



**edaphic scientific**

environmental research & monitoring equipment

www.edaphic.com.au

info@edaphic.com.au

Ph: 1300 430 928

## User Manual



# ESCM-1652

Carbon Dioxide and Oxygen Welding Gas Analyzer

## **Warning!**

This product should only be used as described in this manual. If the equipment is used outside of the manner specified by CO2Meter, the protection provided by the equipment may be diminished. This equipment should be installed/serviced by qualified personnel only.

Please contact [Support@CO2Meter.com](mailto:Support@CO2Meter.com) for more information.

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## Introduction to the CM-1652

Thank you for selecting the CM-1652 Carbon Dioxide and Oxygen Welding Gas Analyzer. CO2Meter provides advanced analysis of welding gas blends that contain 0-50% carbon dioxide and 0-25% oxygen. The CM-1652 will allow the user to verify gas blends and meet standards set by the American Welding Society. This will be achieved by utilizing NDIR carbon dioxide sensors and a fluorescent oxygen sensor, all calibrated to maximize accuracy at different measurement ranges.

## Important Safeguards

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

- READ ALL INSTRUCTIONS BEFORE USING THIS METER.
- Use only the included power supply to operate this meter. Inappropriate voltage supply could cause irreparable damage to this device.
- Do NOT use batteries other than the Li-ion 18650 3.7V rechargeable batteries.
- Additional Li-ion 18650 3.7V rechargeable batteries (3) (can be purchased, [here.](#))
- Do not operate with an obstructed sample path. – remove the luer caps prior to operation.
- Make sure that the tubes are securely attached to the meter before sampling a closed environment.
- Ensure the SD Card has gold chips facing up and towards the user, for proper use.
- Do not expose this meter to water or any liquids – utilize the included filters and water traps.
- Do not operate this meter if the enclosure is opened.
- Do not operate the device if it is malfunctioning.

## Key Features

- Measures CO2 (0-50%)
- Measures O2 (0-25%)
- Quality NDIR CO2 sensing technology
- Quality fluorescent O2 sensing technology
- Simple Target Gas Selection
- Large back-lit LCD display
- Compact, easy to use in the field
- Rechargeable batteries with extended lifespan (last 30+ hours)
- Data Logging to any size micro-SD Card (16GB SD Card included)

## Package Contents

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

- CM-1652 Carbon Dioxide and Oxygen Welding Gas Analyzer
- (3) Li-ion 18650 3.7V batteries (Installed)
- (1) Hydrophobic Filters
- (2) Particulate Matter filters
- (2) Barbed fittings for filters
- (1) Tubing Set - 6'
- (1) 16 GB SD Card
- (1) SD Card Adapter
- (1) Quick Start Guide
- (1) USB 1.5 cable
- (1) 1.0 LPM Flow Regulator
- (1) AW-15A Welding Adaptor
- (1) Carrying Case



## Optional Accessories

CM-1650-REG-1.0: 1.0 LPM Flow Regulator (Replacement)

CM-0101: Fittings and filter kit (Replacement)

BAT-18650: 18650 3.7V Li-ion Rechargeable Battery (Replacement)

**Note:** Please contact our technical support staff for more details about these accessories, [Support@CO2Meter.com](mailto:Support@CO2Meter.com)

