AAON

Orion Control Systems

I²C CO_2 Sensor Technical Guide

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PART DESCRIPTION	AAON P/N
Wall-Mounted I^2C CO_2 Space Sensor	ASM01824
Duct-Mounted I^2C CO_2 Sensor (RA or SA)	ASM01826
I^2C Digital Room Sensor Temp Only	ASM01817
I^2C Digital Room Sensor Temp & Humidity	ASM01818
Mounting Plate	G026490
VCM-X E-BUS Controller	ASM01702

This manual is also available for download from our website—www.aaon.com/controlsmanuals—under Previous Generation Sensors, where you can always find the latest literature updates.

AAON, Inc.
2425 South Yukon Ave.
Tulsa, OK 74107-2728
www.aaon.com
Factory Technical Support Phone: 918-382-6450
Controls Support Phone: 866-918-1100

AAON P/N: G042470, Rev. 01F

Overview

The I²C Wall-Mounted Space CO_2 Sensor (ASM01824) is used for monitoring room CO_2 levels and is designed for permanent wall mounting in the conditioned space. It connects to the VCM-X E-BUS Controller using TSDRSC modular prefabricated cable with RJ-45 connectors. It can be daisy-chained with the I²C Digital Room Sensor or wired separately from the Orion Standard Room Temperature Sensor for applications requiring both a room CO_2 sensor and room temperature sensor. See **Figure 1** for dimensions.

The I²C Duct-Mounted CO_2 Sensor (ASM01826) is comprised of the ASM01824 CO_2 Sensor and the AAON Aspiration Box Assembly. It is used for sensing the current CO_2 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 CO_2 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 CO_2 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 CO_2 sensing
- Addressable based on function within the system

Environmental Requirements

The CO_2 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).

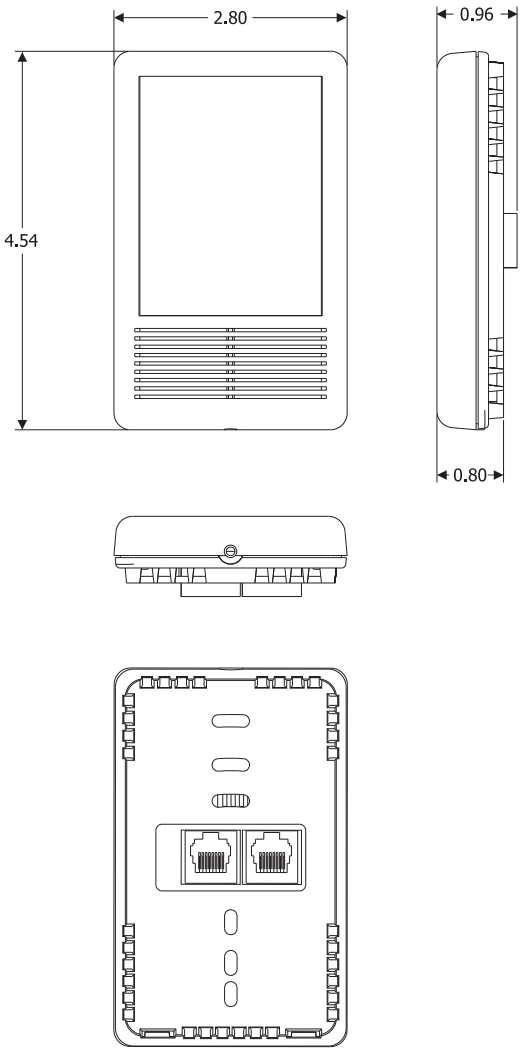


Figure 1: Wall-Mounted CO_2 Sensor Dimensions

Wall-Mounted Space CO_2 Sensor Wiring to HVAC Unit Controller

Wall-Mounted CO_2 Sensor

The Wall-Mounted Space CO_2 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 CO_2 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 mounting plate dimensions.

Wiring to the HVAC Unit Controller

The Wall-Mounted Space CO_2 Sensor connects to the VCM-X E-BUS Controller with the TSDRSC modular cable. It can be daisy-chained with the Digital Room Sensor or used separately from a Standard Room Temperature Sensor for applications requiring both a room CO_2 sensor and room temperature sensor. Refer to **Figure 2** for instructions.

