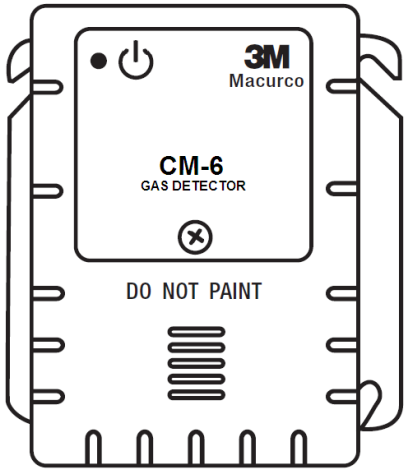
Macurco™ Carbon Monoxide Detector, Controller and Transducer CM-6

User Instructions for 3M™ Macurco™ CM-6 Low voltage, dual relay Carbon Monoxide (CO) detector, controller and transducer



IMPORTANT: Keep these *User Instructions* for reference.

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GENERAL SAFETY INFORMATION

Intended Use
The 3M™ Macurco™ CM-6 is a low voltage, dual relay Carbon Monoxide (CO) detector, controller and transducer. The CM-6 has selectable 4-20mA output, buzzer and digital display options. It is an electronic detection system used to measure the concentration of CO and provide feedback and automatic exhaust fan control to help reduce CO concentrations in parking garages, maintenance facilities or other commercial applications. The CM-6 is a low level meter capable of displaying from 0-200 ppm of Carbon monoxide. The CM-6 is factory calibrated and 100% tested for proper operation, but can also be calibrated in the field.

List of Warnings and Cautions within these *User Instructions*

⚠ WARNING

- Each person using this equipment must read and understand the information in these *User Instructions* before use. Use of this equipment by untrained or unqualified persons, or use that is not in accordance with these *User Instructions*, may adversely affect product performance and **result in sickness or death.**
- Use only for monitoring the gas which the sensor and instrument are designed to monitor. Failure to do so may result in exposures to gases not detectable and **cause sickness or death**. For proper use, see supervisor or *User Instructions,* or call 3M in U.S.A., 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.
- CM-6 may not function effectively below 0°F or above 125°F (-18°C or above 52°C). Using the detector outside of this temperature range may adversely affect product performance and **result in sickness or death**.
- This detector helps monitor for the presence and concentration level of certain specified airborne gases. Misuse may produce an inaccurate reading, which means that higher levels of the gas being monitored may be present and could result in overexposure and **cause sickness or death.** For proper use, see supervisor or *User Instructions,* or call 3M in U.S.A., 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.
- Each time the unit is turned on it performs a self-test, which activates visual alarms. If the self-test fails, or all the alarms do not activate, do not use. Failure to do so may adversely affect product performance and **result in sickness or death**.
- Do not cover or obstruct visual alarm. Doing so may adversely affect product performance and **result in sickness or death**.
- Do not disassemble unit or attempt to repair or modify any component of this instrument. This instrument contains no user serviceable parts, and substitution of components may impair product performance and **result in sickness or death.**
- Using a certified gas with a concentration other than the one listed for this instrument and sensor when conducting a calibration or calibration verification test (bump test) will produce inaccurate readings. This means that higher levels of the gas being monitored may be present and could result in overexposure and **cause sickness or death**. For proper use, see supervisor or *User Instructions,* or call 3M in U.S.A., 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.
- The following steps must be performed when conducting a calibration or calibration verification test (bump test) to ensure proper performance of the monitor. Failure to do so may adversely affect product performance and **result in sickness or death**.
  - When performing a calibration or calibration verification test (bump test) only use certified calibration gas at the required concentration level. Do not calibrate with expired calibration gas.
  - If the instrument cannot be calibrated, do not use until the reason can be determined and corrected.
  - Do not cover or obstruct display or visual alarm cover.
  - Ensure sensor inlet is unobstructed and is free of debris.

USE INSTRUCTIONS AND LIMITATIONS

⚠ WARNING

Each person using this equipment must read and understand the information in these *User Instructions* before use. Use of this equipment by untrained or unqualified persons, or use that is not in accordance with these *User Instructions,* may adversely affect product performance and **result in sickness or death.**

Use For
The CM-6 provides CO detection and automatic exhaust fan control for automotive maintenance facilities, enclosed parking garages, warehouses with forklifts, etc. The CM-6 meets the requirements of the Uniform Building Code for enclosed garages and meets OSHA standards for CO exposure. CM-6 can be used with 12VDC or 24VDC N.O. (fire/security) panels.

⚠ WARNING

Use only for monitoring the gas which the sensor and instrument are designed to monitor. Failure to do so may result in exposures to gases not detectable and **cause sickness or death.** For proper use, see supervisor or *User Instructions,* or call 3M in U.S.A., 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.

Do Not Use For
The CM-6 is **NOT** intended for use in industrial applications such as refineries, chemical plants, etc. **DO NOT** mount the CM-6 where the normal ambient temperature is below 0°F or exceeds 125°F (-18°C or above 52°C). The CM-6 mounts on a type 4S electrical box supplied by the contractor. **DO NOT** install the CM-6 inside another box unless it has good air flow through it.

