CO2Meter.com
CO2 Measurement Specialists

User's Manual

25% O2 Sampling Data Logger
Model CM-0505

Rev. 6 December 2017
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Save for future reference

Model Number: _____

Serial Number: _____

Purchase Date: _____

WARNING!

Install our complimentary GasLab® software before connecting your CO2Meter product(s) to your computer. Failure to do so may affect the ability for GasLab® to detect your sensor.

If this happens, please follow the instructions shown in the Troubleshooting Guide on page 21.

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Welcome

Thank you for purchasing our sensor. CO2Meter, Inc. is a Florida based business specializing in the design and manufacturing of gas detection and monitoring devices – mainly CO2. Our approach is one based in the science of gas and how best to accurately and repeatedly measure that gas for the end users purposes. Our business partners in Agriculture, Medical, Pharmaceuticals, Science, Beverage, and other fields find our devices to be highly accurate and cost effective.

We approach each customer's application as a unique opportunity to understand, educate, and provide product solutions that meet the customers' needs while exceeding their expectations for reliability and service. Our continued product innovation in combination with our "customer first" focus allows CO2Meter, Inc. to continue to provide solutions for the future.

Based in Ormond Beach, FL, CO2Meter, Inc. is committed to the success of our customers; the health, welfare, and prosperity of our talented employees; and the continued development of our local community.

CO2Meter, Inc. appreciates your business and looks forward to working with you and your team in the future.

Please take some time to read through this manual in order to become familiar with the sensor. Also, please pay special attention to the important safeguards shown on the next page.

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 THIS SENSOR.
2. INSTALL GasLab® SOFTWARE BEFORE CONNECTING METER TO A COMPUTER.
3. Use only the included power supply to operate this meter. Inappropriate voltage supply could cause irreparable damage to this device.

4. Do NOT use rechargeable AA batteries.
5. Duracell brand AA Alkaline batteries are recommended.
6. Do not store the meter with the AA Alkaline batteries installed to prevent the potential for battery leakage.
7. Make sure that the tubes are securely attached to the meter before sampling a closed environment.
8. Do not operate with an obstructed sample path.
9. This meter is not designed for outdoor use.
10. Do not expose this meter to water or any liquids.
11. Do not operate this meter if the enclosure is opened.
12. Do not operate the device if it is malfunctioning.

SAVE THESE INSTRUCTIONS!

Package Contents

Please verify that your package contains the following items before using this meter:

UNITS:

- (1) Meter
- (1) Protective rubber grips
- (1) 6-foot USB cable
- (1) International power supply
- (1) High-impact carrying case
- (1) Calibration Tag
- (1) User manual
- (1) Fittings, tubing, & filter kit
    - (1) 10-foot long 1/8" tubing
    - (2) 1/8" Barb tubing bulkhead fitting
    - (2) 1/8" Barb 10-32 UNF fittings
    - (2) Particulate filter (CM-0117)
    - (2) Hydrophobic filter (CM-0118)
    - (1) Moisture trap (CM-0112)

Figure 1: Basic kit - all units

Optional Accessories

If the meter is to operate in environments where humidity is very high (>95% RH), an *Extreme Moisture Filter* (CM-0103) can be purchased separately. This filter will allow free flow of sampled air while keeping moisture out of the meter. A 10,000-hour pump is also available at the time of purchase.

Note: Please contact our technical support staff for more details about these or any other accessories.

GasLab® Software

IMPORTANT: MAKE SURE TO INSTALL SOFTWARE BEFORE CONNECTING YOUR SENSOR TO YOUR COMPUTER.

Minimum System Requirements

To utilize our free software, the computer must meet the following minimum requirements:

- 1GHz processor with 1GB of RAM, 1GB free disk space (2GB free disk space for 64-bit systems).
- Windows XP*/7/8/8.1 with Microsoft .NET Framework 4.0** or later.
- On Intel-based Mac computers, GasLab® software can run using a Windows 7/8 virtual machine software such as *VMware Fusion*® or similar.

