CO2Meter.com

# iSense 1% & 100% CO2 Monitor Alarm Logger-NEMA4


*CM-0052 100%*
*CM-0155 65%*
*CM-0154 30%*
*CM-0153 5%*
*CM-0152 1%*
*CM-0132 1% 2Hz (fast response)*

# Contents

# IMPORTANT SAFEGUARDS

To reduce the risk of fire, electrical shock and/or injury to persons, basic safety precautions should always be followed when using electrical appliances, including the following:

1. READ ALL INSTRUCTIONS BEFORE USING THE DEVICE
2. Use only the supplied power supply to operate the unit.
3. Ensure that when sampling in a closed environment that the tubes are securely fashioned to the device.
4. Do not operate with a blocked off sample path.
5. Do not operate the device if it is malfunctioning.
6. If the unit starts to malfunction contact CO2 Meter.
7. Do not operate the device with the cover detached.

**SAVE THESE INSTRUCTIONS**

# SPECIFICATIONS

## *Input Voltage*

| | |
|---|---|
| **Voltage Maximum** | 30VDC |
| **Voltage Minimum** | 12VDC |
| **Power Consumption** | ~1Watt Average |
| | DC voltage accepted |

## *Pump*

| | |
|---|---|
| **Maximum Flow (STP)** | .40 LPM |
| **Maximum Vacuum** | 150 mbars |
| **Maximum Pressure** | 500 mbars |
| **Maximum System Pressure** | ~ 1 atm |

## *Sensor Ratings*

| | |
|---|---|
| **Life Expectancy** | >15 years typical |
| **Maintenance Interval** | No maintenance required |
| **Warm-up Time** | < 1 min (measurements immediately) |

## 0-1% CO2

| | |
|---|---|
| **Range** | 0-1% vol. ( 0-10,000 ppm ) |
| **Accuracy** | ± 0.5%, ± 3% of measured value |

## 0-5% CO2

| | |
|---|---|
| **Range** | 0-5% vol. ( 0-50,000 ppm ) |
| **Accuracy** | ± 0.5%, ± 3% of measured value |

## 0-30% CO2

| | |
|---|---|
| **Range** | 0-30% vol. ( 0-300,000 ppm ) |
| **Accuracy** | ± 0.5%, ± 3% of measured value |

## 0-65% CO2

| | |
|---|---|
| **Range** | 0-65% vol. ( 0-650,000 ppm ) |
| **Accuracy** | ± 0.5%, ± 3% of measured value |

## 0-100% CO2

| | |
|---|---|
| **Range** | 0-100% vol. ( 0-1,000,000 ppm ) |
| **Accuracy** | ± 0.5%, ± 3% of measured value |

## *Outputs*

| | |
|---|---|
| **Range** | 0-100% vol. |
| **Output Value** | 4-20mA, linearly scaled |
| **Relay** | COM, NC, NO 1A @ 30 VDC |
| **RS-485** | Modbus Interface |

# PACKAGE CONTENTS

Please verify the contents of your package before using the product.

- 1- NEMA Sampler Unit
- 1- 6’ USB Cable
- 1- M12, 12-Positions 5M Cable
- 1- Fitting, Tubing & Filter Kit include

## MINIMUM SYSTEM REQUIREMENTS

To utilize our software your Windows-PC must meet the following requirements:

- Windows XP SP3 or higher
- Microsoft .Net Framework 3.5 SP1
- Pentium 4 2.4Ghz or higher processor
- 1GB of RAM
- Sufficient disk space for logs and application files (20MB minimum, 200MB+ recommended)

Software is compatible with 64-bit operating systems and is fully tested under Windows 7.

## SETUP

The sampling device will require minimal setup and is designed to be portable. The most important aspect of setup involves connecting the sampling hoses and ensuring proper environmental setup.

## *Permanent Installation*

If used in a permanent installation the device can be powered by 24VDC power. The 4-20mA output loop will be powered in this situation for use with external controllers. The RS-485 and Relay outputs for NC & NO operations are indicate on the next Legend.

