



CM-650

Welding Gas Analyzer



USER MANUAL

Revision C

Table of Contents

Product Overview.....	3
Package Content & Unit Layout.....	4
Contents	4
Internal Features	4-5
External Features.	5-6
Operation.....	6
Installation Procedure.....	7
System Functionality Test Procedure	8
Specifications.....	9
Downloading Data.....	10
Calibration Kit.....	11
Calibration.....	12
Troubleshooting.	13
Product Care & Contact Info	14

Product Overview

Thank you for selecting the CM-650 Welding Gas Analyzer. The Welding Gas Analyzer device was designed to indicate proper CO2 concentrations of welding gas mixtures. The device features two standard ¼ inch NPT inlet ports to allow the user to monitor the concentration of the shield gas before and during welding operations.



Figure 2-2

Features

1. Fig. 2-3, NEMA 4 Enclosure – Weather Resistant
2. Fig. 2-5, Standard NPT Fittings
3. Fig. 2-3, Viewing window with digital display
4. Fig. 2-3, larger green and red indicator lights
5. Fig. 2-3, Manual operation-
6. Fig. 2-3, Automatic operation -
7. Fig. 2-4, USB port for easy data retrieval
8. Fig. 2-1, Large weather tight communication and power ports
9. Fig. 2-1, Weather resistant breather vent
10. Fig. 2-1, 15% sampling channel
11. Fig. 2-1, 25% sampling channel



Figure 2-3



Figure 2-1



Figure 2-4

Package Content & Unit Layout

The CM-650 package comprises the following parts:

- NEMA 4 Enclosure, CM-650 Gas Analyzer
- (1x) 12 ft. relay cable
- (1x) 12 ft. power cable
- (2x) 5/8-18 LH x 1/4 Male fittings
- (1x) USB Drive
- Mounting Hardware
- Carrying Case



Internal Features



Figure 3-1

- Display: Indicates activity in the inlet ports and displays CO₂ concentration when active.
- 15% Green confirmation light: indicates when proper CO₂ concentration is present in the 15% port
- 15% Red warning light: indicates when unsuitable CO₂ concentration is present in the 15% port

- D. 25% Green confirmation light: indicates when proper CO2 concentration is present in the 25% port
- E. 25% Red warning light: indicates when unsuitable CO2 concentration is present in the 25% port
- F. USB port: Used to remove data log files.

External Features



Figure 4-1

- 1. Gas Out: Gas exit port for both inlet ports
- 2. Breather: Allows pressure equalization of the environment and the enclosure.

3. Log Button: Used to force a data log reading to be saved to the data log file.
4. Power In: Connection port for the power cable.
5. Signal Out: Connection port for the signals sent out. Used to control strobe.
6. 15% Inlet Port: Connection port for the 15% CO2 gas line
7. 25% Inlet Port: Connection port for the 25 % CO2 gas line



Operation

Step 1) Install the device (Please see installation page)

Step 2) Connect Gas lines to appropriate inlet ports:

Ports will be labeled 15% and 25%. The inlets are a standard 1/4 Female NPT. Two adaptor fittings will be included:

- a) 1/4 NPT Male to 5/8-18 Female
- b) 1/4 NPT Male barb fitting

Step 3) Power on the unit:

The device will take roughly 1 minute to begin reading CO2 levels.

Step 4) Reading Display and Indicator Lights:

- a) The display will show if the device is in Manual or Automatic mode and will also display the information for each inlet port. If there is not pressure on the inlet port, it will read inactive. Once <15 psi is applied to that port it will become active and the device display the concentration of the gas being sampled.
- b) There are RED and GREEN indicator lights for both the 15% and 25% inlet ports. Once the channels are active, The RED indicator light will be on until the correct connection range is reached; then the GREEN light will turn on to indicate it is safe to weld

Installation Procedure

This device features four mounting feet to allow for easy installations for an array of applications. *****Mounting hardware not included*****

1. Mount the device securely in desired location. Pay close attention to the orientation of the device.

FRONT



Figure 5-1

BOTTOM



Figure 5-2

UPRIGHT



Figure 5-3

2. Connect the Power and Signal cable to the appropriate ports.
3. Hard wire the device following this wiring diagram:
 - 1- Black- System Ground
 - 2- White – Not Used
 - 3- Red – 24v In
 - 4- Green/Yellow – Not Used