⚠ WARNING

CM-6 may not function effectively below 0°F or above 125°F (-18°C or above 52°C). Using the detector outside of this temperature range may adversely affect product performance and **result in sickness or death.**

General Description
The 3M™ Macurco™ CM-6 is a low voltage, dual relay Carbon Monoxide (CO) Detector and Automatic Ventilation Controller. The CM-6 uses a microcomputer controlled, electronic system to measure the concentration of CO, actuate relays and provide a 4-20mA (0-200 ppm) output. The CM-6 is low maintenance with no periodic calibration needed and a long life (7+ years) electrochemical sensor. The CM-6 is a low level meter capable of displaying from 0-200 ppm of carbon monoxide.

Features

- ETL Listed to UL 61010-1
- The CM-6 meets the requirements of the Uniform Building Code for enclosed garages and meets OSHA standards for CO exposure
- Aerosol Carbon Monoxide Test Gas allows a quick functionality test of the CO sensor
- The CM-6 is a low level meter capable of displaying from 0-200 ppm of CO
- Selectable fan and alarm relay activation
- 5 A SPDT fan relay controls starters of exhaust fans
- 0.5 A N.O. or N.C. alarm relay connects to warning devices or control panels
- 4-20mA Current Loop
- CM-6 mounts on a standard 4x4 electrical box and becomes cover for the box
- Supervised system: any internal detector problem will cause the fan & Alarm relay to activate
- Optional calibration kit is available. One screw allows access for calibration

Specifications

- Power: 3 W (max) from 12 to 24 VAC or 12 to 32 VDC
- Current @ 24 VDC: 75mA in alarm (two relays), 50mA (fan relay only) and 23mA stand by
- Shipping Weight: 1 pound (0.45 kg)
- Size: 4 1/2 x 4 x 2 1/8 in. (11.4 X 11.4 X 5.3 cm)
- Color: Dark gray
- Connections: plugs/terminals
- Mounting box: (not included) 4x4 electric
- Fan relay: 5 A, 240 VAC, pilot duty, SPDT
- Fan relay actuation: selectable at 25 ppm, 35 ppm (default), 50 ppm or 100 ppm CO
- Fan Delay Settings of 0, 1, 3 (default), 5 and 10 minutes
- Fan Minimum Run Time settings are OFF (default), 3, 5, 10 or 15 minutes
- Alarm relay: 0.5 A 200 V, 10 VA
- Alarm relay actuation: selectable N.O. default or N.C.
- Alarm relay settings: OFF, 50 ppm, 100 ppm, 150 ppm and 200 ppm (default)
- Current Loop, 4-20mA for 0-200 ppm CO
- Operating Environ: 0°F to 125°F (-18°C or above 52°C). 10 to 90% RH

INSTALLATION AND OPERATING INSTRUCTIONS

The following instructions are intended to serve as a guideline for the use of the 3M™ Macurco™ CM-6 Carbon Monoxide Detector. It is not to be considered all-inclusive, nor is it intended to replace the policy and procedures for each facility.

⚠ WARNING

This detector monitors for the presence and concentration level of certain specified airborne gases. Misuse may produce an inaccurate reading, which means that higher levels of the gas being monitored may be present and could result in overexposure and **cause sickness or death.** For proper use, see supervisor or *User Instructions,* or call 3M in U.S.A., 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.

If you have any doubts about the applicability of the equipment to your job situation, consult an industrial hygienist or call 3M at 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.

General Information

The 3M™ Macurco™ CM-6 is a low voltage, dual relay Carbon Monoxide (CO) Detector, Controller and Transducer. The CM-6 has selectable 4-20mA output, buzzer and digital display options. It is an electronic detection system used to measure the concentration of CO and provide feedback and automatic exhaust fan control to help reduce CO concentrations in parking garages, maintenance facilities or other commercial applications. The CM-6 is a low level meter capable of displaying from 0-200 ppm of Carbon monoxide.

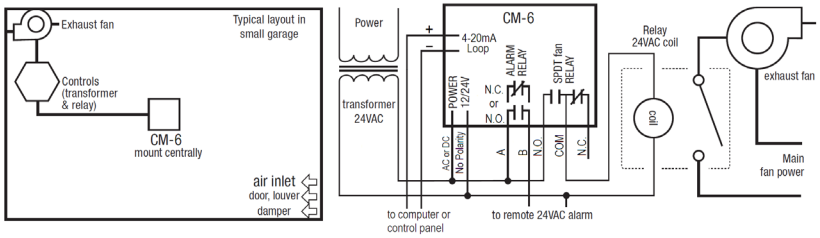
Location

The unit typically covers about 5000 sq. ft. (465 square meters) in a parking garage or similar application and 900 sq. ft. (84 square meters) in a residential or office type application. The coverage depends on air movement in the room or facility. **DO NOT** mount the CM-6 in a corner. The detector may be installed on either a ceiling or a wall. If installed on a peaked, gabled, or sloped ceiling, it should be located about 3 feet (0.9 m) from the highest point. Normally, the unit is mounted about 5 feet (1.5 m) above the floor (normal breathing zone), in a central area where air movement is generally good. Additional detectors may be needed near any areas where people work or the air is stagnant.