*Microsoft .NET is not supported on Media Center or Tablet editions.
**Installer will optionally install .NET Framework.

Visit **www.co2meter.com/pages/downloads** to download our complimentary GasLab® software to your computer. You can also download the GasLab® user manual in PDF from this page.

Please read the GasLab® user manual carefully to become more familiar with how the software works so that you can get the maximum benefit from this useful tool.

Install the GasLab® software first to ensure that the proper driver, necessary for the sensor, is installed on your computer before connecting the sensor.

Figure 2: GasLab® download page (Internet Explorer 11 shown)

Follow the steps and instructions prompted by your computer's operating system. Make sure you have administrator privileges in order to install this program.

NOTE: We strongly recommend allowing GasLab® to install drivers for the sensor automatically.

Software Capabilities

Our GasLab® software will allow users to:

Manage and download logs
Configure sensor
Adjust logging intervals
Calibrate the sensor
Collect data real-time

Powering the Metter

This meter can be powered by four (4) AA size batteries (not included) but sampling units can also be powered by the included 6VDC international wall power supply. These units should NOT be powered using the included USB cable since it supplies inconsistent voltage to the meter, which degrades sensor accuracy.

If the unit is not going to be used for an extended period of time, batteries should be removed to prevent damage due to potential battery leakage.

The power switch ⏻ on the left side of the meter turns the unit ON/OFF. The LOG switch on the right side of the meter enables/disables data logging and pump function.

Product Overview

This portable CO2Meter, Inc. sampling data logger is designed to monitor oxygen (O2) in real-time in concentration levels from 0% to 25%.

Sampling data loggers log data for a specified period of time and store up to 60,000 data points to its internal memory to be retrieved at a later time for analysis.

When combined with our GasLab® software, it allows you to see data in real time on your computer's screen. Its built-in 1,000-hour (10,000-hour optional) sampling micro-pump ensures reliable operation for persistent readings based on user-selected time intervals.

Among others, this meter is ideal for the following applications:

Incubation
Fermentation monitoring and validation
Agricultural O2 up take analysis
Modified Atmosphere Packaging (MAP)
O2 leak detection
Fire suppression system testing

Scientific devices such as this oxygen meter require users to have intimate knowledge of the sensor's features, limitations, operation, required software, and specifications prior to use. CO2Meter, Inc. highly recommends reading this user's manual before operating this sensor, especially the *Important Safeguards* section on page 4.

Instrument Overview

Figure 3: O2 meter components

Detector Principal

This meter features a zirconia oxygen sensor that utilizes solid-state electrochemical reactions to produce a voltage proportional to the current oxygen. This voltage is then digitalized and filtered to a usable value. The oxygen sensor has also been factory calibrated to meet specifications.

Operation Guide

Make sure you read through these instructions thoroughly before using the meter. This guide will help you become more familiar with the meter in order to be as productive as possible in a short period of time. Please read the *Important Safeguards* on page 4 before continuing.

IMPORTANT: Follow these instructions to ensure proper set up:

1. Download the GasLab® software to your computer as shown in the *GasLab® Software* section on page 7.
2. Power the meter using the included universal power supply. Turn *ON* ⏻ the meter.
3. Wait until the display changes colors to visually confirm it has reset successfully after connecting it to a computer.

Connecting Meter

The first time the meter is connected to your computer, the operating system will install the necessary USB drivers as shown in *Error! Reference source not found.*. This process could take a few minutes.

