RAM 4021-DPX

Operation Manual

GfG Instrumentation

Worldwide Manufacturer of Gas Detection Solutions

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ABL 4021-DPX / RAM 4021-DPX

For Your Safety

Like any piece of complex equipment, the GfG Instrumentation ABL 4021 / RAM 4021 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.

Description

General

This unit is designed to provide continuous monitoring of carbon monoxide and dew point levels in 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 release the compressor's air). The unit operates on 110 VAC power. It comes equipped with a case-mounted horn that can be disconnected if it is not required.

CAUTION: GfG Instrumentation recommends using PTFE Thread Sealant Tape on all pipe fittings and air line connections that require a sealant. Pipe dope or paste is not recommended due to the potential for off gassing that may affect the CO sensor performance.

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, depending on operating conditions, with a recommended 30-day calibration check. The dew point sensor has an expected life of one year and requires no calibration due to its automatic calibration feature.

Setup Mode

By briefly pressing the bottom button (see Diagram on page 12) it is possible to cycle through the setup parameters. Each time the bottom button is pressed the display screen will identify the selected mode and indicate the current setup. The top button will change the parameter.

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

Lights/Alarms

DPalm xx

- Dew point high relay setting (dryer failure alarm).

DLalm xx

- Dew point low relay setting (dryer control).

COalm xx

- The alarm point in parts per million is displayed.

CO xx

- The parts 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 due to the error protection feature.

CAUTION: Changing the calibration gas concentration to another value will require the instrument to be successfully zero and gas calibrated. Do not change the calibration gas concentration without having the proper equipment to perform a zero and gas calibration (see Calibration on page 5).

CO rly ACOM - ANO/ANC
- The carbon monoxide alarm relay (remote) can be enabled (ON) or disabled (OFF) in this mode. Setting the relay ON or OFF permits any auxiliary device connected to the monitor to be shut off if it is not needed. During calibration it will be automatically shut off.

DP rly WCOM - WNO/WNC
- Setting the relay ON or OFF permits any auxiliary device connected to the monitor to be shut off if it is not needed. Factory set to 10° F (dryer failure relay).

DL rly HCOM - HNO/HNC
- Used for controlling a dryer to cycle on/off at the set point, factory set to -4ºF.

Test Mode Activates alarm, relays, LEDs, and solid squares on the LCD readout when the top switch is pushed.

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

Operation

Plug the unit into a 110 VAC outlet 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 in the unit. If start-up does not occur, call the factory.

After the warm-up countdown, the instrument will display CO and dew point 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 0.5 to 0.9 CFH.

CAUTION: If the unit is reading a carbon monoxide gas level, do not make any adjustments 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), re-calibration 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.

Calibration

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.

"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, small wire, or suitable 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, press the ZERO/CAL switch momentarily.

NOTE: Holding the zero switch for 15 seconds will re initialize 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.

The auto zero process will begin immediately and display **ZEROING.** If the supply air is clean the display will indicate **CO SET, END CAL** 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 0 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 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 zeroing 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.

NOTE: Holding the zero switch for 15 seconds will re initialize 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.

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

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 DETECTED,** and then 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**, then **REMOVE CAL GAS**, indicating that the CO gain adjustment has been reset for 20 ppm. This prompts the calibrator to remove the test gas. Then a **LOW FLOW** message appears, prompting the calibrator to turn on the supplied air at the regulator.

If an incorrect gas concentration is used or the sensor and/or instrument is not properly functioning, a message will appear: **CAL 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).

NOTE: To restore dryer control relay operation, enter, scroll through, and exit the "Set up" menu after performing a calibration.

Dew Point Sensor Calibration

The dew point sensor does not require external calibration and will self calibrate periodically or after a severe humidity change. During the dew point sensor auto-calibration, the dew point reading will remain constant on the display until auto calibration is complete. The auto calibration process will take 2-3 minutes.

