ESCO-CO2D

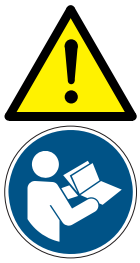
Ecosmart Connect Duct Mounted CO_2 Sensor

Installation Manual

1.0 SAFETY INFORMATION

- The provision of the electrical supply and the connection of the unit to the mains must be carried out by a qualified electrician.

1.1 Hazard Symbols



GENERAL WARNING

Signifies a general warning regarding hazard specified by supplementary information.

REFER TO INSTRUCTION MANUAL

Read and understand the installation and maintenance manual before installing, operating or maintaining this product.

1.2 Important Information

This manual contains important information on the safe and appropriate assembly, transport, commissioning, operation, maintenance, disassembly and simple troubleshooting of the product.

While the product has been manufactured according to the accepted rules of current technology, there is still a danger of personal injury or damage to equipment if the following general safety instructions and the warnings contained in these instructions are not complied with.

- **Read these instructions completely and thoroughly before working with the product.**
- **Keep these instructions in a location where they are accessible to all users at all times.**
- **Always include the operating instructions when you pass the product on to third parties.**

1.3 Personal Protective Equipment

The following minimum Personal Protective Equipment (PPE) is recommended when interacting with Nuaire product:

- **Protective Steel Toed Shoes -** when handling heavy objects.
- **Full Finger Gloves (Marigold PU800 or equivalent) -** when handling sheet metal components.
- **Semi Fingerless Gloves (Marigold PU3000 3DO or equivalent)** - when conducting light work on the unit requiring tactile dexterity.
- **Safety Glasses** - when conducting any cleaning/cutting operation or exchanging filters.
- **Reusable Half Mask Respirators** - when replacing filters which have been in contact with normal room or environmental air.

Nuaire would always recommend a site specific risk assessment by a competent person to determine if any additional PPE is required.

2.0 INTRODUCTION

Nuaire's Ecosmart Connect Controls offer a compact, duct mounted carbon dioxide (CO_2) sensor for measuring and transmitting CO_2 levels, ranging from 0 to 2,000 parts per million (ppm). Nuaire's CO_2 sensors are easy to install and to operate.

The silicon-based sensor delivers high accuracy and long-term measurement stability (±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_2 sensor.

The ESCO-CO2D duct mounted CO_2 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.

2.1 MECHANICAL INSTALLATION

2.2 Parts Included

The duct mount CO_2 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.

2.3 Mounting Location

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

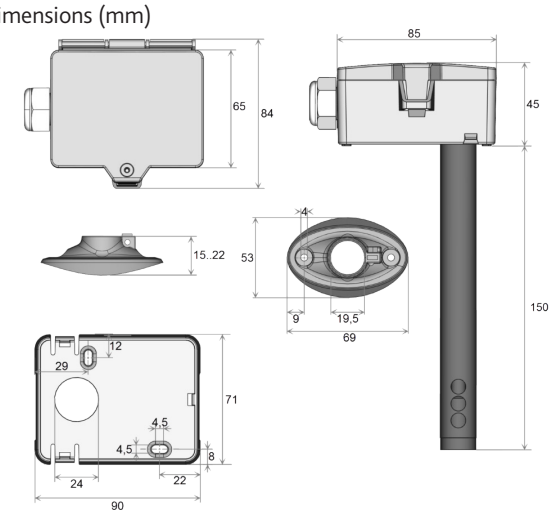
- The sensor is designed for duct mounting in any position.
- The probe is best mounted in the return air stream.
- The device should penetrate the duct by a minimum of 76mm to ensure the sensing part of the element is fully in the air stream.
- The sensor should be placed in an area free of condensation.

2.4 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 1.
- 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.

1 Dimensions (mm)



3.0 ELECTRICAL INSTALLATION

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.

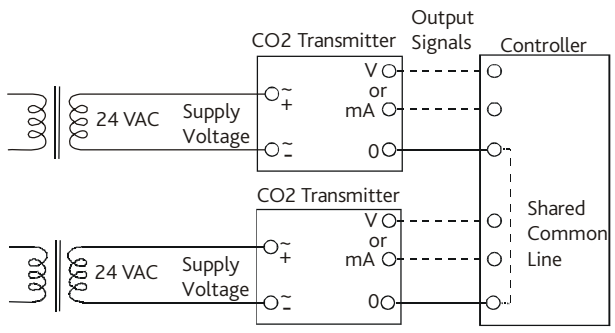
3.2 24 VAC Power Supply Connections

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.

