

RAM 50 Series

Operation Manual



GfG Instrumentation

Worldwide Manufacturer of Gas Detection Solutions

TABLE OF CONTENTS

	Page
Introduction	3
Principles of operation	3
Overview	4
Description	4
Installation	7
Operation	8
Calibration	8
Sensor replacement	10
Maintenance	10
Figure 1	12
Figure 2	13
Figure 3	14
Figure 4	15
Guide to troubleshooting	16
Replacement parts for ABL 50 / RAM 50 / RAM 50	20
Warranty	20

Introduction

The ABL 50 / RAM 50 is designed to monitor the level of carbon monoxide in a respiratory air line and activate an alarm when the CO concentration exceeds the unit's preset alarm threshold. Your ABL 50 / RAM 50, operated as described in this manual, should give years of trouble-free operation.

The ABL 50 / RAM 50 is offered in two versions:

Model 1540 - air line monitor

Model 1541 - air line monitor with built-in horn

Principles of operation

The basic sensor used in the ABL 50 / RAM 50 CO monitor is a semiconductor catalytic sensor. When a catalytic oxidation occurs at the surface of the sensor, the electron concentration in the catalytic material increases, decreasing the resistance of the sensor. The resistance change is measured by the ABL 50 / RAM 50's integrated circuitry, converted to a equivalent gas concentration, and then displayed on a meter.

Although the sensor response is optimized for CO detection, it will respond to other oxidizable gases. It also shows a slight response to water vapor; therefore, if the ABL 50 / RAM 50 is used to monitor air lines where the air has been dried (less than 50% RH), a humidifying system (GFC number 2610-001) should be used to supply water vapor to the air reaching the sensor.

Overview

From the respiratory air line, the air to be monitored enters the ABL 50 / RAM 50's regulator filter where 99.99% of all oil and dirt are removed. Oil vapors and other liquids drop to the bottom of the bowl and are automatically drained. The air pressure is then reduced to 10 psi at the pressure regulator. After the gas passes through the check valve and the 1/16 I.D. tubing, its flow rate is set at 0.5 SCFH by the flow meter. The air then proceeds to the conduit where the sensor monitors the air before it exits to the atmosphere.

Description

The ABL 50 / RAM 50 is housed in a polyester fiberglass NEMA-4 case. All of the electronic controls and indicators are mounted behind a window in the hinged door to provide protection for the circuitry. A cover latch permits quick access to the interior for calibration or adjustment, and may be secured with a small padlock.

Switches

There are three switches that allow operator control of the ABL 50 / RAM 50 functions.

ALARM ON Switch (white)

The ALARM ON switch, when depressed, permits the alarm relay to be energized. The red jewel light on the cover operates whether the ALARM ON switch is activated or not.

PURGE Switch (yellow)

The momentary PURGE switch initiates the purge cycle when depressed. During the purge cycle, the sensor temperature is elevated above normal operating temperature to clean and condition the catalytic surface of the sensor to ready it for normal operation. The unit automatically goes into a purge cycle when power is applied to the unit, or when power is restored after an interruption of more than two minutes.

TEST Switch (orange)

The momentary TEST switch connects a parallel resistance across the sensor to simulate a gas load. It is used to check circuit and alarm function, and for a rough calibration check.

Indicators

There are four indicators that display the status of the ABL 50 / RAM 50.

Alarm (red)

The red jewel alarm light on the cover goes on whenever the instrument reading exceeds the alarm threshold. It operates regardless of whether the ALARM switch is in or out. The bulb may be replaced from the front of the case by unscrewing the red jewel.

Alarm On (white)

The "alarm on" indicator shows that the ALARM ON switch is in and serves as a pilot light to show that the unit is fully operational. The switch is left in the depressed position during normal operation.

Purge (yellow)

The purge indicator shows that the unit is going through a purge cycle. None of the alarms are operative during the purge cycle.

Fault (orange)

The fault indicator is tripped when the basic sensor readout circuit is out of normal operating range. This condition could be caused by a sensor open circuit, heater failure, or amplifier failure. The indicator function and the switch function are not related.

Controls

Three controls regulate the ABL 50 / RAM 50's operational accuracy.

Calibration Control

The calibration control is used to set the unit's CO readout relative to a calibration gas. Under normal conditions, the calibration control should be the only control adjusted during calibration.

Alarm Set

The upper trim pot is used to set the alarm threshold. The alarm point may be set at any point on the meter scale.

