



# ESCO-CO2D

## Ecosmart Connect Duct Mounted CO<sub>2</sub> Sensor Installation and Maintenance



### 1.0 Product Overview

Nuaire's Ecosmart Connect Controls offer a compact, duct mounted carbon dioxide (CO<sub>2</sub>) sensor for measuring and transmitting CO<sub>2</sub> levels, ranging from 0 to 2,000 parts per million (ppm). Nuaire's CO<sub>2</sub> sensors are easy to install and to operate.

The silicon-based sensor delivers high accuracy and long-term measurement stability ( $\pm 100$  ppm) over a five-year period without calibration. The diffusion-aspirated, single-beam, dual-wavelength sensor structure is remarkably simple. It consists of an infrared (IR) source, a sample cell, an IR detector, and a tuneable interference filter that enables measurements at two wavelengths. This innovative design provides precise reference readings that eliminate the typically broad deviation expected from a traditional CO<sub>2</sub> sensor.

#### IMPORTANT

The ESCO-CO2D duct mounted CO<sub>2</sub> sensor is intended to provide an input to equipment under normal operating conditions.

Where failure or malfunction of the sensor could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of, or protect against failure or malfunction of the sensor.

### 2.0 Installation

#### 2.1 Parts Included

The duct mount CO<sub>2</sub> sensor is shipped assembled. It consists of three main parts: base and Printed Circuit Board (PCB), cover, and mounting flange with four screws (for probe depth adjustment). A conduit adaptor is also included.

#### 2.2 Mounting Location

When selecting a location for the sensor, note the following:

- The sensor is designed for duct mounting in any position.
- The probe is best mounted in the return airstream.
- The device should penetrate the duct by a minimum of 76mm to ensure the sensing part of the element is fully in the airstream.
- The sensor should be placed in an area free of condensation.

#### 2.3 Mounting the Sensor

The sensor is duct mounted using a flange. The mounting flange adjusts the distance between the probe and the inner duct wall. Fasten the mounting flange with the four screws as follows:

- Loosen the probe retention screw, and separate the flange from the assembled unit.
- Drill a hole 22 - 25 mm diameter in the duct for the sensor's probe.
- Using the mounting flange as a template centred on the hole, drill four 3.2 mm holes for the mounting screws positioned as in Figure 2.
- Fasten the mounting flange onto the duct using the four screws provided.
- Insert the probe a minimum of 76 mm, and tighten the probe retention screw on the mounting flange.

Figure 1. Sensor Dimensions (mm)

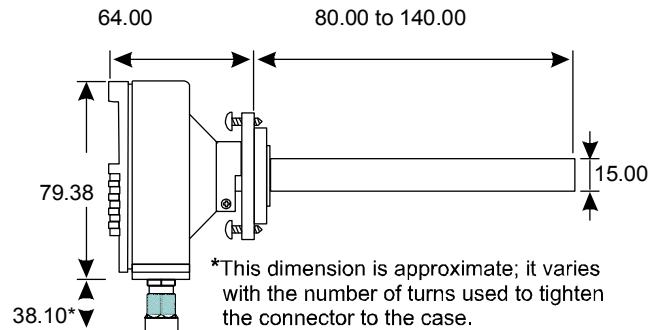
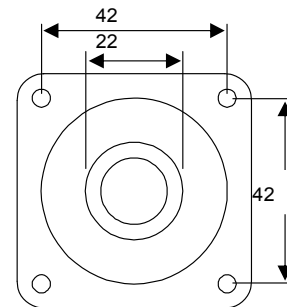


Figure 2. Flange Mounting Holes Dimensions (mm)



### 3.0 Wiring

#### 3.1 Power Supply Requirements

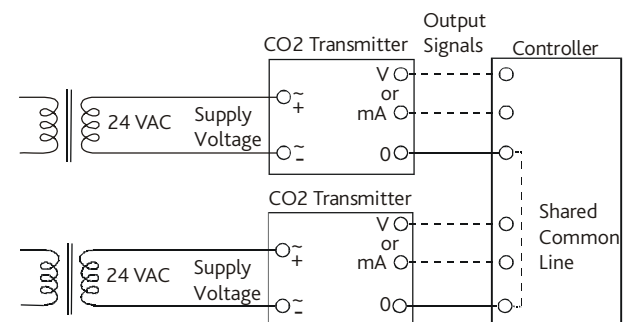
The sensor requires a 24 VAC/VDC, Class 2 power supply maintaining voltages of 18 to 30 VDC or 20 to 30 VAC. Although the power input includes a halfwave rectifier, using a DC supply is recommended to avoid excessive current peaks (current consumption: peak, 170 mA; average, 85 mA).