## Product Overview

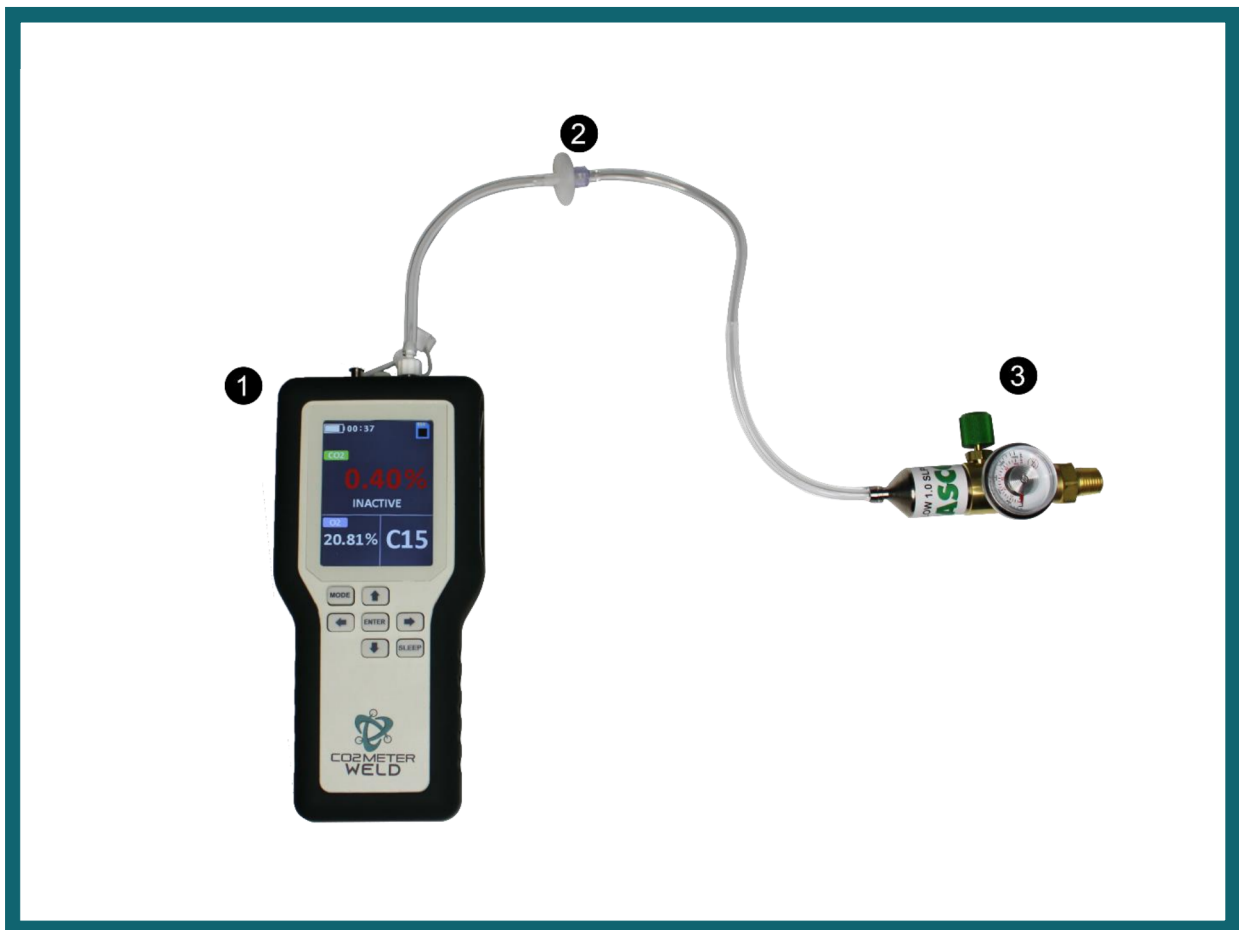
With the **CM-1652 Carbon Dioxide and Oxygen Welding Gas Analyzer**, CO2Meter is providing advanced analysis of active welding gas blends that contain 0-50% carbon dioxide and 0-25% oxygen. This device verifies the most common gas mixtures in the industry and will set the main targets for verification.



## Proper Setup

Be sure to use the included tubing, filters and flow regulator. Failure to use the device without these included accessories could result in malfunction or damage to your device.

1. CM-1652
2. Particulate Matter filter
3. Flow Regulator



## Quick Start Guide

Taking a measurement with your analyzer is simple and can be completed in as little as 3 minutes. Follow these few steps to begin analyzing your welding gas:

Step 1. Unpackage your device and be sure that your CM-1652 is charged and ready to use.

Step 2. Power on the CM-1652 and wait for device to complete warm-up.