Zero Control

The lower trim pot is used to set the circuit zero point. Normally, it should be adjusted only in clean air, and only if a large adjustment has been made in the calibration control. The zero control is electronically independent of the gain control, but a large adjustment of gain may change the clean

air voltage output enough to require resetting of the zero control.

Installation Mounting

The ABL 50 / RAM 50 should be mounted in a vertical position for the flow meter to indicate the correct reading. The NEMA case provides four holes for mounting.

Connecting to the air line

Install into the air line a pipe fitting (such as a pipe tee) that will supply a small flow of air through the unit. Connect the small air flow line to the ABL 50 / RAM 50's regulator by means of a male 1/8" NPT fitting.

Connecting to power

Connect 110 VAC, single-phase power to the terminals on the upper terminal board (TB1 - refer to figure 2). Strip the ends of the wire to 1/4" exposed conductor, slip the bare wire under the clamp plates provided on the terminals, and securely tighten the screws.

To convert to 12 VDC operation, connect the 12 VDC supply to the DC IN terminals (shown in figure 2).

CAUTION: REVERSAL OF THE POLARITY WILL PERMANENTLY DAMAGE THE UNIT.

Connecting To Alarm Terminal Board

A conduit hole is provided in the bottom of the case for external alarm wiring. Remove the hole plug by unscrewing the wing nut and insert an appropriate conduit fitting.

On the lower terminal board (TB2 - see figure 4) are the relay outputs for connecting the external alarm. These relays are rated at 2 amperes. If more current is required to operate alarm or ventilating equipment, these may be used as pilot relays to activate higher current relays to control those devices.

Operation

Apply power to the unit (either 110 VAC or 12 VDC). The purge light should activate and remain on for about five minutes. Depress the TEST switch; the meter should go upscale and the alarm light should go on. Release the TEST switch and depress the ALARM ON switch; the pilot light (white) should go on. Press the TEST switch again; the alarm relay should be engaged. This will be indicated by a click, and any external alarm should be activated.

Calibration

The following procedure requires the use of GfG's number 7701-001 calibration connector, and a known concentration of carbon monoxide in air, such as GfG's number 7802-001 test gas (or calibration kit number 7701-002).

Connector preparation

Unlike ambient air, standard calibration gas mixtures are bone-dry. Attempting to calibrate the ABL 50 / RAM 50 without humidifying these mixtures will cause a significant error to be introduced into readings of compressor air with a normal level of humidity.

The GfG calibration connector contains a moisturizing section to humidify calibration gases. This section should be dampened slightly with water. Distilled water is recommended so as not to introduce any potential contaminants into the calibration gas. Be sure to shake out any excess water before using the connector.

NOTE: At least 50% relative humidity must be provided to standard gases to avoid introducing error into ABL 50 / RAM 50 calibrations.

Procedure

NOTE: Do NOT purge the ABL 50 / RAM 50. If the unit has just been purged, wait at least two hours for the sensor temperature to stabilize before attempting to calibrate it.

1. Attach the calibration connector to the tank of gas that will be used to set the instrument.
2. Open the flow meter valve (#7, figure 1) to its maximum reading so that the pressure from the calibration gas tank will not build up in the flow meter and vinyl tube lines (a tank of calibration has a normal filled pressure of 240 psi).
3. Close the regulator valve to shut off the air flow from the respirator line to the ABL 50 / RAM 50 (number 3, figure 1).
4. Attach the quick disconnect end of the calibration connector/gas to its mate on the ABL 50 / RAM 50 (number 10, figure 1). Open the connector valve gently until the flow rate is approximately 0.5 SCFH.

5. Turn control number 15 full counter clockwise, and then turn control number 16 full clockwise.
6. After 1.5 - 2 minutes, turn control number 15 until meter number 17 reads 40 then turn control number 16 back until meter number 17 reads 20.
7. Turn test gas off and remove from quick disconnect, turn regulator number 3 on until flow meter number 7 reads between .5 and .8.
8. Recheck after 30 minutes and adjust control number 15 as needed.

Sensor replacement

Open the cover of the sensor conduit by removing its two retaining screws. Remove the sensor by grasping it by the sides and gently pulling it out of the socket on the conduit cover. Plug a new sensor into the socket, taking care not to press on its screen.

Replace the cover and put the ABL 50 / RAM 50 through several successive purge cycles. Allow the unit to stabilize for approximately 24 hours, under power, before calibration. Calibrate unit as described in Calibration Section.

