

PM2110 miniCO Monitor Manual

examination by AirTest Technologies, if the unit is found to be defective according to the WARRANTY, at AIRTEST's discretion, it will be repaired or replaced at no charge. If the product is found not to be covered by the WARRANTY, the customer will be offered the opportunity pay for repair of the damaged unit.

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User Manual: Model PM2110 miniCO

1. Introduction

The MiniCO has been designed as a simple and effective tool to determine, measure or record Carbon Monoxide (CO) levels in any environment. The miniCO measures parts-per million of CO (ppm) in the air. The instrument has been programmed to comply with guidelines set by the Occupational Safety and Health Administration (OSHA), the American conference of Governmental Industrial Hygienists (ACGIH) and the national institute for Occupational safety and health (NIOSH). Alarms are factory set at the ACGIH recommended 8 hour TWA of 25 ppm, The ACGIH maximum excursion limit of 125 ppm and the OSHA ceiling value of 400 ppm.

Low levels of CO, typically less than 10 ppm are not considered especially hazardous, but they do indicate a source of combustion fumes that should be investigated. Indoor levels should be at or near 0 ppm. Sustained levels above 25 ppm for 8 hours, and exposure to more than 125 ppm CO should be avoided. Also it is important to note that children, the elderly and people with respiratory or liver problems may be more susceptible to lower levels of CO. Seek clean air, increase ventilation or employ whatever ever means to eliminate exposure.

The miniCO is a stand alone monitor that is designed to be carried as a personal monitor. It can be carried on a key ring, clipped to a workers shirt pocket or attached to the dashboard of a vehicle or piece of equipment. The miniCO is designed specifically to be affordable and easy to use by health professionals and concerned homeowners. The device can be used in CO detection applications such as OSHA enforcement, fire services exposure, parking garages, warehouses, municipal buildings, and home furnace inspections. It can also be used on boats, cars, trucks, trains, airplanes, in hotel rooms and anywhere else exposure to combustion fumes and carbon monoxide is possible.

2. Very Important Information

Read all of the information in this booklet before using the miniCO.

Many factors can affect air quality. This instrument will give a dependable indication of CO levels, but should not be considered an all-inclusive monitor for overall air quality. The miniCO is only one tool for CO measurement or CO dosimetry for personal use.

The miniCO Self-Test checks most of its functionality, but does not test the CO sensor, which can only be tested with actual exposure to carbon monoxide. Monthly "bump" testing of the miniCO with a source of carbon monoxide is recommended. AirTest sells a CO bump test kit for this purpose.



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The miniCO is small and light enough to be transported in your pocket. However, miniCO should not be operated while in your pocket. To detect CO, the miniCO must be well exposed to your surrounding environment (e.g. on your key chain, attached to your dashboard or uniform, or worn around your neck).

3. Operating Modes

5 Minute Mode: With the miniCO off, push the button once. After turning on the monitor will perform a brief self test, display the temperature and then show the current CO reading in ppm. The display will update with a new reading every 4 seconds, for a 5 minute period before turning off automatically. To turn the miniCO off at any time just press the button once. When the button is pressed to turn off the unit, it will first display dosimetry information (see section 3). If you do not want to see this data, press the button once again and the miniCO will turn off immediately.

8 Hour Mode: With the miniCO off, push the button twice quickly. After turning on the instrument will perform a brief self test, sho "8 HR", display the temperature, and then show the current CO reading in ppm. The display will update with a new reading of CO every 4 seconds, for an 8 hour period before turning off automatically. To turn the miniCO off sooner, press the button once. When the button is pressed to turn off the unit, it will first display dosimetry information (see section 3). If you do not want to see this data, press the button once again and the miniCO will turn off immediately.

4. Viewing Dosimetry Information:

When running in the 8-Hour Detection period, the miniCO maintains CO dosimetry information. Dosimetry information allows you to track your total-exposure to carbon monoxide (TE), and your 8-hour time-averaged exposure (TWA). It also keeps track of the maximum concentration of CO measured (MAX), and when this maximum occurred (TIME), in minutes since being turned on. Also reported is the total running time (RUN), in minutes. The miniCO will save this information until Detection Mode is entered again. For a more detailed explanation of TE and TWA, see Section 3.6.

To view the dosimetry information during normal operation, quickly push and release the button two times (the backlight will turn on after the first push). The dosimetry information will be displayed after a moment, starting with the word "DOSM". After the dosimetry information has been displayed, miniCO will resume normal operation.