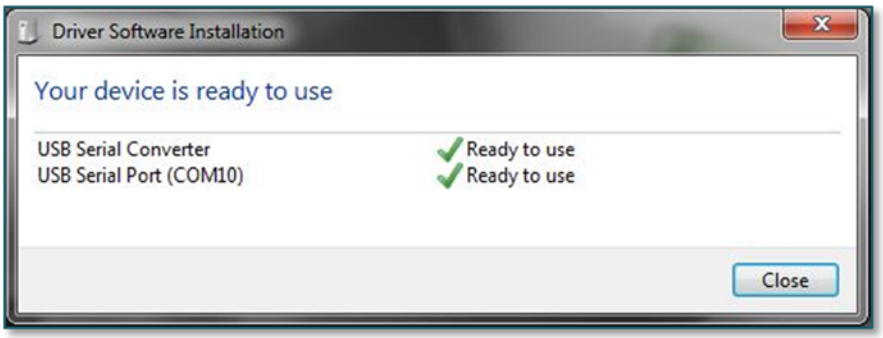

Figure 3: USB Driver Installation.

LCD Display

The Liquid Crystal Display (LCD) shows the following features:

O2 levels in percentage (99.99%) format
Logging ON/OFF
Percentage of free memory

Data Storage

This meter features an internal memory capable of storing 60,000 data points. Due to the nature of the design, this meter will need to be initialized before operation and the logging period and real-time clock will need to be set under the **SETTINGS** menu.

Setup

CO2Meter, Inc.'s sampling meters will require minimal setup since they are designed to be portable. The most important aspect of the setup involves connecting the sampling hoses and ensuring proper setup. The *Instrument Overview* section in this manual shows the labeled components of these meters, as referenced throughout the rest of this manual.

Insert four (4) AA size batteries or connect to the included power supply. This meter has an internal coin cell CR-2032 3V battery backup for the real-time clock. This battery is inserted in the factory for your convenience and should last the lifetime of the product.

In order to initialize data logging, the unit MUST be connected to the computer with data logging switched to **OFF**, and the GasLab® software started. Once the unit has been connected, click on the **CONFIGURE SENSOR** button in the GasLab® interface, and set the pump period and data logging interval as desired. We recommend leaving the pump "on" period to the default 10 seconds. For the data logging interval, we recommend at least 10 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" for proper operation of the unit.

Settings

Settings – allows you to access all the parameters, options, outputs, communications, and date/time settings to be changed or programmed.

Display Settings

Here you can change the brightness and color theme (3 available) on the device and you can also activate a Screen Timeout to save power. This setting will not affect the meter's functionality but will affect the battery life depending on how you set this parameter.

Port Settings

Here you can configure and activate ports that control additional accessories such as the device Modbus address. Please call technical support for guidance and important information before making changes to the configuration of any of these ports. You can reach us during regular business hours at **(386) 256-4910** or send us a message to support@co2meter.com.

Time/Date Settings

Here you can change the date and time on the meter for more accurate reference on the records. The default time of your meter could vary depending on your location.

Review these settings before you start using the meter.

Data Logs

Will take you where the logs are, you can see the data storage on your device and display it graphically in the same window.

Data Logging Configuration

These meters feature an internal memory capable of storing data when not attached to a personal computer. These units will allow you to read and store O2 concentration levels data. Due to the nature of the design, this meter should be connected to a computer first, before operation, in order to initialize the sensor and set the logging interval and real-time clock.

Logging Data

Once the GasLab® software has been installed and the meter is connected to the computer, you can gather data in a variety of ways. Data can be collected in real time, data logs can be downloaded from the meter's memory and saved to the computer, and data can be reviewed on the meter's LCD display.

For each logging session

1. Turn the meter **ON** by connecting to power supply.
2. The meter must be started at least 1 minute prior to deployment and data logging to allow the sensor enough time to warm-up and calibrate.
3. Set the logging interval as desired using GasLab®.
4. Turn the Log switch to the **ON** position in order to start the logging session.
5. When data logging is completed, turn the Log switch to the **OFF** position in order to stop the logging session and disconnect the meter.

NOTE: Refer to the GasLab® User's Manual for more information.

Logging Settings

Here you can change the logging interval and duration. This will enable you to collect the data for a period of time in a specific logging interval. This screen also gives you the option to set the desired pump interval. Remember to synchronize the pump before, during, or after the logging interval to read and collect the correct reading according to the application.

