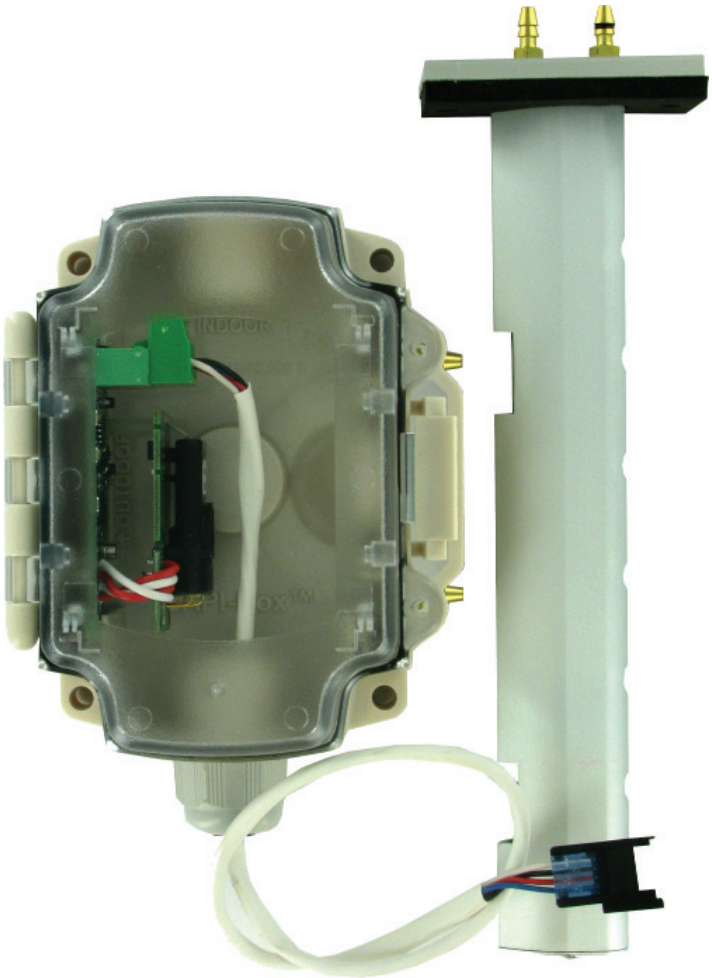
AAON®

Orion Control Systems

# Duct Mounted E-BUS $CO_2$ Sensor Technical Guide



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| PART NUMBER CROSS REFERENCE TABLE | |
|---|---|
| **PART DESCRIPTION** | **PART NUMBER** |
| Duct Mounted E-BUS $CO_2$ Sensor | ASM01831 |
| EBC E-BUS Cables - varying lengths | See Table 1, Page 3 |
| VCCX2 Controller | ASM01698 |
| VCB-X Controller | ASM01862 |

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


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AAON P/N: G042480, Rev. 01C

## Overview

The Duct Mounted E-BUS $CO_2$ Sensor with Remote Pickup Tube is used for monitoring duct $CO_2$ levels and is designed for permanent mounting in the Return Air duct. It utilizes an aspiration box to accurately capture $CO_2$ levels in the duct. See **Figure 1** for dimensions.

A 10 foot EBC E-BUS cable (provided) plugs into the aspiration box's attached 3 foot cable and then attaches to an E-BUS expansion port on the VCCX2 or VCB-X Controller. Additional lengths of EBC E-BUS cable can be purchased if needed (see **Table 1**, below).

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

| Cable Assembly Part Numbers | |
|---|---|
| 1.5 Foot Cable - G029440 | 75 Foot Cable - G029530 |
| 3 Foot Cable - G012870 | 100 Foot Cable - G029450 |
| 10 Foot Cable - G029460 | 150 Foot Cable - G029470 |
| 25 Foot Cable - G045270 | 250 Foot Cable - V36590 |
| 50 Foot Cable - G029510 | 1000 Foot Spool - G018870 |

**Table 1: EBC E-BUS Cable Assembly Part Numbers**

## 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
- HB LED under front cover shows active $CO_2$ sensing

## Environmental Requirements

The Duct Mounted E-BUS $CO_2$ 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).