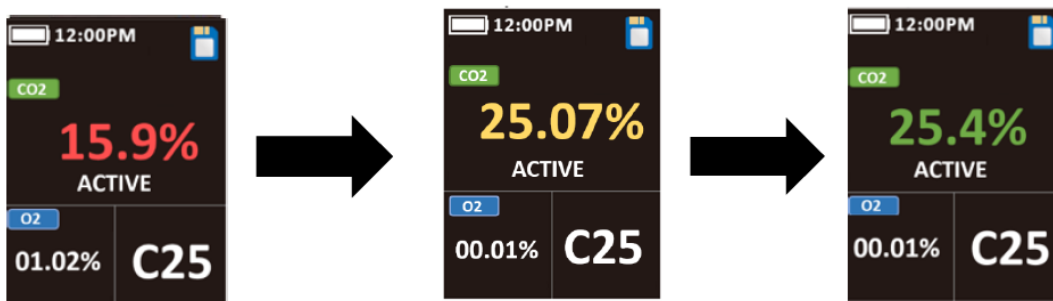
Step 3. Use the the included tubing, filters, and flow regulator to connect gas supply.

**\*\*\*Note: failure to use included regulator could resulting in damage to your analyzer\*\*\***

Step 4. Select welding gas blend concentration to be analyzed.





Step 4. Apply gas to activate the device and begin measuring.





## Principles of Operation

### CO2 Blend Selection:

User will use up  and down  key to scroll through the CO2 blend selections.



### Display Explained:



### **Zone 1:**

Shows CO2 reading and Active Status

- (1) Battery Icon - Indicates battery life
- (2) Time-Display time to match with data log
- (3) SD card icon - Where recorded data logging is located
- (4) Large CO2 reading-Provides a live CO2 reading
- (5) Active and Inactive Status-Indicates if gas is flowing through the sampling chamber

### **Zone 2:**

Shows O2 Reading.

### **Zone 3:**

Displays CO2 blend user selection

Zone 3 displays the user selected blend that is being analyzed. The user is prompted to select this configuration upon startup of the device.

Blend Selection:

(C2, C5, C10, C15, C20, C25, C30, C35, C40, C45 C50, O2)

C25	CO2 <b>15.9%</b> ACTIVE	CO2 <b>25.4%</b> ACTIVE	CO2 <b>29.4%</b> ACTIVE
Blend	Below Range	In Range	Above Range
C2	Measurement < 1.5%	1.5-2.5%	Measurement > 2.5%
C5	Measurement < 4.5%	4.5-5.5%	Measurement > 5.5%
C10	Measurement < 9%	9-11%	Measurement > 11%
C15	Measurement < 13.5%	13.5-16.5%	Measurement > 16.5%
C20	Measurement < 18%	18-22%	Measurement > 22%
C25	Measurement < 22.5%	22.5-27.5%	Measurement > 27.5%
C30	Measurement < 27%	27-33%	Measurement > 33%
C35	Measurement < 31.5%	31.5-38.5%	Measurement > 38.5%
C40	Measurement < 36%	36-44%	Measurement > 44%
C45	Measurement < 40.5%	40.5-49.5%	Measurement > 49.5%
C50	Measurement < 45%	45-55%	Measurement > 55%
O2	(±10 percent of the minor component)		

Chart created based on the AWS standard: (ANSI/AWS A5.32/A5.32M-97) - When mixed gases are being analyzed, the volumetric percentage of minor components shall be within ±10 percent relative to the nominal percentage of the minor component of the classification.

## Getting the green “Go”

Wait for the gas reading to stabilize.

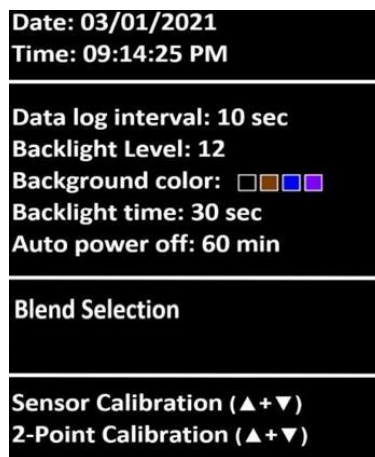
This could take 1-5 minutes. The regulator allows 1.0 L/m flow. When it's active, the LCD back light will remain on.

