Model 4802A

Zero Two Series Control Module
For Combustible Gas Applications

Instruction Manual **08/07**

Part No. MAN4802A-EU
Revision N/08.07

Warranty Statement

General Monitors warrants the Model 4802A to be free from defects in workmanship or material under normal use and service within two (2) years from the date of shipment. General Monitors will repair or replace without charge any such equipment found to be defective during the warranty period. Full determination of the nature of, and responsibility for, defective or damaged equipment will be made by General Monitors' personnel. Defective or damaged equipment must be shipped prepaid to General Monitors' plant or the representative from which shipment was made. In all cases, this warranty is limited to the cost of the equipment supplied by General Monitors. The customer will assume all liability for the misuse of this equipment by its employees or other personnel. All warranties are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without General Monitors' approval or which have been subjected to neglect, accident, improper installation or application, or on which the original identification marks have been removed or altered. Except for the express warranty stated above, General Monitors disclaims all warranties with regard to the products sold, including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of General Monitors for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the product.

Warnings

WARNING - COMBUSTIBLE & FLAMMABLE GASES AND VAPORS ARE VERY DANGEROUS. EXTREME CAUTION SHOULD BE USED WHEN COMBUSTIBLE & FLAMMABLE GASES AND VAPORS ARE PRESENT.

All Zero Two Series Modules contain components, which can be damaged by static electricity. Special care must be taken when wiring the system to ensure that only the connection points are touched.

Only Catalytic Bead sensors designed by General Monitors will work with the Model 4802A. Any attempt to use a sensor that has not been designed by General Monitors will void the warranty.

WARNING - Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

Full backward compatibility can be specified at the time of order. If this configuration is specified, the rear terminal output designations will be identical to the previous generation of Zero Two Series Modules.

This generation of product can be distinguished from the previous generation by the lack of a door on the front panel. Adjustments are not necessary on the current generation of this product.

E C Declaration of Conformity in accordance with EC & ATEX Directives

We at General Monitors Ireland Ltd., Ballybrit Business Park, Galway, Republic of Ireland, hereby declare that the equipment described below, both in its basic design and construction, and in the version or versions marketed by us, conforms to the relevant safety and health related requirements of the appropriate EC Directives, only as follows:

a) Conforms with the protection requirements of Council Directive 89/336/EEC, = Amd 92/31/68/EEC relating to Electromagnetic Compatibility, by the application of:

A Technical Construction File No. GM 97005 and Competent Body Certificate No. 4473-95-106 and Report No. 4473/1K8.

And

b) Conforms with the protection requirements of IEC 1010-1: 1990 + Amd 1:1992 +Amd 2: 1995 relating to safety by the application of:

A Technical Construction File No. GM 97005 and Competent Body Certificate No. 4146/699L-6870, 4146/1119/9510 and 4146/1119/9507 issued by:
ERA Technology Ltd. Cleeve Road, Leatherhead Surrey KT22 7SA, England. Tel: +44 1372 367000

c) Conforms to EN50270:1999 as tested by ITS Testing & Certification Cleeve Road, Leatherhead Surrey KT22 7SB. Report No. EM02006611.

This declaration shall cease to be valid if modifications are made to the equipment without our approval.

PRODUCT: **Control Module for Combustible Gas Applications**
MODEL: **4802A**

It is ensured through internal measures and our ISO9001: 1994 certifications, that series production units conform at all times to the requirements of these current EC Directives and relevant standards.

Note: The Following Information applies to ATEX.
This equipment has been assured for use as a safety related device under the terms of Directive 94/9/EC EHSR 1.5.
General Monitors Ireland Ltd. in order to comply with ATEX will provide this Instruction Manual in a European Language required to operate the product upon request. Should this be necessary, General Monitors Ireland Ltd. should be notified of this request to allow adequate time to process the request.

ATEX Certificate Markings:
4802A
General Monitors Ireland Ltd.