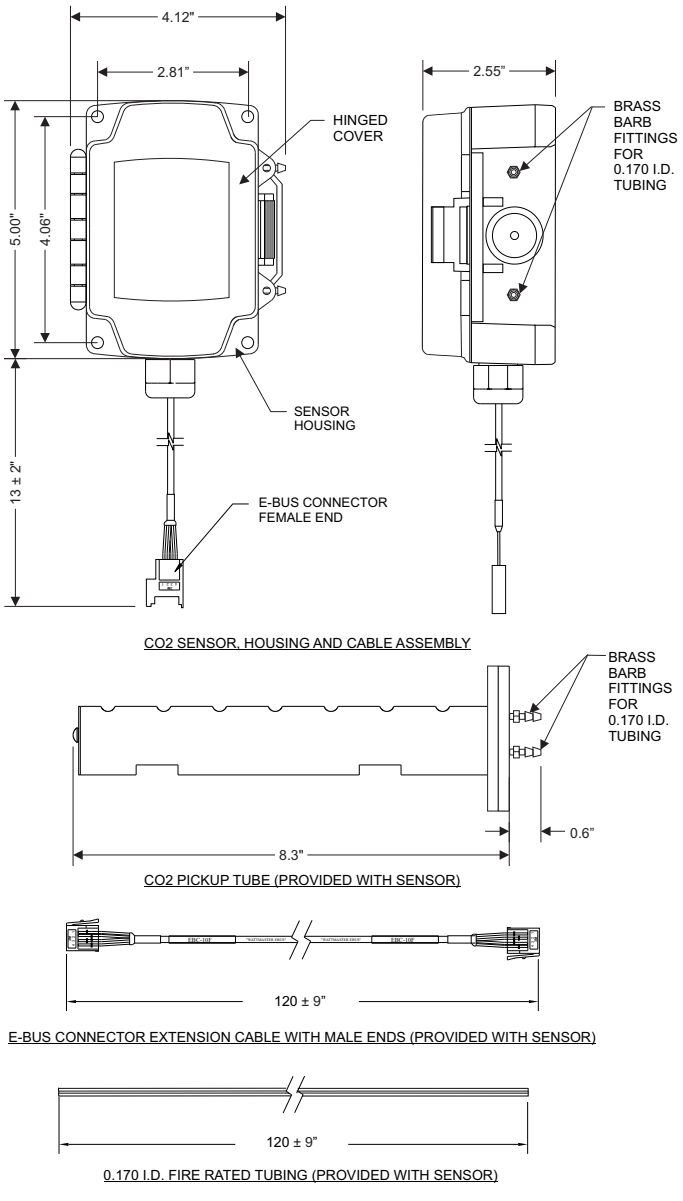


**Figure 1: Duct Mounted E-BUS $CO_2$ Sensor with Remote Pickup Tube Dimensions**

# Duct Mounted E-BUS $CO_2$ Sensor Installation

## Duct Mounted $CO_2$ Sensor Installation

To install the Duct Mounted E-BUS $CO_2$ Sensor, please follow the instructions below. See **Figure 2** for detailed illustrations of the Duct Mounted E-BUS $CO_2$ 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. A conduit clamp is provided to help seal the opening where the sensor cabling penetrates the aspiration box housing.

**STEP 2:** Connect the sensor's attached cable which has a Jack E-BUS connector to the provided 10 foot EBC E-BUS Cable. Then connect the EBC E-BUS Cable to the Unit Controller or EBC Hub or Adapter Board and then to the Unit Controller.

**STEP 3:** Secure the sensor in its aspiration box assembly to the ductwork with the (2) supplied sheet metal screws.

**STEP 4:** Mount the remote pickup tube assembly separately to the ductwork by first cutting a $1^1/_4$" diameter hole in the ductwork wall. Then insert the remote pickup tube into the hole. Secure the remote pickup tube to the ductwork by inserting (2) supplied sheet metal screws through the (2) mounting holes in the remote pickup tube mounting plate and securing the remote pickup tube assembly by screwing it to the ductwork using a manual or powered screw driver to tighten the screws.

**STEP 5:** Using the supplied 10 ft. long tubing, connect the remote pickup tube to the aspiration box assembly, cutting the tubing to fit.

