

# RAM 9025-XPS

## Operation Manual



**GfG Instrumentation**

Worldwide Manufacturer of Gas Detection Solutions



# TABLE OF CONTENTS

## RAM 9025-XPS

<b>For Your Safety</b> .....	<b>3</b>
<b>Description</b> .....	<b>3</b>
Setup Mode.....	4
Lights/Alarms .....	4
<b>Operation</b> .....	<b>5</b>
<b>Calibration</b> .....	<b>6</b>
Calibrating Carbon Monoxide Sensor with CO Test Gas .....	6
Manual Calibration of Oxygen Sensor .....	8
“ZERO/CAL” Adjustment for Carbon Monoxide .....	8
<b>Maintenance</b> .....	<b>9</b>
Oxygen Sensor Replacement.....	9
Carbon Monoxide Sensor Replacement .....	10
<b>Cleaning</b> .....	<b>11</b>
<b>Troubleshooting</b> .....	<b>11</b>
Zero Fail During CO Calibration .....	11
Calibration Gas Fail During CO Calibration.....	11
<b>Accessories and Field Replacement Parts</b> .....	<b>14</b>
<b>Replacement Parts</b> .....	<b>14</b>
<b>Equipment Technical Data</b> .....	<b>14</b>
<b>Warranty</b> .....	<b>16</b>

## For Your Safety

Like any piece of complex equipment, the GfG Instrumentation 9025-XPS series will do the job it is designed to do only if it is used and serviced in accordance with the manufacturer's instructions. All individuals who have or will have the responsibility of servicing the equipment must carefully read this manual.

The warranties made by GfG Instrumentation with regards to this instrument are voided if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and others who depend on this instrument by following these instructions. The above does not alter statements regarding GfG Instrumentation's warranties and conditions of sale and delivery.

**CAUTION: Protection will be impaired if used in a manner not specified by the manufacturer.**

## Description

This unit is designed to provide continuous monitoring of carbon monoxide and oxygen levels in breathing air.

The instrument's electronics are enclosed in a weatherproof case. The case is corrosion resistant, positively pressurized by the compressor supply line, and sealed except for a bleed hole (to release the compressor's air). The unit operates on an internal 12 VDC power module. It comes equipped with a case-mounted horn and alarm light.

Calibration adjustment controls are not necessary since they are automatically performed by the microprocessor.

The carbon monoxide chemical cell has a life expectancy of one to three years with a recommended 30-day calibration check. The oxygen sensor has a life expectancy of 12 to 18 months and may require periodic calibration.

## Setup Mode

By briefly pressing the bottom switch it is possible to cycle through the setup parameters. Each time the bottom switch is pressed the display screen will identify the selected mode and indicate the current setup.

The following paragraphs outline the setup modes and options available. In each mode it is possible to change the setup using the top switch.

## Lights/Alarms

### **YelLxx.x**

-Low oxygen alarm, factory set to 19.5% volume.

### **YelHxx.x**

-High oxygen alarm, factory set to 23.5% volume.

### **AutoC ON/OFF**

-Set to on, the oxygen sensor will auto-calibrate every 24 hours.

### **CO Alm - XX**

-The CO alarm point in parts per million, factory set to 10 ppm.

### **Cal**

-The parts per million of carbon monoxide to be used for calibration is displayed (i.e. CO - 20).

**NOTE: This setup must be identical to the ppm concentration of the carbon monoxide calibration gas (5-100 ppm CO).**

The carbon monoxide test gas concentration may be set from 5 to 100 ppm and is factory set to 20 ppm. It is important to use the same test gas as the "CAL" setting, otherwise the calibration will fail due to the error protection feature.

Changing the calibration gas to another value will require the monitor to zero cal. Then it will be necessary to calibrate the monitor with the new test gas concentration.

## CO # RLY

-The carbon monoxide alarm relay can be enabled (ON) or disabled (OFF) in this mode. The top switch will change this option.

