

RAM 4021

Operation Manual



GfG Instrumentation

Worldwide Manufacturer of Gas Detection Solutions

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For your safety

Like any piece of complex equipment, the GfG Instrumentation RAM-4021 will do the job it was 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.

Description

General

This unit is designed to provide continuous monitoring of the carbon monoxide levels of breathing air.

The instrument's electronics are enclosed in a NEMA-4X polycarbonate case. The case is corrosion resistant, positively pressurized by the compressor supply line, and sealed except for a bleed hole to exhaust the compressor's air. The unit operates on 110V AC power. It comes equipped with a case mounted horn that may be disconnected if not required.

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

The carbon monoxide chemical cell has a life expectancy of two to three years with a 30-day calibration check recommended.

Set-up mode

By briefly depressing the bottom button it is possible to cycle through the set up parameters. Each time the bottom button is depressed the display screen will identify the selected mode and indicate the current set up.

The following outlines the set up modes and options available. In each mode it is possible to change the set up using the top button.

Annunciator lights/alarms

YelLxx.x – Caution alarm for low flow or first CO alarm (warn)

CO Alm - XX

-The alarm point in parts per million is displayed. (i.e. CO ALM 10).

Cal

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

NOTE: This set-up 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 because of the error protection feature.

Changing the calibration gas concentration to another value without calibrating will fault (FLT) the unit's reading.

The FLT message may be removed by returning to the calibration value prior to changing or calibrating with the new test gas concentration.

CO # RLY

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

Setting the relay ON or OFF permits any auxiliary device connected to them to be shut off if not needed. During calibration it will be automatically shut off.

Test mode Activates alarm, relays, LEDs, and solid squares on LED readout when top button is pushed.

The alarm horn and relays may be tested by pressing and holding the top button while in alarm test Set-Up mode. When testing an auxiliary horn, be sure the relay is turned ON.

Operation

Plug the unit into 110V AC and the display will show introductory messages and a warm-up countdown. If the unit does not power up, check the electrical connections and try re-plugging the unit. If the start up does not occur, call the factory.

After the warm-up countdown, the instrument will display CO readings. The air regulator may be adjusted at any time to set the flow level from 0.5 to 0.9 CFH. If the **low flow** indication shows on the display, increase the flow to 1 CFH; and then drop the flow to the operational range of .5 to .8 CFH.

CAUTION: If the unit is reading a carbon monoxide gas level, do not make any adjustment for a few hours until the unit has settled in. If calibration is attempted within the first fifteen minutes, a **TOO SOON** message will occur on the display.

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 for 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.

Calibration

Calibrating carbon monoxide sensor with CO test gas
(recommended every 30 days)

Although the unit was calibrated at the factory, it may require carbon monoxide recalibration due to handling. The only way to assure the sensor is operating properly is to place gas on it.

To calibrate the unit with carbon monoxide test gas, shut off the air from the compressor supply line with the regulator 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 count down will begin.

If the compressor air supply line was not shut off, a message will appear **SUPPLY OFF**. If such a message occurs,

shut off the supply air; and then begin the calibration process again to activate the calibration port switch.

After 60 seconds a gas reading will appear along with a count number. With 20 ppm test gas applied the gas reading should be 20 and the count 70. At 70 counts with 20 ppm CO the unit will automatically set.

The count number is also used for troubleshooting (see troubleshooting section). After the unit auto calibrates, a message will appear **CO G SET** indicating that the CO gain adjustment has been set for 20 ppm. Next an informational message on the automatic control pot value is displayed which also can be used in troubleshooting.

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 test gas and turn the supply on at the regulator.

"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" set switch is activated through a small hole in the face of the unit using a wire activator (bent paper clip).

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 closed until the carbon monoxide read-out stops flashing (about 3 seconds) and 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 zero calibrate because of bad zero air and it will use its previously zeroed calibration setting.

A second method for zeroing is to place zero test gas (impurity free air) in the calibration port in the same manner described previously with calibration gas, and the unit will initiate its calibration gas routine. However, the unit expects that 20 ppm CO is being applied in the calibration port unless the zero set switch is pushed. Check to see that the message now says zero gas instead of calibration gas as the 60 second countdown proceeds. At any time during the countdown the zero may be pushed to program the unit for zero gas. If the set switch is not pushed, a calibration failed message will appear resulting in returning to the previous calibration. This is the error

protection. After the zero button is depressed, a **ZEROING** message appears and then **RELEASE UNLESS ZERO INIT** message.