User will get a red CO2 reading while the gas is not within spec. Connect gas and allow reading to move towards specification. The 60 sec countdown will begin once the reading moves within specification of selected blend and is displayed in yellow. Specification  $\pm 10\%$



**Timer will continue to countdown until reading stabilized. After 60 sec the user will see a green CO2 reading message.**

## Menu



- (1) Date: 01/01/2022 ~ 2099
- (2) Time: 10:42:28 AM 12/24 hour selectable
- (3) Data log interval: XX sec (2,5,10sec)
- (4) Backlight level: 01-32
- (5) Background color:
- (6) Backlight time: --- (10-999sec)
- (7) Auto Power Off: 1-60 min
- (8) CO2 Blend Selection (Press Enter for setting)
- (9) Custom CO2 Bland (Press Enter for setting)
- (10) Sensor Calibration (▲+▼) (Press (▲+▼) to select then Press Enter)
- (11) 2-Point Calibration (▲+▼) (Press (▲+▼) to select then Press Enter)

**\*\*\*CALIBRATION SHOULD BE COMPLETED ANNUALLY BY QUALIFIED TECHNICIANS ONLY\*\*\* \*\*\*PLEASE CONTACT CO2METER FOR MORE INFORMATION\*\*\***

## Menu Navigation

1. Press Mode key until the menu display appears.



2. Press the Up and Down arrows to navigate through the menu options.



3. Press the Enter key to select an option and configure.



## Data Storage

This device features an included 16GB micro-SD card; however, any size micro-SD card can be utilized.

Once the Carbon Dioxide and Oxygen Welding Gas Analyzer is turned on, you can gather data in real time. Data logs can be downloaded from the device's micro-SD Card to an excel/csv. file and analyzed for further observation. The full color LCD display also features real-time data graphing by rotating the device to the horizontal position.

## Before Logging

1. Verify the 16 GB SD Card is installed in the card slot correctly.  
(The gold tabs should point towards the front of the device/user - see, 1.3 image)
2. Verify the batteries are fully charged before deployment. Charge/replace if necessary.



## Recording Data

1. Place the CM-1652 Carbon Dioxide and Oxygen Welding Gas Analyzer in its desired location.
2. Connect the included tubing and filters as required to the top ports.
3. To begin logging, simply flow gas into the device using the included flow regulator. Once gas is flowing through the device, it will switch from "Inactive" status to "Active" status.
4. When the device is in "Active" status and gas is flowing through the device, a data log will be created and saved.

## Managing Files

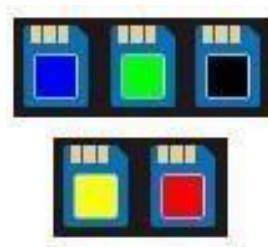
CM-1652 Log Files Reference

	A	B	C	D	E
1	Time	CO2(%)	Baro1(hPa)	Baro2(hPa)	
2	2:37:18	0.13	1009.3	1046	
3	2:37:20	0.85	1009.3	1045.9	
4	2:37:22	2.99	1009.3	1045.8	
5	2:37:24	4.02	1009.3	1045.7	
6	2:37:26	5.47	1009.3	1045.6	
7	2:37:28	7.21	1009.3	1045.6	
8	2:37:30	8.84	1009.3	1045.7	
9	2:37:32	10.3	1009.3	1045.5	
10	2:37:34	11.62	1009.3	1045.4	
11	2:37:36	12.67	1009.3	1045.4	
12	2:37:38	13.62	1009.2	1045.4	
13	2:37:40	14.68	1009.3	1045.4	
14	2:37:42	14.68	1009.3	1045.4	
15	2:37:44	15.88	1009.3	1045.3	
16	2:37:46	16.26	1009.3	1045.2	
17	2:37:48	16.64	1009.3	1045.2	
18	2:37:50	16.87	1009.3	1045.2	
19	2:37:52	17.06	1009.3	1045.1	
20	2:37:54	17.24	1009.3	1045.1	
21	2:37:56	17.38	1009.3	1045.2	
22	2:37:58	17.38	1009.3	1045.1	
23	2:38:00	17.44	1009.3	1045	
24	2:38:02	17.44	1009.3	1045.1	
25	---	---	---	---	