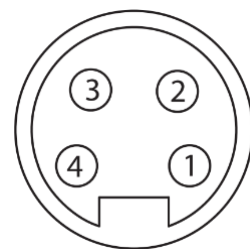


Figure 5-1

System Functionality Test Procedure:

1. Connect Welding Gas Analyzer to Power Supply and wait for initialization.
2. Connect 15% CO₂/Argon Calibration Gas to 15% Inlet Port of the Welding Gas Analyzer.
3. Adjust calibration gas pressure regulator to 40 psi.
4. Observe 15% LCD Read-Out display and Red/green indicator lamps. The 15% channel should read active.
5. Verify – As gas pressure goes above 20psi, the Monitor becomes active.
6. Verify - LCD display shows CO₂ Values.
7. Verify - Red lamp is lit when CO₂ values are below 13.5% or above 16.5%.
8. Verify - Green lamp is lit when CO₂ values are between 13.5% and 16.5%.
9. Maintain 15% CO₂ at 40 psi for at least 10 minutes to create Data Log Files.
10. Reduce CO₂ gas pressure to 10 psi and verify Lamps are OFF and LCD does not provide CO₂ concentration.
11. Remove 15% CO₂ calibration gas from the Welding Gas Analyzer.
12. Connect 25% CO₂/Argon calibration Gas to 25% inlet port of the Welding Gas Analyzer.
13. Adjust gas regulator for 40 psi.
14. Observe 25% LCD Read-Out display and Red/green indicator lamps. The 25% channel should read active.
15. Verify – As gas pressure goes above 20psi, the monitor becomes active.
16. Verify - LCD displays CO₂ Values.
17. Verify - Red Lamp is lit when CO₂ values are below 22.5% or above 27.5%.
18. Verify - Green Lamp is lit when CO₂ values are between 22.5% and 27.5%.
19. Maintain 25% CO₂ at 40 psi for at least 10 minutes to create Data Log Files.
20. Reduce CO₂ Gas Pressure to 10psi and verify Lamps are OFF and LCD does not provide CO₂ concentration.
21. Remove 25% CO₂ calibration gas from the Welding Gas Analyzer.
22. Insert USB drive into Welding Gas Analyzer USB Port to automatically download Log Files.
23. Remove USB drive from Welding Gas Analyzer USB Port.
24. Insert USB drive into USB Port of a computer and view Log Files.
25. Review Log Files for proper operation and correct values.

Specifications

- CO2 Sensing Method: Non-dispersive infrared (NDIR) absorption
- Measurement Range: 0-100%
- Accuracy @ 100% Range: ± 300 ppm $\pm 5\%$ of reading @ STP
- Resolution: 1,000ppm
- Non Linearity: < 1% of FS
- Operating Pressure Range: 0-1200 PSI
- external pressure calibration
- Pressure Dependence: 0.1% of reading per mbar @STP
- Warm-up Time: < 10s. 1.2 secs to first reading
- Response Time: 10 secs to 3 mins
- Reading refreshed once per second
- Operating Conditions: 0°C to 50°C, 0 to 95% RH, non-condensing
- Dimensions:
 - 11.8 x 9.84 x 5.91 inch
- 300 x 250 x 150 mm
- Weight: 25lbs
- Sensor Life Expectancy: > 15 years

Downloading Data:

Located internally, on the front panel of the device, there is a protected UBS port. Remove Cap and insert USB drive into port to begin data log download. Data logs are saved as .CSV files. There are two downloading option:

Complete Record Download – Inserting a new/blank USB drive into the device will initialize a complete data download.

Record New Data Since Previous Download – Inserting a USB drive that contains previous logs from that device will initialize a data download of all records since the previous download.

