Introduction

The OSA CO2 transmitter uses Infrared Technology to monitor CO2 levels within a range of 0 – 2000 ppm and outputs a linear 4-20 mA or 0-5/0-10 Vdc signal. The enclosure is designed to operate in outside conditions ranging from -40°C to 70°C   (-40°F to 158°F). The enclosure can be used in humid or harsh conditions typically found in greenhouses, livestock pens or industrial areas. Options include an LCD, control relay, and resistive temperature sensor. Features include a back-lit LCD and user menu for easy installation

Before Installation

Read these instructions carefully before installing and commissioning the CO2 transmitter. Failure to follow these instructions may result in product damage. Do not use in an explosive or hazardous environment, with combustible or flammable gases, as a safety or emergency stop device or in any other application where failure of the product could result in personal injury. Take electrostatic discharge precautions during installation and do not exceed the device ratings.

Mounting

Mount in a desired location using 4 mounting screws(provided). Removed desired knock-out, connect conduit, make proper wiring connections

The cover is hooked to the base at the top edge and must be removed from the bottom edge first. Use a small screwdriver to carefully pry each bottom corner if necessary. If a security screw is installed on the bottom edge, then it may have to be loosened or removed also. Tip the cover away from the base and sit it aside.

After the base is screwed to an electrical box or the wall using the appropriate holes, pull the wires through the wiring hole in the center of the pcb and then reinstall it in the enclosure base. Ensure the pcb is snapped into the base securely and correctly.

Remove cover from base

Un-snap pcb
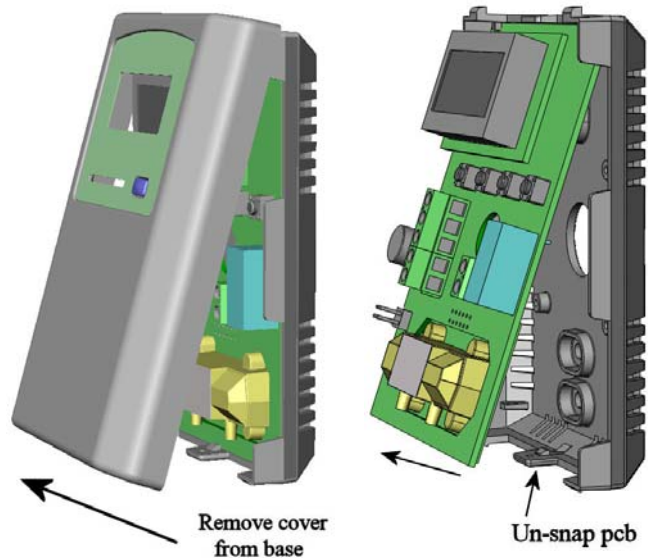
Wiring

Deactivate the 24 Vac/dc power supply until all connections are made to the device to prevent electrical shock or equipment damage. Follow proper electrostatic discharge (ESD) handling procedures when installing the device or equipment damage may occur. Use 22 AWG shielded wiring for all connections and do not locate the device wires in the same conduit with wiring used to supply inductive loads such as motors. Make all connections in accordance with national and local codes.

This is a 3-wire sourcing device. **.   The wires for the power connections come preconnected to the CDD with the connections made with the supplied wire nuts. The RED wire is +24 Vdc or the hot side of 24 Vac supply. The BLACK is the common. These connections also power the enclosure heaters.**The device is reverse voltage protected and will not operate if connected backwards. It has a half-wave power supply so the supply common is the same as the signal common. Several devices may be connected to one power supply and the output signals all share the same common. Use caution when grounding the secondary of a transformer or when wiring multiple devices to ensure the ground point is the same on all devices and the controller.

The analog output is available on the **CO2** terminal. This signal is switch selectable for either voltage or 4-20 mA active output. In voltage mode the output is selectable for either 0-5 or 0-10 Vdc via the menu (the factory default is 0-5 Vdc). The current output operates in the active mode and does not require a loop power supply (the signal

current is generated by the transmitter and must not be connected to a powered input or device damage will result). Check the controller Analog Input to determine the proper connection before applying power. Both current and voltage signals are referenced to the **COM** terminal. The analog output signal is typically connected directly to the Building Automation System (B.A.S.) and used as a control parameter or for logging purposes.

The optional relay output is on the **N.O. RELAY** terminals. The relay output is completely isolated and has a Normally Open (NO) signal. This signal can be used to directly control an alarm or ventilation fan.