II (2) G SIRA02ATEX 9378

CE 0518 T ambient
-18ºC to +66ºC

Responsible Person: **Date: 05-12-02**

Denis Connolly
General Manager European Operations

The signatory acts on behalf of company management, and with full power of attorney

System Integrity Verification

General Monitors' mission is to benefit society by providing solutions through industry- leading safety products, services and systems that save lives and protect capital resources from the dangers of hazardous flames, gases and vapors.

The safety products you have purchased should be handled carefully and installed, calibrated and maintained in accordance with the respective product instruction manual. Remember, these products are for your safety.

To ensure operation at optimum performance, General Monitors recommends that certain maintenance items are performed.

Commissioning Safety Systems

Before power up, verify wiring, terminal connections and stability of mounting for all integral safety equipment including, but not limited to:

- Power supplies
- Control modules
- Field detection devices
- Signaling / output devices
- Accessories connected to field and signaling devices

After the initial application of power (and any factory specified warm-up period) to the safety system, verify that all signal outputs, to and from devices and modules, are within the manufacturers' specifications. Initial calibration / calibration checking / testing should be performed per the manufacturers' recommendations and instructions.

Proper system operation should be verified by performing a full, functional test of all component devices of the safety system, ensuring that the proper levels of alarming occur.

Fault/Malfunction circuit operation should be verified.

Periodic Testing/Calibration of Field Devices

Periodic testing/calibrating should be performed per the manufacturers' recommendations and instructions. Testing/Calibrating procedures should include, but not be limited to:

- Verify zero reading
- Apply a known concentration of gas, or a simulated test device provided by the manufacturer
- Verify integrity of all optical surfaces and devices.

When testing produces results outside of the manufacturers' specifications, re-calibration or repair/replacement of the suspect device(s) should be performed as necessary. Calibration intervals should be independently established through a documented procedure, including a calibration log maintained by plant personnel, or third party testing services.

Periodic System Verification

The following system verifications should be performed at least annually:

Verify wiring, terminal connections and stability of mounting for all integral safety equipment including, but not limited to:

- Power supplies
- Control modules
- Field detection devices
- Signaling / output devices
- Accessories connected to field and signaling devices.

Proper system operation should be verified by performing a full, functional test of all component devices of the safety system, ensuring that the proper levels of alarming occur.

Fault/Malfunction circuit operation should be verified.

Calibration intervals should be independently established through a documented procedure, including a calibration log maintained by plant personnel, or third party testing services.

1.0 Quick-Start Guide

1.1 Upon Receipt of Equipment

All equipment shipped by General Monitors is packaged in shock absorbing containers, which provides considerable protection against physical damage. The contents should be carefully removed and checked against the packing slip. If any damage has occurred or if there is any discrepancy in the order, notify General Monitors as soon as possible. All subsequent correspondence with General Monitors must specify the equipment part and serial numbers.

Each Model 4802A is completely checked at the factory; however, a complete checkout is necessary upon initial installation and start-up to ensure system integrity.

1.2 Sensor Location Considerations

There are no standard rules for sensor placement, since the optimum sensor location is different for each application. The customer must evaluate conditions at the sensor site in order to make this determination.

WARNING – Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

1.2.1 General Sensor Location Considerations

- The sensor should be easily accessible for calibration checks. Ensure that sufficient clearance exists to allow the use of field calibration devices.
- The sensor head should always be pointing down to prevent water build up on the sensing element. Remember that some combustible gases are heavier than air; however, do not rely too heavily on this fact when selecting a sensor position.
- The sensor should be located in areas where leaks are suspected (i.e. near valves & pipe connections, etc.).
- The sensor should not be placed where contaminating substances may coat it.

1.3 Sensor Poisons

Sensors may be adversely affected by prolonged exposure to certain atmospheres. The more important poisons are:

- Prolonged exposure to Hydrogen Sulfide (H_2S) Gas
- Halides (compounds containing Fluorine, Chlorine, Bromine and Iodine)
- Heavy Metals (e.g. Tetraethyl lead)

Silicones contained in greases or aerosols are the most common “coating” agents. These are not true sensor poisons, but reduce sensor response. Other damaging materials, which attack the sensor physically, include mineral acids and caustic vapors. The presence of such poisons and vapors does not exclude the use of General Monitors Catalytic Bead Sensors. A careful analysis of ambient conditions should be undertaken and the customer should be aware that sensor calibration might need to occur at more frequent intervals.

