

# MACURCO GAS DETECTORS

## CM-1B

### INSTALLATION & OPERATING INSTRUCTIONS

WWW.MACURCO.COM

#### GENERAL INFORMATION

The CM-1B is a Carbon Monoxide (CO) Meter, Alarm and Controller. It is an all electronic system using a microprocessor to measure the concentration of CO and calculate the danger level, which is a combination of level of CO and time of exposure. The unit also has the ability to be calibrated in the field. See the CM-1B data sheet for more technical information.

#### LOCATION

The unit on average can cover about 5000 sq. ft. The coverage depends on air movement in the room or facility. Extra detectors may be needed near any areas where people work or the air is stagnant. Normally, the unit mounts 5 feet above the floor, in a central area where air movement is generally good. See the CM-1B data sheet for more information on location.

#### INSTALLATION

Remove the two screws on the sides of the unit that attach the cover, and remove cover. Inside is a terminal strip of 7 terminals. Connect power to the two far left terminals marked power (12 to 24 VAC or VDC). There is no polarity preference for either terminal. The 5.0 amp SPDT relay is usually connected to control exhaust fans or other devices such as gas valves. The three terminals in the middle of the terminal strip are marked N.O. - COM - N.C. . The back of the CM-1B data sheet shows the use of the COM and N.O. connections to control an exhaust fan. The COM and N.C. contacts could be used in series with a gas valve, to provide automatic shut off when carbon monoxide is detected. The two 0.5 amp N.O. alarm relay terminals are located at the far right of the terminal strip. They also have no polarity preference. The alarm relay closes whenever the buzzer sounds. The relay maximum ratings are 1/2 Amp, 200 volt, 10 VA. If your location is in a quiet area, the alarm buzzer in the unit can be disabled by clipping a jumper wire. It is clearly labeled ( CLIP JUMPER TO DISABLE BUZZER ) on the upper right side of the circuit board. The keyhole shaped hole on the back of the detector will slip over a # 6 or # 8 screw. Locate the screw at the desired location preferably at breathing height level.

#### OPERATING

Turn on power to the detector. The unit will go through a test procedure for 2 1/2 minutes (150 seconds). The display will count from 1 to 150 at a rate of one count per second. The buzzer will sound continuously for the first two seconds of this test cycle. The Alarm relay and Fan relay will be closed for the first 10 seconds of the test cycle, so any external alarms will also be tested at this time. At the count of 150, the CM-1B finishes the test cycle, takes the first sample of the air, and then displays this reading.

**THIS AND FUTURE READINGS WILL HOLD FOR 2 1/2 MINUTES. NO MATTER WHAT YOU DO, THIS READING WILL NOT CHANGE DURING EACH 2 1/2 MINUTE CYCLE.**

The unit continuously monitors the air. The digital display shows the current level of CO. Please see the CARBON MONOXIDE DANGER LEVELS graph on the data sheet. If the time weighted averaged level of CO exceeds the alarm curve, the buzzer will sound and the Alarm relay will close. If the CO level is greater than 250 ppm, the display will indicate **-H-** (HIGH). When an alarm occurs, take appropriate action, depending on the level of Carbon Monoxide. Look at the level indicated by the digital display, then refer to the graph on the data sheet. If the level is below 100 ppm, it is not an immediate life threatening danger. You can take several minutes to open windows or doors and attempt to locate and remedy the problem. If the alarm is at a level of above 200 ppm, **EVACUATE THE PREMISES AND SEEK HELP TO LOCATE AND REPAIR THE CAUSE.**

The CM-1B buzzer can be silenced by pushing the red switch once, located at the bottom of the unit. The buzzer will sound for two more seconds, and then go silent. The unit will step through the 2 1/2 minute test cycle. If a high level of CO is present, it will alarm again after a period of time--see the graph of danger levels on the data sheet. When the CM-1B alarms, it is a constant loud alarm. Whenever the buzzer sounds, the Alarm relay will close to switch on any external alarms. The Fan relay actuates whenever the average reading for **two** cycles (approx. 5 minutes) exceeds 35 PPM.

#### TESTING

The suggested way to test the CM-1B is to push the Red Test button once. This restarts the test cycle where the buzzer will sound for two seconds and both relays will actuate for 10 seconds. The unit will step through the 2 1/2 minute cycle.

If the installation is a parking garage, a good test is to run a vehicle in the vicinity of the CM-1B. It will take at least 2 1/2 minutes for a reading. The optional Field Calibration Kit may also be used to test the unit. However, it is difficult to do so in the confines of a garage. The field Calibration Kit can be best utilized in a shop to check the calibration -- an optional procedure that does not need to be done unless required by job specifications, and then only at 6 month intervals.

#### ERRORS

Occasionally, a lower than normal line voltage ( Brown-Out ) can cause the CM-1B to display erratically, and become inoperable. Simply turn the power off, then back on (or push the Red Test switch) to restart the unit.

The CM-1B microprocessor continuously monitors various parameters of the system. If a problem is detected, the display will read **E** (for error) 1 to 7. If this occurs once, reset the system by briefly interrupting the power. The system should restart as described earlier. If another **E** reading occurs, check that power to the unit is within the normal range. If the problem happens again, consult the factory, or return the unit for service.

#### STABILIZATION TIME

Although it will be fully operational within a few minutes of being first powered, the gas sensor in the unit requires up to 3 days to reach its final operating point. The CM-1B is intended to be continuously powered.

#### SENSOR POISONS

The gas sensing tip in the detector is designed with extreme sensitivity to the environment. As a result, the sensing function of the tip may be deteriorated if it is exposed to a direct spray from aerosols such as paints, silicone vapors, etc., or to a high density of corrosive gases (such as hydrogen sulfide, sulfur dioxide) for an extended period of time.