Setting the relay ON or OFF permits the red alarm light connected to the monitor to be shut off if it is not needed. During calibration it will be automatically shut off.

**Test Mode** Activates audible alarm, alarm light, and solid squares on the LCD readout when the top switch is pushed.

The alarm horn and light may be tested by pressing and holding the top switch while in alarm test setup mode.

## Operation

Flip the toggle switch to the “on” position and the display will show introductory messages and a warm-up countdown. If the unit does not power up, charge the battery by plugging in the battery charger to the charging jack on the side of the unit (see Charging Monitor). If start-up does not occur, call the factory.

After the warm-up countdown, the instrument will display CO and O<sub>2</sub> readings, and the green “Safe” indicator light should be on. The monitor air regulator may be adjusted at any time to set the flow level from 0.5 to 0.9 CFH as indicated in the flowmeter sight window. If the **low flow** indication shows on the display, make sure the supply air is set to the operational range of 80 to 150 psi.

**NOTE:** Free flowing two masks can drop the pressure below the alarm setpoint and activate the audible and visual alarms.  
**Masks should not be left free flowing.**

**CAUTION:** If the unit is reading a carbon monoxide gas level, do not make any adjustments for a few minutes until the unit has settled in. A zero calibration should be attempted to reset the CO reading to 0 ppm.

If the carbon monoxide gas readings remain high or below zero (-0), recalibration may be needed. We also recommend checking the compressor's air intake, which may be the cause of high readings. Outside air intake is recommended, but can easily be contaminated by furnace exhaust, building vents, parking lots, etc. Intakes within the building are to be avoided because they often contain low ppm levels of carbon monoxide.

The oxygen sensor may require manual calibration if the oxygen reading is greater than +/- 0.5% of 20.9% volume.

## Calibration

### Calibrating Carbon Monoxide Sensor with CO Test Gas (recommended every 30 days)

Although the unit is calibrated at the factory, it may require carbon monoxide recalibration due to handling. The only way to ensure that the sensor is operating properly is to test it with calibration gas.

To calibrate the unit with carbon monoxide test gas, shut off the air from the compressor supply line and a **LOW FLOW** message will appear. Assemble the calibration kit and connect the tank of test gas to the calibration port connector on the instrument. Open the gas valve (use only the fixed flow regulator provided with the calibration kit). The display will read "CAL GAS" and a 60 second countdown will begin.

If the compressor air supply line is not shut off, a message will appear: **SUPPLY OFF**. If such a message occurs, shut off the supplied air and then begin the calibration process again to activate the calibration port switch.

After 60 seconds some informational numbers may appear on the display of the monitor. These numbers are for factory evaluation and troubleshooting. If the correct calibration gas is being used and the monitor is working correctly it will automatically calibrate.

After the unit auto calibrates, a message will appear: **CO G SET**, indicating that the CO gain adjustment has been set for 20 ppm.

If an incorrect gas concentration is used or the sensor and/or instrument is not properly functioning, a message will appear: **CO G FAILED, PREV CAL, END CAL**. This affords improper calibration protection and an effort should be made to understand why it did not calibrate (see troubleshooting section for assistance).

After proper calibration, the next messages will be **REMOVE CALIBRATION GAS, END CAL, SUPPLY ON**. This prompts the calibrator to remove the test gas and turn the supply on at the regulator.

The oxygen sensor has a special AutoCal<sup>®</sup> mode that activates calibration every 24 hours. The instrument is shipped with this mode disabled. This function (when enabled) will reset the oxygen sensor to 20.9% volume. If the required adjustment is greater than +/- 0.5% volume, the unit will return to its previous calibration. If the oxygen sensor does not calibrate, a new sensor may be required. During the AutoCal<sup>®</sup> period, alarms will be de-activated for 15 seconds.

When oxygen levels of supplied air are normally 20.9% volume, and the monitor is to be operated for more than a 24 hour period continuously, the unit may be set to AutoCal<sup>®</sup> oxygen ON.

