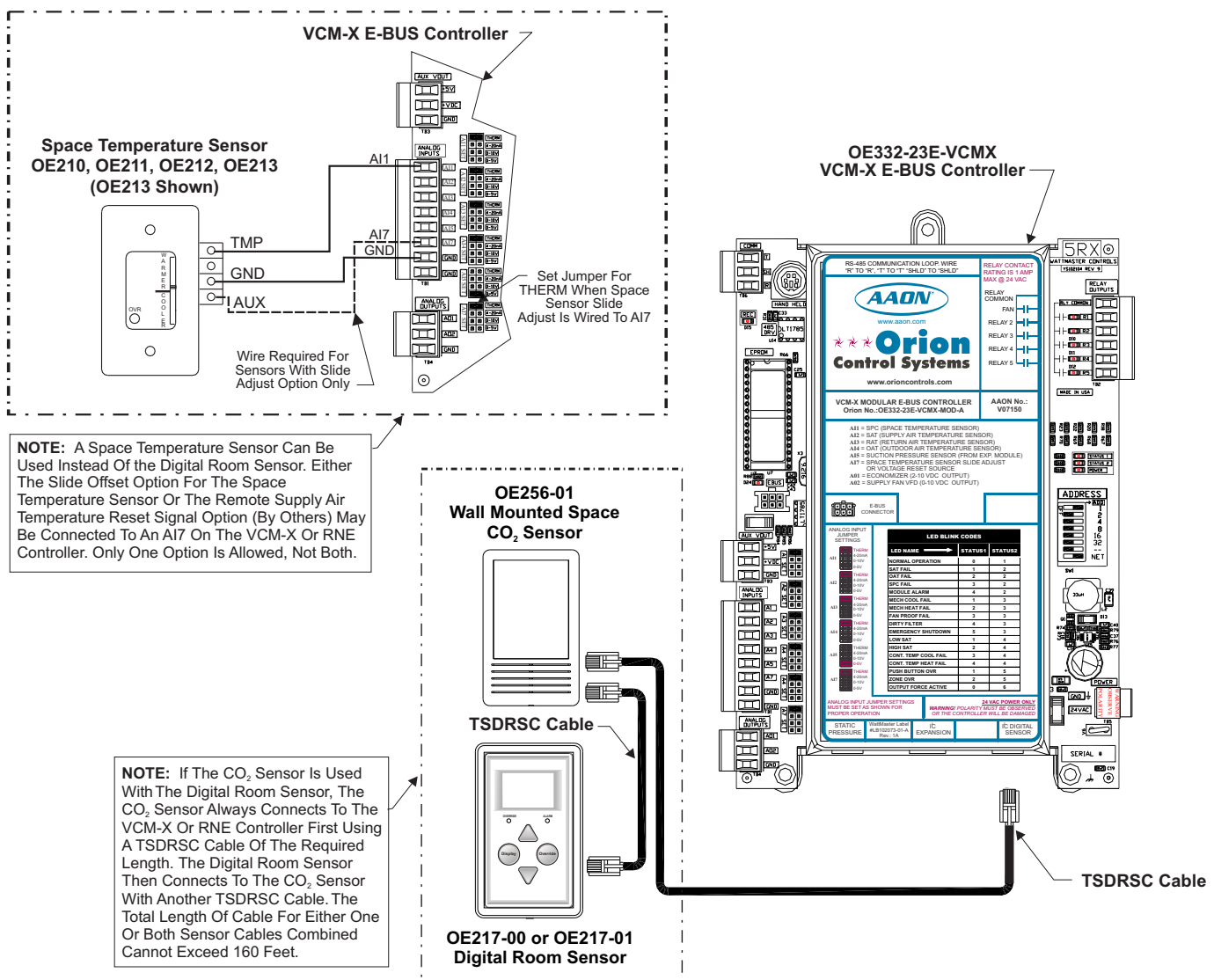


Figure 2: Wall Mounted Space CO₂ Sensor & Digital Room Sensor Wiring for VCM-X E-BUS Controller

Duct Mounted CO₂ Sensor Wiring to HVAC Unit Controller

Duct Mounted CO₂ Sensor

The OE256-02 is comprised of the OE256-01 CO₂ Sensor and the Watt-Master Aspiration Box Assembly. See the dimensional and installation information in **Figures 3, below and 4 & 5, pages 6 & 7** for mounting, wiring, and installation details.