Closed Loop Operation

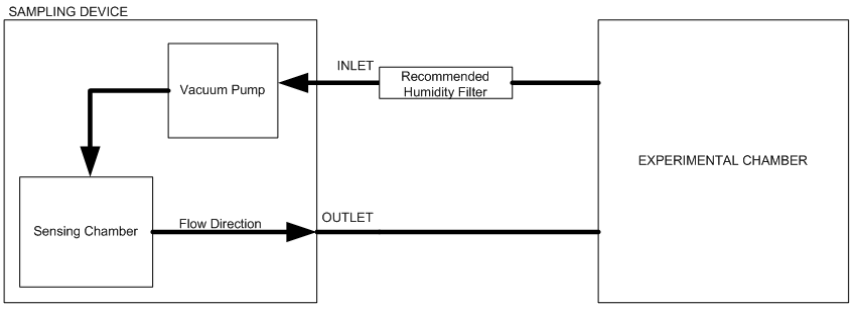

Figure 4: Closed-loop operation

Open Loop with Environmental Exhaust

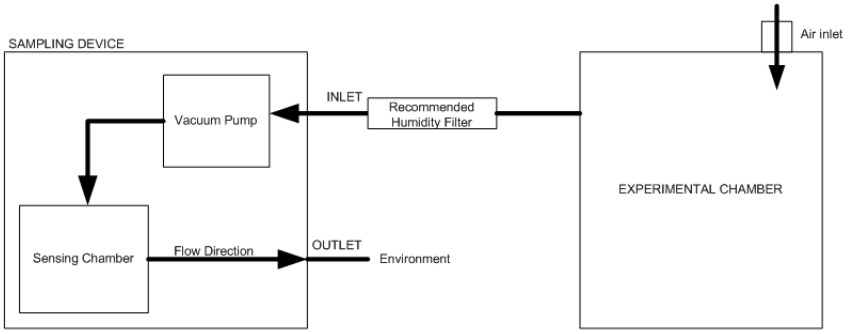

Figure 5: Opened-loop operation

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

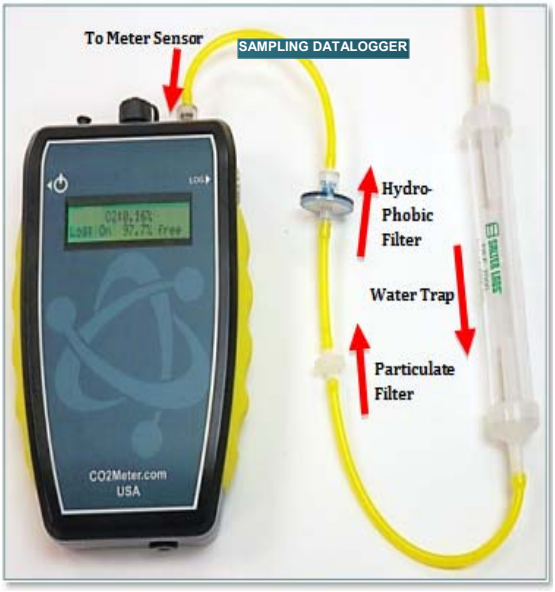

Figure 6: Filter Installation and Orientation

Quick Start Guide

IMPORTANT: MAKE SURE TO INSTALL SOFTWARE BEFORE CONNECTING YOUR METER TO YOUR COMPUTER.

1. Install fresh set of AA batteries (Duracell brand recommended) or connect the included power supply.
2. Install filters and tubing included as shown on ***Figure 6***.
3. Turn the meter ON by pressing the power switch once.
4. For data logging models, turn logging ON by pressing the LOG switch once. Once the sampling process is completed, data can be downloaded to your computer using our GasLab® software.