## Manual Calibration of Oxygen Sensor

To set the oxygen at 20.9% volume and carbon monoxide to zero, follow the instructions for “ZERO/CAL” adjustment for carbon monoxide below.

### “ZERO/CAL” Adjustment for Carbon Monoxide

The carbon monoxide read-out (ppm) will be “0” in the absence of carbon monoxide. This “0” can be calibrated by flowing clean air over the sensor and activating the ZERO/CAL set switch.

The “ZERO/CAL” switch is activated through a small hole in the face of the unit using a bent paper clip or similar thin wire or tool.

Two methods are available to check or set the carbon monoxide ZERO/CAL.

With normal flow through the unit from a clean air supply depress the ZERO/CAL switch and hold until the carbon monoxide read-out stops flashing (about 3 seconds) and then immediately release the switch.

The auto zero process will begin immediately. If the supply air is clean the display will indicate **CO SET, END CALIBRATION** which indicates that a zero setting has been accepted and is now in use. If the supply line has more than a trace of carbon monoxide, the following messages will appear: **BAD O AIR, PREV CAL, END CAL**. The instrument is informing the user that it will not calibrate because of bad zero air and it will use its previously zeroed calibration setting.

The other method to zero the unit is to supply zero test gas (impurity free air) to the calibration port in the same manner as described above with calibration gas, and the unit will initiate its calibration gas routine. However, the unit expects that 20 ppm CO is being applied to the calibration port unless the zero switch is pushed. Check to see that the message says zero gas instead of calibration gas as the 60 second countdown proceeds. At any time during the countdown the zero switch may be pushed to calibrate the unit with zero gas. If the

switch is not pushed, a cal fail message will appear, resulting in a return to the previous calibration. After the zero switch is pressed, a **ZEROING** message appears and then **RELEASE UNLESS ZERO INIT** message.

Holding the zero switch for 15 seconds will reinitialize the unit. This step is used when replacing a sensor or as discussed in the troubleshooting section. Do not ZERO INIT unless instructed to do so in the troubleshooting section.

### **Maintenance (qualified technicians only)**

**NOTE: Except for the sensors, all internal parts are to be serviced only by the factory or its authorized agents.**

#### Oxygen Sensor Replacement

The oxygen sensor output will eventually reach a low level where it will be unstable and calibration will not be possible. To replace the sensor, turn off the power to the unit and remove the four corner screws and the electronics front cover. Next, remove the three screws that hold the sensor block and unplug the O<sub>2</sub> sensor from its socket. Replace with a new sensor. Reassemble the unit and turn the unit back on.

1. Push the top of the two set-up mode switches and the display will read **O2 XXX**.
2. Adjust the control pot to obtain a reading of **O2 200** (the control pot is located on the display board- right hand corner bottom pot).

Push the bottom setup switch to return the instrument to normal display mode.

1. Let the new sensor settle in for an hour prior to calibrating.
2. Follow ZERO/CAL instructions to reset the sensor to 20.9% volume.

### Carbon Monoxide Sensor Replacement

When CO test gas fails to show a gas response during calibration, a new sensor is required. Most CO sensors will last from one and a half years to three years.

To replace the sensor, turn off the power to the unit and remove the four corner screws and the electronics front cover. Next remove the three screws that hold the sensor block and unplug the CO sensor from its socket. Install a new sensor after **being sure that the shorting wire is removed** from the new sensor. Reassemble the unit and turn the unit back on. Let the new sensor settle in for an hour before calibrating.

### A NEW SENSOR MUST BE INITIALIZED

When calibrating a new sensor, an initializing step is added to the procedure. This permits the sensor to be zero calibrated regardless of the background air and caution must be taken that the air is free of carbon monoxide. If the supply line is not CO free, then obtain a tank of impurity free air test gas from GfG (stock number 7802-006).

