

# SENSAPHONE<sup>®</sup>

## REMOTE MONITORING SOLUTIONS

### SENSAPHONE CARBON DIOXIDE (CO<sub>2</sub>) SENSOR • FGD-0068-OD Quick Installation Instructions

The Sensaphone Carbon Dioxide (CO<sub>2</sub>) sensor will allow you to monitor levels of Carbon Dioxide from 0-20,000 ppm with any Sensaphone that will accept a 4-20 Input signal. The FGD-0068-OD will require a 24VDC power supply to operate (Part No: FGD-0053).

Note on wiring: Use 22AWG shielded wiring for all connections (Sensaphone Part No. FGD-0010) and do not locate the device wires in the same conduit with wiring used to supply inductive loads such as motors. Disconnect the power supply before making any connections to prevent electrical shock or equipment damage. Make all connections in accordance with national and local codes.

Described below is the correct way to wire your Carbon Dioxide (CO<sub>2</sub>) Sensor to your Sensaphone.

1. Remove the cover.
2. Verify the switch in the upper left corner on the sensor is in the "OUTPUT mA" position.
3. Connect the 24VDC Power Supply Positive (+) to the terminal marked PWR.
4. Connect the 24VDC Power Supply Negative (-) to the Sensaphone Zone Negative (-)
5. Connect the Sensaphone Zone Negative (-) to the terminal marked COM.
6. Connect a wire from the CO<sub>2</sub> terminal to the Sensaphone Zone (+) positive terminal.
7. Replace the cover.
8. Program the Sensaphone zone (input) for a 4-20mA sensor type with a table range of 0-20,000.

#### Introduction

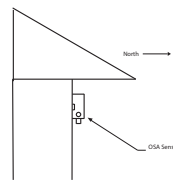
The CO<sub>2</sub> transmitter uses Infrared Technology to monitor CO<sub>2</sub> levels within a range of 0 – 20,000 ppm and outputs a linear 4-20 mA signal. Features include a back-lit LCD and user menu for easy installation

#### Before Installation

Read these instructions carefully before installing and commissioning the CO<sub>2</sub> 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

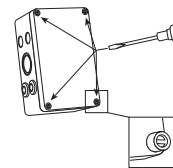
Figure 1



Select a suitable mounting spot on an exterior wall where the CO<sub>2</sub> sensor is best protected from direct exposure to sunlight, wind, etc. preferably on a north facing wall. Do not mount the sensor near opening windows, supply/exhaust air louvres or other known air disturbances. Avoid areas where the sensor is

exposed to vibrations or rapid temperature changes. It is recommended that the enclosure be mounted so conduit or cable-gland connections be made on the bottom of the enclosure. See Figure 1.

Figure 2



Remove the cover by using a standard or flat screwdriver to loosen the four screws as shown in Figure 2. As the screws are captive type, complete removal of the screw from the cover is not required.

On the bottom of the enclosure, remove one of the available knockouts by using a utility knife which allows for control wire access as shown in Figure 3. It is recommended that weatherproof conduit or cable gland fittings be used. See Figure 4.

Figure 3

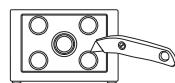


Figure 4



The outside mount CO<sub>2</sub> sensor installs directly on an exterior wall using the four integrated mounting holes provided on the enclosure. Select the best mounting technique based on the exterior wall material. The 4 mounting holes will facilitate a #10 size screw (Not supplied). Mount the base by screwing directly to the wall.

After the base is securely fastened to the exterior wall, connect conduit to conduit connector or feed cable through the cable gland and tighten.

Make wire connections as per the “Wiring” instructions on Page 1. Once wiring and set up are complete, re-install cover and secure by tightening the four screws using a screwdriver.

### Start Up

Verify the transmitter is properly wired and connections are tight. Ensure the output switch is set for mA. 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 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.