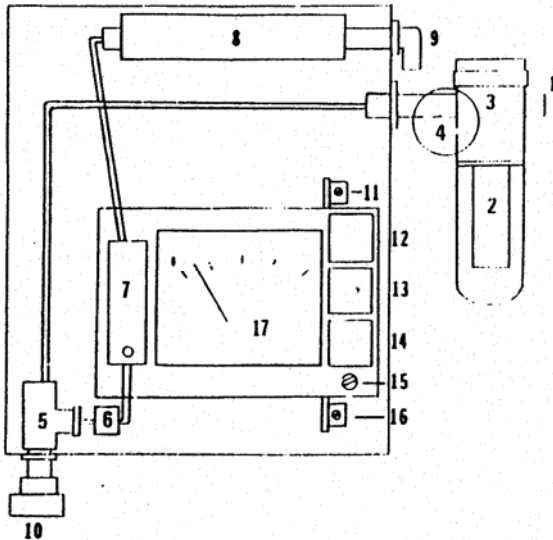
Maintenance

The sensor should operate continuously for more than three years. However, it is recommended that the unit's calibration be checked at least once a month to assure correct operation. While checking the calibration, the regulator filter should also be inspected to determine if it needs cleaning or replacement.

If the optional humidifier is used, it must be filled with water as required.

To replace the alarm light, unscrew the red jewel from the front of the case and insert a new bulb (GfG part number 2401-002) into the socket. To replace the indicator light bulbs, pull up the colored covers to the illuminated switches with the fingers or a thin bladed screwdriver. Be careful not to lose the white plastic light diffusers or film legends. Push a short length of 1/4" diameter vinyl tubing over the end of the wedge base bulb and pull the bulb out. Insert the bulbs (GfG part number 2401-001) using the same piece of tubing as a tool.

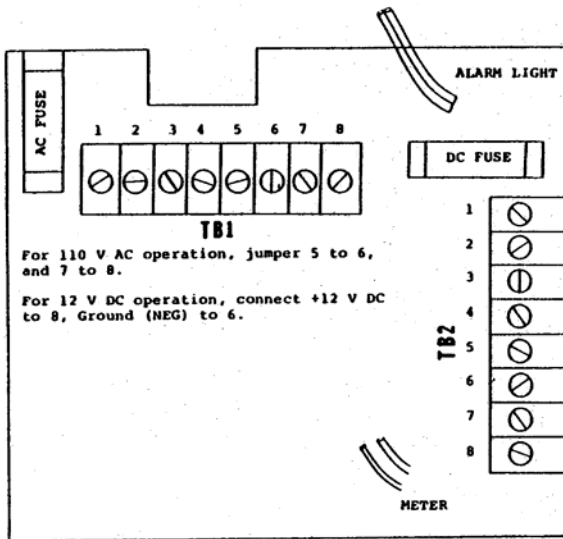
Figure 1



- | | |
|--------------------------------|---------------------------------------|
| 1. Air inlet (1/8" female NPT) | 10. Quick disconnect test gas fitting |
| 2. Coalescing filter | 11. Alarm set adjustment |
| 3. Regulator | 12. Illuminated alarm circuit |
| 4. Regulator gauge | 13. Illuminated purge switch |
| 5. Check valve | |
| 6. Air fuse | |

- 7. Flow indicator
- 8. Sensor conduit
- 9. Air outlet to atmosphere
- 14. Illuminated fault light and test switch
- 15. Calibration control
- 16. Zero set adjustment CO level meter

Figure 2



AC Fuse 1 ampere 3AG (AGC)

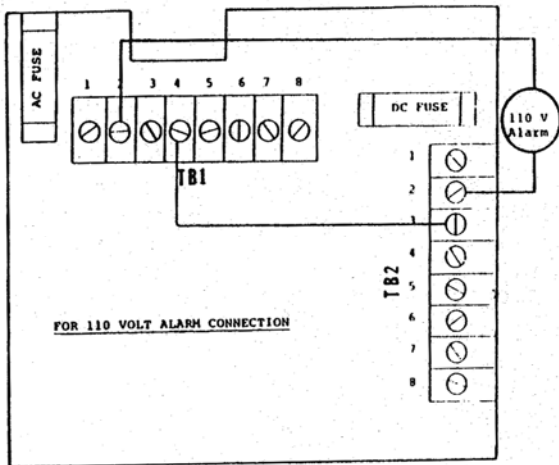
CD Fuse 2 1/2 ampere 3AG (AGC)