1.4 Control Module Installation

A rack or panel mounted chassis will be required when installing any Zero Two Series Module. These chassis' should be mounted in non-hazardous, weather-protected locations and should be subjected to minimal shock and vibrations. The rack and panel mounted chassis are available in 4, 8, and 16 channel sizes. Multiple 16-channel chassis may be connected to each other to form larger systems.

In installations where two or more module types are to be mixed in the same chassis, ensure that the individual coding strips match the channel application. The coding strips are pre-configured at the factory and the male portion is already on each module.

The female portion, if un-mounted, must be fastened into position on the mounting strip of the desired chassis channel so as to mate with its counterpart on the module (see Figure 1).

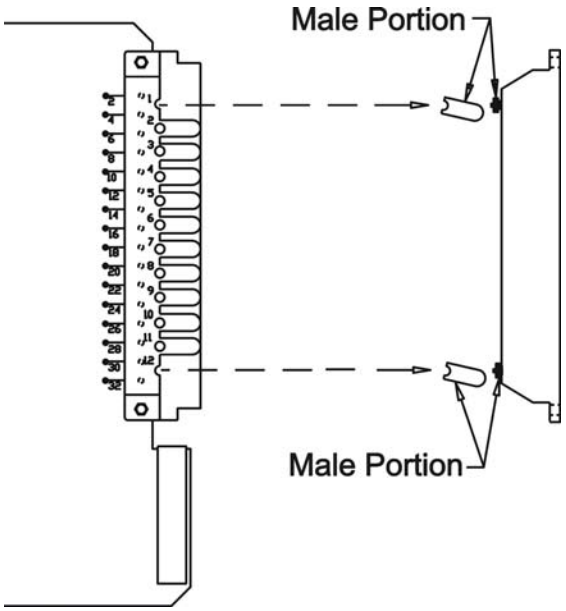

Figure 1 – Control Module Coding Strip

NOTE - Zero Two series modules require air circulation to avoid excessive heat build-up. If chassis are stacked vertically within an enclosure, forced air circulation may be required. The Control Modules are, to a great extent, immune to electromagnetic interference (EMI). However, they should not be mounted in close proximity to radio transmitters or similar equipment.

1.5 Rear Terminal Connections

All wire connections to the Model 4802A are made to the terminal block located at the rear of the chassis. The terminal block accepts 16 AWG to 20 AWG, stranded or solid core wire.

14 AWG wire may be used if it is properly stripped according to Figure 2.

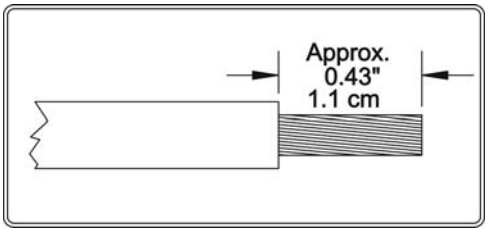

Figure 2 – Wire Strip Length

CAUTION - Contact with PC Board components should be avoided in order to prevent damage by static electricity.

To connect wires to the terminal block on the Model 4802A, loosen the desired screw, insert the stripped end of the wire and tighten.