The dosimetry information from the last use of the 12-Hour Detection period may also be recalled after Pocket CO has turned off. With Pocket CO off, quick-push the button three times. The display will show "DOSM", and then display the dosimetry information from the last use of the 8-Hour Detection period. After displaying this information, the miniCO will turn back off.

5. Alarms

The miniCO is equipped with the following alarm mechanisms:

- A loud, 82 dB beeper (at 24 inches).
- A display backlight.
- A bright, red LED on the top of the instrument.

Pocket CO is programmed to repeatedly pulse all of these alarms when the CO exposure reaches or exceeds certain limits. These limits are pre-programmed at the following levels:

- CO level between 50 PPM and 124 PPM: Alarm beeper/LED/Vibrator pulse once every 20 seconds.
- CO level between 125 PPM and 399 PPM: Alarm beeper/LED/Vibrator pulse once every 10 seconds.
- CO level exposure at or above 400 PPM: Alarm beeper/LED/Vibrator pulse once every 5 seconds.

These are known as "instantaneous" alarms, since the miniCO will alarm as soon as the level of CO reaches or exceeds these levels. The alarms at these levels are designed to protect you from the immediate health effects of carbon monoxide. Pay attention to your miniCO when it alarms, and vacate the area until the source of the CO can be found and addressed.

The miniCO will also pulse its alarms during the following, non-CO related situations:

- Self Test: One alarm pulse is normal and expected during the Self Test.
- Temperature above 50°C (122°F), or below 0°C (32°F): Alarm pulses, plus "HOT" or "COLD" on the display.
- Sensor Malfunction: One alarm pulse, plus "SNSR" on the display. Note that absence of this alarm does not necessarily guarantee that the sensor is working normally.

6. Understanding Dosimetry and TWA Warnings:

When run in the 12-Hour Detection period, the miniCO keeps track of dosimetry information, which includes your total-exposure and time-weighted average exposure.

Total-Exposure (TE) is a measure of the amount of CO you've been exposed to over a length of time, and is measured in ppm-hours.

Example: If from the time you turned on the miniCO, you were exposed to 25ppm for 5 hours, and then 10 ppm for 1 hour, your Total Exposure would be:

$$\text{Total Exposure} = [(25\text{ppm} \times 5 \text{ hours}) + (10\text{ppm} \times 1 \text{ hour})] = 135 \text{ ppm-hours}$$

Time-Weighted Average exposure (TWA) gives you an idea of how much CO, on average, you've been exposed to, and is calculated as follows:

$$\text{TWA} = \text{Total Exposure to CO (in ppm-hrs)} / 8 \text{ hours}$$

Example: If your total exposure was 135 ppm-hours (as in the first example), your 8-Hour TWA at that point would be:

$$\text{TWA} = 135\text{ppm-hours} / 8 \text{ hours} = 16.9 \text{ ppm}$$

The TWA is called "time-weighted" because its calculation weighs more heavily exposure that took place over a longer period of time. Hence, an additional exposure to a large amount of CO, but over a very short period of time (e.g. 1-2 minutes), would not largely affect the TWA calculated in the second example.

The American Conference of Governmental Industrial Hygienists (ACGIH) has published a recommended limit of 25ppm for an 8- Hour TWA. Based on this limit, the miniCO will issue a warning if you have exceeded this average over 8 hours.

7. Important User Information

The Battery:

The battery on the miniCO should last for 1 year under typical usage (8 hours per day, 5 days per week with no more than 0.5 hours of TWA alarming per week). If the mini CO alarms more than this average, the battery life will be reduced.

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The Battery (continued)

The miniCO will indicate a low battery with a "BATT" message during the startup self test. At this point the miniCO will continue to work but you should take action to replace it soon. You may also notice a low battery if you see the backlight dimmer than normal, or if you hear any unusual noises from the beeper, even when the miniCO is not alarming.

The Battery in the miniCO is not user changeable. You must return the your miniCO to AirTest at your own expense for a battery replacement. When the battery is replaced, AirTest will also perform a calibration on your sensor. There will be a charge for this service. To arrange to return a miniCO to AirTest you must first call AirTest at 888-855-8880 or email us at sales@airtesttechnologies.com to get an RMA number. This number must be placed so it is clearly visible on the outside of the package being returned. This RMA number is our way to track your package so it does not get lost. Do not send packages to AirTest without this RMA number as it may be refused delivery and returned to you unopened. Also when you call you will be quoted a price for the battery replacement and re-calibration and asked for your method of payment (all credit cards accepted).