To initialize the unit, hold the ZERO/CAL switch for 15 seconds (air supply OFF). During the fifteen seconds, messages will read: **ZERO CAL, RELEASE UNLESS ZERO INT, INIT-ING.** Release the zero set switch when INIT-ING appears and the display will read: **ZERO GAS REQUIRED.**

Supply clean air from either the supply line or calibration port and the unit will set its ZERO/CAL after 60 seconds. The instrument message will then read **CAL GAS REQUIRED.**

Supply 20 ppm calibration gas (or another value selected in the setup mode on the unit) until the display reads **END CAL, REMOVE GAS, SUPPLY ON.** After turning the air supply on, the unit will reset the error protection and monitor the carbon monoxide of the compressor air supply line.

## Cleaning

The casing can be cleaned with a damp cloth. Never use solvents or detergents!

## Troubleshooting

### Count Numbers

A number is displayed after CO calibration. This number is there to assist in troubleshooting in case zero or calibration fails or other malfunctions occur.

### Zero Fail During CO Calibration

If a failure occurs during CO zero calibration, a **BAD AIR** message occurs and the zero air should be checked for CO content. It may be a malfunctioning unit or during initial zero calibration (without the error protection), it could have been zeroed with a contaminated gas sample.

Another initialization with known zero air may solve the issue. If the monitor will not zero, the unit is malfunctioning; please call the factory for further instructions.

**CAUTION:** Be sure that the cylinder in use is “zero gas” impurity free air (standard air) when zero initializing.

### Calibration Gas Fail During CO Calibration

With 20 ppm CO calibration gas applied to the calibration port, the monitor should calibrate at the end of the 60 second countdown. If it does not, then use the appropriate procedure:

1. If the gas reading does not show any increase when the gas is applied, the sensor is probably expired or the test gas has a concentration of zero CO. Check the hose connections to assure that gas is flowing into the sensor chamber.

2. Check to make sure the calibration gas being used matches the gas indicated on the display of the monitor during the calibration countdown. Using a different concentration of calibration gas than is being shown on the display will result in a failure to calibrate (error protection). Also, make sure that the gas being used has not reached the expiration date or is very low in pressure.

## Charging the Internal Battery Pack

**CAUTION:** Do not force the plug into the jack. Line up the slot on the plug with the dimple on the jack; it only fits one way.

To charge the unit, connect the charging plug to the charger jack on the side of the case. Plug the charging module into an AC power source. The charging module LED will indicate power has been connected and the LED will flash red then green. Charging will begin indicated by a solid red LED. When charging is complete, the LED will change to solid green, and the charging module will go into trickle charge mode to maintain a full charge on the battery pack.

**CAUTION:** Use only the approved GfG charging adapter supplied for charging, GfG part number 4001-021.

## Filter System

### Overview

The filter system is comprised of a 3-stage filtering section specifically designed to purify compressor air so that it may be used in respiratory breathing systems. These systems will provide Grade D breathable air as long as they are maintained.

## Description

Compressor air enters the system and flows through the filter section, which consists of three filters. The first filter removes airborne particulates of 5 microns and traps moisture. An automatic float drain provides for water removal. The second filter removes 99% of liquid aerosols, both oil and water, and sub micron particulate from the air by coalescent action. An automatic float drain provides for removal of oil and water. The third filter removes gaseous hydrocarbons, taste and odor from the air by use of activated charcoal to comply with OSHA Respiratory Standard 1910.134 (i)(1)(ii)(B)-(E). Air leaving the third filter then passes through an air regulator to the CO/O<sub>2</sub> meter and breathing line regulator to the manifold with quick disconnects.

**NOTE:** Free flowing two masks can drop the pressure below the alarm setpoint and activate the audible and visual alarms.

**Masks should not be left free flowing.**

## Operation

Connect the air supply to the system inlet and set the breathing line regulator to the pressure recommended by the manufacturer of the respirator device. Adjust the pressure by rotating the knob on the breathing line regulator until the proper pressure is indicated on the gauge.

Connect the breathing line hoses to the outlet air quick disconnects.

Note: It may be necessary to readjust the manifold pressure after the respiratory air equipment has been attached.