Calibration

All units are shipped factory-calibrated. When it is time to re-calibrate, you have two choices. You can ship your Sampling Data Logger to us for recalibration, or you can calibrate it yourself.

Why is Calibration required?

Over time all sensors require recalibration. During recalibration, the sensor is exposed to a known gas source, multiple readings are taken, an average is calculated, and the difference between the new reading and the original reading when the sensor was originally calibrated at the factory is stored in EPROM memory. This "offset" value is then automatically added or subtracted to any subsequent readings taken by the sensor during use.

Factory Calibration

Factory calibration is a pre-paid service CO2Meter offers. It not only corrects for sensor drift, but provides a Certificate of Calibration. A Certificate of Calibration is required for products in ISO 9000, FDA-regulated, government contracted, or other industries that requires traceability.

To order factory calibration, you must first get a Return Material Authorization (RMA) number. This number insures we know your unit is coming back to CO2Meter and returned to you the same day if possible. To obtain an RMA number, call (877) 256-4910 M-F 9-5pm EST or send an email to: support@co2meter.com. Please have your original order number ready. You will receive an authorization code to access the RMA system.

Once you have an authorization code, go to http://rmasupport.net/rma2.aspx. Fill in the form, enter the authorization code you were provided and an RMA number will be assigned to you.

Please use the original packaging (if available) when returning the meter to CO2Meter. Include the provided RMA number on the outside of the box, preferably on the shipping label. Secure the meter inside the package properly to prevent any damage during transit. Ship the meter to the address listed on your RMA paperwork.

When we receive your Sampling Data Logger, we will run a diagnostic test, then contact you with a total cost for recalibration, return shipping, and repair/replacement (if required) of any non-working parts required to complete the calibration. Once calibration is complete, your meter will be returned with a Certificate of Recalibration.

All applicable duties, tariffs, taxes and brokerage fees are the responsibility of the customer.

Ordering a Factory Certificate of Calibration during Purchase

In some cases, you may need an original Certificate of Calibration when you place your order. You can save time by ordering your calibration certificate at the same time you place your order.

https://www.co2meter.com/products/certificate-calibration

Calibration Procedure

The CM-0505 is calibrated using 100% Nitrogen Gas and Ambient Air

1. Install AA batteries and verify CM-0505 operates on battery power.
2. Connect CM-0505 to 6V power supply and verify operation.
3. Connect data cable from USB port on the computer to CM-0505.
4. Turn "ON" CM-0505 and wait for display to turn green.
5. Turn "ON" LOG.
6. Run GASLAB program.
7. Under "Sensor Select" open "Port:" menu and select COM port.
8. Open "Product:" menu and select "CM-0505"
9. Select the Green "Connect" button.
10. Select "Read Oxygen" button
11. Connect 100% Nitrogen gas to the "IN" port through a regulator.
12. Select "Read Oxygen" button
13. When O2 readings are stable, select "Configure Sensor" button.
14. In the "Configure AQ500 Window", Select "Calibrate to Zero".
15. Select the "OK" button.
16. Select the "Close" button.

17. Select "Read Oxygen" button
18. If readings are not between 20.4% – 21.4%, repeat step 14.
19. Select "Read CO2" button
20. Disconnect 100% Nitrogen from the "IN" port.
21. Allow CM-0505 to return to Ambient.
22. Select "Read Oxygen" button.
23. Type the Serial Number into the "Name:" box.
24. Use Snipping tool to record calibration graphic.
25. Select "Configure Sensor" button.
26. Select "Data Logs" tab.
27. Verify "Logging Interval" is "5".
28. Verify Device Time" is correct.
29. Select "Clear Logs" button.
30. In the "Clear Logs" window, select "Yes".
31. Verify "Erasing Log" on CM-0505 display.
32. Close the "Configure AQ500" window.
33. Turn OFF Logging Switch on CM-0505.
34. Turn OFF Power Switch on CM-0505.
35. Disconnect power, unplug USB connections and remove batteries.