Temperature Sensitivity

The MiniCO may display slightly higher readings of CO when being moved quickly between extreme temperatures (such as cold outside air and a warm building). The higher reading will settle back down to the actual concentration of CO within a few minutes, as the miniCO's temperature compensation circuit corrects for the temperature change.

Response to High Exposures

After exposure to a high concentration of CO it may take your miniCO several minutes to return to a 0 ppm reading, even when exposed to fresh air.

7. Care And Maintenance

The miniCO is a high performance CO measurement device. TO maintain best performance, clean it with a cloth, lightly dampened with water. The miniCO may become un-repairable and unreliable if it is cleaned with or exposed to soap, cleansers, alcohol, gasoline, paint thinner or other solvents to clean the device. Submerging the device in water or any other type of liquid will also render the device non operational. Any of these measures will void the 2 year warranty on the device.

For optimum life and operation, Keep the miniCO away from extremes in temperature and humidity. Store the monitor in a clean place away from solvents, chemicals, disinfectants, pesticides and cleaning products. For maximum lifetime of the miniCO sensor and electronics, store and operate the device in moderate environmental conditions (temperatures between 50-80°F (4-27°C), RH between 40-85% at normal atmospheric pressures). Do not refrigerate or expose to extreme pressure.

The calibration of the electrochemical sensor in the miniCO can drift over time and can be affected by high regular high concentration exposures. It is recommended that the calibration of the miniCO be checked periodically using a known concentration of carbon monoxide gas. If the unit appears to be out of calibration, return the device to AirTest for calibration (service fee involved).

To arrange to return a miniCO to AirTest for calibration you must first call AirTest at 888-855-8880 or email us at sales@airtesttechnologies.com to get an RMA number. This number must be placed so it is clearly visible on the outside of the package being returned. This RMA number is our way to track your package so it does

not get lost. Do not send packages to AirTest without this RMA number as it may be refused delivery and returned to you unopened. Also when you call you will be quoted a price for the battery replacement and re-calibration and asked for your method of payment (all credit cards accepted). Calibration is recommended every one to two years.

8. Carbon Monoxide Health Effects

Carbon Monoxide & Health

miniCO Audible Alarm	800 ppm	800 ppm Headache, nausea and dizziness after 45 minutes. Collapse and unconsciousness after 1 hour exposure (adults).
Alert every 4 seconds (400 ppm)	400 ppm	400 ppm Headache and nausea after 1-2 hours of exposure. Life threatening in 3 hours (adults).
Alert every 8 seconds (125 ppm)	200 ppm	200 ppm Dizziness, nausea, fatigue, headache after 2-3 hours of exposure (adults).
Alert every 12 seconds (TWA >25 ppm)	100 ppm	100 ppm Headache after a few hours (adult). After 90 minutes, UL approved residential CO sensors should alarm (UL-2034).
	50 ppm	50 ppm Maximum permissible level in workplace. (OSHA)
	25 ppm	35 ppm Typical maximum limit in parking garages (IBC) 25 ppm MaxTWA Exposure for 8 hour work day (adult).
	10 ppm	10-24 ppm Very unusual for indoor air in non-industrial buildings. Minimal effect on adults, may be a problem for children, the elderly and individuals with impaired respiratory systems. Investigate & eliminate sources.
		9 ppm Maximum short term exposure (ASHRAE).
		0 ppm Normal outside air.

Note: values above are for adults. Children, the elderly and the sick may exhibit symptoms at much lower levels.

9. MiniCO Warranty

AirTest Technologies Inc. (AIRTEST) warrants the miniCO to be free of defects in materials and workmanship for the 2 years from date of purchase. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of AIRTEST's control. Components which wear are not warranted, including but not limited to switches, displays, batteries and calibration. AIRTEST's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification.

If the unit should malfunction, it must be returned to the factory for evaluation. Contact AirTest Technologies to determine if a product problem is a Warranty or repair issue (888 855-8880). Prior to sending any product back to AIRTEST you must contact us to receive a Return Materials Authorization Number (RMA #). This number must be marked clearly on the outside of the package you are sending. Packages without RMA # may be returned to sender unopened. Upon