

AIRSPACE Inc.

OPERATION MANUAL

*Model AI-1100 Series Gas Monitor
Model AI-1200 Series Gas Monitor
(includes Data Logger versions)*

The logo for AIRSPACE AGS technology. It features the word "AIRSPACE" in a bold, sans-serif font, with a horizontal line passing through the middle of the letters. Below "AIRSPACE", the words "AGS technology" are written in a smaller, lowercase, sans-serif font. To the left of the "AIRSPACE" text is a solid black circle. To the right of the "AIRSPACE" text is a large, thin, curved line that arches upwards and then downwards, resembling a stylized "C" or a partial arc.

AIRSPACE
AGS technology

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CAUTIONS AND WARNINGS

Caution! Carefully Read The Entire Manual Before Operating The Monitor.

Caution: The Airspace portable gas monitor has been designed to detect hazardous concentrations of CO or CO/Methane. When an alarm condition exists, take the appropriate actions to safeguard against life threatening situations. Concentrations may actually be higher in the hazardous location than at the monitor's location. Leave the area immediately. Return only after further testing together with other safety procedures has determined that the area is safe for re-entry.

Caution: The Airspace Gas Monitor by design will not alarm at CO levels below 30 ppm.

Caution: Do not leave the batteries in your CO or CO/Methane Monitor when the Monitor is not used for long periods of time.

Caution: Replace the Monitor's batteries when the Low Battery Indicator LED is flashing RED.

Warning: Not intended for use in atmospheres containing oxygen concentrations greater than 21%.

Warning: Substitution of components may impair Intrinsic Safety.

Warning: Batteries specified for use in your Airspace Monitor are Duracell MN1500, Energizer LR6-AM3 (E91), Rayovac LR6.

Warning: Data Logger Monitor should not be connected to a personal computer in a hazardous location.

Warning: Never use vehicle exhaust to test a CO sensor, as byproducts of combustion can clog sensor filters and membranes, permanently disabling the CO sensor.

Warning: Airspace, Inc. will not honor the warranty if the product has been determined damaged due to gross contamination. Such contamination includes, but is not limited to: exposure to silicone vapors, highly corrosive materials, alkaline metals, immersion in water, and extreme cold. In addition, the warranty will be voided if the product has been damaged by causes that include but are not limited to: water condensation, exposure to a high density of gas, and long term exposure to high humidity, extreme temperatures, and/or high contamination levels.

ABOUT YOUR AIRSPACE GAS MONITOR

Dear Airspace Gas Monitor Owner,

Thank you for purchasing an Airspace Gas Monitor. Airspace is proud to offer you this innovative gas monitor with Advanced Gas Sensor (AGS) Technology™. We developed our family of CO and CO/Methane gas monitors with your needs in mind. As your gas detection partner, we wanted to provide you with a long lasting, easy to use, life saving gas monitor whose sensor requires no routine calibration and never needs replacement. You can be confident that your Airspace gas monitor will give you the performance you expect since it has been designed and manufactured to the highest quality standards. Once again, thank you for your purchase. We, at Airspace, are changing the way people monitor their Airspace.

WHAT YOU SHOULD KNOW ABOUT CO AND METHANE

Carbon Monoxide (CO) is a tasteless, colorless, odorless gas that causes headaches, disorientation, nausea, and death, even in very low concentrations. Often misdiagnosed as symptoms that mimic the flu, it is the leading cause of accidental poisoning deaths in the United States and throughout the World.

Carbon Monoxide poisons by inhibiting the blood's ability to carry oxygen to body tissues including vital organs such as the heart and brain. When a person breathes, oxygen in the lungs combines with hemoglobin in the blood and travels to the body's cells. When CO is inhaled, it tightly binds with the oxygen carrying hemoglobin of the blood, forming carboxyhemoglobin. Once combined with the hemoglobin, oxygen is replaced and the oxygen-carrying capacity of the blood is reduced.

How quickly the carboxyhemoglobin builds up is influenced by three main factors: (1) the concentration of the gas being inhaled (measured in parts per million or PPM), (2) how long the exposure lasts, and (3) rate of respiration and circulation (affected by workload, temperature, altitude, and one's health). Adding to the effects of the exposure is the long half-life of carboxyhemoglobin in the blood. Half-life is the measure by how quickly levels return to normal. The half-life of carboxyhemoglobin is approximately 5 hours.