# Duct Mounted E-BUS $CO_2$ Sensor Installation

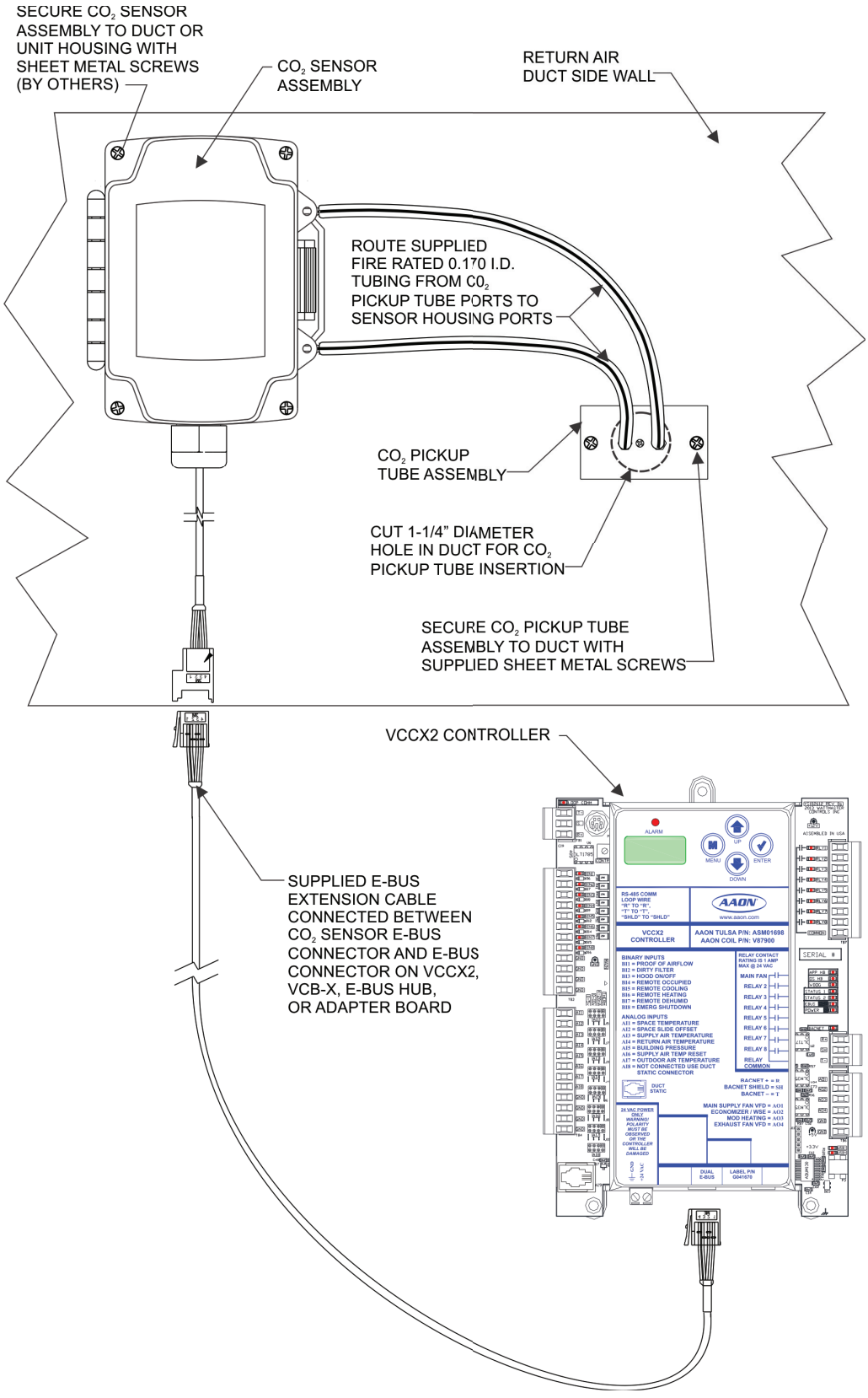


**Figure 2: Mounting and Cable Installation for Duct Mounted E-BUS $CO_2$ Sensor**

# Duct Mounted E-BUS $CO_2$ Sensor Wiring to HVAC Unit

## Duct Mounted E-BUS $CO_2$ Sensor

The Duct Mounted E-BUS $CO_2$ Sensor with Remote Pickup Tube is used for sensing the current $CO_2$ level in the HVAC unit's return air stream. This is useful 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 E-BUS $CO_2$ Sensor due to sensor tampering concerns in the space.

The Duct Mounted Return Air $CO_2$ Sensor is comprised of the $CO_2$ Sensor, the AAON Aspiration Box Assembly, and a Remote Pickup Tube. See the dimensional and installation information in **Figures 2 & 3** for mounting, wiring, and installation details.

The Duct Mounted Return Air E-BUS $CO_2$ Sensor with Remote Pickup Tube 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. See **Figure 3** below for wiring and installation details.

**NOTE:** If using multiple E-BUS Sensors or Modules, the E-BUS Hub or Adapter Board may be required.

**NOTE:**
**1.)** The Duct Mounted E-BUS $CO_2$ Sensor Connects to the VCCX2 or VCB-X Controller using an EBC E-BUS cable of the required length or the provided 10 foot EBC cable.