The OE256-02 Duct Mounted CO₂ Sensor is used for sensing the current CO₂ level in the HVAC unit's return air stream. The return air sensing use of this sensor is applied when you want an average CO₂ reading in the area served by the HVAC unit or when you don't want a wall mounted CO₂ due to sensor tampering concerns in the space.

The OE256-02 Duct Mounted CO₂ Sensor is designed to be mounted in the return air duct of the HVAC unit and uses its integral aspiration box to sample the CO₂ level in the duct. Its address switch is factory set to address "1" which is for space or return air sensing applications and does not need to be changed for this application.

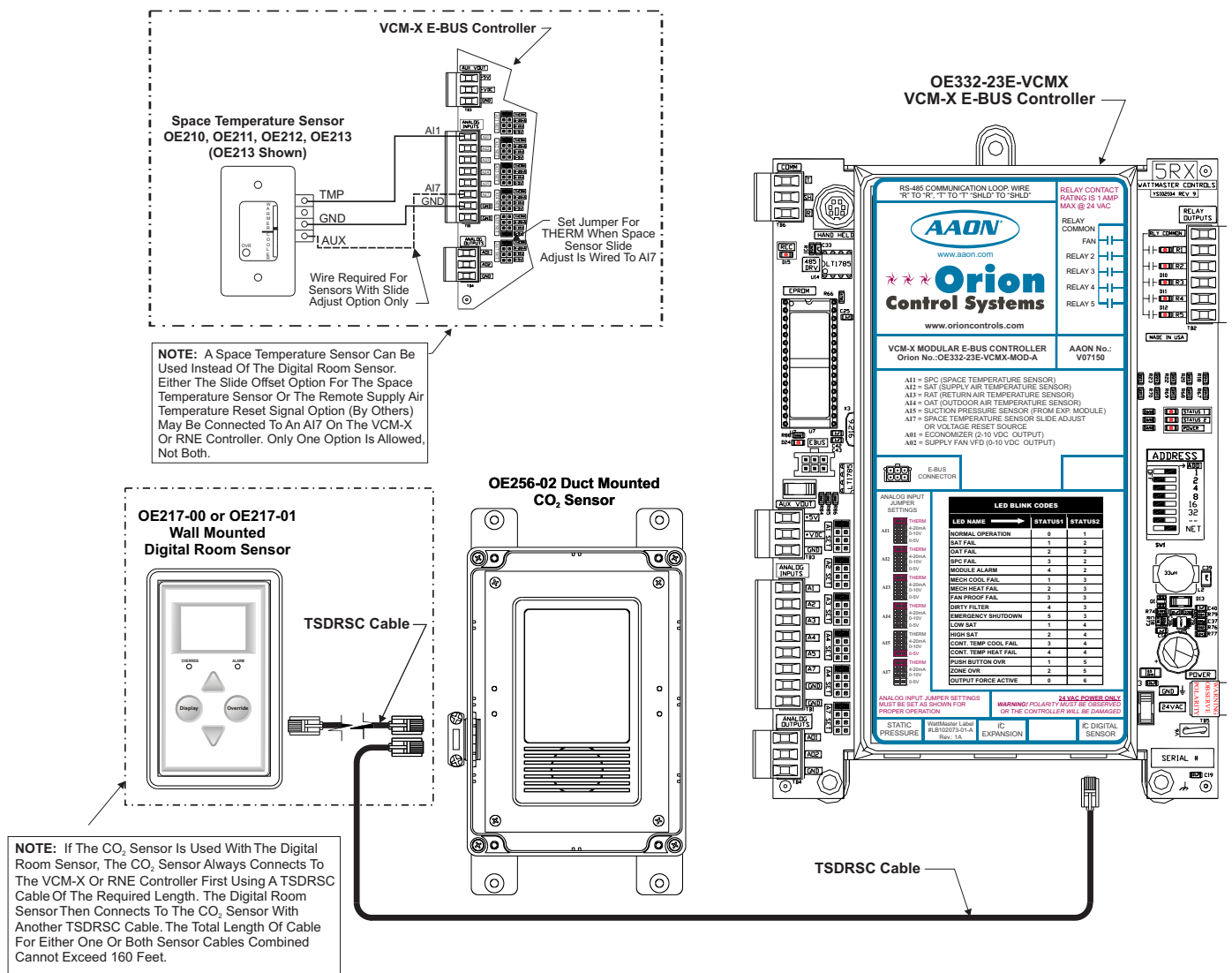


Figure 3: Duct Mounted CO₂ Sensor & Digital Room Sensor Wiring for VCM-X E-BUS Controller

Duct Mounted CO₂ Sensor Installation

Duct Mounted CO₂ Sensor Installation

To install the Duct Mounted CO₂ Sensor, please follow the instructions below. See **Figures 4 & 5** for detailed illustrations of the Duct Mounted CO₂ Sensor and its components.