**Pin Internal Color Function**

| | | | |
|---|---|---|---|
| 1 | Brown | | CO2 4-20mA- |
| 2 | White | | CO2 4-20mA+ |
| 3 | Blue | | NO-Relay |
| 4 | Pink | | NC-Relay |
| 5 | Yellow | | CM-Relay |
| 6 | Red Power | | Voltage Input |
| 7 | Black | | Power Voltage Ground |
| 8 | Grey | | Not Connected |
| 9 | Purple | | Not Connected |
| 10 | Green | | RS-485 Ground |
| 11 | Pink/Grey | | RS-485 B |
| 12 | Red/Blue | | RS-485 A |

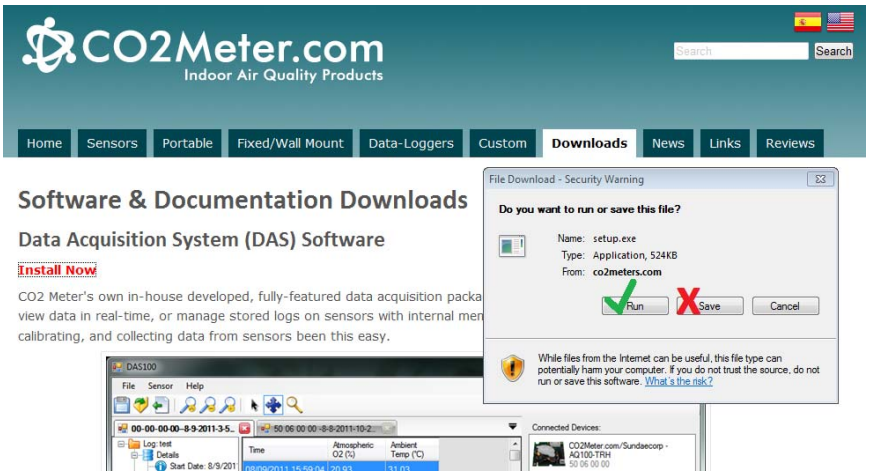
*Figure 1- Table Wiring Connections for Unit*

The device features 4-20mA output linearly scaled to the Current CO2 readings and additionally a digital RS-485 Interface for connection to a MODBUS network and one Relay 1A 30VDC.

## *Configuring the Device for Data Logging*

**IMPORTANT: INSTALL SOFTWARE FIRST!**

Visit CO2Meter.com and go to the downloads page (http://www.co2meter.com/pages/downloads). Install the DAS software package. By installing this package first you will ensure the drivers and software to use your unit is properly installed on your computer before connecting it.




## Data Logger Configuration Model

These products feature internal memory capable of reading and storing data when not attached to a personal computer. Due to the nature of their design, they should be connected to your computer first because required configuration before operation, to initialize and set the logging period, and real-time clock.

## 0-1/5/30/65/100% Data Logger

In order to initialize data logging functionality the unit MUST be connected to the computer with data logging off, and DAS software started.

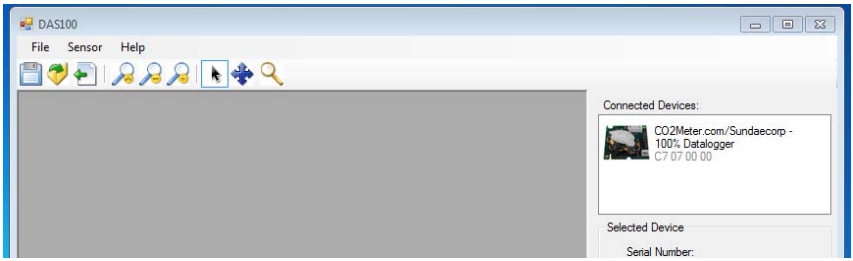



*Figure 2 – DAS Recognized the unit*

Once the unit has been connected click on the “Configure Sensor” button in DAS, set the data logging period and desired pump interval. We recommend leaving the Log interval to the default 30 second period and the pump 10 second period.