Sample Data Log File

	A	B	C	D	E	F	G	H
1	8/6/2019 14:31	Auto	Inactive	0	OK	Inactive	0	OK
2	8/6/2019 14:36	Auto	Inactive	0	OK	Inactive	0	OK
3	8/6/2019 14:37	Manual	Inactive	0	OK	Inactive	0	OK
4	8/6/2019 14:37	Manual	Inactive	0	OK	Inactive	0	OK
5	8/16/2019 15:49	Manual	Inactive	0	OK	Inactive	0	OK
6	8/16/2019 15:52	Manual	Active	11.9	Alarm	Inactive	0	OK
7	8/16/2019 15:52	Manual	Active	11.9	Alarm	Inactive	0	OK
8	8/16/2019 15:54	Manual	Inactive	0	OK	Inactive	0	OK
9	8/22/2019 20:08	Manual	Inactive	0	OK	Inactive	0	OK
10	8/22/2019 20:17	Manual	Active	13.8	OK	Inactive	0	OK
11	8/22/2019 20:17	Manual	Active	13.8	OK	Inactive	0	OK
12	8/22/2019 20:17	Manual	Active	13.8	OK	Inactive	0	OK
13	8/22/2019 20:17	Manual	Active	13.8	OK	Inactive	0	OK
14	8/22/2019 20:17	Manual	Active	13.8	OK	Inactive	0	OK
15	8/22/2019 20:18	Manual	Active	13.8	OK	Inactive	0	OK
16	8/22/2019 20:18	Manual	Active	13.8	OK	Inactive	0	OK
17	8/22/2019 20:18	Manual	Active	13.8	OK	Inactive	0	OK
18	8/22/2019 20:38	Manual	Inactive	0	OK	Inactive	0	OK
19	8/22/2019 20:47	Manual	Active	13.3	Alarm	Inactive	0	OK
20	8/22/2019 20:47	Manual	Active	14.3	OK	Inactive	0	OK
21	8/22/2019 20:47	Manual	Active	14.3	OK	Inactive	0	OK
22	8/22/2019 20:48	Manual	Active	14.3	OK	Inactive	0	OK
23	8/22/2019 20:48	Manual	Active	14.3	OK	Inactive	0	OK
24	8/22/2019 20:48	Manual	Active	14.3	OK	Inactive	0	OK
25	8/22/2019 20:48	Manual	Active	14.3	OK	Inactive	0	OK
26	8/22/2019 20:49	Manual	Active	14.3	OK	Inactive	0	OK
27	8/22/2019 20:49	Manual	Active	14.3	OK	Inactive	0	OK

Figure 8-1

- A. Date and time stamp
- B. Indicates whether the data was automatic or manually taken.
- C. Indicates if the 15% port is active or inactive.
- D. Shows gas concentration in the 15% port.
- E. Indicates if the CO2 range was good to weld on the 15% port.
- F. Indicates if the 25% port is active or inactive.
- G. Shows gas concentration in the 15% port.
- H. Indicates if the CO2 range was good to weld on the 25% port.

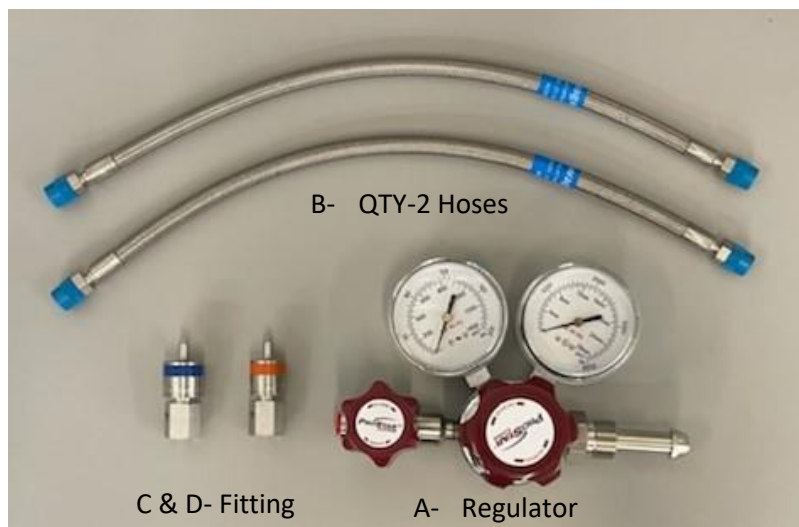
CM-650-CK:

The CM-650-CK is a calibration kit specifically designed to make calibrating the CM-650 Welding Gas Analyzer a simple and user-friendly experience. Use the included components listed and described below in order to successfully calibrate your welding gas analyzer. See page 11 for step-by-step instructions.