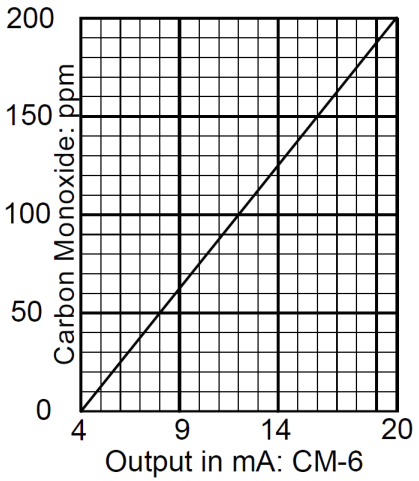
Installation

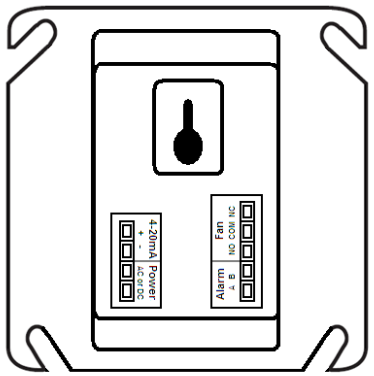
1. The CM-6 mounts on a type 4S electrical box supplied by the contractor. **DO NOT** mount the CM-6 inside another box, *unless* it has good air flow through it.
2. It is suggested to use a separate transformer for powering the unit or units because of possible interference from other devices on the same power supply that may cause the CM-6 microcontroller to become erratic.
3. Connect the CM-6 to the control cables with terminal plugs. When making connections, make sure the power is off.

Typical Installation in small garage



4. There are two terminals for Power: 12 to 24 VAC or 12 to 32 VDC, with no polarity preference.
5. There are two terminals for the dry Alarm relay contacts, again with no polarity preference. The Alarm relay can switch up to 0.5 A, 200 V, or 10 VA. The Alarm relay is activated if CO reaches or exceeds the alarm settings. The programmable Alarm relay settings are OFF, 50 ppm, 100 ppm, 150 ppm and 200 ppm (default). This relay can also be programmed to be Normally Open or Normally Closed (N.O. or N.C.). See OPERATION section for details on relay settings.
6. The dry contact, SPDT Fan relay has three terminals. The common (COM.), Normally Open (N.O.) and the Normally Closed (N.C.) contact. The Fan relay can switch up to 5.0 A up to 240 VAC. The Fan relay is activated if CO reaches or exceeds the Fan relay settings. The programmable fan relay activation settings are OFF, 25 ppm, 35 ppm (default), 50 ppm or 100 ppm CO. The programmable Fan Delay Settings are OFF, 1, 3 (default), 5 and 10 minutes and the programmable Fan Minimum Run Time settings are OFF (default), 3, 5, 10 or 15 minutes (see OPERATION section for details on relay settings).
7. The Current Loop is 4mA in clean air and 4-20mA for 0-200 ppm CO.



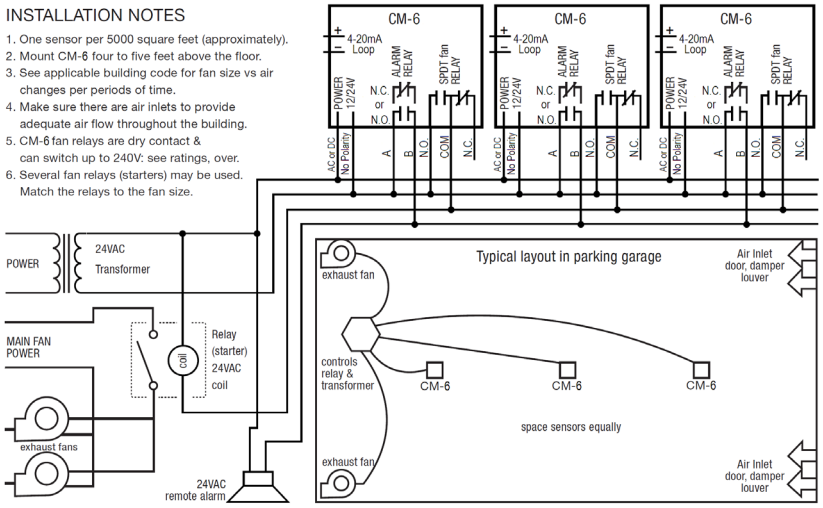


CM-6 rear view with Modular Connectors

Typical multiple CM-6 installation

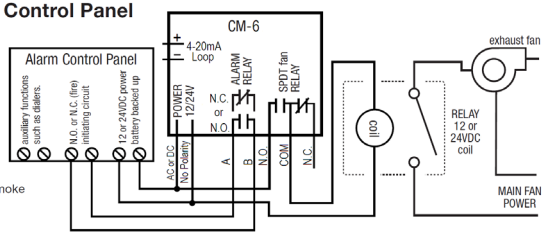
INSTALLATION NOTES

1. One sensor per 5000 square feet (approximately).
2. Mount CM-6 four to five feet above the floor.
3. See applicable building code for fan size vs air changes per periods of time.
4. Make sure there are air inlets to provide adequate air flow throughout the building.
5. CM-6 fan relays are dry contact & can switch up to 240V: see ratings, over.
6. Several fan relays (starters) may be used. Match the relays to the fan size.