For a given exposure level, it will take about 5 hours for the level of carboxyhemoglobin in the blood to drop to half its current level after the exposure is terminated. The following chart shows the maximum allowable exposure limits and symptoms developed for CO inhalation.

CONCENTRATION	INHALATION TIMES AND TOXIC SYMPTOMS
9 ppm	(ASHRAE) The American Society of Heating, Refrigerating, and Air-Conditioning Engineers Standard 62-1989 for living areas. (ASHRAE) requires that ventilating air meet the outdoor air standard as determined by the (EPA) The Environmental Protection Agency - a person should not
25 ppm	The threshold limit value (TLV) for continuous exposure in any 8 hour period adopted by (ACGIH) The American Conference of Governmental Industrial Hygienists.
35 ppm	The recommended exposure limit (REL) for continuous exposure in any 8 hour period according to (OSHA).
50 ppm	The permissible exposure limit (PEL) for continuous exposure in any 8 hour period according to (OSHA).
100 ppm	The exposure limit to remove employees from enclosed spaces according to (OSHA).
200 ppm	Mild headache, fatigue, dizziness, and nausea after 2-3 hours. Maximum concentration allowable at any time according to (OSHA).
400 ppm	Serious frontal headache within 1-2 hours. Life threatening after 3 hours. The short term exposure limit (STEL) which is a 15 minute time-weighted average concentration adopted by (ACGIH).
1500 ppm	Headache, dizziness, and nausea within 30 minutes. Death within 1 hour. The instantaneous exposure limit or (IDLH) immediately dangerous to life and health according to

* Exposure to CO will have varying effects depending upon the person (size, age, sex, and health) and the environment (temperature and altitude).

Like Carbon Monoxide, Methane (CH₄) is a colorless, odorless gas with a wide distribution in nature. It is the principal component of natural gas, a fossil fuel. It is released into the atmosphere when organic matter decomposes in environments lacking sufficient oxygen. Natural sources include wetlands, swamps and marshes, termites, and oceans. Man-made sources include the mining and burning of fossil fuels, digestive processes in ruminant animals such as cattle, rice paddies and the burying of waste in landfills.

At room temperature, Methane is a gas less dense than air. It melts at -183°C and boils at -164°C. It is not very soluble in water. Methane in general is very stable, but mixtures of Methane and air, with the Methane content between 5 and 15% by volume, are explosive. Unlike Carbon Monoxide, Methane is not toxic when inhaled, but it can produce suffocation by reducing the concentration of oxygen inhaled.

PRODUCT DESCRIPTION

Airspace Gas Monitors are factory calibrated and designed to detect concentrations of hazardous levels of CO or CO/Methane in parts per million (PPM). Made of rugged polycarbonate material, the Monitors are lightweight, battery powered, and portable with various clip options and accessories.

These easy to use, long lasting, life saving Monitors detect lethal gas using Advanced Gas Sensor (AGS) Technology™. AGS Technology™ is a highly sensitive semiconductor sensor that responds quickly in detecting CO and Methane gases. With AGS Technology™, the sensor requires no routine calibration and never needs replacement.

The CO and CO/Methane Monitors provide both audible and visual alarms. The CO Monitor has three different alarm levels: low, medium, and high. The CO/Methane Monitor has one alarm level for Methane in addition to the three alarm levels for CO. The audible alarm as well as the optional vibrator alarm can be temporarily silenced with the alarm silence button.

The LCD version of these Monitors will display numeric levels of gas concentration in parts per million (PPM) as well as the icon of the gas being detected.

The Data Logger version of the basic and LCD Monitors has a communication port. The port allows the Monitor to be connected to a computer for graphing gas levels. Note: To read data from the Logger, please see the Operator's Manual supplied with the Data Logger PC Software DL-01.

Airspace Gas Monitors are powered with two (2) AA alkaline batteries that provide three months of typical operation during an 8 hour shift, 5 days a week. Batteries specified for use in your Airspace Monitor are Duracell MN1500, Energizer LR6-AM3 (E91), or Rayovac LR6.

Caution: Remove the batteries if your CO or CO/Methane Monitor is to be stored for long periods of time.