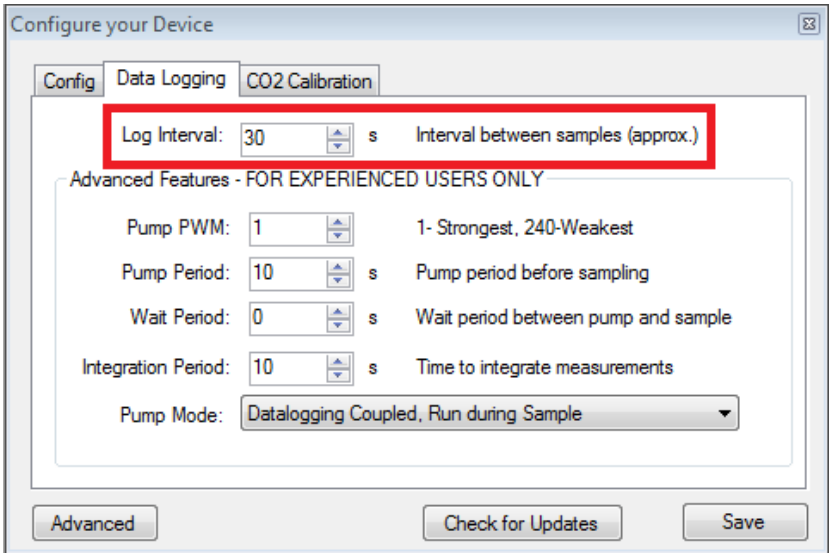



*Figure 3 – Data logging interval & Pump period (recommended 10 or more seconds)*

The pump PWM period can also be adjusted for advanced applications, with 1 being full duty cycle, and values approaching 255 being the shortest duty cycle. The pump mode should always be set to “Data logging Mode” for proper operation of the unit.

# USAGE

To use the unit one must attach hoses to the inlet and outlet. The pump will draw air from the inlet in a vacuum configuration, push it through the sensing chamber, and exhaust the air out through the outlet.

## *Closed Loop Operation*

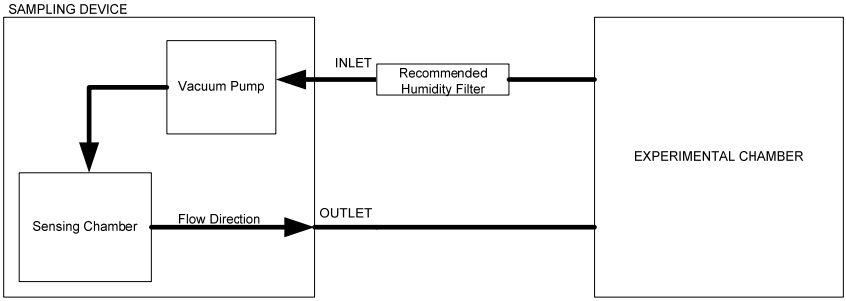



*Figure 4 – Closed loop sampling setup*

## *Open Loop with Environmental Exhaust*

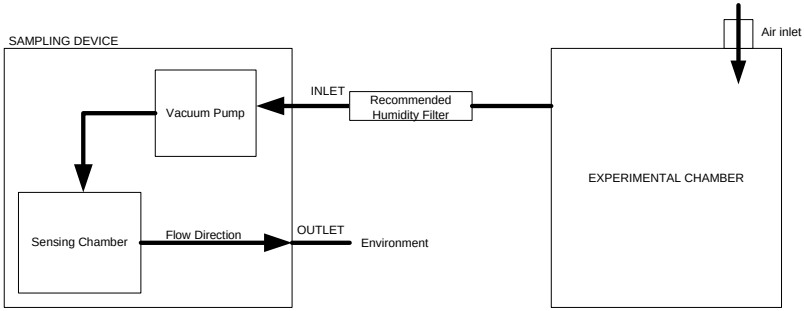



*Figure 5 – Open loop sampling setup*

We recommend installing the included humidity/contaminate filter to ensure the sensing chamber and pump baffle stays clear and corrosion free.

