Macurco™ CM-21A Carbon Monoxide Detector and Controller

User Instructions for 3M Macurco CM-21A - Low voltage, dual relay Carbon Monoxide (CO) detector and controller

Important: Keep these User Instructions for reference

GENERAL SAFETY INFORMATION

Intended Use

The 3M™ Macurco™ CM-21A is a low voltage, dual relay Carbon Monoxide (CO) detector and controller. The CM-21A uses an electronic detection system to measure the concentration of CO and provide automatic exhaust fan control to help ensure a safe environment in parking garages or maintenance facilities. The CM-21A 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-21A may not function effectively below 0 °F or above 125°F. 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 LED. 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-21A provides CO detection and automatic exhaust fan control for automotive maintenance facilities, enclosed parking garages, warehouses with forklifts, etc. The CM-21A meets the requirements of the Uniform Building Code for enclosed garages and meets OSHA standards for CO exposure. CM-21A 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-21A is **NOT** intended for use in industrial applications such as refineries, chemical plants, etc. **Do NOT** mount the CM-21A where the normal ambient temperature is below 0° F or exceeds 125° F. The CM-21A mounts on a type 4S electrical box supplied by the contractor. **DO NOT** install the CM-21A inside another box unless it has good air flow through it.

⚠ WARNING

CM-21A may not function effectively below 0 °F or above 125°F. Using the detector outside of this temperature range may adversely affect product performance and **result in sickness or death**.

General Description

The CM-21A is a low voltage, dual relay Carbon Monoxide (CO) detector and Automatic ventilation controller. The CM-21A uses a Microcomputer controlled, electronic system to measure the concentration of CO and calculates when the relays should be actuated. The CM-21A is low maintenance with no periodic calibration needed and a long life (7 to 10 years) solid-state sensor.

Features

- CM-21A provides CO detection and automatic exhaust fan control for automotive maintenance facilities, enclosed parking garages, warehouses with forklifts, etc.
- Selectable fan and alarm relay activation
- 5 amp SPDT fan relay controls starters of exhaust fans
- 1/2 amp N.O. or N.C. alarm relay connects to warning devices or control panels
- CM-21A mounts on a standard 4x4 electrical box and becomes cover for the box
- Supervised system: any internal detector problem will cause the fan relay to activate
- Optional calibration kit is available. One screw allows access for calibration

Specifications

- Power: 3 watts from 12 to 24 VAC or VDC
- Current: 12 V - 0.25 amps, 24 V - 0.12 amps
- Shipping Weight: 1 pound
- Size: 4 1/2 x 4 x 2 1/8 in.
- Color: gray
- Connections: 7 each #20 wires, 6 inches long
- Mounting box: (not included) 4x4 electric
- Fan relay: 5 amp, 240 VAC, pilot duty, SPDT
- Fan relay actuation: selectable at 25ppm, 35ppm (default), 50ppm or 100ppm CO within 5 min.
- Alarm relay: 0.5 amp 200 V, 10 VA
- Alarm relay actuation: selectable at 100ppm CO within 3 hours or 200ppm CO within 10 min.
- Operating Environ: 0 to 125 F, 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-21A 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 CM-21A is a low voltage, dual relay Carbon Monoxide (CO) detector and controller. It uses an electronic detection system to measure the concentration of CO and provide automatic exhaust fan control to help ensure a safe environment in parking garages or maintenance facilities. The unit has the ability to be calibrated in the field.