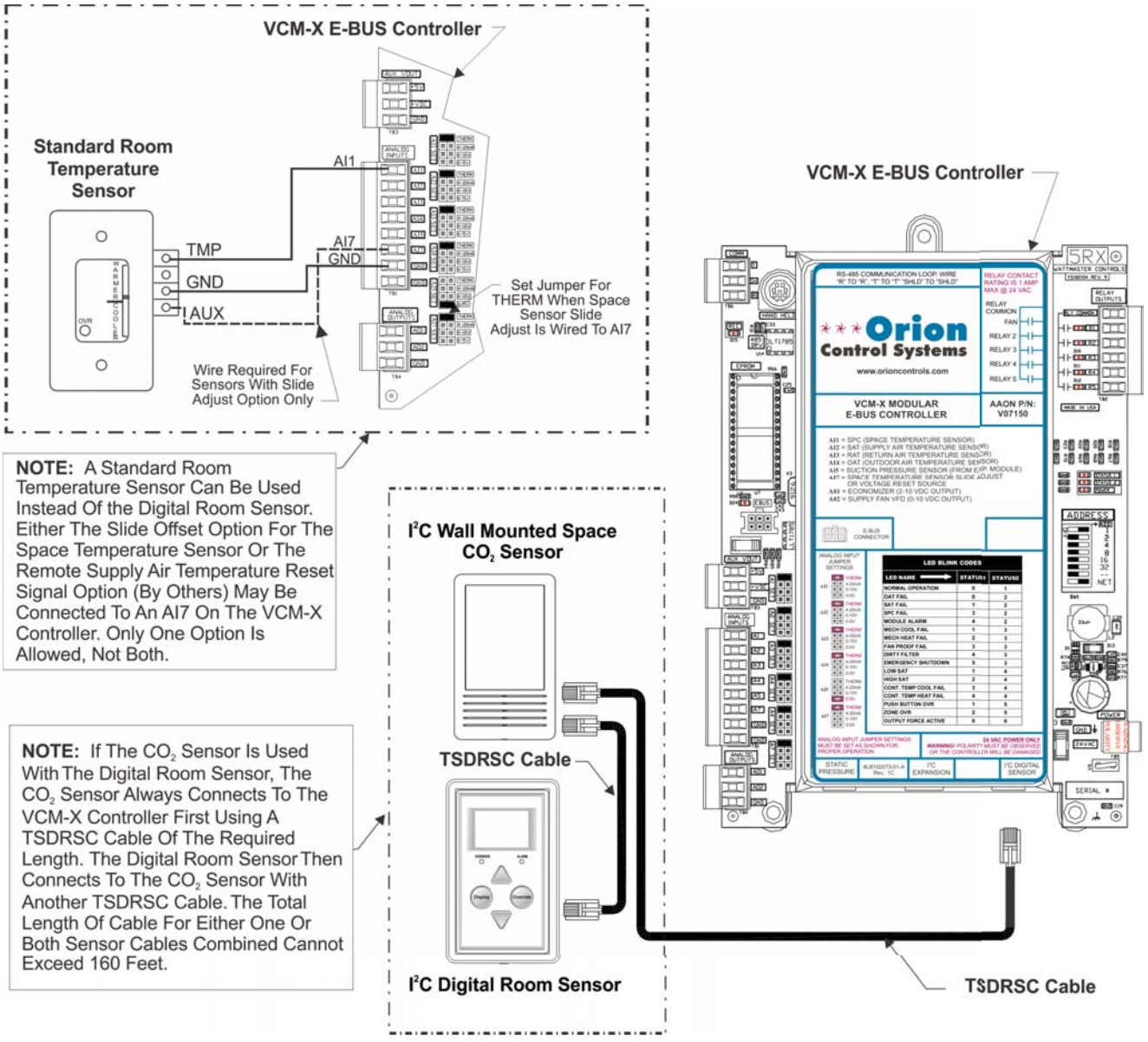


Figure 2: Wall Mounted Space CO_2 Sensor & Digital Room Sensor Wiring for VCM-X E-BUS Controller

Duct-Mounted CO_2 Sensor Wiring to HVAC Unit Controller

Duct-Mounted CO_2 Sensor

The ASM01826 is comprised of the ASM01824 CO_2 Sensor and the AAON Aspiration Box Assembly. See **Figure 3**, **below** and **Figures 4 & 5**, **pages 6 & 7** for mounting, wiring, and installation details.

The Duct-Mounted CO_2 Sensor is used for sensing the current CO_2 level in the HVAC unit's return air stream. The return air sensing use of this sensor is applied when you want an average CO_2 reading in the area served by the HVAC unit or when you don't want a wall mounted CO_2 Sensor due to sensor tampering concerns in the space.