Airspace Monitors are U.L. tested and certified to be Intrinsically Safe for use in Class 1, Division 1 Group A, B, C, and D, T3C, Hazardous Locations.

Case: The case is constructed of a Polycarbonate/Acrylic blend polymer with integrated ESD and anti-static protection.

On/Off Power Switch: The on/off switch turns power on (I position) and off (O position) to the monitor.

Comm. Port: 5V digital serial communication port on Data Logger Monitor.

Battery Door: Covers battery compartment using universal screw, which can be opened by using a coin or screwdriver.

Speaker Opening: Speaker for audible alarm to warn of hazardous conditions.

LCD Display: Numeric indication of CO and/or Methane levels and gas icon identification on LCD Monitor.

Alarm Indicator LED: Visual indication to warn when alarm levels have been reached for CO and/or Methane.

Sensor Inlet: Inlet for sensing concentrations of gas.

Low Battery Indicator LED: Visual indication to warn of low battery life.

Status Indicator LED: Visual indication of the condition of the monitor.

Alarm Silence Button: Temporarily silences the audible alarm, as well as the optional vibrator alarm.

BASIC OPERATION

After turning on your Airspace Monitor, the device will automatically perform a sequence of self-tests during which time the Status LED will be on solid YELLOW, followed by the visual sequencing of all LEDs. An audible alarm will occur to verify the operation of the speaker. The unit will then enter its warm-up with the Status LED flashing RED for approximately 5 seconds and then flashing YELLOW.

Once the warm-up is complete, the Status LED will flash GREEN and the device is ready for its main function of measuring and calculating CO or CO/Methane values. During initialization of the AI-1200 LCD series, all segments of the LCD display will be lit including either the CO or CO/Methane icons.

Then the LCD will flash dashed lines in each digit for up to one minute. After warm-up is complete, the farthest right digit will read zero as long as a concentration of CO or CO/Methane is not measured. In addition, the CO icon will also be displayed for the AI-1200 while the CO and Methane icons will alternate for the AI-1201.

ALARM LEVELS

CO Alarm Level

The CO and CO/Methane Monitors have three alarm levels for CO, which are 30, 60 and 120 ppm. The alarm will trigger if the CO value is greater or equal to the limit for any single measurement.

Methane Alarm Level

The CO/Methane Monitor has one alarm level for methane, which is 5000 ppm or 10% LEL. The alarm will trigger if the Methane value is greater than or equal to the limit for any single measurement.

ALARM ACTIONS

CO Alarm

The CO Monitor will perform the following actions when the CO alarm activates:

CO LEVEL (in ppm)	ALARM LEVEL	AUDIBLE DUTY CYCLE	VISUAL DUTY CYCLE	LCD DISPLAY
30 - 59	LOW	Beeps every 5 seconds	RED LED flashes every 5 seconds	CO Level and icon
60 - 119	MEDIUM	Beeps every second	RED LED flashes every second	CO Level and icon
120 or >	HIGH	ON	RED LED flashes 2 times per second	CO Level and icon

For the LCD version, if the measured CO value is greater than 255 ppm, the display will flash 255.

Methane Alarm

The CO/Methane Monitor will perform the following actions when the Methane alarm activates:

METHANE LEVEL (in ppm)	ALARM LEVEL	AUDIBLE DUTY CYCLE	VISUAL DUTY CYCLE	LCD DISPLAY
5000 or >	H I G H	Beeps 2 times per second	ORANGE LED flashes 2 times per second	Methane Level and icon flash every

CO and Methane Alarms

When both the CO and Methane alarms activate on the CO/Methane Monitor, the Alarm LED will be ORANGE and flash RED as described in the CO Alarm table. All audible alarms will beep at 2 times per second and the LCD display will alternate between the CO and Methane levels every 2 seconds.

Vibrating Alarm (Optional)

If the vibrating alarm option is installed, the vibrating time for the first minute for all alarms will be 3 seconds ON and 7 seconds OFF. After the first minute, the vibrating time for all alarms will be 3 seconds ON and 25 seconds OFF.

ALARM SILENCE BUTTON

To activate the alarm silence feature, the alarm silence button must be held down for 2 seconds. Holding down the alarm silence button for another 2 seconds will deactivate the alarm silence feature.