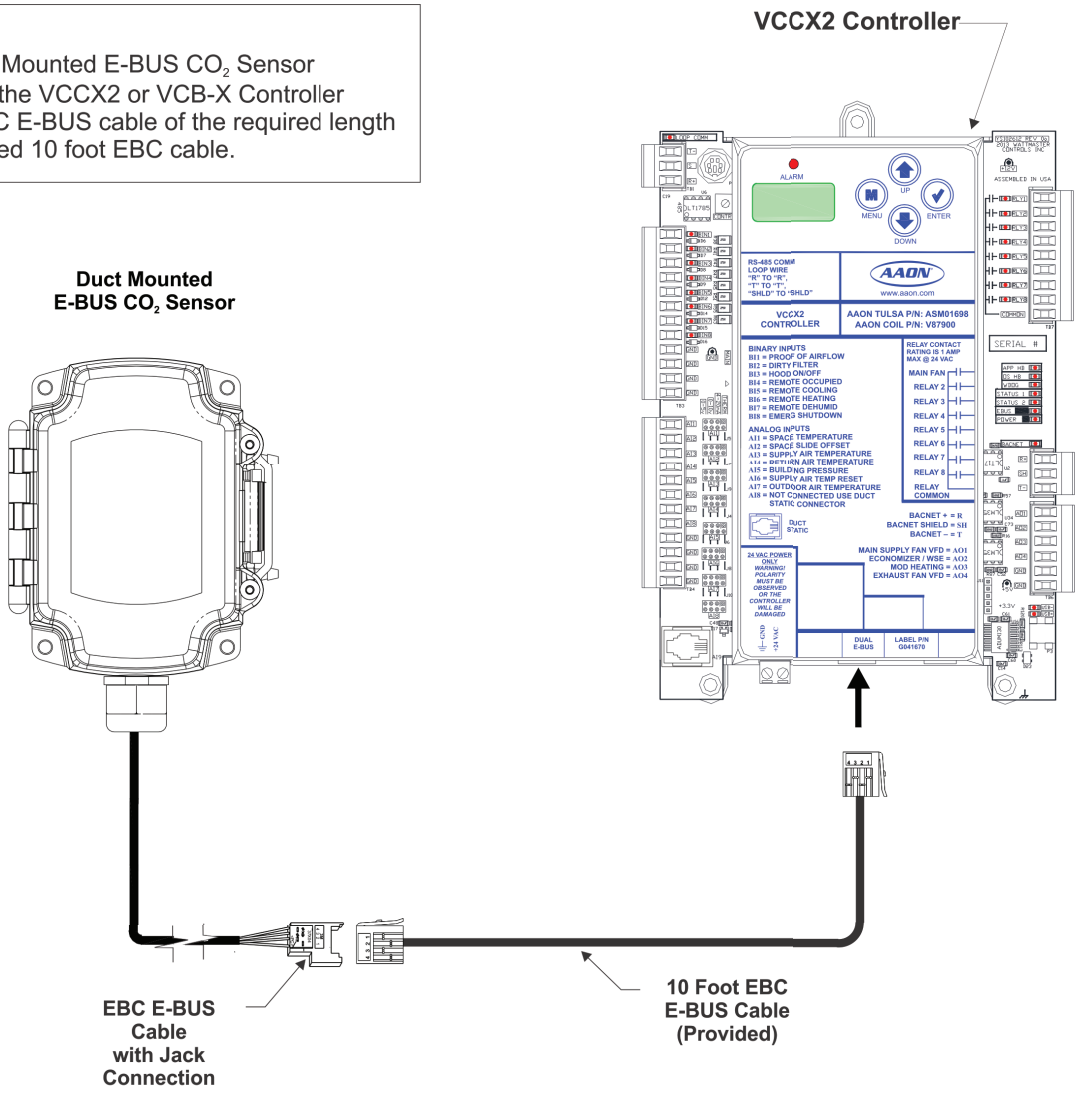


**Figure 3: Duct Mounted E-BUS $CO_2$ Sensor Wiring (VCCX2 Controller Shown)**

## Using LEDs to Troubleshoot

LEDs are available for troubleshooting the $CO_2$ Sensor. There are two LEDs that are visible at an angle through the plastic cover. See **Figure 4** for locations.

### COMM LED

The COMM LED blinks on whenever communications are sensed.

### HB LED

Initially, the HB LED blinks fast for 30 seconds. It will then blink once every 30 seconds. A $CO_2$ sample is taken once every 30 seconds.

## 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 2. If the signal doesn't match the sensor reading, contact AAON Controls Support.

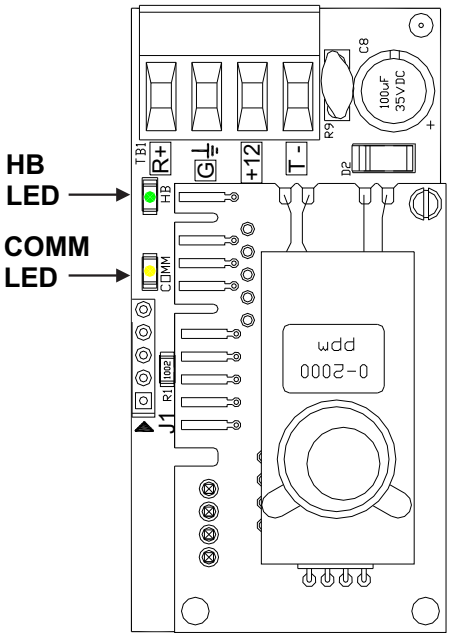


**Figure 4: Board LEDs**

**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.

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