The two-wire temperature sensor output is available with various RTDs and thermistors to suit all control applications and is available on the **TEMP** terminals.

Typical 4-20 mA wiring with 24 Vdc and all options
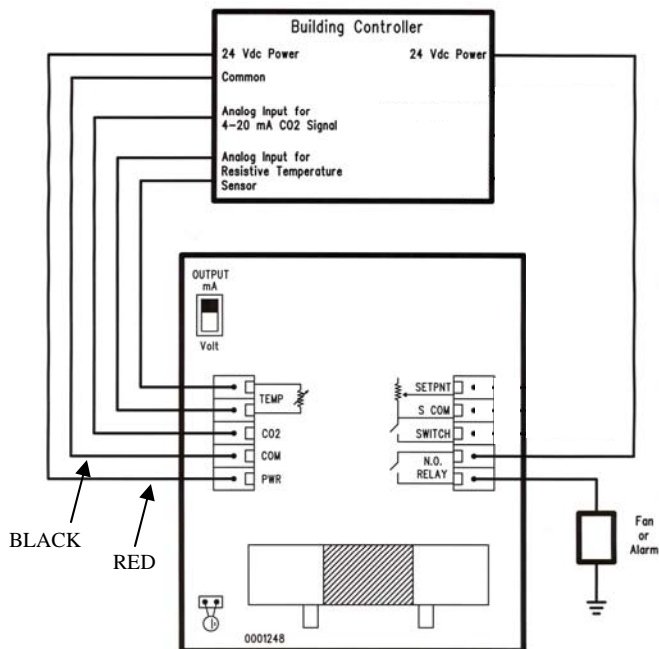
Typical 0-5 Vdc wiring with 24 Vac for CO2 only
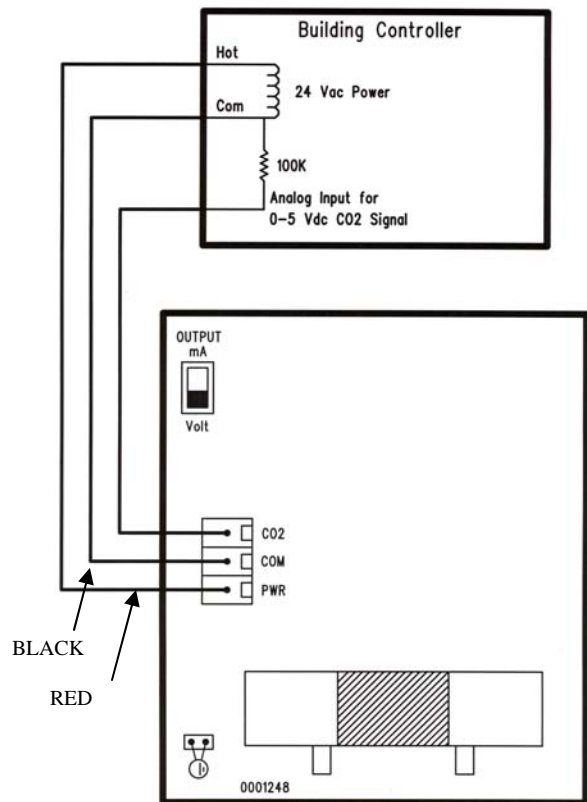
Start-up

Verify the transmitter is properly wired and connections are tight. Ensure the V/I switch is set for the correct signal type. Apply power and note that the CO2 sensor chamber light flashes on and off. The LCD will indicate the software version number, the output signal type, the relay setpoint (if installed), the CO2 measurement range and then the sensor will begin reading the CO2 level, output the correct analog signal and display the value on the LCD. The sensor operates on a 4 second interval and will update the output and display every 4 seconds.

Output

The CO2 output is scaled such that 4-20 mA (or 0-5/0-10 Vdc) equals 0 to Out_High as set in the Setup Menu. The factory default is 0-2000 ppm. Out_High can be changed from 1000 to 7500 ppm and the output signal is scaled accordingly. If using voltage output type, the factory default is 0-5 Vdc. If 0-10 Vdc is required, ensure it is selected in the menu.

Operation

The CO2 analog signal is always available on the **CO2** terminal and is connected to the B.A.S. analog input. The B.A.S. reads the CO2 voltage or current signal and calculates the actual CO2 ppm value using correct scaling for the CO2 range and signal type. This CO2 value can be used to control output ventilation devices or initiate alarms. The CO2 value is also displayed locally on the optional LCD.