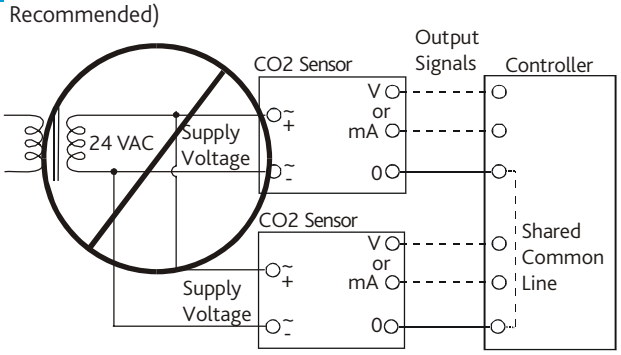
To avoid a short circuit, isolate the 24V power supply by providing a separate transformer for each sensor as shown in Figure 2.

2 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 3.

3 Connecting One AC Supply to Several Sensors (Not Recommended)

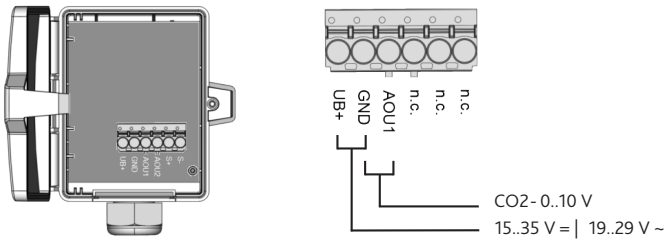


3.3 Wiring the PCB

To wire the PCB's input and output connections:

- Open the sensor cover.
- Insert the wire carefully through the conduit adapter 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 UB+ and GND terminals as shown in Figure 4.
- Connect the common wire to the GND terminal.
- Connect the other wire to AOU1 terminal (for voltage output).

4 Sensor PCB



4.0 SENSOR CONTROLS

4.1 Default Calibration

Nuaire's carbon dioxide (CO2) sensors come from the factory calibrated for the following:

- Output signal (0 to 10V) proportional to CO2 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.

4.1.1 CO_2 Control

When a CO_2 sensor is assigned to the system and an enable signal is received, ventilation will increase fans speeds to reduce CO_2 concentration. The target CO_2 sensor setpoint can be changed as one of the commissioning setpoints. Room Module CO_2 sensors are detected automatically. 0-10V CO_2 sensors need to be assigned to input 4 or 5.

4.2 Sensor Setpoints

4.2.1 Multiple Sensors

Where multiple sensors are connected the following options are available.

State	Description
Temp Sensor Operation	Room Module Average (Default) Return Air Only Room Module & Return Air Average
Setpoint Operation	Last Value Changed Software Setpoint Only (Default) Last Value Changed With Timeout
Humidity Sensor Operation	Average (Default) Max Ignore
CO2 Sensor Operation	Average (Default) Max Ignore
Pressure Sensor Operation	Average (Default) Max Ignore

4.2.2 Setpoint Adjustment and Operating Modes

There are 3 ways of setting the controller's setpoint:

- Software Setpoint - Adjustable by ESCO-LCD or BACnet network. Once set the LCD can be disconnected.
- Setpoint Schedule - Adjustable by ESCO-LCD or BACnet network. Once set the LCD can be disconnected.
- User operated Room Module with LCD - The room module must stay connected in order to retain the setpoint.

There are 3 options for setpoint operation which can be selected by the setting "SetPoint Op":

- Last Changed - This uses whichever setpoint was adjusted as the active setpoint. This includes Room Module setpoints, Software Setpoint and Setpoint Schedule.
- Software Only - This only uses the software setpoint as the active setpoint.
- Last Changed With Timeout - This option uses the last setpoint changed as the active setpoint but reverts back to the 'Software Setpoint' after a period set by the value 'Setpoint Timeout'.

4.2.3 Auxiliary Inputs 4 & 5 (0-10V Inputs)

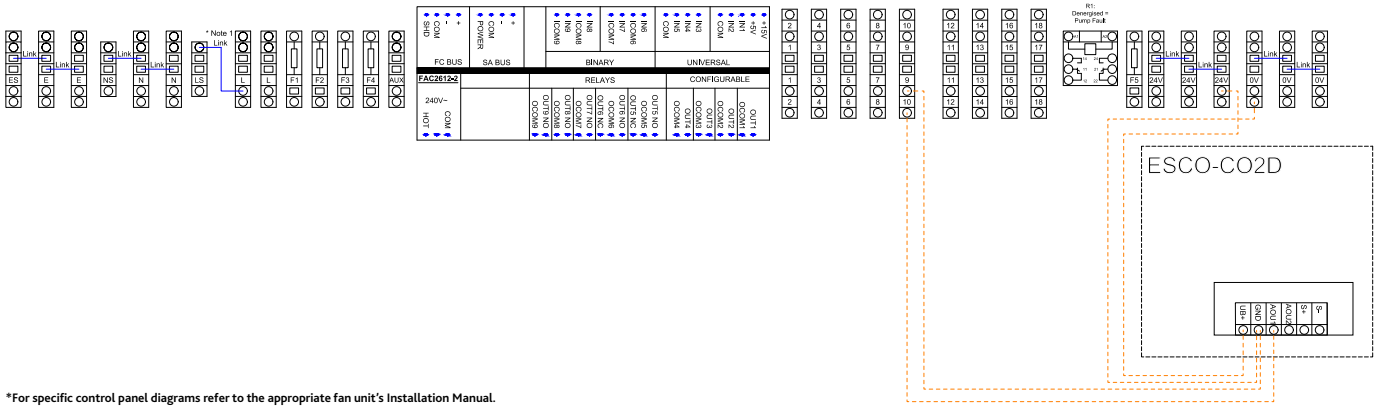
The function of IN4 & IN5 can be set by the network inputs IN4 Function & IN5 Function. The available options are as follows.