STEP 1: Find the general location on the side of the Return Air Duct where you want to mount the CO₂ Sensor. Be sure to locate the box with the airflow in the proper direction per the airflow label. Using the Aspiration Box as a template, draw around it with a pencil on the duct. Locate the center of the box you have drawn and mark it. Using a 1 1/4" hole saw, drill a hole in the duct wall using the center you have just drawn as the drilling point. Insert the aspiration tube into the hole in the duct and mount the Aspiration Box to the Duct using a power screwdriver to secure the (4) mounting feet to the Duct wall using the (4) supplied sheet metal screws.

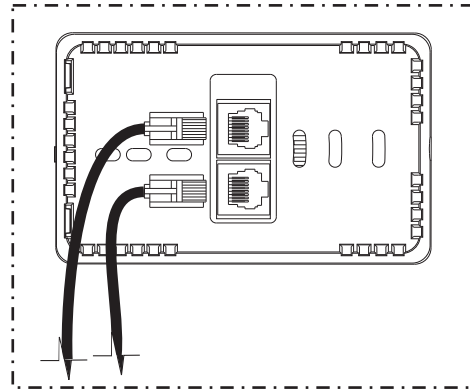
STEP 2: Remove the Aspiration Box cover from the Aspiration Box base by loosening the (4) screws that secure it with a Phillips screwdriver. Using the Phillips screwdriver, loosen the (2) conduit clamp screws on the conduit clamp assembly located on the side of the Aspiration Box enough to allow the insertion of the RJ-45 male cable connector(s) and cable(s) through the cable clamp opening and into the Aspiration Box using the appropriate length pre-fabricated TSDRSC cable(s) or TSDRSC & FMRSC cable(s) as required by your application.

STEP 3: Remove the CO₂ Sensor cover with circuit board by using the included Allen wrench to loosen the set screw located at the bottom edge of the CO₂ Sensor assembly and pulling the Sensor cover with circuit board apart from the Sensor base. Route the RJ-45 male plug(s) and cable(s) under the Sensor base and through the rectangular clearance opening in the Sensor base and then plug the RJ-45 male cable connector(s) into the RJ-45 female connector(s) on the back of the Sensor circuit board which is attached to the Sensor cover.

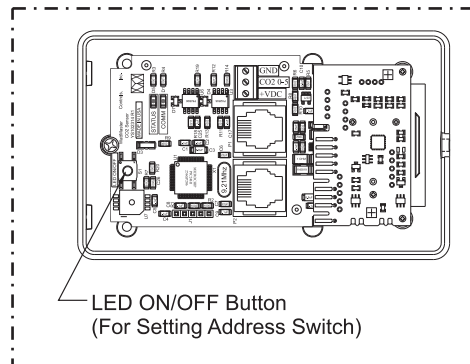
STEP 4: The address switch is factory set to "1" which is correct for Space CO₂ Sensor applications or Return Air CO₂ Sensor applications. If you have a custom coded application and need to change the address switch, setting the address switch at this time is a good idea as it requires taking the Sensor base apart from the Sensor cover. See **page 8** for instructions. It will also require that you power up the VCM-X Controller that the Sensor is plugged into to perform the address setting procedures.

STEP 5: After setting the address switch (if required), re-install the Sensor cover with circuit board to the Sensor base using the supplied Allen wrench and set screw and re-install the Aspiration Box cover in reverse fashion from how you disassembled it previously.

STEP 6: Tighten the conduit clamp screws down until the conduit clamp is gripping the Sensor cable(s) snugly. Do not over-tighten the clamp screws as this could damage the cable(s).