Typical Connection to Alarm Control Panel

1. CM-6 can be used with 12VDC or 24VDC N.O. (fire) panels.
2. Alarm panel provides battery backed up power to CM-6.
3. CM-6 dry contact fan relay can use panel power or fan power: check ratings.
4. Match fan relay contacts to fan size, and coil voltage to power source.
5. Alarm Control Panels are available with many features & can control other devices such as smoke detectors, fire detectors & burglar alarms.

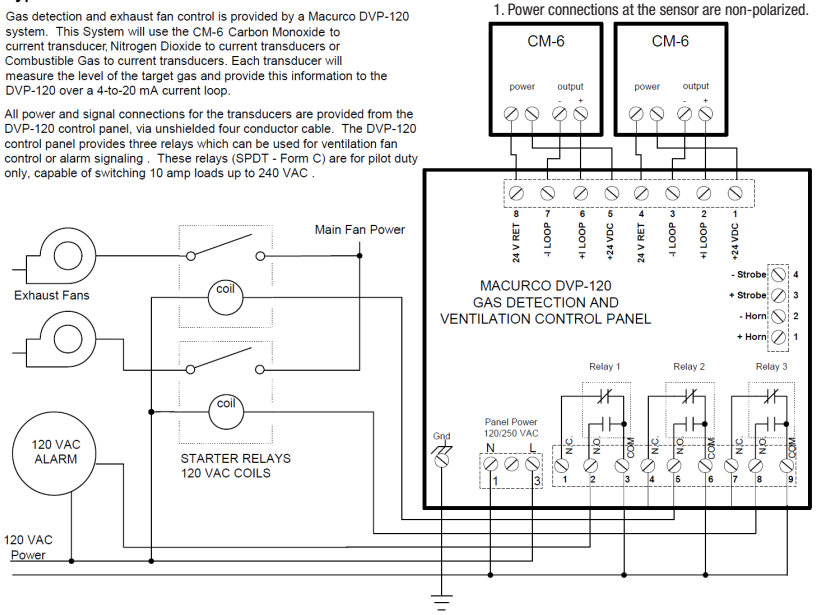


Typical connection to the 3M™ Macurco™ DVP-120 Control Panel

NOTE:
1. Power connections at the sensor are non-polarized.

Gas detection and exhaust fan control is provided by a Macurco DVP-120 system. This System will use the CM-6 Carbon Monoxide to current transducer, Nitrogen Dioxide to current transducers or Combustible Gas to current transducers. Each transducer will measure the level of the target gas and provide this information to the DVP-120 over a 4-to-20 mA current loop.

All power and signal connections for the transducers are provided from the DVP-120 control panel, via unshielded four conductor cable. The DVP-120 control panel provides three relays which can be used for ventilation fan control or alarm signaling . These relays (SPDT - Form C) are for pilot duty only, capable of switching 10 amp loads up to 240 VAC .



Power Up

⚠ WARNING

Each time the unit is turned on it performs a self-test, which activates visual alarms. If the self-test fails, or all the alarms do not activate, do not use. Failure to do so may adversely affect product performance and **result in sickness or death.**

The 3M™ Marcurco™ CM-6 steps through an internal self-test cycle for the first 1 minute that it is powered. The unit will execute the test cycle any time power is dropped and reapplied (i.e. power failure). During the self-test cycle the unit will display the Firmware Version number, then count down from 60 to 0 and finally go into normal operation. The Fan and Alarm relay will be activated for the power-up cycle unless the "Power Up Test" (PUt) option is OFF. The indicator light (LED) will flash green during the self-test cycle. At the end of the 1 minute cycle, the unit will take its first sample of the air and the light will turn solid green.

⚠ WARNING

Do not cover or obstruct visual alarm LED. Doing so may adversely affect product performance and **result in sickness or death**.

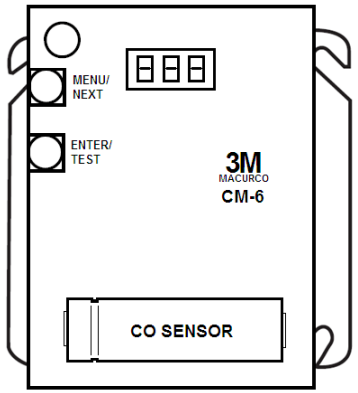
Operation

1. With the display function turned "On", the CM-6 will show the current concentration of CO or "0" (zero) in clean air. When the CO concentration reaches the Fan Relay setting (35 ppm, for example) the display will flash back and forth between "FAn" and "35". With the display function turned "Off", the display does not show the CO concentration, but will show "FAn" as long as the fan relay is activated.
2. With the display function turned "On" and the CO concentration reaching the Alarm Relay setting, (200 ppm, for example) the display will flash back and forth between "ALr" and "200". The buzzer will sound indicating "Alarm" if the buzzer is turned "On". With the display function turned off the display does not show the CO concentration, but will show "ALr" when the Alarm relay is activated.
3. With the 4-20mA function turned "On" and the CO concentration climbing, the 4-20mA signal will ramp up corresponding to the concentration (0-200 ppm, for example). The display will show "FAn" and "ALr" and sound as outlined above.