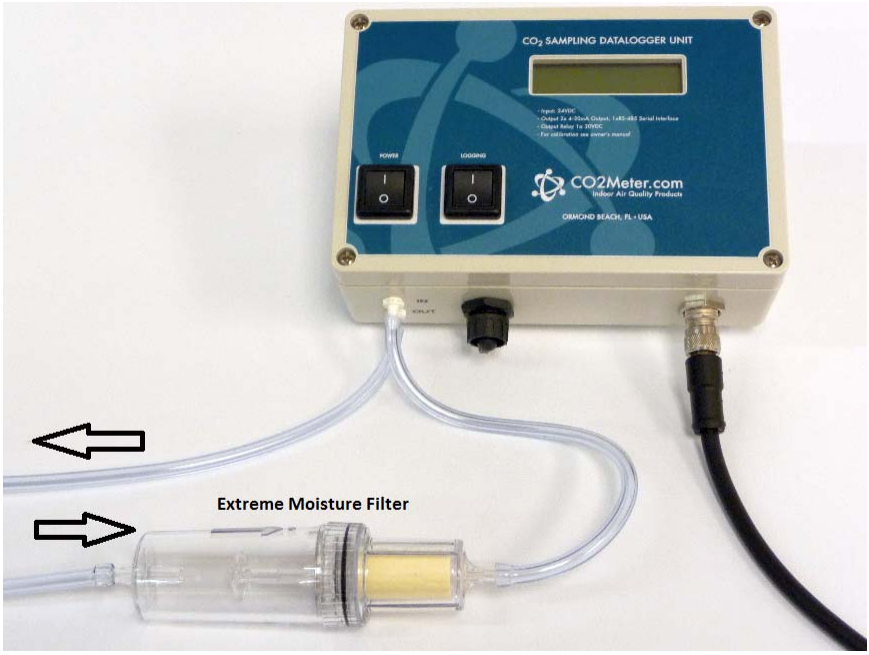



*Figure 6 – Filter Installation and Orientation*

# THEORY OF OPERATION

The CO2 sensor inside this device uses non-dispersive infrared technology to sense, as a function of transmitted light, the concentration of CO2 in the air. It has been factory calibrated to operate within the specified accuracy and precision.

# TUBING CONSIDERATIONS

## Latency

When attempting to measure changes in CO2 level in real-time, care should be taken to compensate for sample tube length. For example, the latency per 100ft (30m) is approximately 8 seconds for a horizontal run.

## High Moisture

While a moisture trap is sufficient for most applications, it cannot compensate for air with very high moisture content ( T > 37C and > 95% humidity).

In these situations, we strongly recommend using Nafion tubing in the input line. Nafion tubing is a highly selective, semi-permeable membrane to water vapor. If gases inside Nafion tubing are wetter than gases surrounding the tubing, drying will occur. If the surrounding gases are wetter, humidification will occur. In normal use, a portion of Nafion tubing is used as a portion of the tube between a gas sample stream and a sensor. If the sample stream is much wetter than ambient air (such as breath samples), the sample falls to ambient humidity. If the sample stream inside is much drier than ambient air (such as calibration cylinder gases), the sample rises to ambient humidity.

TUB-0003

You can order Nafion tubing from our website, part #TUB-0003.

# CALIBRATION

Calibration procedure is dependent on the type of unit, and whether it has optional data logging functionality.

All units are factory calibrated with multiple reference points of gas, and have been verified to be accurate within their specified performance before shipment, however, if severely jolted or otherwise mechanically disturbed calibration can occasionally drift.

To compensate for this drift all calibration procedures are based around a procedure that consists of a single calibration point, effectively shifting the zero-point of the CO2 sensor.

To ensure the highest accuracy we recommend calibrating with calibration gas (available from CO2Meter) close to the concentrations being measured. Alternatively a 0% or ambient 400ppm calibration can be performed.

To perform a calibration, attach the unit to your computer, power it with VDC and either expose it to atmosphere or supply it with your calibration gas, fed with a demand-based regulator.

Open DAS, and click the “Configure Sensor button”. Click the Turn Pump ON Continuously button to ensure continuous flow.