1. The CM-1652 series stores "Log Files" on the removable SD card.
2. The excel/csv. columns are pre-labeled: Time / Gas Concentration / RH%/DP (C), Baro1 (ambient air)/ Baro2 (pressure inside the sensing chamber)
3. At the completion of your tests, remove the SD Card from the CM-1652.
4. Place the SD card into the included card adapter or simply place it in your PC.
5. Open the Log files in Excel (.xlsx)
6. Success! You have downloaded/managed the data you recorded with your analyzer.

## SD Card Self diagnosis

(Blue=stand by, Green=writing, Black=without SD card, Red=bad SD card, Yellow=SD card is full)



## Specifications

<b>CO2 Specification</b>	
CO2 Measurement Range	0 - 50%
O2 Measurement Range	0 - 25%
Display Resolution	0.01%
CO2 Accuracy	+/-300ppm or +/-5% reading
O2 Accuracy	Better than 2% of measured value
Pressure Dependence	Auto pressure compensation
Warm-Up Time	<60 seconds at 22°C
<b>Monitor Specification</b>	
Power	AC Adapter: 5V±5% >1A, 100~240 VAC, 50/60 Hz (USB Wall Plug)
Batteries	Rechargeable Battery: Li-ion 18650 3.7V
Dimensions	8.9-inch x 3.9-inch x 2.2-inch (226mm x 100mm x 55mm)
Weight	1.05lbs (480g) (Analyzer Only)
Ingress Protection	IP54
<b>Operating Conditions:</b>	
Temperature	32°F to 122°F (0°C to 50°C)
Humidity Range	0 ~ 95% RH non-condensing
<b>Storage Conditions:</b>	
Storage Temperature	-4°F to 140°F (-20°C to 60 °C)



## Sensor Slots Explained

	SLOT 1	SLOT 2	SLOT 3	SLOT 4
Gas	CO2	CO2	<b>O2</b>	CO2
Sensor	GSS	GSS	SST	GSS
Communication	UART	UART	UART	UART
Sensor Range	0-50%	0-50%	0-25%	0-5%
Blend Target	C15	C25	0-25%	C2
Span Calibration	15%	25%	0%	2%
2-Point Range	0-30	15-50	0-25	0-5
User Gas Selection	C5 C10 <b>C15</b> C20	<b>C25</b> C30 C35 C40 C45 C50	<b>0-25%</b>	<b>C2</b>

..

## Safety and Product Care

To ensure correct and safe device use, please read the User Manual before using the device. Please handle the device lightly, do not subject the device to impact/shock.

- (1) Do not submerge the device in water or allow liquid to be sampled into the device. This will cause electric shock, fire or malfunction which may result in damage.
- (2) Do not keep the device in a hot/humid environment. Keep the device away from heat source or water.
- (3) Please use a standard USB power supply (such as PC's USB port, universal AC adapter with USB port).
- (4) Improper power supply can cause serious damage to the device or result in injury or death to the user.

## Product Maintenance

- (1) The maximum capacity of the Micro SD card is 16G. (This is five years' worth of space)
- (2) During battery charging, the temperature of the device rises. The temperature and humidity sensors are affected. Currently, measurements are only for reference. After batteries are fully charged and the device cools down, measurements are reliable.
- (3) Repair – Do not attempt to repair the device or modify the circuitry by yourself. Please contact CO2Meter if the device needs servicing.
- (4) Caution – Annual calibration is recommended to maintain accuracy.
- (5) Cleaning – Disconnect the power before cleaning. Use a damp cloth, do not use a liquid cleaning agent, such as benzene, thinner or aerosols.
- (6) Maintenance – Recommended that the user conducts a comprehensive test and calibration every year to ensure normal operation of the device. Contact CO2Meter for additional information.