Holding the zero button for 15 seconds will reinitialize a unit, which is used when replacing a sensor or as discussed in the troubleshooting section. Do not ZERO INIT unless instructed to 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.

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 one-half years to three years.

To replace the sensor, disconnect the power to the unit, 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. Replace with a new sensor after **being sure that the shorting wire is removed** from the new sensor. Reassemble the unit and reconnect to power. Let the new sensor settle in for an hour prior to 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 needs to 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).

1. To initialize the unit hold the ZERO/CAL set switch depressed for 15 seconds. (airline OFF) During the fifteen seconds the 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.**

Flow 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 set up mode on the unit) until 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.

Trouble shooting section

Count numbers

Another set of numbers are displayed during CO calibration other than the gas concentration. These numbers are there to assist in trouble shooting in case zero or calibration fails or other malfunctions occur. These other numbers are called counts.

The CO zero calibration will not set if the counts are less than 46 or greater than 53; and when the unit sets at zero, the number will read 50 ± 1 counts. With 20 ppm CO calibration gas the count number will be 70 ± 1 to set. If the computer cannot auto adjust the readout to these values of 50 and 70, the zero or calibration will fail.

Zero fail during CO calibration

If a failure occurs during CO zero calibration, it means the counts are not between 46 and 53. If the counts are above 53, a **BAD AIR** message occurs and the zero air should be questioned for CO content. When the count level is below 46, it may be a malfunctioning unit or during initial zero calibration (without the error protection) it was zeroed with a contaminated gas sample.

Another initialization will remove the 46 to 53 count restraint, and with known zero air the unit may be re-zeroed. If the counts never reach 50, the unit is malfunctioning, call the factory for further instructions.

Calibration gas fail during CO calibration

With 20 CO ppm gas on the unit the reading should reach 70 counts. If the reading does not reach 70 counts, use the appropriate following procedure.

1. If the counts or gas reading do not show any increase when the gas is applied, probably the sensor is expired or the test gas is zero concentration. Check hose connections to assure gas is flowing into the sensor chamber.
2. If the counts are close to 70, a zero reinitializing with known zero gas will probably correct the problem. If the unit was initialized with more than a couple ppm of CO, the calibration will fail when 20 ppm test gas is applied.

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

Accessories and field replacement parts

Accessories

7750-001	Calibration kit (Includes calibration connector and 20 ppm test gas 34L)
2605-002	High pressure regulator (5000 PSI)
1301-002	Remote horn – 110V AC