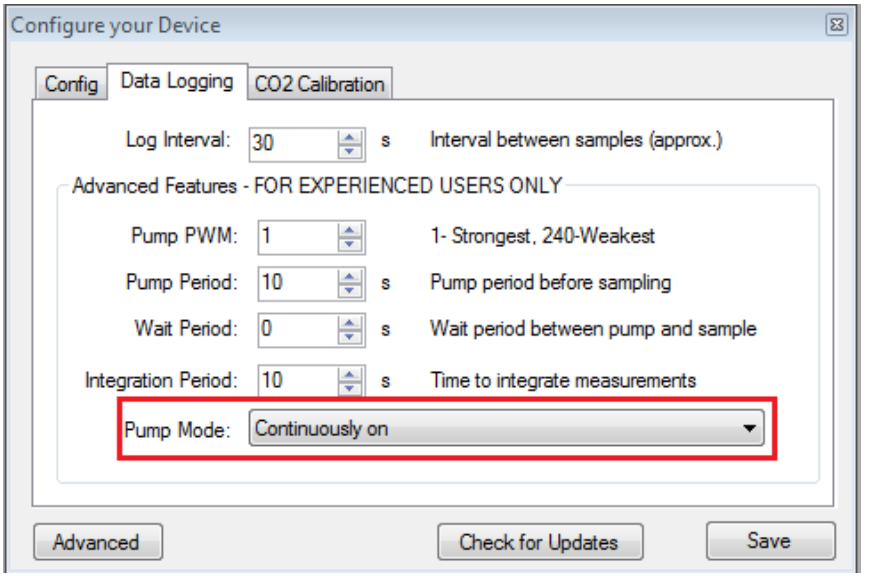



*Figure 7– 0-100% Data logger / Sampler Calibration Screen*

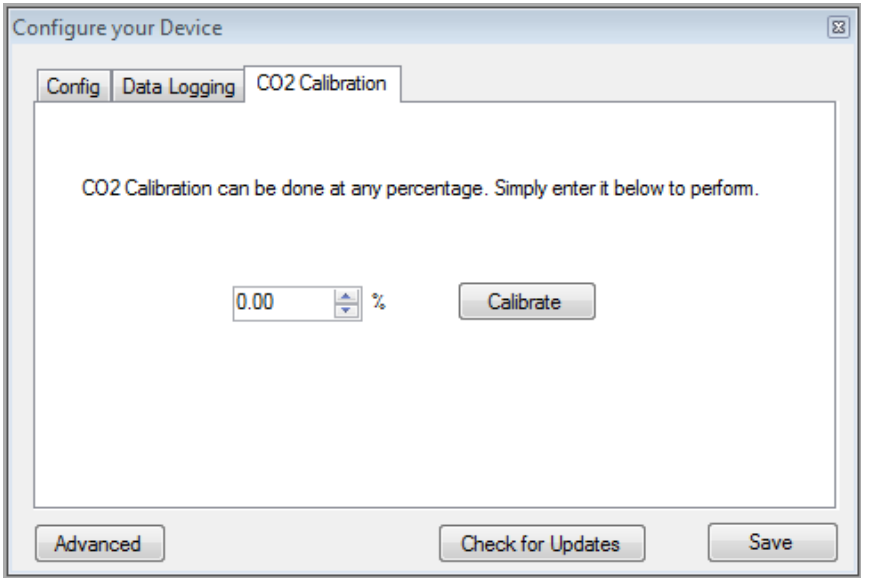



*Figure 8–Data logger 0-5%, 65%, 100% / Sampler Calibration Screen*

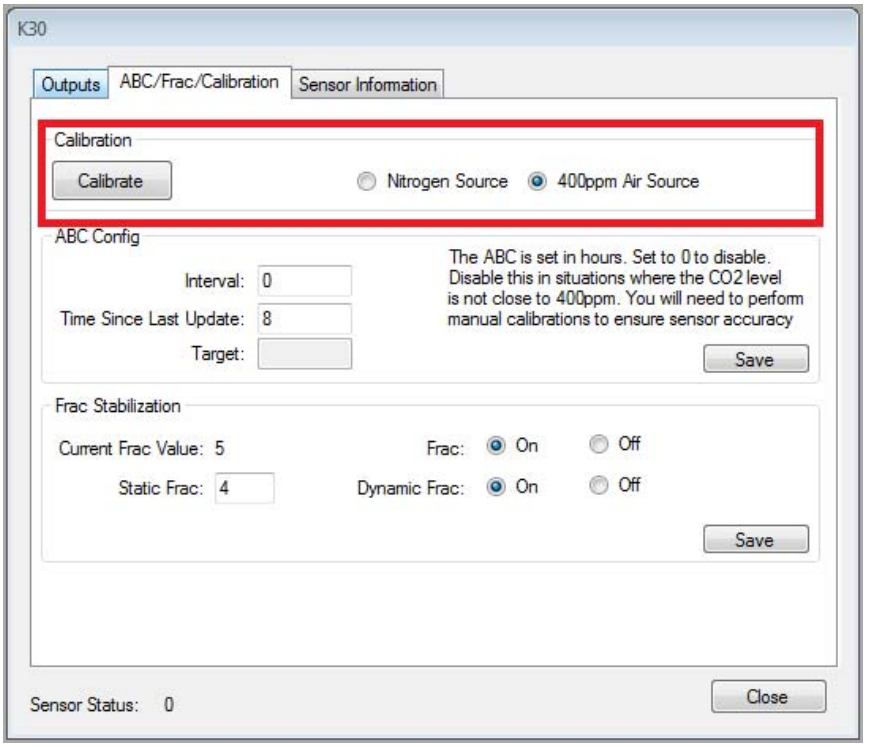



*Figure 9–Data logger 0-1%, 30% / Sampler Calibration Screen*

## Zero or Fresh Air Calibration

Apply gas and select the appropriate concentration in the screen shown in Figure 10. Click the calibrate button. The sensor reading should instantly reflect the calibration.

## High-Concentration Calibration

Write down the original Zero Value before adjustment for reference. Apply the desired concentration calibration gas; adjust the Zero Value in increments of 10, pressing the large Calibrate button to the right, until the unit displays the correct concentration.

**DO NOT ADJUST THE SPAN VALUE.**

## Support

The quickest way to obtain technical support is via email. Please send all support enquires to ***support@co2meter.com***. In your email, please include a clear, concise definition of the problem and any relevant troubleshooting information or steps taken so far, so we can duplicate the problem and quickly respond to your inquiry.

## Warranty

This unit comes with a 1YEAR (warranty period) limited manufacturer's warranty, starting from the date the unit was shipped to the buyer.

During this period of time, CO2Meter.com warrants our products to be free from defects in materials and workmanship when used for their intended purpose and agrees to fix or replace (at our discretion) any part or product that fails under normal use.

To take advantage of this warranty, the product must be returned to CO2Meter.com at your expense. If, after examination, we determine the product is defective, we will repair or replace it at no additional cost to you.

This warranty does not cover any products that have been subjected to misuse, neglect, accident, modifications or repairs by you or by a third party. No employee or reseller of CO2Meter.com's products may alter this warranty verbally or in writing.