Default Configuration – Factory Settings

- The default **Display** setting is **Off**
- The default **Power Up Test** setting is **On**
- The default **Buzzer** setting is **Off**
- The default **Alarm Relay** setting is activation at **200 ppm**
- The default **Fan Relay Delay** setting is **3 minutes**
- The default **Fan Minimum Runtime** setting is **OFF**
- The default **Fan Relay** setting is activation at **35 ppm**
- The default **Alarm Relay Configuration** is **Normally Open**
- The default **4-20mA Output** setting is **OFF**

To change settings, remove the Philips screw on the front of the CM-6. Pull off the front cover of the unit.



Selecting Default Configuration – "dEF"

To select the Default Configuration, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. The **first** selection is the "dEF" or Default setting. Push ***Enter***. If it is already in Default configuration, there will be no action. If it is not already in Default configuration, "nO" will be displayed. Push ***Next*** to change it to "YES" (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "dEF" in the con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Power Up Test Option – "PUt"

To select the **Power Up Test** Configuration, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. Then push the ***Next*** button to get to **the second selection** "PUt" or **Power Up Test** setting. Push ***Enter***. If the test is "On" push ***Next*** to turn it "OFF" (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "PUt" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Display Option – "dSP"

To select the Display Configuration, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. Then push the ***Next*** button to get to **the third selection** "dSP" or Display setting. Push ***Enter***. If the display is "On" push ***Next*** to turn it "OFF" (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "dSP" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Buzzer Option – "bUZ"
To select the Buzzer Configuration, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. **The forth selection** is the "bUZ" or Buzzer setting. Push ***Next*** twice to get to "bUZ" then ***Enter***. If the display is "On" push ***Next*** to turn it "OFF" (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "bUZ" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Alarm Relay Setting – "ArS"
To select the Alarm Relay Setting, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. **The fifth selection** is the "ArS" or Alarm Relay Setting. Push ***Next*** three times to get to "ArS" then ***Enter***. If the display is "OFF" (disabled) push ***Next*** to change it to 50, 100, 150 or 200 ppm (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "ArS" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Alarm Relay Configuration – "Arc"
To select the **Alarm Relay Configuration**, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. **The sixth selection** is the "Arc" or Alarm Relay Configuration. Push ***Next*** four times to get to "Arc" then ***Enter***. If the relay is "nO" (normally open) push ***Next*** to turn it to "nC" (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "Arc" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Fan Relay Settings – "FrS"
To select the Fan Relay setting, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. **The seventh selection** is the "FrS" or Fan Relay setting. Push ***Next*** five times to get to "FrS" then ***Enter***. If the fan relay is "OFF" (disabled) push ***Next*** to change it to 25, 35, 50 or 100 ppm (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "run" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Fan Relay Delay – "FrD"
To select the Fan Relay Delay setting, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. **The eighth selection** is the "FrD" or Fan Relay Delay. Push ***Next*** six times to get to "FrD" then ***Enter***. If the delay is "OFF" (disabled) push ***Next*** to change it to 1, 3, 5, or 10 minutes (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "FrD" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting Fan Minimum Run Time – "Frr"
To select the Fan Minimum Runtime setting, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. **The ninth selection** is the "Frr" or Fan Minimum Run Time. Push ***Next*** seven times to get to "Frr" then ***Enter***. If the runtime is "OFF" (disabled) push ***Next*** to change it to 3, 5, 10 or 15 minutes (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "run" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Selecting 4-20mA Output Option – "420"
To select the **4-20mA Output Option**, in normal mode, push the ***Next*** button to get to "Con" or the Configuration menu. Then push the ***Enter*** button to enter the Con menu. **The tenth selection** is the "420" or 4-20mA Output Option. Push ***Next*** eight times to get to "420" then ***Enter***. If the 4-20mA is "On" push ***Next*** to turn it to "OFF" (flashing) then push ***Enter*** to confirm the change (solid) and push ***Enter*** again to return to "420" in the Con menu. Push ***Next*** until "End" is displayed then push ***Enter*** to get back to normal operation. See the Configuration flowchart.

Onboard Diagnostics
The CM-6 monitors all critical functions of the unit through software diagnostics that continuously test and verify unit operations. If a problem is found, the unit will switch to a fail-safe/error mode or trouble condition. In this error mode, the Fan and Alarm relays will be activated, the 4-20mA current loop will go to 24mA and the LED light will Flash Green. This is a safety precaution. To clear this mode, simply turn off power to the unit for a few seconds, or push the TEST switch (inside the unit). This will cause the unit to restart the 1 minute self-test cycle.