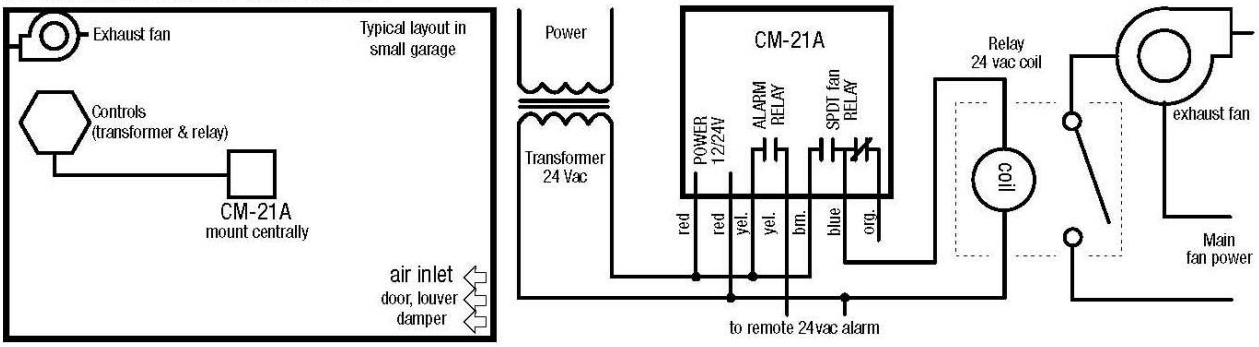
Location

The unit typically covers about 5000 sq. ft. The coverage depends on air movement in the room or facility. Do NOT mount the CM-21A in a corner. Normally, the unit mounts 5 feet above the floor, 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-21A mounts on a type 4S electrical box supplied by the contractor. Do *not* mount the CM-21A 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's from other devices on the same power supply that may cause the CM-21A microcontroller to become erratic.
3. Connect the CM-21A wires to the control cable with wire nuts. When making connections, make sure the power is off.