If the optional relay is installed it can directly control a small fan or alarm by setting the trip value and hysteresis to appropriate values. The relay status is not indicated on the device LCD.

If the optional temperature sensor is installed it will also be wired to an analog input of the B.A.S. that is set for the specific resistance type. For example, this could be a 10 KΩ Type 7 thermistor, a 1000 ohm RTD or various other sensor values. The B.A.S. reads the resistance signal and converts it to a temperature value. The temperature sensor is completely isolated from the CO2 sensor and it's value is not displayed on the device LCD.

The optional override switch provides a dry contact closure to a digital input of the B.A.S. The switch status is not indicated on the LCD.

The optional slide pot can be connected to an analog input of the B.A.S. and will provide a linear resistance signal such as 0-10 KΩ (for example) to be used as a setpoint control. The setpoint value is not shown on the LCD.

Calibration

Calibration with gas requires a field calibration kit consisting of an LCD, a bottle of 1000 ppm CO2 gas, a tank pressure regulator with flow restrictor and the necessary tubing to connect to the device.

Note that because of the Automatic Calibration Mode and other technology incorporated into the CDD series, only a single point 1000 ppm calibration is required to meet specified accuracy.

Turn the regulator on/off knob fully off and attach it to the 1000 ppm CO2 gas bottle and firmly tighten it by hand. Remove the cover of the unit to be calibrated to expose the gas sensor chamber. The tubing from the gas bottle can be connected to either port on the chamber after the plastic cap is removed. Gently remove one cap and connect the tubing, note that strong shock or vibration can affect calibration.

Ensure the device has been operating normally for at least five minutes before applying gas. Slowly turn the valve knob on the regulator to let the gas begin flowing.

The regulator will restrict the flow rate to the specified 100 ml/min. After a brief period the gas will flow into the chamber and the CO2 reading on the LCD will begin to approach 1000 ppm. Wait 1 to 2 minutes until the CO2 reading stabilizes.

Enter the Setup menu and use the <MENU> key to advance to **Calibrat 1000 PPM**. Press and hold the <SAVE> key for 2 seconds and the display will change to **Waiting Calibrat** then to **Waiting 5 minute** to indicate that the process of reprogramming the internal calibration setting is taking place.

This calibration process takes about 5 minutes and the LCD will count down the minutes. Do not disturb the unit or the gas flow during this period. When calibration is complete the unit will display **Calibrat Done**. Press the <SAVE> key to return to normal operation and then the gas can be shut off.

Disconnect the tubing and replace the cap on the sensor chamber as calibration is complete.

Setup Menu
The menu has several items as shown below. To enter the menu, press and release the <MENU> key while in normal operation. This will enter the SETUP menu step 1, pressing the <MENU> key a second time advances to step 2. Each press of the <MENU> key advances the menu item. No values are saved or changed by using the <MENU> key. The <ROLL> key is used to make changes to program variables by scrolling through the available options. When a value is changed, use the <SAVE> key to save it to memory and advance to the next menu item.

<MENU>   Press and release the <MENU> key to enter the SETUP menu.

1. Out High   The default CO2 range is 0-2000 ppm. The span can be changed from 1000 to 7500 ppm in increments of
    2000 ppm   500. Use the <ROLL> key to change the value and <SAVE> to save. The factory default is 2000 ppm.

<MENU>

2. Altitude   The default is 0 feet. Change by using the <ROLL> key from 0 to 5000 feet in 500 ft increments. Change
    0 Ft   for CO2 local altitude correction and press <SAVE> to save a change.

<MENU>

3. Auto Cal   Automatic Cal Mode default is ON to correct CO2 sensor drift to better than ± 10 ppm per year. Change
    ON   with the <ROLL> key and save using <SAVE>. ON is recommended for applications where the CO2
                  level will be close to normal (400 ppm) at least once per day. If a building is occupied 24 hours and the
                  CO2 level is fairly constant then this should be set to OFF.
<MENU>

Items 4, 5 and 6 are only available if the Relay Option is installed, otherwise the menu skips directly to step 7.

4. Relay SP   The relay trip setpoint default is 1000 ppm. It can be changed from 500 to 5000 in 100 ppm increments.
    1000 ppm   Save changes by using the <SAVE> key.

<MENU>

5. Relay Hy   The relay hysteresis default is 50 ppm. This can be changed from 25 to 200 in 25 ppm increments. Use
    50 ppm   the <SAVE> key to save any change.