Maintenance (qualified technicians only)

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

Dew Point Sensor Replacement

The dew point sensor is shipped to you pre-calibrated; no user calibration is required. The dew point sensor will auto calibrate periodically during use. To replace the sensor, disconnect the power, unplug and remove the sensor from the dew point sensor chamber, replace the sensor, and reassemble the unit.

CAUTION: Attach to the analog connector only - do not use the digital connection.

Carbon Monoxide Sensor Replacement

When CO test gas fails to show a gas response during calibration, or the instrument will not complete calibration, a new sensor is required. Most CO sensors will last from one to three years, depending on operating conditions.

To replace the sensor, disconnect 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 reconnect it to power. Let the new sensor settle in for at least an hour before calibrating.

A NEW CO SENSOR MUST BE ZERO 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.

Troubleshooting

The CO zero calibration will not set if the there is CO gas present, or if the sensor or electronics are bad. Also, the instrument will not calibrate if the incorrect concentration of CO gas is used, or if the sensor is bad or beyond its usable life.

Zero Fail During 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 gas supplied to the unit, the reading should reach 20. If the reading does not reach 20, 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. If the reading is close to 20, a zero calibration procedure with known zero gas will probably correct the problem. If the unit was zeroed with more than 2 ppm of CO, the calibration will fail when 20 ppm test gas is applied.

Dew Point Fault (DPF)

If the display indicates "DPF" for the Dew Point reading, the Dew Point sensor has become unplugged, the cable is damaged, or the sensor has

exceeded its measurement range.

1. Check the cable connection to the Dew Point sensor for proper connection or damage.
2. Make certain that the supply air Dew Point is above -112 degrees F.

Accessories and Field Replacement Parts

Accessories

Calibration kit (includes calibration connector and 20 ppm test gas 34 L)	7750-001
High pressure regulator (5,000 PSI)	2605-002
Regulator for 4021 DPX	2605-014
Remote horn – 110 VAC	1301-002

Replacement Parts

Calibration regulator	7750-004
Dew point sensor	1702-DPX
Sensor – chemical cell	5503-020
Test gas – 20 ppm carbon monoxide 34 L	7802-001
Test gas – impurity free air 34 L (zero gas)	7802-006
Field Service Kit (includes both tubing assemblies, both pressure switches, and a flow meter	9000-4021

Equipment Technical Data

Gases Detected	**Carbon Monoxide**	**Dew Point**
Sensor	Electrochemical cell	Solid state Thin film type
Meter scale	0 to 100 ppm	-112 to +68°F
Response	90% maximum in 20 seconds	N/A
Accuracy	+/- 1ppm	+/- 3°F
Expected sensor life	*1-3 years	1 year
Sensor warranty	1 year	1 year
Operating temperature range (sample air)	+32 to 105°F	
Factory set adjustable alarm points	10 ppm CO	(H) +4°F (L) -10°F
Inlet pressure range	30 to 145 psig	
Sample flow rate	0.8 cubic feet of air per hour (scfh)	

Relays	
1 – CO alarm	
2 – dew point	250 VAC / 30 VDC @ 7 A
Power source	110 VAC @ 1 A or 12 VDC - 24 VDC
Dimensions	4x5.9x7.3 inches (101x 150x185 mm)(HxWxD)

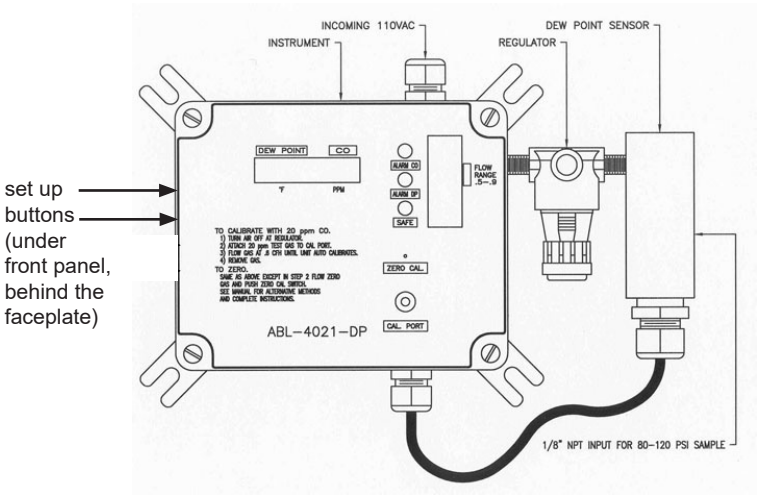
* Depending on operating conditions.