Replacement parts

5503-020	CO sensor – chemical cell
2608-004	Regulator

TEST GAS

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

Equipment technical data

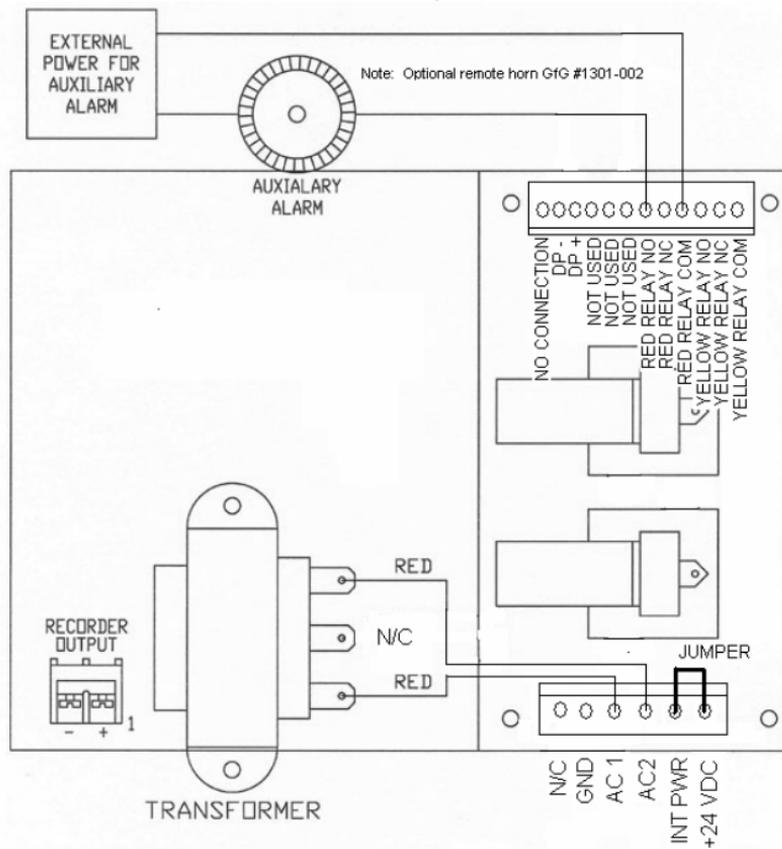
Gases detected	Carbon monoxide
Sensor	Electro- chemical cell
Meter scale	0...100 ppm CO
Response	90% maximum in 20 sec
Accuracy expected sensor life	+/- 1 ppm, 2-3 years
Sensor warranty's	1 year
Operating temperature range (sample air)	+ 32 °F to 105 °F
Factory set adjustable alarm points	5 ppm CO (Y) 10 ppm CO (H)
Standard inlet pressure	½" feed – 80 to 120 psig
Sample flow rate	0.5 cubic feet of air per hour (scfh)
Relays	
1 – Caution alarm	250V AC/30V DC @ 7 A
1 – CO alarm	
Power source	110V AC @ 1 A or 12V DC
Dimensions	7.3 x 5.9 x 4 inches (L x W x H) (185 x 150 x 101 mm)

Warranty

GfG INSTRUMENTATION, INC., warrants each new electrical product manufactured by it to be free from defective material and workmanship 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 thus defective.

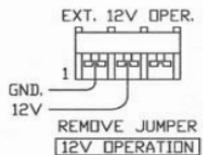
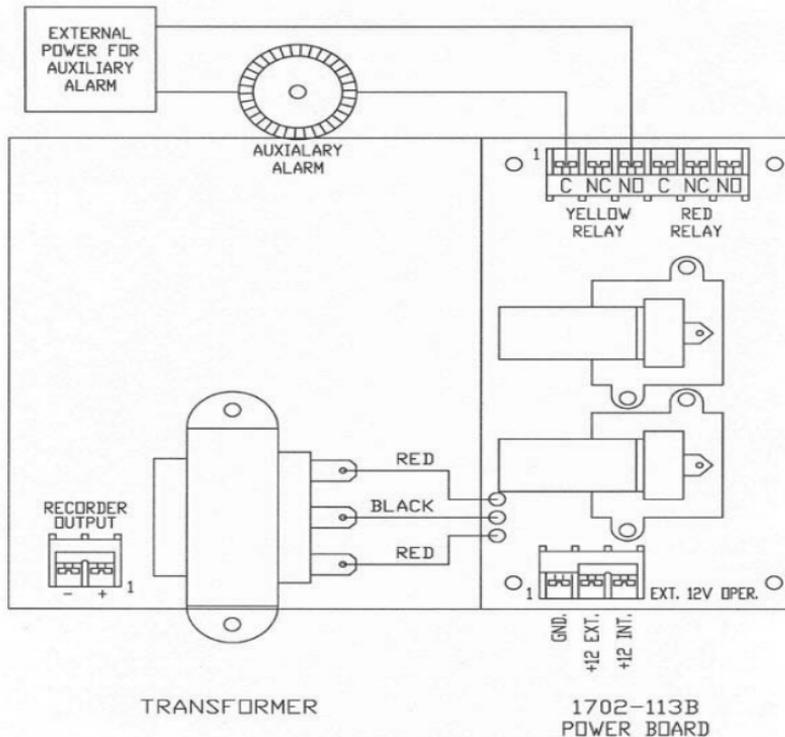
This warranty does not extend to any products that have been subjected to misuse, neglect, accident, unauthorized modifications, or to use in violation of instructions furnished by us, nor does it extend to products that have been repaired or altered outside of our factory. **This warranty is in lieu 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 INSTRUMENTATION, INC., liable for special, incidental, or consequential damages arising from any breach of warranty of product.**

New style



NOTE: Optional GfG remote horn part number 1301-002

Old style





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