The OE256-02 Duct Mounted CO_2 Sensor is designed to be mounted in the return air duct of the HVAC unit and uses its integral aspiration box to sample the CO_2 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.

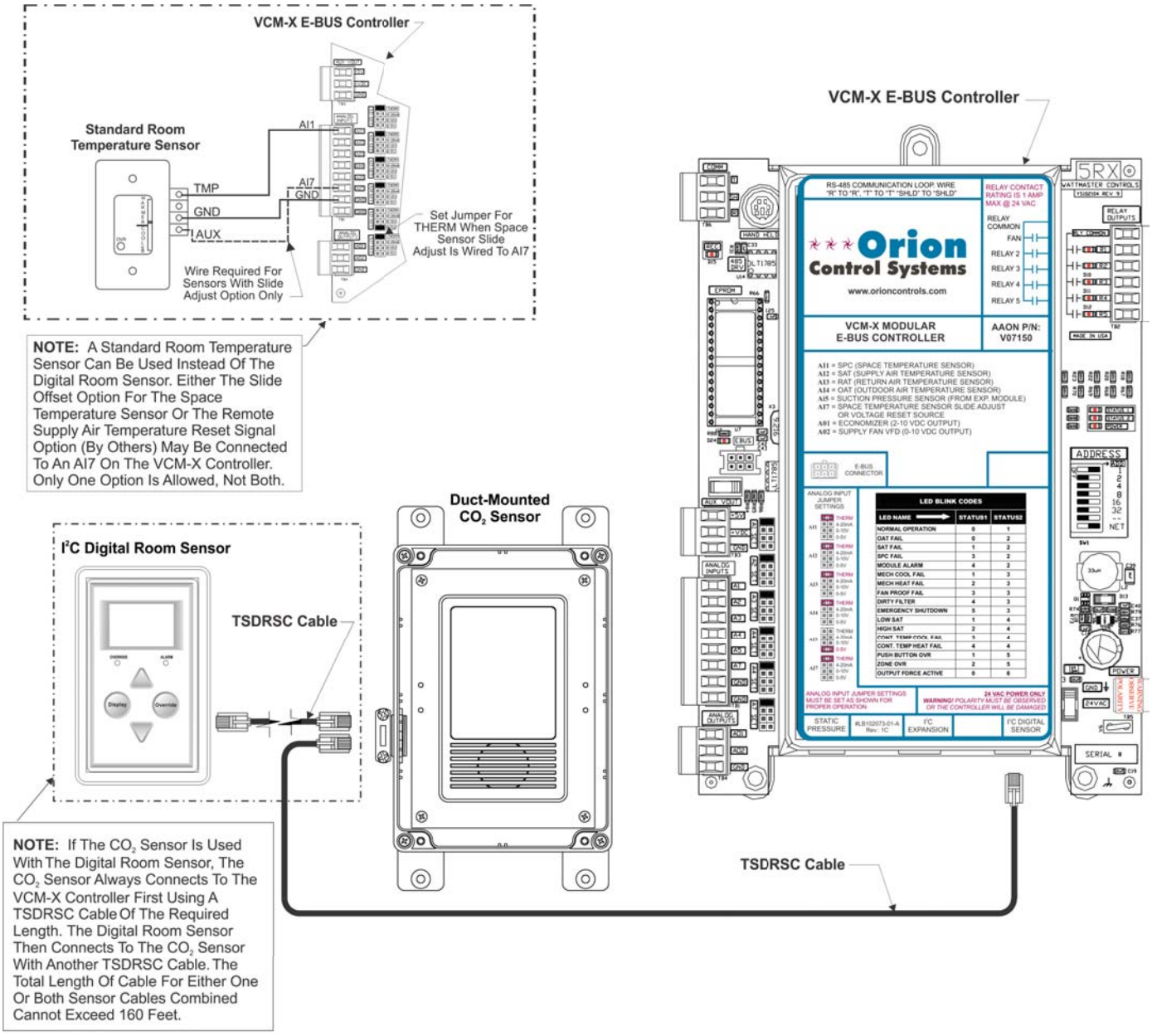


Figure 3: Duct-Mounted CO_2 Sensor & Digital Room Sensor Wiring for VCM-X E-BUS Controller

Duct-Mounted CO_2 Sensor Installation

Duct-Mounted CO_2 Sensor Installation

To install the Duct-Mounted CO_2 Sensor, please follow the instructions below. See **Figures 4 & 5** for detailed illustrations of the Duct-Mounted CO_2 Sensor and its components.