The 4-20mA signal can be used for troubleshooting:

- 0mA is most likely a connection problem
- 4-20mA is normal gas reading range (0-200 ppm)
- 24mA indicates a Trouble condition

Error Codes

- t01 Sensor is missing
- t02 Temperature compensation failed
- t04 Bad EEPROM checksum
- t08 Sensor is shorted
- t10 Bad EEPROM
- t20 Bad factory calibration
- t40 Factory calibration was not done
- t80 SDADC reading failed

If the error mode repeats frequently, check for continuous power and proper voltage. If power is not the problem and a unit has repeating error conditions, it may need to be returned to 3M Macurco for service, per in this *User Instruction*.

Sensor Poisons
The gas sensor in the detector is designed with extreme sensitivity to the environment. As a result, the sensing function 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.

MAINTENANCE
The CM-6 does not require regular maintenance. The unit uses a long life electrochemical sensor that has a 7+ year life expectancy. All maintenance and repair of products manufactured by 3M are to be performed at the appropriate 3M manufacturing facility. 3M does not sanction any third-party repair facilities.

⚠ WARNING

Do not disassemble unit or attempt to repair or modify any component of this instrument. This instrument contains no user serviceable parts, and substitution of components may impair intrinsic safety, which may adversely affect product performance and **result in sickness or death.**

CAUTION

- Avoid the use of harsh cleaning materials, abrasives and other organic solvents. Such materials may permanently scratch the surfaces and damage the display window, labels, or instrument housing.

Cleaning

Cleaning of the external surfaces is best carried out using a damp cloth with a mild detergent or soap. Vacuum under the cover with soft brush to remove dust or contamination.

TESTING

⚠ WARNING

Using a certified gas with a concentration other than the one listed for this instrument and sensor when conducting a calibration or calibration verification test (bump test) will produce inaccurate readings. This means that higher levels of the gas being monitored may be present and could result in overexposure and **cause sickness or death**. For proper use, see supervisor or *User Instructions,* or call 3M in U.S.A., 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.

General

Normally this will be the only test required for the CM-6 and is the recommended way to test the unit or units after installation. All CM-6 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 it will default into Error mode. In Error mode, the unit will Flash Green and both the Fan & Alarm relay will be actuated. Check that the CM-6 OPERATING LED type light is illuminated, continuously. If not, do not proceed with the tests. If the unit is in error mode contact your local representative or 3M Macurco Technical Service Representative for information on resolving the problem.

Operation Test

1. Remove the single screw in the middle of the front cover of the CM-6.
2. Remove the front cover.
3. Locate the switch labeled ENTER/TEST on the left side of the printed circuit board.
4. Observe the LED light on the front of the CM-6.
5. If the light is solid green proceed to step 7.
6. If the light is off or flashing Green, refer to the General section above.
7. Push the Test switch once.
8. The CM-6 will step through a cycle test:
   a. The display progresses through the **Art** (alarm relay test), **Frt** (fan relay test) then **42t** (4-20mA output test).
   b. During the first 5 seconds of the test cycle, the Alarm relay will be closed, so any devices connected to that relay will be tested.
   c. The Fan relay will be activated for the next 1 minute of the test, so if the fan circuits are wired in the normal manner, the fan should run.
   d. The 4-20mA output will then ramp up from 4 to 20mA over the next 130 seconds of the test, so if the circuit is wired in the normal manner, the control panel or building automation system should respond.
   e. At the end of the test cycle, the light will turn green and be on steady (Normal Operation), the Fan & Alarm relay will be in standby mode and the 4-20mA output will return to 4mA (in clean air).
9. When testing is completed reassemble the unit or units.

Carbon Monoxide Gas Test

⚠ WARNING

The following steps must be performed when conducting a calibration or calibration verification test (bump test) to ensure proper performance of the monitor. Failure to do so may adversely affect product performance and **result in sickness or death**.

- When performing a calibration or calibration verification test (bump test) only use certified calibration gas at the required concentration level. Do not calibrate with expired calibration gas.
- If the instrument cannot be calibrated, do not use until the reason can be determined and corrected.
- Do not cover or obstruct display, audible alarm opening or visual alarm cover.
- Ensure sensor inlet is unobstructed and is free of debris.

General

A Field Calibration Kit (CME-FCK) is needed to complete a CO gas test. These are available through your local representative or from 3M Macurco.

Contents of the FCK

- CMS-FCK: (1) Gas Cylinder, 50 ppm Carbon Monoxide (CO) in air
- CME-FCK: (2) Gas Cylinders, (1) 50 ppm Carbon Monoxide (CO) in air and (1) 200 ppm
- Gas regulator with about two feet of plastic tubing
- Humidifier
- Gas applicator caps

FCK Information

Several detectors can be calibrated with one FCK. The only limitation is the amount of gas in the cylinder. The 17 liter cylinder has approximately 85 minutes of continuous calibration run time. Replacement cylinders are available. The gas cylinder should be replaced when the pressure gauge on the regulator shows 25-psi or less.