<MENU>

6. Relay   Use the <ROLL> key to toggle the relay ON or OFF for testing purposes. Press either <SAVE> or
    Test OFF   <MENU> to turn the relay off and advance to the next item.

<MENU>

7. Out Type   For voltage, the factory default output type is 0-5 Vdc. Use the <ROLL> key to change the value to 0-10
    0-5 Vdc   Vdc if necessary. Press the <SAVE> key to save. If the switch is set to mA, then 4-20 mA is displayed.

<MENU>

8. Output   Use the <ROLL> key to toggle the output OFF (normal operation), MIN (minimum output) or MAX
    Test OFF   (maximum output) for testing purposes. Press either <SAVE> or <MENU> to set it back to OFF and
                  advance to the next item.
<MENU>

9. Calibrat   This item is used for 1000 ppm gas calibration and is explained in the *Calibration* section.
    1000 PPM

<MENU>

Item 10 is only available if the cover is equipped with a viewable LCD, otherwise the menu skips directly to step 11.

10. BackLite   Use the <ROLL> key to enable or disable the LCD backlight. When enabled the backlight is always on,
      Enable   when disabled it never lights. Press the <SAVE> key to save the setting. The factory default is Enable.

<MENU>

11. Restore   Press the <SAVE> key to restore all factory defaults and calibration to original factory settings.
      Defaults

<MENU>

12. Menu   Press <SAVE> to exit the menu and return to normal operation or <MENU> to repeat the menu.
      Exit

General Specifications
Power Supply . . . . 20 – 28 Vac/dc (non-isolated half-wave rectified)
Consumption . . . . 100 mA max @ 24 Vdc, 185 mA max @ 24 Vac (with all options)
Output Signals . . . . 4-20 mA active (sourcing), 0-5 Vdc or 0-10 Vdc (field selectable)
Output Drive Capability . . . . . 550 ohms maximum for current output, 10 Kohm min for voltage output
Output Resolution . . . . 10 bit PWM
Protection Circuitry . . . . Reverse voltage protected, overvoltage protected
Operating Conditions . . . . 0-50 °C (32-122 °F), 0-95 %RH non-condensing
Wiring Connections . . . . Screw terminal block (14 to 22 AWG)
Sensor Coverage Area . . . . . . 100 m^2 (1000 ft^2) typical
Enclosure . . . . Wall mount enclosure, 3.3"w x 4.7"h x 1.15"d (84 x 119 x 29 mm)

CO2 Signal
Measurement Type . . . . Non-Dispersive Infrared (NDIR), diffusion sampling
Measurement Range . . . . 0-2000 ppm standard, programmable up to 7500 ppm
Standard Accuracy . . . . ± 75 ppm @ 1000 ppm @ 22 °C (72 °F) compared to certified calibration gas
Temperature Dependence . . . . 0.2 %FS per °C
Stability . . . . < 2 %FS over life of sensor (15 year typical)
Pressure Dependence . . . . 0.13 % of reading per mm Hg
Altitude Correction . . . . Programmable from 0-5000 ft via keypad
Response Time . . . . < 2 minutes for 90 % step change typical
Warm-up Time . . . . < 2 minutes

LCD Display
Resolution . . . . 1 ppm CO2
Size . . . . 1.4" w x 0.6" h (35 x 15 mm) alpha-numeric 2 line x 8 characters
Backlight . . . . Enable or disable via keypad

Optional Temperature Signal
Sensing Element . . . . Various RTDs and thermistors available as 2-wire resistance output

Optional Relay Output
Contact Ratings . . . . Form A contact (N.O.), 2 Amps @ 140 Vac, 2 Amps @ 30 Vdc
Relay Trip Point . . . . Programmable 500-5000 ppm via keypad
Relay Hysteresis . . . . Programmable 25-200 ppm via keypad

Optional Override Switch . . Front panel push-button available as two-wire dry-contact output

Optional Slide Pot . . . . Front panel pot available as two-wire resistive output, 0-10 KΩ standard

Signal
Type
Switch

mA

Volt

L C D

ROLL

SAVE

Optional
Slidepot

OVERRIDE

MENU

Optional
Relay

SETPNT

S COM

SWITCH

N.O.
RELAY

TEMP

CO2

COM

PWR

Optional
Temperature
Sensor

CO2 SENSOR

0001248

CO2 Calibration Ports