STEP 1: Find the general location on the side of the Return Air Duct where you want to mount the CO_2 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.

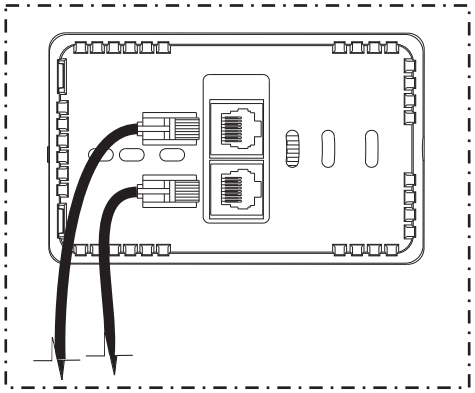
STEP 2: Remove the Aspiration Box cover from the Aspiration Box base by loosening the (4) screws that secure it with a Phillips screwdriver. Using the Phillips screwdriver, loosen the (2) conduit clamp screws on the conduit clamp assembly located on the side of the Aspiration Box enough to allow the 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 of pre-fabricated TSDRSC cable(s) as required by your application.

STEP 3: Remove the CO_2 Sensor cover with circuit board by using the included Allen wrench to loosen the set screw located at the bottom edge of the CO_2 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.

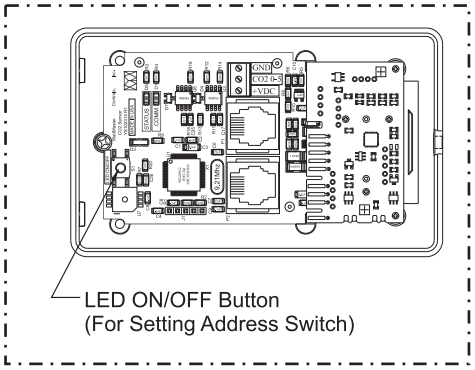
STEP 4: The address switch is factory set to "1" which is correct for Space CO_2 Sensor applications or Return Air CO_2 Sensor applications. If you have a custom coded application and need to change the address switch, see **page 8** for instructions.

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) snuggly. 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: CO_2 Sensor Components and Wiring