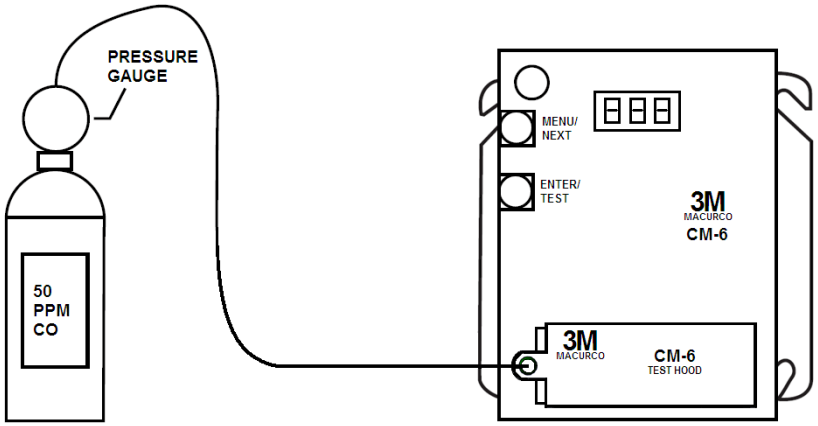
Note: For optimum test results it is suggested that the unit be in clean air (green light on) and be in a low ambient air flow

Gas Testing

Testing the Fan Relay

1. Remove the Philips screw on the front of the CM-6. Remove the front cover.
2. Open the FCK. Connect the 50 ppm gas cylinder to the regulator.
3. Check the pressure gauge on the regulator. If you have 25-psi or less you will need to replace the gas canister.
4. Assemble regulator, hose and Test Hood and place the Test Hood over the CO sensor.

   Note: The time to activate the Fan relay depends on the delay setting.



5. Turn on the regulator to start the gas flow and wait with the gas applied continuously.
6. With the display function turned “On”, the CM-6 will show the current concentration of CO or “0” (zero) in clean air. When the CO concentration reaches the Fan Relay setting (35 ppm, for example) the display will flash back and forth between “FAn” and “35”. With the display function turned ”Off”, the display does not show the CO concentration, but will show “FAn” as long as the fan relay is activated.

   Note: If the Fan relay does not close within 2 minutes, there are four possibilities:

   a. Gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25-psi or less.

   b. Unit needs to be re-calibrated (go through recalibration and re-test).

   c. Detector is in need of servicing (return unit to factory for servicing).

   d. Detector has fan relay set to disable (OFF) or 100 ppm. Set fan relay to 25 ppm and repeat the test.
7. Remove the gas from the sensor. Proceed to Test the Alarm relay or replace the top cover.

Testing the Alarm Relay

Note: The CO concentration to activate the Alarm relay depends on the setting.

1. Connect the 200 ppm cylinder of Carbon Monoxide to the regulator.
2. Check the pressure gauge. If there is 25-psi or less the cylinder should be replaced.
3. Place the Test Hood over the CO sensor. Turn on the regulator to start the gas flow.
4. The Fan relay should activate according to the settings.
5. With the display function turned “On” and the CO concentration reaching the Alarm Relay setting, (200 ppm, for example) the display will flash back and forth between “ALr” and “200”. The buzzer will sound indicating “Alarm” if the buzzer is turned “On”. With the display function turned off the display does not show the CO concentration, but will show “ALr” when the Alarm relay is activated.

   Note: If the Alarm relay fails to operate within 2 minutes, there are four possibilities:

   a. Gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25-psi or less.

   b. Unit needs to be re-calibrated (go through recalibration and re-test).

   c. Detector is in need of servicing (return unit to factory for servicing).

   d. Detector has Alarm relay set to disable (OFF). Set Alarm relay to 100 ppm and repeat the test.
6. Remove the gas from the sensor after Test. Proceed to Test the 4-20mA output or replace the top cover.

Testing the 4-20mA current loop

1. Connect the 200 ppm cylinder of Carbon Monoxide to the regulator.
2. Check the pressure gauge. If there is 25-psi or less the cylinder should be replaced.
3. Place the cap from the regulator over the CO sensor. Turn on the regulator to start the gas flow.
4. The Fan relay should activate according to the settings.
5. The Alarm relay should activate according to the settings.
6. The 4-20mA output should ramp up from 4mA in clean air to 20mA at 200 ppm. See 4-20mA diagram on page 7.

Note: If the 4-20mA output does not ramp up within 2 minutes, there are four possibilities:

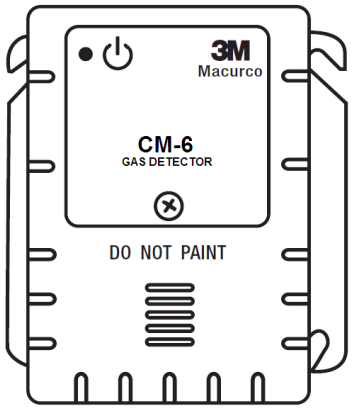
a. Gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25-psi or less.
b. Unit needs to be re-calibrated (go through recalibration and re-test).
c. Detector is in need of servicing (return unit to factory for servicing).
d. Detector has 4-20mA option set to "OFF". Set 4-20mA option to "On" and repeat the test.