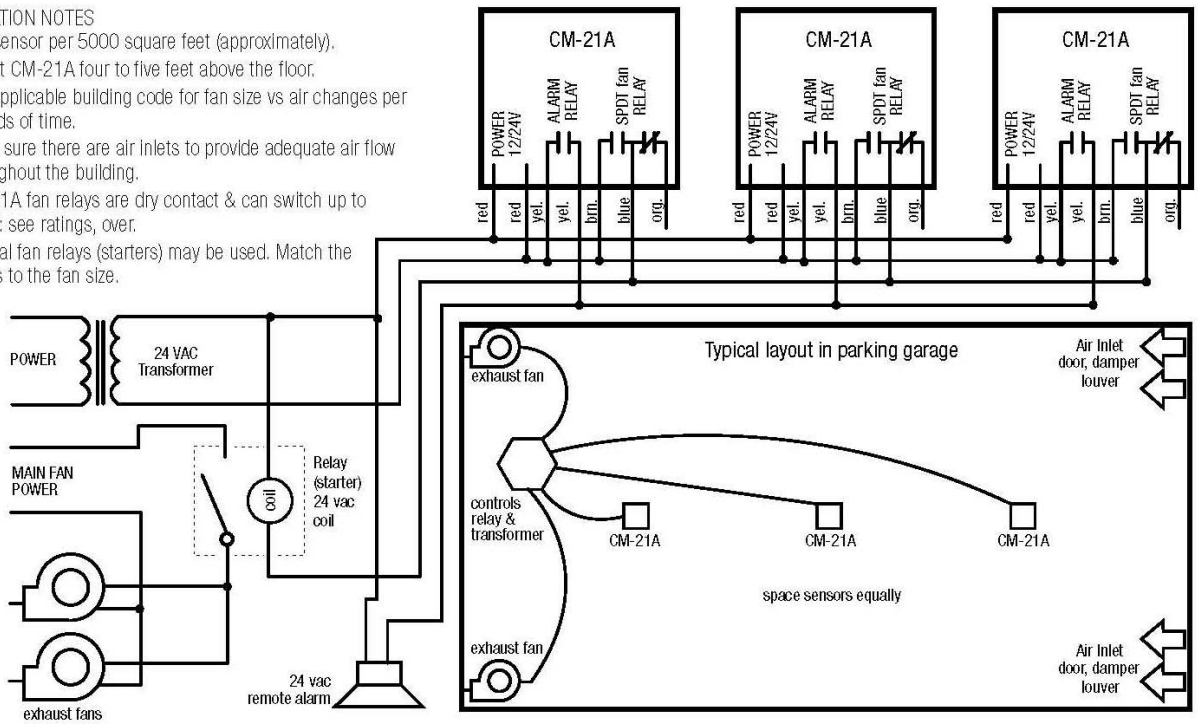
TYPICAL INSTALLATION IN SMALL GARAGE



4. The two **Red** wires are the power: 12 to 24VAC or VDC (26.5 max.), with no polarity preference.
5. The two Yellow wires are the dry, Normally Open (N.O.) Alarm relay contacts, again with no polarity preference. The Alarm relay is activated if CO vs. time is exceeded. The Alarm relay can switch up to 0.5 Amp, 200 V, or 10 VA. This relay can also be set to be Normally Closed (N.C.).
6. The dry contact, SPDT Fan relay has three wires. The Blue wire is common (COM.). The Brown wire is the Normally Open (N.O.) contact. The Orange wire is the Normally Closed (N.C.) contact. The Fan relay can switch up to 5.0 Amps up to 240 VAC. The Fan relay switches if there is 35 ppm or more of CO for two or more sampling cycles (5 minutes average). Other fan relay activation settings are selectable (see OPERATION section for details on relay settings).

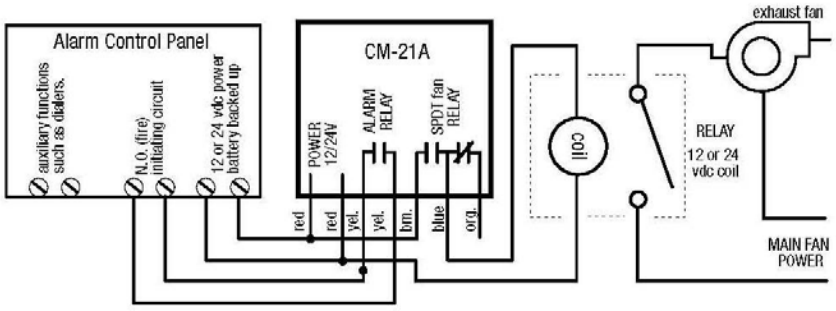
TYPICAL MULTIPLE CM-21A INSTALLATION

INSTALLATION NOTES
1. One sensor per 5000 square feet (approximately).
2. Mount CM-21A 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-21A 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-21A can be used with 12vdc or 24vdc N.O. (fire) panels.
2. Alarm panel provides battery backed up power to CM-21A.
3. CM-21A 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.



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 CM-21A steps through a self test cycle for the first 2 1/2 minutes that it is powered. The unit will execute the test cycle any time power is dropped and reapplied (ex. power failure). During the self-test cycle:

1. The Fan relay will be activated for the entire cycle (therefore the fan should run, if the system is wired to exhaust carbon monoxide).
2. The Alarm relay will turn on for the first 10 seconds of the self-test cycle, and be open for the remainder of the cycle.

The indicator light (LED) can display three different colors: green, amber and red. During the self-test cycle, the light on the CM-21A will turn alternately between red and green. At the end of the 2 1/2 minute cycle, the unit will take its first carbon monoxide sample and the light will turn solid green.

Operation

Once the unit has finished the self-test cycle and the light is on continuously, the color of the light then indicates the relay condition. If the light is **green** neither of the relays should be activated. If the light is **amber** the Fan relay should be activated. If the light is **red** the Fan relay & Alarm relay should be activated. If the unit detects an improper voltage or inoperable component it will default into Error mode. In Error mode, the light is off and both the Fan & Alarm relay will be actuated. The CM-21A samples the air and updates its outputs every 2 1/2 minutes***. Nothing you do will cause a change until the next 2 1/2 minute cycle.***

⚠ WARNING

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

The CM-21A default **Fan Relay** setting is activation at 35 ppm of CO within 5 minutes. The default **Alarm Relay** setting is Normally Open with activation at 100 ppm of CO within 3 hours and/or 200 ppm within 10 minutes.

Selecting Fan Relay Level

There are two jumpers: J1 and J2 that control the fan relay level. Use this table to set the fan relay control.

Fan relay setting (ppm)	J1	J2
25	Off	On
35	On	On
50	On	Off
100	Off	Off

Selecting Alarm Relay Operation

The Alarm Relay output can be selected to be NO - Normally Open (Default) or NC - Normally Closed by the insertion or removal of J3 Jumper. For Normally Open Alarm Relay ensure that the J3 Jumper is On the J3 location on the circuit board. For Normally Closed Alarm Relay ensure that the J3 jumper is removed from the circuit board.

Onboard Diagnostics

The CM-21A 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 mode/error mode. In this error mode, the Fan and Alarm relays will be activated and the light will Flash Amber. This is a safety precaution. To clear this mode, simply turn off power to the unit for a few