#### 3.2 24 VAC Power Supply Connections

When more than one sensor is connected to one 24 VAC transformer, a common loop is formed at the controller, and the risk of a short circuit increases.

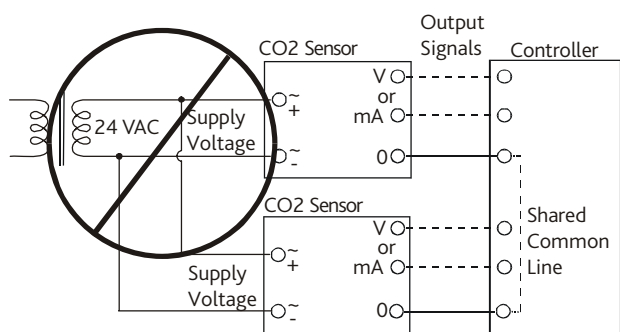
All commons must be at the same potential. Note: To avoid a short circuit, isolate the 24V power supply by providing a separate transformer for each sensor as shown in Figure 3.

Figure 3. Connecting Separate AC Supplies (Recommended)



If several sensors share one transformer, the phase (~) must always be the same at each sensor to maintain polarity and avoid a short circuit via a shared common line at the controller, as shown in Figure 4.

Figure 4. Connecting One AC Supply to Several Sensors (Not Recommended)



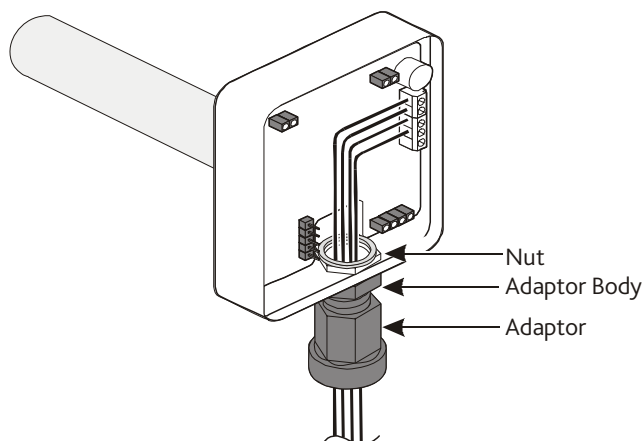
### 3.3 Connecting the Conduit Adaptor

- Align the nut with the opening inside the enclosure, and hold it in place.
- Insert the adaptor body into the sensor conduit opening.
- Manually tighten the adaptor into the nut, turning in a clockwise direction (see Figure 5).
- Insert the wires through the conduit adaptor body opening.
- Tighten the adaptor onto the adaptor body by turning the adaptor in a clockwise direction.

#### IMPORTANT

Do not overtighten the conduit adaptor, doing so could cause damage to or displacement of the PCB.

Figure 5. Inserting the Conduit Adaptor.

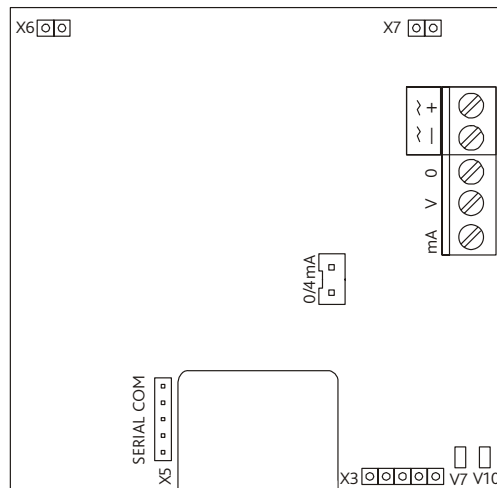


### 3.4 Wiring the PCB

To wire the PCB's input and output connections:

- Open the sensor cover.
- Insert the wire carefully through the conduit adaptor and then strip 6.35 mm of the wire insulation to prepare the wire for connection to the terminal block.
- Connect the 24V supply between the positive (+) and negative (-) terminals as shown in Figure 6.
- Connect the common wire to Terminal 0.
- Connect the other wire to Terminal V (for voltage output).