### 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.

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. Press <MENU> to advance.
- 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. Press <MENU> to advance.
- 3. Output Type** 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. Press <MENU> to advance.
- 4. Output Test** Use the <ROLL> key to toggle the output OFF (normal operation) or MAX (maximum output) for testing purposes. Press either <SAVE> or <MENU> to set it back to OFF and advance to the next item.
- 5. Calibrat 0 PPM**  
This item is used for 0 ppm gas calibration and is explained in the Calibration section. Press <MENU> to advance
- 6. Calibrat 1,000 PPM**  
This item is used for 1,000 ppm gas calibration and is explained in the Calibration section. Press <MENU> to advance

### 7. Calibrat 20,000 PPM

This item is used for 20,000 ppm gas calibration and is explained in the Calibration section. Press <MENU> to advance

### 8. Restore

Press the <SAVE> key to restore all factory defaults and calibration to original factory settings. Press <MENU> to advance.

### 9. Menu

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

### Output

The CO2 output is scaled such that 4-20mA equals 0 to Out\_High as set in the Setup Menu. The factory default is 0-20,000 ppm. Out\_High can be changed from 2,000 to 20,000 ppm and the output signal is scaled accordingly.

### Calibration

Calibration with gas requires a field calibration kit with pressure regulator, necessary tubing and appropriate bottles of CO2 gas.

#### 0 PPM Calibration

Turn the regulator knob on and attach it to the Nitrogen gas bottle and hand tighten. 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. Turn the valve knob on the regulator to start the gas flow. The regulator will restrict the flow rate to the specified 100 ml/min. After a brief period the gas will flow into the chamber. Wait 1 to 2 minutes until the CO2 stabilizes.

Enter the Setup menu and use the <MENU> key to advance to Calibrat 0 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 setting the internal calibration is taking place.

This takes about 5 minutes while the LCD counts down. Do not disturb the unit or the gas flow. When complete the unit will display the ppm value and Cal Done. Press the <SAVE> key to return to normal operation and shut the gas off.

#### 1000 PPM Calibration

Connect the 1000 ppm CO2 gas bottle and apply the gas as before. 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 device is calibrating.

Again, this process takes about 5 minutes. When calibration is complete the unit will display the ppm and Cal Done. Press the <SAVE> key to return to normal operation and shut the gas off.

#### 20,000 PPM Calibration

Connect the 20,000 ppm CO2 and apply the gas as before. The LCD will begin to approach 20,000 ppm. Wait 1 to 2 minutes until

the CO2 reading stabilizes.

Enter the Setup menu and use the <MENU> key to advance to Calibrat 20,000 PPM. Press and hold the <SAVE> key for 2 seconds and the display will change to Waiting Calibrat then to Waiting 5 minute.

Again, wait 5 minutes and when calibration is complete the unit will display the ppm and Cal Done. Press the <SAVE> key to return to normal operation and shut the gas off.

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

### General Specifications

Range: 0 - 20,000 ppm standard, programmable span from 2000 to 20,000 ppm

Accuracy:  $\pm 75$  PPM or 10% of reading (whichever is greater)

Sensor: Dual Channel Non-Dispersive Infrared (NDIR), diffusion sampling

Sensor Coverage Area: 100 m<sup>2</sup> (1000 ft<sup>2</sup>) typical

Temp. Dependence: 0.2% FS per °C

Stability: < 5 % FS over life of sensor

Sensor Life Span: 15 years typical

Press. 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

Power Supply: 20-28 Vac/dc (non-isolated half-wave rectified)

Output Signals: 4-20 mA active (sourcing), 0-5 Vdc or 0-10 Vdc (field selectable)

Consumption: Heated: 1.0 A max @ 24 Vdc, 1.1 A max @ 24 Vac

Consumption: Unheated: 100 mA max @ 24 Vdc, 185 mA max @ 24 Vac

Output Drive Capability: Current: 550 ohms max

Voltage: 10 Kohm min

Output Resolution: 10 bit PWM

Protection Circuitry: Reverse voltage & over-voltage protected

Operation Conditions: Heated: -40° - 50°C (-40° - 122°F)

Operation Conditions: Unheated: 0° - 50°C (32° - 122°F)

0-95% RH non-condensing

Wiring Connections: Screw terminal block (14 to 22 AWG)

External Dimensions: 84mm W x 119mm H x 29mm D (3.3" x 4.7" x 1.15")

Enclosure Ratings: IP65 (NEMA 4X)

Concealed LCD Display (Used for setting parameters):

Resolution: 1 ppm CO2

Size: 1.4" w x 0.6" h (35 mm x 15 mm)

Alpha-numeric 2 line x 8 character