## Maintenance

The filter system is equipped with a filter replacement indicator , which is located at the top of the second filter. This indicator will turn red when the filter is no longer operating efficiently. The expected filter life is 5,000 hours, however, the actual filter life may vary, depending on the contaminant levels in the air supply.

Note: The GfG filter system is designed to provide high quality breathing air and therefore recommends replacing all three filter elements each time the filters are replaced.

Pressure drop is the early warning indicator that the filter is becoming clogged and its efficiency is becoming impaired. When a pressure drop of 8-10 psi is indicated, the filters should be replaced. Ignoring pressure drop can result in poor air quality.

### Filter Replacement

1. Before replacing filters, remove the supply air from the system and depressurize the unit.
2. Unscrew threaded bowl.
3. Unscrew lower filter retainer and remove filter element.
4. Clean all internal parts and bowl before reassembling.  
(Note: to clean internal parts and bowl, use only mild soap and water. Never use cleaning agents such as benzene, acetone, etc. which are damaging to this plastic)
5. Install new filter element.
6. Screw on lower filter retainer and hand tighten firmly.
7. Screw bowl onto body.
8. Apply pressure and check for leaks. If leak occurs, shut off air supply, depressurize unit and correct leak.

## **Accessories and Field Replacement Parts**

### Accessories

Calibration kit (includes calibration connector and 20 ppm test gas 34 L) 7750-001

### Replacement Parts

CO sensor – chemical cell 5503-020  
Oxygen sensor 5701-011  
Filter kit (includes all three filters) 2609-25P  
Battery charging adapter 4001-021

### Test Gas

20 ppm carbon monoxide 34 L 7802-001  
Impurity free air 34 L 7802-006

## **Equipment Technical Data**

<b>Gases Detected</b>	<b>Carbon Monoxide</b>	<b>Oxygen</b>
-----------------------	------------------------	---------------

Sensor	Electrochemical cell	Electrochemical cell
Meter scale	0-100 ppm CO	0-25% volume
Response	90% maximum in 20 seconds	95% in 15 seconds
Accuracy, expected sensor life	+/- 1 ppm *1-3 years	+/- 0.1% volume 12-18 months
Sensor warranty	1 year	1 year
Factory set adjustable alarm points	10 ppm CO	19.5% low 23.5% high
Inlet pressure range	30 to 145 psig	
Sample flow rate	0.8 cubic feet of air per hour (scfh)	
Run time	>24 hours	
Power source	Internal Battery pack 12 VDC	
Fuse rating	Battery 3 A type 2AG Instrument 5 A type 2AG	
Dimensions	17x24x8 inches (HxWxD) (431x609x203 mm)	

\*Depending on operating conditions.

### Environmental Conditions

Operating temperature range	+41 to 104°F +5 to 40°C
Altitude	Up to 2,000 M
Pollution degree	2

## **Warranty**

GfG Instrumentation warrants our products to be free from defects in material and workmanship when used for their intended purpose, and agrees to remedy any such defect or to furnish a new part (at the option of GfG Instrumentation) in exchange for any part of any product that we manufacture that under normal use is found to be defective; provided that the product is returned, by the purchaser, to GfG's factory, intact, for our examination, with all transportation costs prepaid, and provided that such examination reveals, in our judgment, that it is defective.

This warranty does not extend to any products that have been subjected to misuse, neglect, accident, or unauthorized modifications; nor does it extend to products used contrary to the instructions furnished by us or to products that have been repaired or altered outside of our factory. No agent or reseller of GfG Instrumentation may alter the above statements.







## GfG Instrumentation

1194 Oak Valley Drive, Suite 20  
Ann Arbor, Michigan 48108 USA

Phone: (800) 959-0329 or (734) 769-0573

Fax: (734) 769-1888

E-mail: [info@gfg-inc.com](mailto:info@gfg-inc.com)

Web: [www.goodforgas.com](http://www.goodforgas.com)