Alarm Silence for CO Alarm

The alarm silence button allows for the temporary disabling of the audible alarm, as well as the optional vibrating alarm, if installed.

Only the LOW and MEDIUM CO alarms can be permanently disabled (the HIGH CO alarm can only be temporarily disabled).

The alarm silence period depends on what alarm is active.

ALARM ACTIVE	LENGTH OF SILENCE	DEACTIVE CONDITONS
LOW CO	As long as Level is LOW	Level is NOT LOW
MEDIUM CO	As long as Level is MEDIUM or LOW	If Level decreases to LOW, stays silenced as long as it remains LOW. If Level increases to HIGH or jumps to safe levels, deactivate the silence.
HIGH CO	4 minutes	If Level decreases to MEDIUM or LOW, stays silenced as long as it remains decreased. If level remains HIGH or jumps to safe levels, deactivate the silence

Alarm Silence for Methane Alarm

The alarm silence button allows for the temporary disabling of the audible alarm as well as the optional vibrating alarm, if installed. The one alarm level for Methane can only be temporarily disabled.

ALARM ACTIVE	LENGTH OF SILENCE	DEACTIVE CONDITONS
METHANE	4 minutes	If level remains > 5000 pm or jumps to safe levels, deactivate the silence

Status and Low Battery Indicator LEDS

In addition to the Alarm Indicator LED, the CO and CO/Methane Monitors have two other LEDs. They are labeled the Status Indicator and the Low Battery Indicator. The Status LED will give a visual indication as to the condition of the monitor. The Low Battery LED will give a visual indication as to the life of the batteries. For more information on the function of these LEDs, please see the Maintenance and Troubleshooting section of this manual.

MAINTENANCE AND TROUBLESHOOTING

Though there are no user serviceable parts in either the CO or CO/Methane Monitor, care should be taken to ensure that the sensor is not exposed to high contamination levels or is damaged by water. If a problem occurs with the Monitor's sensor, consult the factory regarding replacement.

If the CO or CO/Methane Monitor is to be stored for long periods of time, be sure to remove the batteries.

Airspace offers an optional Bump Test Kit in order to perform a gas verification test of the Monitor. Airspace recommends that such a test be performed on a periodic basis. By exposing the Monitor to a gas that exceeds the alarm levels, one is able to verify that the Monitor is fully functional.

The CO and CO/Methane Monitors will automatically enter into Fault Mode if they detect any recoverable or unrecoverable error. To indicate Fault Mode, the CO and CO/Methane Monitors will trigger both audible and visual alarms. Low Battery and Outside Operating Temperature Faults are recoverable errors. Dead Battery and Hardware Faults are unrecoverable errors.

FAULT	AUDIBLE DUTY CYCLE	VISUAL DUTY CYCLE	ACTION	LCD DISPLAY
LOW BATTERY FAULT	Beeps every 5 minutes	BATTERY LED (RED) flashes every 10 seconds	Continues normal readings	Normal readings
OUTSIDE OPERATING TEMPERATURE FAULT	Beeps every 10 seconds	STATUS LED (ORANGE) flashes every 10 seconds	Continues normal readings	Normal readings
DEAD BATTERY FAULT	None	BATTERY LED (RED), STATUS LED (RED) ON	Stops reading	Err will be displayed
HARDWARE FAULT	Beeps every 10 seconds	STATUS LED (RED) ON	Stops reading	Err will be displayed

If the Low Battery Indicator LED is flashing RED, the batteries have reached the last 5% of their life. Steady RED indicates the batteries are dead and the Monitor will not function.

Caution: When replacing the batteries, install them in the correct orientation according to the battery icons on the back of the case near the battery door.

If the Monitor is operating normally, the Status Indicator LED will flash GREEN every 10 seconds.

If the Status Indicator LED is flashing ORANGE, there is a recoverable error with the Monitor. If the Status Indicator LED is steady on RED, there is an unrecoverable (major failure) error with the Monitor.