#### SERVICING OF UNIT

The CM-1B does not require regular maintenance. The unit uses a self purging semi-conductor sensor that has a 7-10 year life expectancy. All maintenance and repair of products manufactured by Macurco, Inc. are to be performed at the Macurco manufacturing facility. Macurco does not sanction any third-party repair facilities.

#### LIMITED WARRANTY

The CM-1B gas detectors are warranted to be free from defective material and workmanship for a period of one (1) year from the date of installation. If any component becomes defective during the warranty period, it will be replaced or repaired free of charge, if the unit is returned in accordance with the instructions below. This warranty does not apply to units that have been altered or had repair attempted, or that have been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations or liabilities. **THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE**

LIMITED TO A PERIOD OF ONE (1) YEAR FROM THE PURCHASE DATE. Macurco shall not be liable for any incidental or consequential damages for breach of this or any other warranty express or implied arising out of or related to the use of said gas detector. Manufacturer or its agents liability shall be limited to replacement or repair as set forth above. Buyer's sole and exclusive remedies are return of the goods and repayment of the price, or repair and replacement of non-conforming goods or parts. (The Uniform Commercial Code applicable in the State of Colorado shall govern.)

**RETURN INSTRUCTIONS**

Call (303) 781-4062 for a Return Authorization number. Then carefully pack the gas detector with a written description of the nature of the return. Send the unit to the following address:

**Macurco Inc.  
3946 South Mariposa St.  
Englewood, Colorado 80110  
WWW.MACURCO.COM**

## TESTING THE CM-1B AFTER INSTALLATION

### SUGGESTED FUNCTIONAL TEST

#### GENERAL:

Normally this will be the only test required for the CM-1B and is the recommended way to test the unit or units after installation. All CM-1B units are factory calibrated and 100 % tested for proper operation. The unit also has the ability to test itself automatically and does so every 2 1/2 minute cycle. If the unit detects an improper voltage or inoperable component including the CO sensor it will default into Error mode. In Error mode, the digital display will read E01 to E08.

You will need to verify that the CM-1B digital display is illuminated, and reads 000 to 250 (normal). If the reading is not normal, do not proceed with the tests. If the unit fails to indicate a normal reading, See "CM-1B Installation & Operating Instructions" for information on correcting the problem.

#### TESTING:

1. Observe the bottom of the CM-1B.
2. Note the RED switch mounted on the bottom of the unit.
3. Press the RED switch once.
4. The CM-1B will step through a 2 1/2 minute test cycle:
  - a. The digital display will start at 000 and then count up to 150, at a rate of one count per second.
  - b. The buzzer will sound for the first two seconds of the test cycle.
  - c. The alarm relay will close for the first ten seconds of the test cycle.
  - d. The fan relay will be activated for the first ten seconds of the test cycle also.
  - e. Any devices connected to the relays will now be tested for ten seconds of the test cycle.
5. At the end of the test cycle, the digital display and unit output will indicate the ambient CO level.

### CARBON MONOXIDE GAS TEST (Optional)

#### GENERAL:

The CM1B-FCK is needed to complete a CO gas test. The kit includes a cylinder of 50 ppm of carbon monoxide (CO) in air. A cylinder of 200 ppm of CO in air will also be needed. These are available through your local representative or from Macurco Inc.

- NOTE:** 1) All units to be tested must be powered continuously for a minimum of **72 hours**.  
2) For optimum test results concerning accuracy it is suggested that the unit be tested in clean air and be in a low ambient air flow.

#### TESTING:

1. Remove the two screws located on the sides of the CM-1B.
2. Remove the front cover of the unit.
3. Open the CM1B-FCK. Connect the 50 ppm gas cylinder to the regulator.
4. Check the pressure gauge on the regulator. If you have 25 psi or less you will need to replace the gas canister.
5. Place the white cap from the regulator over the round gray device labeled FIGARO TGS 203 (CO sensor).
6. Wait 5 minutes with the gas applied continuously. The CM-1B takes samples every 2 1/2 minutes.
7. After the five minutes the digital display should read 050  $\pm$ 10%, plus the accuracy of the gas (normally  $\pm$ 2%), and the fan relay should be activated.
8. Once the reading has been taken remove the gas from the sensor.

**Note:** If the display did not read within the given parameters, there are three possibilities:

- a) the gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25 psi or less.
- b) the unit needs to be re-calibrated (go through recalibration and re-test)
- c) the detector is in need of servicing (return unit to factory for servicing).

9. Wait 7 1/2 minutes for the CM-1B to stabilize, with no gas applied to the sensor. You might test another unit at 50 ppm while waiting. If you do not test another unit with the 50 ppm gas disconnect the canister from the regulator.
10. After the 7 1/2 minutes, if the 50 ppm canister has not been disconnected from the regulator do so now and connect the 200 ppm cylinder of carbon monoxide to the regulator.
11. Check the pressure gauge. If there is 25 psi or less the cylinder should be replaced.
12. Place the white cap from the regulator over the gray device labeled FIGARO TGS 203 (CO sensor). Continue to apply the gas for 5 minutes.
13. The digital display will update every 2 1/2 minutes.
14. After 5 minutes the unit should have updated the digital display twice and should read 200  $\pm$ 20%, plus the accuracy of the gas (normally  $\pm$ 2%) and the fan relay should be activated. See 3 possibilities in "Note" above if the reading is not with specifications.
15. Re-apply the front cover of the unit and secure it with the two mounting screws.
16. If there are more units to test repeat the above steps from step one.
17. When testing is complete disassemble the regulator and cylinder.

**Note:** The specification for repeatability ( $\pm$ 10%) is after calibration at 50 ppm. The gas accuracy (normally  $\pm$ 2%) needs to be considered also.

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