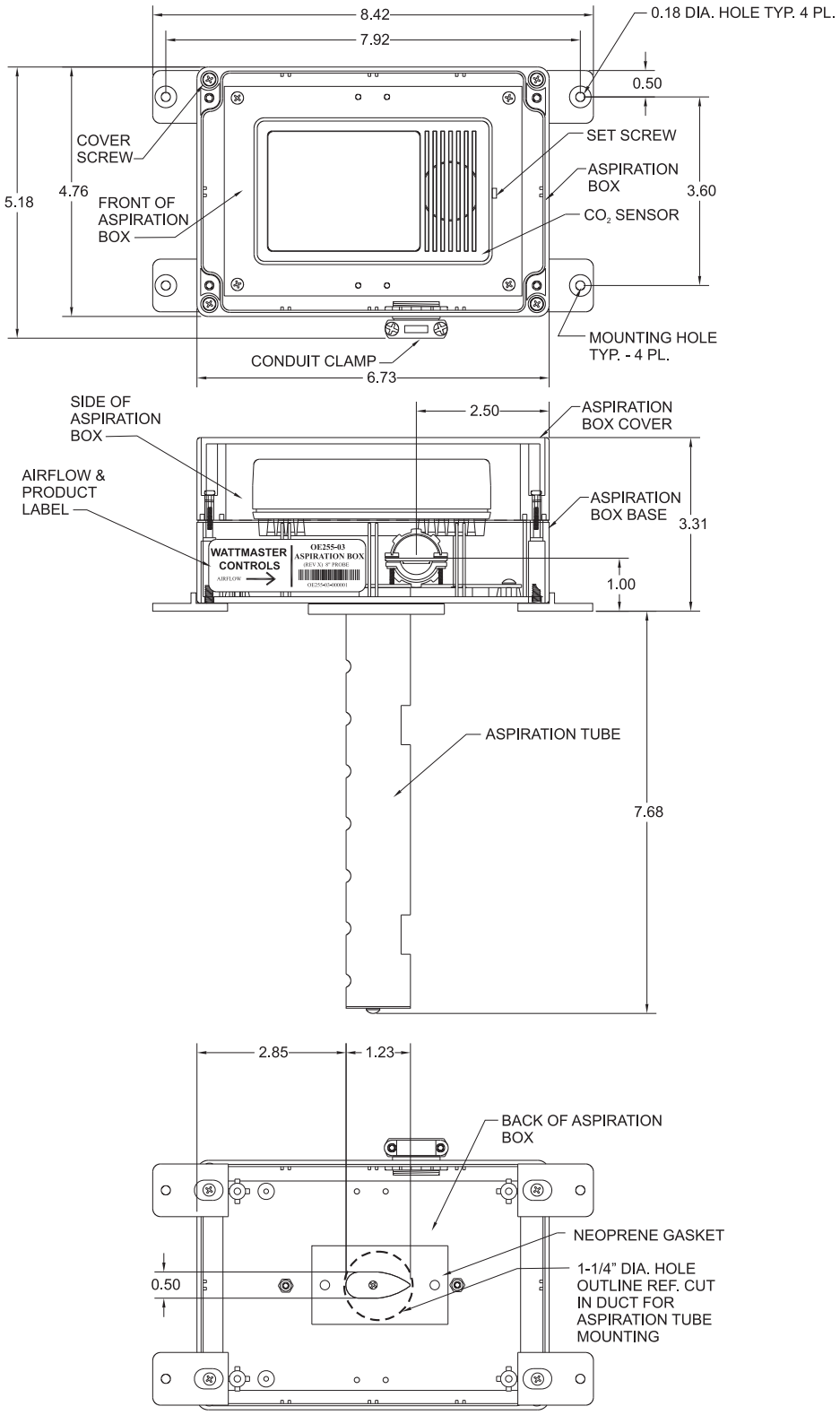


Figure 5: Mounting and Cable Installation for Duct-Mounted CO_2 Sensor

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 CO_2 Sensor's address. The LED ON/OFF Push-Button is located on the Sensor's board and is only visible by removing the back cover. See location in **Figure 6**. The default addresses are as follows:

- Space or Return CO_2 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 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 CO_2 Sensor. The Front LED is visible through the front cover of the CO_2 Sensor. See **Figure 7** for location. The other LEDs are located on the Sensor's board and are only visible by removing the back cover. See **Figure 6** for locations.

LED ON/OFF Push-Button

This button is located on the CO_2 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 the 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 CO_2 sensor. See **Figure 7**. The Front LED will blink whenever a CO_2 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 CO_2 sample is taken. A CO_2 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 one of our operator interfaces. The altitude can be configured at a value of 0-15,000 feet. The default is 500 feet.

TB1 Terminal Block (CO_2 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 CO_2 0-5 terminal. Look at the output voltage and record it. Multiply the voltage times 400. The value should match the CO_2 as read on the System Manager TS, Modular System Manager, Modular Service Tool, or Prism. If the signal doesn't match the sensor reading, contact AAON Controls Support.

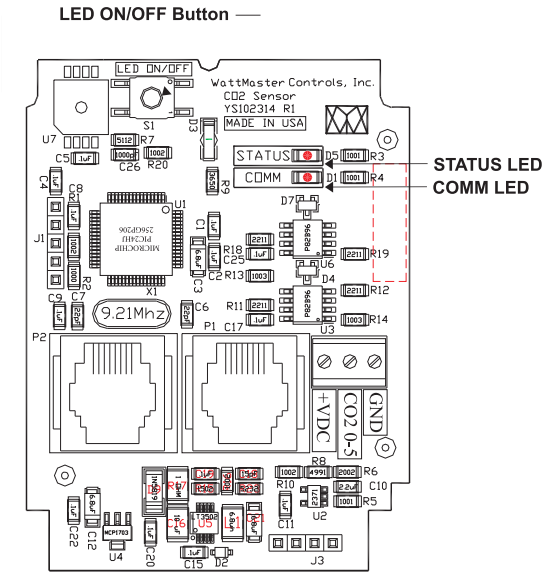


Figure 6: LED ON/OFF Button and Board LEDs

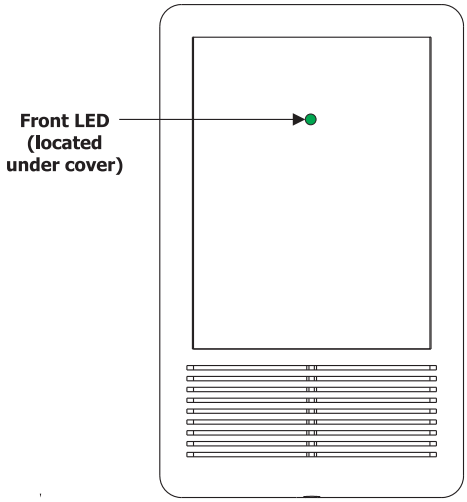


Figure 7: CO_2 Sensor's Front LED

Appendix - Mounting Plate Dimensions

Optional Mounting Plate

Included with the CO_2 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.