View of Back Side of Sensor Showing RJ-45 Cable Connector Locations (With Sensor Base Installed)



View of Back Side of Sensor Cover & Circuit Board (With Sensor Base Removed)

Figure 4: CO₂ Sensor Components and Wiring

Duct Mounted CO₂ Sensor Installation

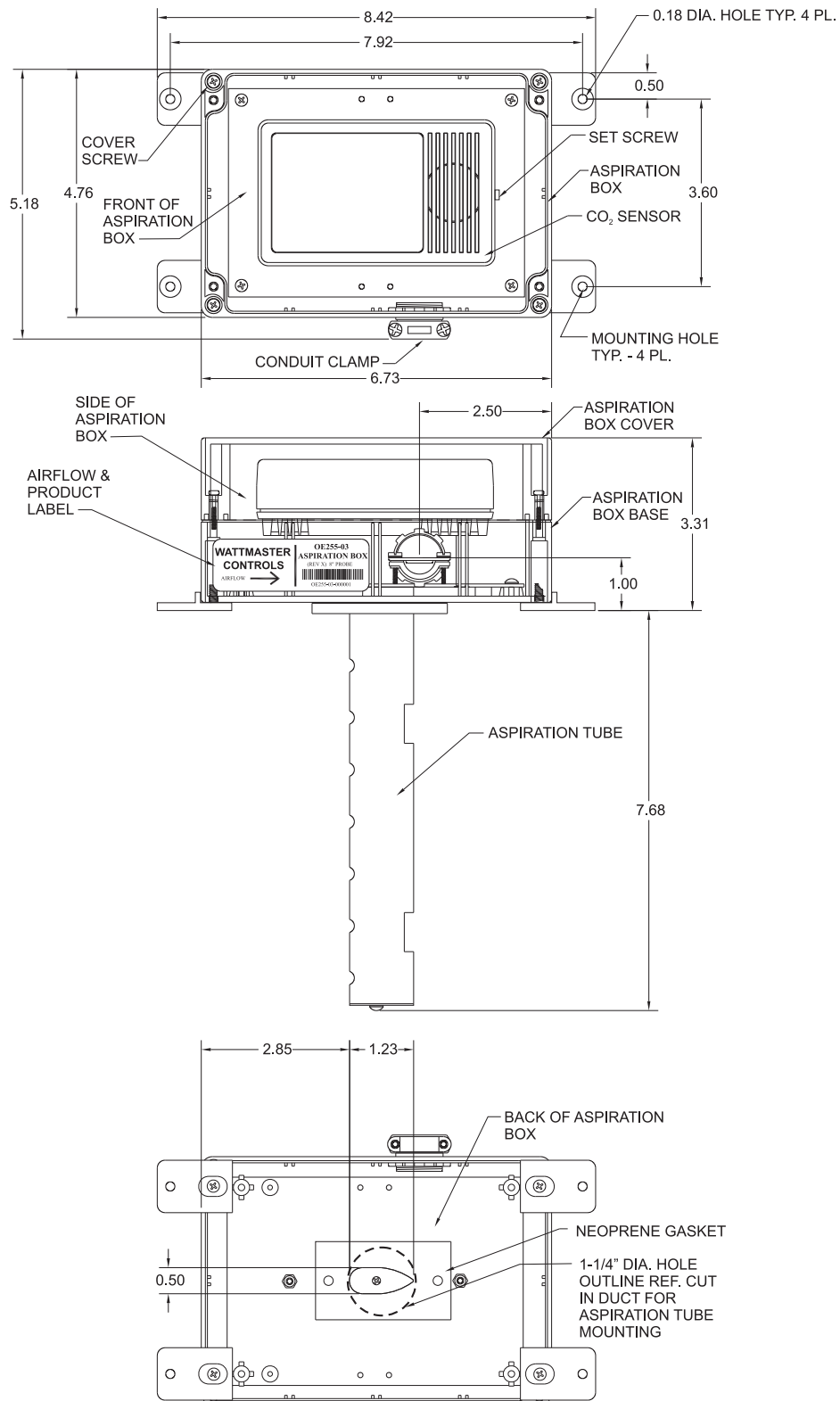


Figure 5: Mounting and Cable Installation for Duct Mounted CO₂ Sensor

Troubleshooting

Setting the Sensor Address Switch

LED ON/OFF Push-Button Operation for Setting Address

The LED ON/OFF Push-Button is used to set the CO₂ Sensor's address. The LED ON/OFF Push-Button is located on the Sensor's board and is only visible by taking the device off the wall. See location in **Figure 6**. The default addresses are as follows:

- Space or Return CO₂ Sensor = Address 1 (Default)
- Address 2 is reserved.
- Open addresses for Custom Applications = Addresses 3-10

To set the address, follow these instructions:

1. Power up the VCM-X or RNE Controller that the Sensor is plugged into.
2. Press the LED ON/OFF Push-Button for 5 seconds until the LEDs turn off.
3. Then press the push-button the number of times that represents the address. Press once for address 1, press twice for address 2, etc.
4. The address range can be set to 1 (default) and from 3 to 10.
5. To verify that the correct address has been entered, refer to the STATUS LED information below.