7. Remove the gas from the sensor. Re-assemble the CM-6 (make sure the LED is aligned with the front case hole). You are done.

Aerosol Carbon Monoxide Test

The 3M™ CME1-FTG is an 11L 500 ppm Aerosol Carbon Monoxide Field Test Gas that can be used with the CM-6. This field test gas allows installers to do a quick functionality test of the CO sensor. The flow rate of the CME1-FTG is 10 Lpm so you will have about a minute of gas or enough to test 20-30 sensors.

1. Units to be tested must be powered continuously for a minimum of 3 minutes before proceeding.
2. For optimum test results the unit should be in clean air and be in a low ambient air flow.
3. Check that the CM-6 status indicator light is illuminated Green continuously. If not, do not proceed with tests. See CM-6 Trouble Indicator section.
4. The display option should be set to "On" and reading 0 ppm in clean air.
5. Aim the nozzle of the aerosol can into the sensor grate area (under DO NOT PAINT) and press for 2 to 3 seconds.



6. Wait for a few seconds. The digital display should climb indicating the increased CO concentration at the sensor confirming a pass of the quick test.

Note: If the Display does not change within 10 seconds, there are three possibilities:

a. Gas cylinder is empty, replace the gas cylinder.
b. Unit needs to be re-calibrated (go through the Field Calibration Procedure and re-test).
c. Detector is in need of servicing (return unit to factory for servicing).

7. Wait for the display to return to 0 ppm and configure options to desired settings.

FIELD CALIBRATION PROCEDURE

Note: For optimum calibration results the unit should be in clean air and be in a low ambient air flow.

⚠ WARNING

Using a certified gas with a concentration other than the one listed for this instrument and sensor when conducting a calibration or calibration verification test (bump test) will produce inaccurate readings. This means that higher levels of the gas being monitored may be present and could result in overexposure and **cause sickness or death.** For proper use, see supervisor or *User Instructions,* or call 3M in U.S.A., 1-800-243-4630. In Canada, call Technical Service at 1-800-267-4414.

1. Remove the Philips screw on the front of the CM-6. Pull the front cover of the unit off.
2. Assemble the 200 ppm gas cylinder and regulator together.
3. Check the pressure gauge on the regulator. If you have 25-psi or less you will need to replace the gas cylinder.
4. Place the test Hood from the regulator over the CO sensor.
5. Push ***Next*** 3 times to get to the CAL menu then push ***Enter***. The display will flash back and forth between GAS and 200.
6. Start applying gas to the CO sensor.
   Note: The sensor will look for the gas for 45 seconds. If no gas is applied or detected in that time, the display will return to CAL.
7. When the sensor detects the gas, the display will flash back and forth between the CO concentration and **SPn,** then the calibration will progress and the display will show the gas level for a maximum of 165 seconds.
8. When the calibration is successful, the display will flash back and forth between CO concentration and **PAS**, then the display will show the calibration gas level and the calibration is done.
9. If the calibration fails, the display will flash back and forth between the CO concentration and **FAL** (fail). If this occurs, check the pressure gauge on the regulator. If the pressure is less than 25-psi the flow of gas may not be adequate to properly calibrate the unit. If there is proper pressure in the cylinder repeat steps 4 through 6. If the unit fails to calibrate twice contact Technical Assistance: 1-800-237-9049.
10. Once the calibration has passed, remove gas and disassemble the cylinder and regulator.
11. Re-assemble the CM-6 (make sure the LED is aligned with the front case hole). You are done.
12. See Calibration Flowchart.

3M FIXED GAS DETECTION PRODUCTS LIMITED WARRANTY

3M warrants the CM-6 gas detector will be free from defective materials and workmanship for a period of two (2) years from date of manufacture (indicated on the inside cover of the CM-6), provided it is maintained and used in accordance with 3M instructions and/or recommendations. 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 repairs 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 TWO (2) YEARS FROM THE PURCHASE DATE. 3M 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 agent's 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.

FOR MORE INFORMATION
In United States, contact:
Website: www.3M.com/OccSafety
Technical Assistance: 1-800-243-4630
For other 3M products:
1-800-3M-HELPS or
1-651-737-6501

3M Occupational Health and
Environmental Safety Division
3M Center, Building 0235-02-W-70
St. Paul, MN 55144-1000
Printed in U.S.A

98-0060-0149-3
34-8706-1246-1

dZ **Requester:** Farrel Allen **Creator:** deZinnia **File Name:** 34870612461.indd **Structure #:** SS-38108 **Date:** 9/30/10	**Printed Colors – Front:** K **Printed Colors – Back:** K **Match Colors:**
Scale: 1 Inch	**This artwork has been created as requested by 3M. 3M is responsible for the artwork AS APPROVED and assumes full responsibility for its correctness.**