OPTIONAL ACCESSORIES

Accessories	Part #
Standard Clip	SC-01
Grip Clip w/ D-Ring	GC-01
Protective Boot	PB-01
Bump Test Kit	TK-01
Cable and Software for Data Logger	DL-01

SPECIFICATIONS

Sensor Type	Solid-State Semiconductor
Sensor Life	> 5 Years
Size	3.9"H x 2.3"W x .9"D (99mm x 58mm x 23mm)
Weight	4.8 oz (136g)
Battery	(2) 1.5 V AA Alkaline
Battery Life	1 month if on continuously @ 25°C (non-alarming)
Temperature Operating: Storage:	-4° to 113°F (-20° to 45°C) -40° to 158°F (-40° to 70°C)
Humidity	10 to 95% RH (non-condensing)
Pressure	15500 to -1300 ft (420 to 795 mmHg)
Warm-up Time	60 seconds
Response Time	30 seconds typical
CO Alarm Points	30 ppm = low alarm 60 ppm = medium alarm 120 ppm = high alarm
Methane Alarm Point	5000 ppm (10% of LEL)
Calibration	No routine calibration required. Periodic verification recommended.
Agency Approval	UL Class 1, Div 1, Groups A, B, C and D, T3C, Hazardous Locations.

WARRANTY

Airspace, Inc. warrants that this product will be free of defects in materials and workmanship under normal use and service for a period of five (5) years from the date purchase. The warranty covers both parts and labor. Expendable items such as batteries and filters are not covered by this warranty.

Products believed to be defective should be returned prepaid to Airspace, Inc. for inspection within the warranty period. Shipments will not be accepted without an RMA number. If Airspace, Inc. deems the product defective through inspection; Airspace, Inc. will repair or replace the product, at its option, free of charge. The product will then be returned prepaid to any location in North America using the most economical means. This warranty service is provided to the original purchaser when proof of purchase date is given.

Liability for shipping charges and damage or loss due to the careless or deliberate acts of the shipper or contract affiliates in either direction is not covered in the terms of this warranty. All warranty claims are dependent upon the proper use of the product in the application anticipated by the manufacturer. Only the benefits specified are provided by this warranty. This warranty does not encompass defects which result from acts beyond the control of Airspace, Inc. including, but not limited to:

damage by accident, negligence, tampering, or misuse, failure to operate in concurrence with the instructions detailed in the Operation Manual, repairs or modifications performed by any person other than Airspace, Inc.'s authorized service personnel, use of any replacement parts not specified by Airspace, Inc., or by acts of nature. Airspace, Inc.'s liability under no circumstances will exceed replacement of the product found to be defective.

Airspace, Inc. will not honor this warranty if the product has been determined damaged due to gross contamination. Such contamination includes, but is not limited to: exposure to silicone vapors, highly corrosive materials, alkaline metals, immersion in water, and extreme cold. In addition, the warranty will be voided if the product has been damaged by causes that include but are not limited to: water condensation, exposure to a high density of gas, and long term exposure to high humidity, extreme temperatures, and/or high contamination levels.

THE FULL EXTENT OF AIRSPACE, INC.'S LIABILITY IS STATED IN THIS WARRANTY, WHICH OFFERS NO OTHER WARRANTIES OR GUARANTEES OF ANY KIND, EITHER EXPRESSED OR IMPLIED. AIRSPACE, INC. SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE. UNDER NO CIRCUMSTANCES WILL AIRSPACE, INC. BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR LOSSES OF ANY KIND CONNECTED WITH THE USE OF THIS PRODUCT OR FAILURE OF THIS PRODUCT TO FUNCTION OR OPERATE PROPERLY.

This warranty covers products sold to end-users by authorized distributors, dealers, and representatives of Airspace, Inc.

RETURN MATERIAL AUTHORIZATION (RMA)

Contact Airspace, Inc. to receive a return material authorization (RMA) for warranty and non-warranty service. You will need this RMA number to return your monitor to the factory for repair or replacement. To obtain a RMA number, contact customer service at 1-888-654-5126, fax us at (262) 250-1161, or write to the following address:

AIRSPACE, Inc.
Attn: Customer Service
W143 N9354 Henry Stark Road
Menomonee Falls, WI 53051

When shipping the device, be sure to enclose your return address and telephone number, purchase order, shipping and billing information, RMA number, description of the problem, and any special instructions. For warranty service, please include your proof of purchase date. All returns should be packaged and sent to the above address "ATTN: Customer Service (RMA: _____)" for expedient repair and return of your unit.

FCC COMPLIANCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

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