TB1

- 1 – Safety ground IN
- 2 – 110 VAC low IN
- 3 – 110 VAC high IN
- 4 – 110 VAC high fuse out
- 5 – 14 VDC ground out
- 6 – 14 VDC ground in
- 7 – 14 VDC positive out
- 8 – 14 VDC positive in

TB2

- 1 – Alarm NC
- 2 – Alarm NO
- 3 – Alarm common
- 4 – + Recorder out, 0-1mA
- 5 – -Recorder out, 0-1 mA
- 6 – Fault common
- 7 – Fault NO
- 8 – Fault NC

Figure 3

110 VAC External Alarm Connection Diagram

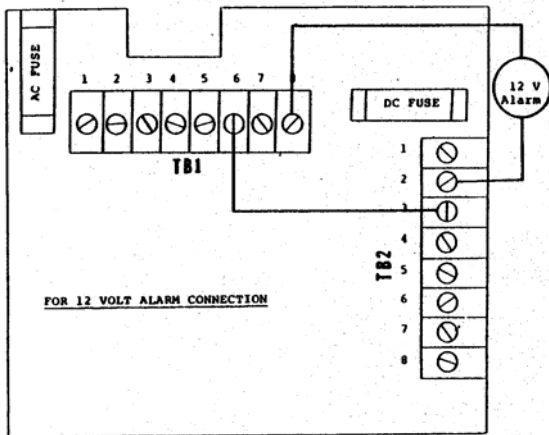
TB1

- 1 – Safety ground IN
- 2 – 110 VAC low IN
- 3 – 110 VAC high IN
- 4 – 110 VAC high fuse out
- 5 – 14 VDC ground out
- 6 – 14 VDC ground in
- 7 – 14 VDC positive out
- 8 – 14 VDC positive in

TB2

- 1 – Alarm NC
- 2 – Alarm NO
- 3 – Alarm common
- 4 – + Recorder out, 0-1mA
- 5 – -Recorder out, 0-1 mA
- 6 – Fault common
- 7 – Fault NO
- 8 – Fault NC

Figure 4



12 VDC External Alarm Connection Diagram

TB1

- 1 – Safety ground IN
- 2 – 110 VAC low IN
- 3 – 110 VAC high IN
- 4 – 110 VAC high fuse out
- 5 – 14 VDC ground out
- 6 – 14 VDC ground in
- 7 – 14 VDC positive out
- 8 – 14 VDC positive in

TB2

- 1 – Alarm NC
- 2 – Alarm NO
- 3 – Alarm common
- 4 – + Recorder out, 0-1mA
- 5 – -Recorder out, 0-1 mA
- 6 – Fault common
- 7 – Fault NO
- 8 – Fault NC

Guide to troubleshooting The new installation

Over the years, GfG Instrumentation distributors and personnel have assisted customers with ABL 50 / RAM 50 installations that appeared to be malfunctioning. By compiling the problem solutions from the troublesome installations, it has been possible to make a list of the most common problems and solutions which can be encountered in a new ABL 50 / RAM 50 installation.

Shown below are conditions, which you may encounter. They are listed in order of frequency:

1. READING IS TOO HIGH - unit alarms during OFF shifts or when breathing air is not in use.

The ABL 50 / RAM 50 is designed for continuous use. When it is not in use, it should be shut down both electrically and pneumatically. It is particularly important that air flow not be stopped if unit is still energized; stopping the air flow will not harm the unit, but the heat from the sensing element will not be carried away and the increasing residual temperature

in the instrument will result in an elevation of the readings. This process may take many hours, but eventually the unit will alarm. Properly utilized, the ABL 50 / RAM 50 should be kept operational 24 hours a day with the air sample being continual. Where interrupted operations (1-shift) are in use, simply shut the unit off electrically until needed again. Where unit is turned off frequently, there should be an allowance for a 15-20 minute start-up time (PURGE cycle).

2. READING IS TOO HIGH - Constantly or cyclic in nature.

Most often, a properly installed ABL 50 / RAM 50 which reads too high is in fact "reading" air contamination from carbon monoxide or hydrocarbon oils. In most cases, the compressor is functioning properly, but the intake air to the compressor is contaminated. The most common sources of contamination are noted below:

- A. Compressor intake is inside a building where fuel-burning trucks and Hi-Lo's are in use.
- B. Process and maintenance materials are stored in the proximity of an internal compressor intake.
- C. Compressor intake is outside of the building but downwind or in close proximity of contaminated vents.

NOTE: Cyclic high readings are commonly caused by this problem. Do not overlook your neighbor who may be venting paint fumes, heat treat fumes, engine exhausts, furnaces, etc.