Specifications

Sensor Performance and Ratings	**Sensor Type**	Zirconium dioxide (ZrO2)
	Range	0-25% O2
	Accuracy	±2% full scale or better
	Repeatability	±0.05%, ±1% of measured value
	Response Time	4 sec. max.
General	**Warm-up Time**	<1 min. (instant measurements)
	Operating Temperature	-30 to 60 °C (-22 to 140 °F)
	Life Expectancy	>5 years
	Maintenance Interval	No maintenance required
Data Logging	**Data Points**	60,000
	Interval Period	From every 2 seconds to every 18 hours
	Data Recorded	Date, time, O2%
Pump Characteristics	**Life Expectancy**	1,000 hours (basic pump)
	Max. Flow (STP)	0.40 liters/min.
	Max. Vacuum	-150 mbar
	Max. Pressure	500 mbar
	Max. System Pressure	~1 atm (~1 bar)
Power	**Batteries**	Four (4) AA-sized Alkaline
	Input Voltage	6 VDC
	Current Consumption	~0.5 W avg. (pump running)
Dimensions	**W x H x D** in(mm)	3.60(91) x 5.75(146) x 1.29(33), excluding boot

Troubleshooting Guide

Symptom / Issue	Possible Cause / Resolution
Unit is not recognized by computer/OS	Make sure unit is connected properly to a suitable 6VDC power source and that the USB cable is properly connected to a computer.
Unit doesn't power ON	Perform resolution above and make sure that there is adequate power to the sensor.
No logs are present on meter	The meter was disconnected while logs were being downloaded. Connect the meter to the computer and download logs again.
The display is blue or showing error	The meter's EEPROM has been corrupted. Improper power supply. Please email our technical support for further assistance.
The GasLab® software doesn't start *1	Your software might be out of date. Update your software online at our website or by clicking on the **CHECK FOR UPDATES** under the *Help* menu. Make sure your computer meets the minimum system requirements.
Slow response	Check the air flow channels/tubes to make sure they are not obstructed. Check the parameters of the meter and make sure the speed of the computer is adequate.
Reading doesn't change	Calibration or recalibration needed.

*For more troubleshooting tips on GasLab® software, see its manual located at www.co2meter.com/pages/downloads.

USB Driver Installation Instructions

To install the appropriate USB port drivers compatible with your sensor, follow these steps:

1. Go to http://www.ftdichip.com/Drivers/VCP.htm and download the package appropriate for the version of Windows installed in your computer.
2. Move the file you downloaded to a location you can easily access. Make sure you have administrator privileges.
3. Extract the file by right clicking on it and selecting ***extract here.***
4. Go to your computer's Device Manager in the ***Control Panel***.
   - For Windows 8, press the Windows key and 'x' at the same time to bring up the start menu then click on ***Device Manager***.
   - For Windows 7, open the start menu and type ***Device Manager*** in the search bar.
5. Find the ***Unrecognized USB Device*** in the list (it usually, but not always, has a yellow triangle icon).
6. Right click the ***Unrecognized USB Device*** item and select ***Update Driver Software***.
7. Select ***Browse My Computer*** and point to the folder where you extracted the driver files to (step #3).

This will install the necessary drivers to your computer and allow you to use your sensor with GasLab®. If you have multiple sensors you should only have to perform this procedure once; the operating system will automatically find the driver for all the other sensors.

Support

The quickest way to obtain technical support is via email. Please send all support inquires to **support@co2meter.com**.

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 sensor comes with a 1YEAR (warranty period) limited manufacturer's warranty, starting from the date the sensor 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.

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.

Returns

If the product fails under normal use during the warranty period, a 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 a RMA number, call us at or email us at (386) 256-4910 support@co2meter.com. When requesting a RMA please provide reason for return and original order number.

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

Contact Us

We are here to help!

For information or technical support, please contact us.

support@co2meter.com

(386) 256-4910 (Technical Support)
(386) 872-7665 (Sales)

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