The board address is stored in nonvolatile memory. Once the address is set, the address will be saved after loss of power.

Using LEDs to Troubleshoot

LEDs are available for troubleshooting the CO₂ Sensor. The Front LED is visible through the front cover of the CO₂ Sensor. See **Figure 7** for location. The other LEDs are located on the Sensor's board and are only visible by taking the device off the wall. See **Figure 6** for locations.

LED ON/OFF Push-Button

This button is located on the CO₂ Sensor's board. See **Figure 6**. This button is initially set for "LEDs OFF." Push this button to enable/disable the LEDs. Pushing this button ON will make Front LED light up. This LED is also used for setting the address.

Front LED

When the LEDs are turned on, a green LED will be visible through the front plastic cover of the CO₂ sensor. See **Figure 7**. The Front LED will blink whenever a CO₂ sample is taken. A sample is taken every 30 seconds.

STATUS LED

Initially, the STATUS LED blinks fast for 30 seconds. It then stays on and blinks the board address whenever a CO₂ sample is taken. A CO₂ sample is taken once every 30 seconds.

COMM LED

The COMM LED blinks on whenever communications are sensed.

Altitude Correction

Altitude correction can be configured using Prism software installed on a computer. The altitude can be configured at a value of 0-15,000 feet. The default is 500 feet.

TB1 Terminal Block (CO₂ Reading)

The TB1 terminal block should only be used to test the sensor when the sensor cable is plugged into the controller and the sensor and controller are powered up. Directions: Set the meter for DC volts and connect the GND probe to the GND terminal and the + probe to the CO₂ 0-5 terminal. Look at the output voltage and record it. Multiply the voltage times 400. The value should match the CO₂ as read on the System Manager TS, Modular System Manager, Modular Service Tool, or Prism. If the signal doesn't match the sensor reading, call WattMaster Controls for a replacement.

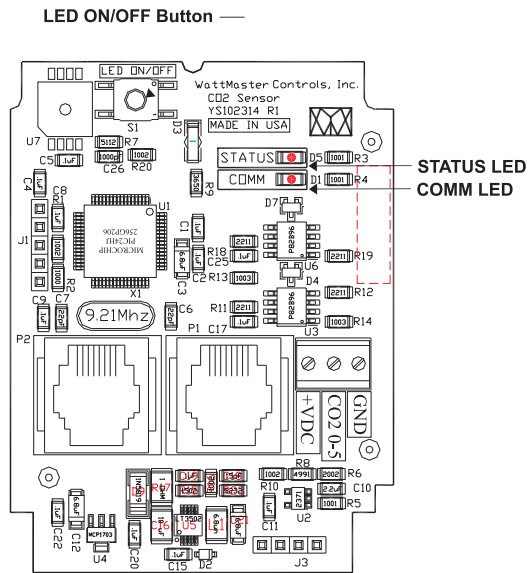


Figure 6: LED ON/OFF Button and Board LEDs

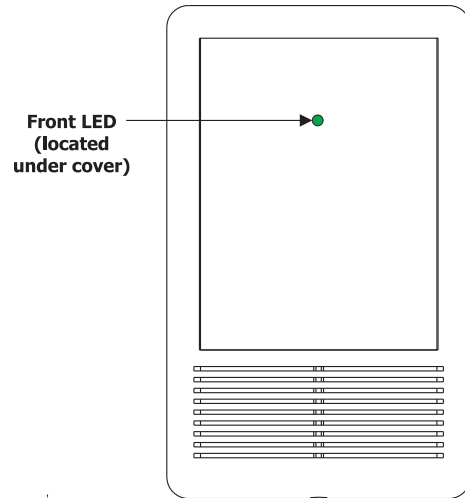


Figure 7: CO₂ Sensor's Front LED

Appendix - Mounting Plate Dimensions

Optional Mounting Plate

Included with the Digital Room Sensor is a mounting plate that can be used, if necessary, to cover the sensor sheet rock opening. This mounting plate screws onto the back of the housing base. The mounting plate is then mounted and covers the recessed space in the wall. A locking screw secures the sensor to the wall. See **Figure 8, below** for dimensions.