CM-650-CK Included Components:

Component	Quantity	CO2 Meter PN	Description
A	1	CM-650-CK-REG	Regulator: High purity 2002 series regulator by ProStar Max inlet pressure: 4000 psig, Single stage, Outlet pressure: 120 psig, Outlet assembly: Diaphragm valve 1/4" tube fitting, CGA: 580 Single Stage Chrome-Plated, Five-Port Configuration, 316L Stainless Steel Diaphragm
B	2	CM-650-CK1-1	Hose: X PTFE Hose, SS Braid, 1/4" OD, 1/4", 18" OAL
C	1	CM-650-CK-22	15% Adapter Fitting: Stainless Steel Instrumentation Quick Connect body, 0.2 CV, 1/4" male NPT, Orange Key
D	1	CM-650-CK-24	25% Adapter Fitting: Stainless Steel Instrumentation Quick Connect body, 0.2 CV, 1/4" male NPT, Blue Key

CM-650-CK Image:



Calibration:

The CM-650 Welding Gas Analyzer is calibrated at CO2Meter prior to being shipped. It is recommended that the device be calibrated annually to maintain optimal functionality.

****Assemble Calibration Kit and attach to certified calibration cylinder prior to calibrating the device. ****



1. Connect certified 15% or 25% calibration gas to desired port to be calibrated. The 15% and 25% ports must be calibrated individually. If both ports are active, a calibration will not be possible.
 2. Wait until the channel becomes active. Display will read active, and the red or green LED will be on.
 3. Wait 3-5 minutes to allow the channel to fill with the certified gas.
 4. To activate the calibration press and hold the manual button for 10 seconds.
 5. The display will read:
 - a. Cali to 15%? Press button to Cali, wait to cancel. to 15%? Press button to Cali, wait to cancel.” To calibrate the 15% port
- OR
- b. Cali to 25%? Press button to Cali, wait to cancel.” To calibrate the 25% port
6. Press the button to start the calibration. ***If the button is not pressed in 30 seconds, the device will return to the home screen***
 7. When the calibration is complete the display will read “Calibrated!” and it will return to the home screen.
 8. Repeat these steps for the next inlet port using an appropriate certified gas concentration.

Document History

Date	Revision	Description
20 December, 2017	A	Initial Draft
30 December, 2019	B	Initial Release
21 May, 2021	C	Publishing, Formatting, Confirmation
28 July, 2021	D	Format Corrections, Date Updates
27 April, 2022	E	Calibration Kit Updates

Troubleshooting and Safety Precautions

DISCLAIMER: Your safety is very important to us. To ensure the proper and safe use of the device, please ensure to read all warnings and the entire User Manual prior to using the device. Otherwise, the protection provided by the equipment may be impaired. These warnings provide important safety information and should be always observed.

1. Please handle the device carefully. Do not subject the product to impact or shock, as it could negatively affect the gas readings.
2. Do not place the unit directly near a heat source. Heat may distort the unit.
3. Do not touch the exposed electronic circuitry of the device under any circumstances, as there is danger of electric shocks.
4. Please take care of cable connections and ensure that the wires are not laid out where an individual could fall or trip over the connectors.
5. Bilingual assistance can be provided by directly contacting us at Sales@CO2Meter.com

Should you come across any initial problems you may reach out directly to a support engineer. via Support@CO2Meter.com

Product Care

To ensure maximum benefit from this product, please observe the follow guidelines.


1. Repair - Do Not attempt to repair or modify the device in any way. Please contact CO2Meter directly if the product needs servicing, including replacement or calibration service. See Section 15 for technical support contact information.
2. Cleaning - Disconnect the power before cleaning. Use a damp cloth. Do not use liquid cleaning agents such as benzene, thinner or aerosols, as these will damage the device. Do Not splash the unit with water.
3. Maintenance – We recommend

Support & Warranty

Contact us: We are here to help!

If the troubleshooting guide above does not 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–5:00pm EST)

 www.CO2Meter.com

See CO2Meter, Inc. Terms & Conditions at:
www.CO2Meter.com/pages/terms-conditions



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