Figure 6. Sensor PCB.



### 4.0 Sensor Calibration

Nuaire's carbon dioxide (CO<sub>2</sub>) sensors come from the factory calibrated for the following:

- Output signal (0 to 10V) proportional to CO<sub>2</sub> concentration (0 to 2,000 parts per million [ppm]).
- Altitude range of 0 to 600m above sea level without compensation.
- Default relay output trigger point of 1,000 ppm.

### 5.0 Troubleshooting

The sensor is not field repairable.

In the event the unit is not functioning properly, use the following checklist to identify the symptoms and determine a solution.

- Verify that all wiring is correct.
- Verify that the power supply voltage level is 20 to 30 VAC or 18 to 30 VDC.

Note: The diagnostic Light-Emitting Diodes (LEDs) shown in the lower right-hand corner of Figure 6 indicate operational status:

- V7 lights up if the self-diagnostics procedure detects an abnormality.
- V10 pulses to indicate that the device is operational.

If the sensor will not operate after completing these steps, replace the unit.

## 6.0 Technical Data

LCD Browser Page	BACnet Object
<b>Product</b>	ESCO-CO2D Duct Mounted CO2 Sensor
<b>Measuring Range</b>	0 to 2,000 ppm CO2
<b>Accuracy at 25°C</b>	< ±[30 ppm CO2 + 2.0% of reading] (includes manufacturing deviation and drift). All accuracy specifications reflect testing the transmitters using high-grade, certified gases. Transmitters are intended for an altitude range of 0 to 600 m above sea level without compensation.
<b>Non-Linearity</b>	< 0.5% of Full Scale
<b>Temperature Dependence of Output</b>	< 0.1% of Full Scale/C°
<b>Long-Term Stability</b>	< ±5.0% of Full Scale/5 Years
<b>Response Time (0 to 63%)</b>	1 Minute
<b>Operating Temperature Range</b>	-5 to 45°C
<b>Storage Temperature Range</b>	-20 to 70°C
<b>Humidity Range</b>	0 to 85% RH (non-condensing)
<b>Transmitter Output Signal CO2</b>	Jumper Selectable: 0 to 10 VDC (Default) Maximum Output Voltage: 12.5V
<b>Relay Output (Optional)</b>	Maximum 30V, 0.5A, Class 2
<b>Recommended External Load</b>	Current Output: Maximum 500 ohms Load Resistance Voltage Output: Minimum 1,000 ohms Load Resistance
<b>Power Supply Range</b>	20 to 30 VAC (18 to 30 VDC), Class 2
<b>Power Consumption</b>	< 2.5 W Average, 4.1 VA
<b>Warm-up Time</b>	< 5 Minutes
<b>Air Flow Range</b>	0 to 2,286 m/Minute
<b>Duct Probe Material</b>	Duct Probe Meets Plenum Rating Requirements of UL 1995, Heating and Cooling Equipment
<b>Housing Material</b>	ABS Plastic
<b>Dimensions (H x W x D)</b>	80 x 81 x 204 (mm)
<b>Shipping Weight</b>	0.14 Kg

The performance specifications are nominal and conform to acceptable industry standards.

## 7.0 Warranty

The 5 year warranty starts from the day of delivery and includes parts and labour for the first year. The remaining 4 years covers replacement parts only.

The labour element of the warranty is subject to full, free and safe access to the equipment as recommended by CDM regulations.

This warranty is void if the equipment is modified without authorisation, is incorrectly applied, misused, disassembled, or not installed, commissioned and maintained in accordance with the details contained in this manual and general good practice.

The product warranty applies to the UK mainland and in accordance with Clause 14 of our Conditions of Sale. Customers purchasing from outside of the UK should contact Nuaire International Sales office for further details.

## 8.0 After Sales

For technical assistance or further product information, please contact the After Sales Department.

**Telephone 02920 858 400**  
**aftersales@nuaire.co.uk**