Warranty

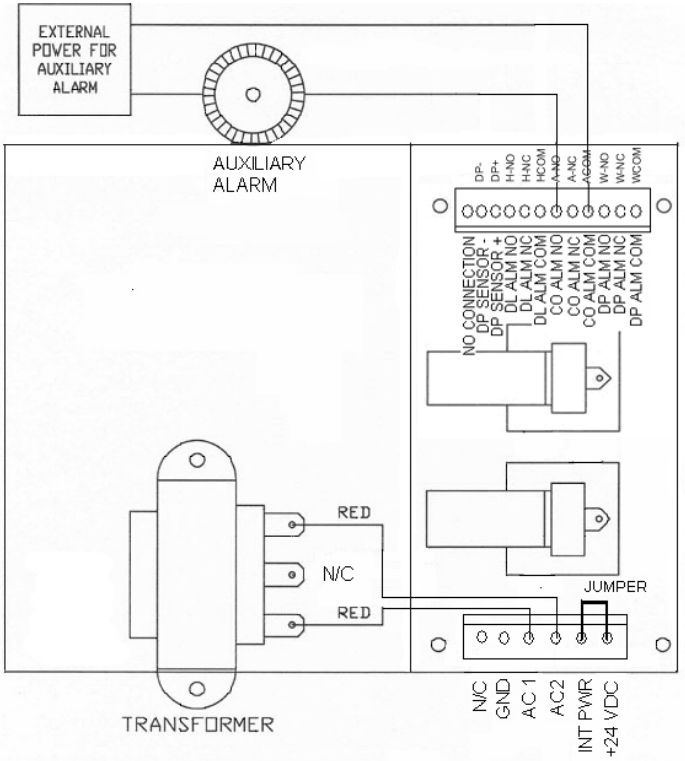
GfG Instrumentation warrants our products to be free from defects in material and workmanship when used for their intended purpose, and agrees to remedy any such defect or to furnish a new part (at the option of GfG Instrumentation) in exchange for any part of any product that we manufacture that under 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 re seller of GfG Instrumentation may alter the above statements.

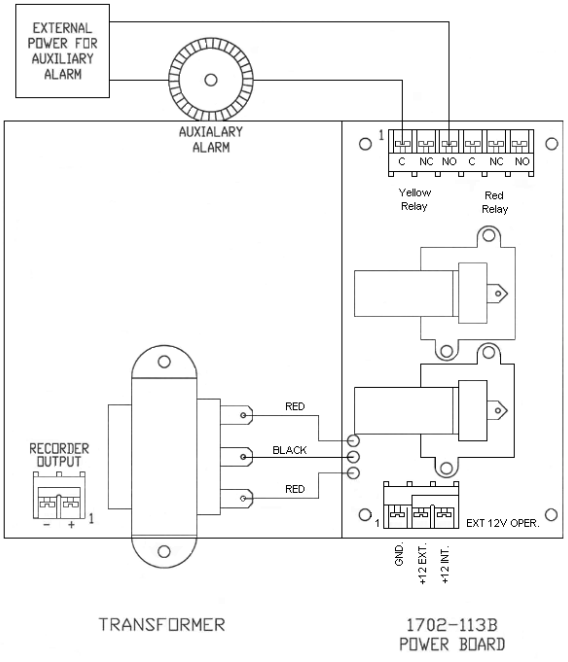
Figure 1
4021-DPX Diagram



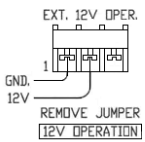
Wiring Diagram



Old Style Diagram



Manufactured before November, 2006.



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