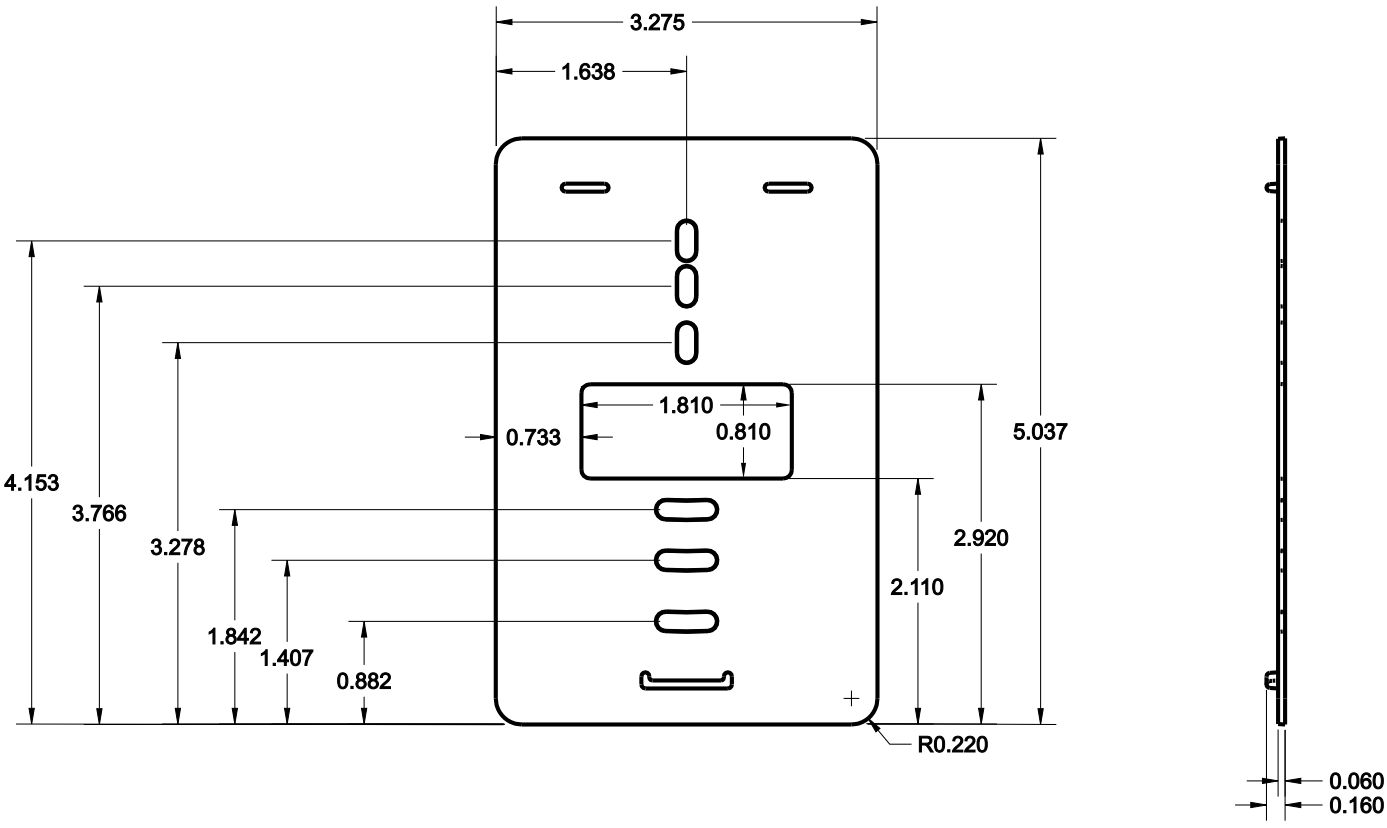


Figure 8: Mounting Plate Dimensions

Notes

AAON Factory Technical Support: 918-382-6450

techsupport@aaon.com

AAON Controls Support: 866-918-1100

Monday through Friday, 7:00 AM to 5:00 PM central standard time.

NOTE: Before calling Technical Support, please have the model and serial number of the unit available.

PARTS: For replacement parts please contact your local AAON Representative.

2425 South Yukon Ave • Tulsa, OK • 74107-2728
Ph: (918) 583-2266 • Fax: (918) 583-6094
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