Function	Description	Available Ranges
None	The signal is ignored	N/A
Fan Speed Control	A 0-10V input is used as a fan speed demand. 0V = Min Speed 10V = Max Speed. This is available on IN5 only.	N/A
EGG (Ecosmart Gateway Gadget)	A 0-10v input will enable the system and run the fans to a speed set by the BMS table in section 7.16.6. This is available on IN5 only.	N/A
0-10V CO2 Sensor	0-10V is scaled as defined by the network input "CO2 0-10V Output Range"	0-2,000ppm 0-4,000ppm 0-5,000ppm 0-10,000ppm 0-20,000ppm
0-10V Temperature Sensor	0-10V is scaled as defined by the network input "Temperature Sensor 0-10V Output Range"	0 - 40°C 0 - 50°C 0 - 80°C 0 - 90°C 0 - 100°C
0-10V Pressure Sensor	0-10V is scaled as defined by the network input "Pressure Sensor"	0 - 25 Pa 0 - 50 Pa 0 - 100 Pa 0 - 300 Pa 0 - 500 Pa 0 - 1000 Pa 0 - 1600 Pa 0 - 2500 Pa 0 - 3000 Pa
0-10V Humidity Sensor	0-10V is scaled to 0-100% humidity	0 - 100% only

5.0 Typical Connect Control Panel Diagram

5 Typical Connect Control Panel Diagram

Typical Connect Control Panel Diagram*



*For specific control panel diagrams refer to the appropriate fan unit's Installation Manual.

6.0 SENSOR SPECIFICATION

ESCO-CO2D Ecosmart Connect Duct Mounted CO_2 Sensor	
Product	ESCO-CO2D Duct Mounted CO2 Sensor
Measuring Range	0 to 2,000 ppm CO2
Accuracy at 21°C	< ±[50 ppm CO2 + 3.0% 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.
Operating Temperature Range	0 to 50°C
Storage Temperature Range	-20 to 70°C
Humidity Range	0 to 85% RH (non-condensing)
Transmitter Output Signal CO2	Jumper Selectable: 0 to 10 VDC (Default) Maximum Output Voltage: 12.5V
Recommended External Load	Current Output: Maximum 500 ohms Load Resistance Voltage Output: Minimum 10k ohms Load Resistance
Power Supply Range	15..35 V = or 19..29 V ~ SELV
Power Consumption	max. 2.3W; 4.3VA
Air Speed	min. 0.3m/s, max. 12m/s
Duct Probe Material	Duct Probe Meets Plenum Rating Requirements of UL 1995, Heating and Cooling Equipment
Housing Material	ABS Plastic
Shipping Weight	0.14 Kg

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

7.0 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.

8.0 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.

9.0 END-OF-LIFE AND RECYCLING

Where possible Nuaire use components which can be largely recycled when the product reaches its end-of-life:

- Fans, motors, controls, actuators, cabling and other electrical components can be segregated into WEEE recycling streams.
- Sheet metal parts, aluminium extrusion, heating/cooling coils and other metallic items can be segregated and fully recycled.
- Cardboard packaging, wood, used filters and other paper components can be largely recycled or fully processed in energy from waste centres.
- Remaining items can be further segregated for energy from waste centres or, as a last resort, sent to landfill. Please call After Sales Support for further information on items not listed above.

Ensure that Nuaire product is made safe from any electrical / water / refrigerant supplies before dismantling commences. This work should only be undertaken by a qualified person in accordance with local authority regulations and guidelines, taking into account all site based risks.

10.0 AFTER SALES AND REPLACEMENT PARTS

For technical assistance or further product information, including spare parts and replacement components, please contact the After Sales Department.

If ordering spares please quote the serial number of the unit together with the part number, if the part number is not known please give a full description of the part required. The serial number will be found on the identification plate attached to the unit casing.

Telephone 02920 858 400
aftersales@nuaire.co.uk

Technical or commercial considerations may, from time to time, make it necessary to alter the design, performance and dimensions of equipment and the right is reserved to make such changes without prior notice.