## Returns

If the product fails under normal use during the warranty period, an RMA (Return Material Authorization) number must be obtained from CO2Meter.com. After the item is received, CO2Meter.com will repair or replace the item at our discretion.

To obtain an RMA number, please call CO2Meter.com at **(386) 256-4910**. When requesting an RMA number, please provide the reason for return and original order number.

If we determine that the product failed due to improper use (water damage, dropping, tampering, electrical damage etc.) or abuse, or if it is beyond the warranty period, we will inform you of the cost to fix or replace your device.

If you are returning your device due to a warranty claim (with an RMA number) and you still have the unit original package, please use it to ship your unit to us. Please make sure to include the provided RMA number on the outside of the box, preferably on the shipping label. Make sure you secure the unit inside the package properly to prevent any damage during transit that could void your device's warranty.

Finally, please ship your device to the address shown under the "Contact Us" section below. CO2Meter.com will not, under any circumstances, be responsible for your shipment expenses and no refund will be issued for shipping charges necessary for you to ship the unit to us.

## Liability

All liabilities under this agreement shall be limited to the actual cost of the product paid to CO2Meter.com. In no event shall CO2Meter.com be liable for any incidental or consequential damages, lost profits, loss of time, lost sales or loss or damage to data, injury to person or personal property or any other indirect damages as the result of use of our products.

# Contact Us

**We are here to help!**
If the troubleshooting guide above doesn't help you solving your problem or for more information, please contact us using the information below.


 Support@CO2Meter.com
 (386) 256-4910 M-F 9:00am–6:00pm EST
 (866) 422-2356
 www.co2meter.com

Shipping Address:
CO2Meter.com
131 Business Center Drive
Ormond Beach, FL 32174 USA