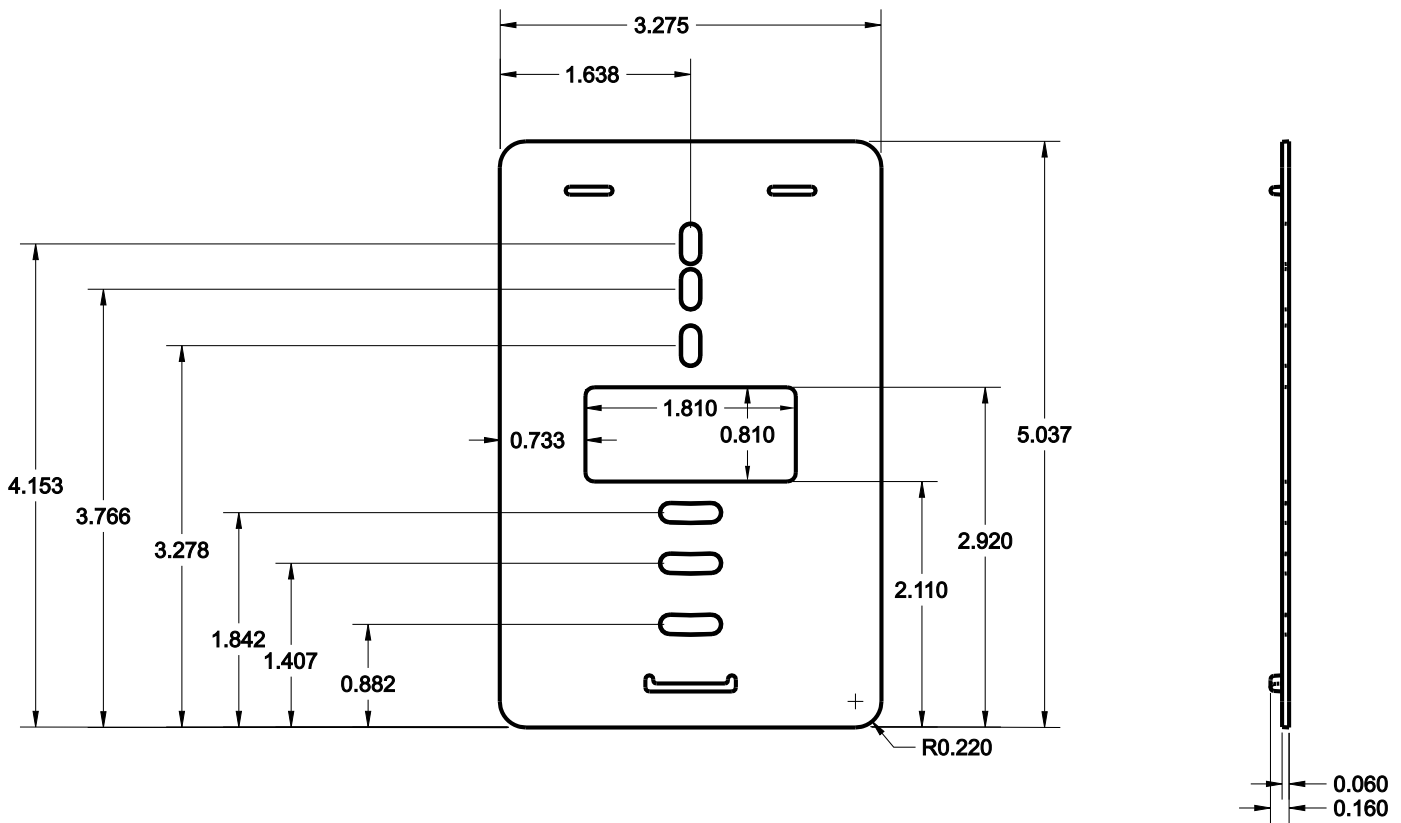


Figure 8: BK000081 Mounting Plate Dimensions



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