NOTE: Cyclic high readings are commonly caused by this problem. Do not overlook your neighbor who may

be venting paint fumes, heat treat fumes, engine exhausts, furnaces, etc.

- D. Pipe dope on plumbing has not cured. Teflon tape pipe seal is the preferred thread seal to avoid air contamination.
 - E. Oil has accumulated in the air lines and is releasing hydrocarbon fumes.
3. READING HIGH OR LOW - Instrument not responding.

Although not the most common problem, it is not unusual for a new instrument to be the victim of human curiosity. The factory calibrated unit may have been "re-adjusted" sometime during unpacking or installation. Where there is any questions about calibration, it is recommended that it be checked as outlined in the manual.

4. INSTRUMENT IS NOT RESPONDING.

Humidity and humidification result in two potential problems. If your air is extremely dry (chemical desiccants or thermal "chillers" are used), it is possible that the air is too dry (30% humidity by volume is recommended). Humidity should be introduced for proper instrument accuracy.

NOTE: Air this dry is not suitable for your breathing apparatus.

A GfG humidifier will correct this problem for the instrument UNLESS it is installed backwards, which will fill the unit with water and damage the sensor.

5. HUMIDIFIED SYSTEM READS TOO HIGH.

Well water and city water both can contain low levels of measurable contaminants. Use distilled or deionized water in humidifiers if your local water is producing a "reading".

6. INSTRUMENT'S REMOTE APPARATUS NOT FUNCTIONING.

Hookups to remote alarms or readouts are common. Incorrect hookup can result in a variety of problems which can be damaging to the monitor. If the unit has external devices, it is imperative that installation be reviewed to determine if it is, or temporarily was, defective. Fuses and diodes protect the basic circuits; but in some cases, the units are damaged and require electronic repair.

7. INSTRUMENT NOT FUNCTIONING.

Way down our list, fortunately, is the situation where an instrument is damaged or defective. The two known causes for new installation failures result from handling in transit to your job site and actual "infant failure" of solid state devices.

The ABL 50 / RAM 50 is a very durable instrument and will seldom be damaged except by clearly negligent handling; look for physical damage to the case. In the case of solid state "infant failure", we observe established procedures of run-in and seasoning. Incidence of "infant failure" is very low.

Over 90% of all troubles will be corrected by thorough evaluation and correction of the first three items on this list.

After thorough evaluation of those items and the others listed, you may wish to contact your distributor or GfG directly.

Replacement parts for ABL 50 / RAM 50 / RAM 50

DESCRIPTION	STOCK NO.
CO sensor - solid-state	5501-001
Check valve	2604-003
Filter/regulator	2608-001
Regulator gauge	2901-002
Flow meter	2902-001
Panel meter	2903-001
Illuminated switch bulb	2401-001
Alarm light bulb	2401-002
Alarm light jewel lens	2403-001
Line cord	6002-001
PC board - side	1702-001
PC board - back	1702-002
Fuse - AC 1 amp 3AG	5105-001
Fuse - DC 2.5 amp 3AG	5105-002
Filter replacement for filter/regulator (new regulator - filter number 2609-015)	2601-005
Test gas - 20 PPM carbon monoxide	7802-001
Test gas - impurity-free air	7802-006
Humidifier (optional)	2610-001

NOTE: PLEASE USE STOCK NUMBER WHEN ORDERING PARTS.

Warranty

GfG Instrumentation, Inc. warrants each new electrical product manufactured by it to be free from defective material and workmanship and that all such product is warranted as to its merchantability and fitness for the purpose intended, for a period of one (1) year from the date of sale to the original purchaser, and agrees to remedy any such defect or to furnish a new part (at the company's option) in exchange for any part of any product of its manufacture which under normal use and service disclosed such defect; provided the product is delivered by the purchaser to GfG's factory intact for our examination, with all transportation prepaid to our factory, provided that such examination discloses, in our judgment, that it is defective.

This warranty does not extend to any products which have been subjected to misuse, neglect, accident, unauthorized modifications or to use in violation of instructions furnished by us, nor does it extend to products which have been repaired or altered outside of our factory. THIS WARRANTY IS IN LIEU OF ALL WARRANTIES EXPRESS OR IMPLIED AND NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO ASSUME FOR US ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF OUR PRODUCTS. ALL IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY. IN NO EVENT IS GFG, INC. LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH OF WARRANTY OF PRODUCT.



GfG Instrumentation