## Battery charging:



### 'Battery OK'

Measurements are possible.



### 'Battery Low'

The battery needs to be charged; measurements are possible.



### 'Battery Depleted'

Measurements are not possible

During battery charging, the temperature of the device will rise by 5°C~10°C. At this time, the measurements of temperature and humidity will be affected by temperature rise. This could cause an effect on the accuracy of temperature when charging. Please use a fan to blow toward the Temperature & Humidity Sensor (B) directly, in order to gain a compensated balance of temperature and humidity between that of the temperature sensor and surrounding area. (5V/1A USB adapter charger).

## Troubleshooting Guide

Symptom / Issue	Possible Cause / Resolution
Device does not power ON	Make sure the power supply is connected properly and that there is power in the outlet the adapter is connected has the appropriate voltage. If using batteries, make sure they are not depleted.
Slow Response	Check the air flow channels to make sure they are not obstructed.
Reading Error	Ensure that the Inlet/Outlet Luer Cap Fittings are <b>removed</b> to enable an accurate means of sampling.
Red SD Card Icon Appears	This indicates that the SD Card is either damaged, missing, or full of data. Replace SD Card.
LCD Display Turns Off During Measurements	If the user experiences LCD display turning off during calibration, measurements, or data logging – please reference the “settings” section to adjust backlight / auto power off from default settings.
LCD Screen Troubleshooting During Use	If the user experiences issues with the screen orientation, this setting can be changed by referencing the “settings” section and adjusting the “screen auto rotate” to “ <b>NO</b> ”.

## Maintenance

The CM-1652 is a low maintenance gas monitor that requires little maintenance after initial installation. It is recommended to calibrate the internal Sensor annually. This calibration should not be completed in the field; the monitor should be returned to CO2Meter to perform the calibration. A calibration certificate will be provided with every calibration service. Be sure to ask a CO2Meter technician for more information.

## Warranty

CO2Meter warrants the products to be substantially free of defects in workmanship and materials when used for their intended purposes for a period of either one (1) year or ninety (90) days from the date of shipment of the applicable products as specified for each product on the individual product pages located at [www.co2meter.com](http://www.co2meter.com) (the "Manufacturer's Limited Warranty"). No employee or representative of CO2Meter may alter the terms of the Manufacturer's Limited Warranty verbally or in writing.

To take advantage of the Manufacturer's Limited Warranty, the product must be returned to us at your expense. If after examination, we determine that the product is defective, CO2Meter at its election will repair or replace the defective product. The foregoing is the customer's exclusive remedy in the event of a valid warranty claim.

Notwithstanding anything contained herein, the Manufacturer's Limited Warranty shall not apply to: (i) any product that has been customized, altered, or repaired by any person not authorized to do so by CO2Meter; or (ii) any product that has been subject to misuse, neglect, or accidental damage. This warranty does not apply to calibration of any product.

In the event of an alleged warranty claim, you agree to contact us to request a return authorization prior to returning any products to us. We will only honor valid warranty claims of which we have been given notice prior to the expiration of the applicable limited warranty period. You agree to comply with all commercially reasonable rules and policies governing warranty claims which we may institute from time to time. Such rules and policies may be located at [www.co2meter.com/pages/faq#warranty](http://www.co2meter.com/pages/faq#warranty).

If you return a product to us, and we determine in our reasonable discretion that it falls within an exception to the Manufacturer's Limited Warranty as described herein, we will have no obligation to you other than to return the product(s) at your sole cost and expense.

It is our customer(s) responsibility to share your application with the CO2Meter sales team so they can help identify any potential issues your application may cause with our devices. Important information to share will be: expected CO2 concentration, temperature, humidity, and any other particles or gases in your application. Applications with interfering gases can damage our sensors and devices. Those applications with high humidity can damage the electronics and the CO2 sensors beyond repair.