For the rear terminal designations refer to Figure 3 below:

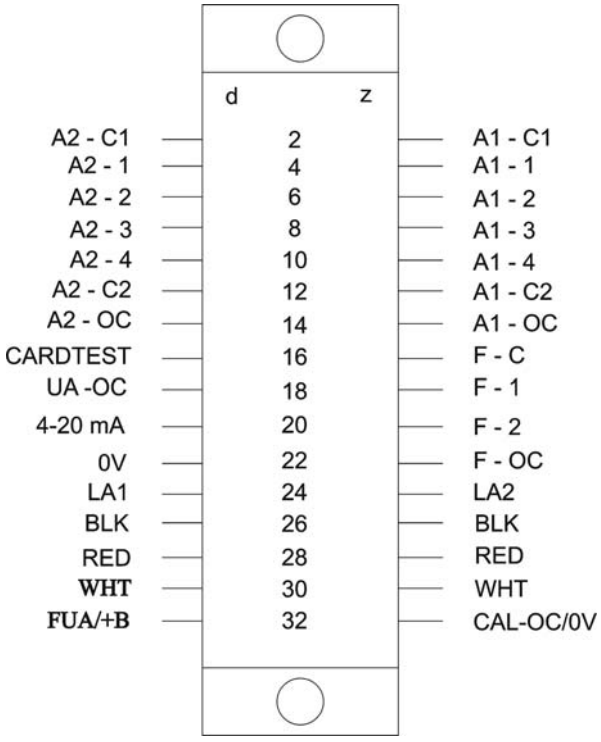

Figure 3 – Rear Terminal Designations

1.5.1 A2 Alarm

The terminal designations for the **A2** alarm outputs are:

LABEL	TERM	DESCRIPTION
A2-C1	2d	Relay Common (1 & 2)
A2-1	4d	Relay Contact
A2-2	6d	Relay Contact
A2-3	8d	Relay Contact
A2-4	10d	Relay Contact
A2-C2	12d	Relay Common (3 & 4)
A2-OC	14d	Open Collector (OC)
LA2	24z	OC Logic for A2 LED

Figure 4 – A2 Alarm Outputs

The **A2** alarm outputs are DPDT relays, 1 open collector output (**A2-OC**) that follows the logic of the relays and 1 open collector output (**LA2**) that follows the blinking pattern of the front panel LED. The A2-C1 designation is common for A2-1 & A2-2. The A2-C2 designation is common for A2-3 & A2-4. The normally open (**NO**) and normally closed (**NC**) contacts depend on a user selectable option (see Chapter 5). The table below refers to the proper open and closed **A2** alarm relay contacts while the unit is on power:

User Selected Relay State	Normally Open	Normally Closed
Normally Energized	A2-C1 & A2-1, A2-C2 & A2-4	A2-C1 & A2-2, A2-C2 & A2-3
Normally De-Energized	A2-C1 & A2-2, A2-C2 & A2-3	A2-C1 & A2-1, A2-C2 & A2-4

Figure 5 – A2 Alarm Relay Contacts

1.5.2 A1 Alarm

The terminal designations for the **A1** Alarm outputs are:

Label	Term	Description
A1-C1	2z	Relay Common (1 & 2)
A1-1	4z	Relay Contact
A1-2	6z	Relay Contact
A1-3	8z	Relay Contact
A1-4	10z	Relay Contact
A1-C2	12z	Relay Common (3 & 4)
A1-OC	14z	Open Collector (OC)
LA1	24d	OC Logic for A1 LED

Figure 6a – A1 Alarm Outputs

The **A1** Alarm outputs are DPDT relays, 1 open collector output (**A1-OC**) that follows the logic of the relays and 1 open collector output (**LA1**) that follows the blinking pattern of the front panel LED. The A1-C1 designation is common for A1-1 & A1-2. The A1-C2 designation is common for A1-3 & A1-4. The normally open (**NO**) and normally closed (**NC**) contacts depend on a user selectable option (see Chapter 5).

The table below refers to the proper open and closed **A1** alarm relay contacts while the unit is on power:

User Selected Relay State	Normally Open	Normally Closed
Normally Energized	A1-C1 & A1-1, A1-C2 & A1-4	A1-C1 & A1-2, A1-C2 & A1-3
Normally De-Energized	A1-C1 & A1-2, A1-C2 & A1-3	A1-C1 & A1-1, A1-C2 & A1-4

Figure 6b – A1 Alarm Relay Contacts

1.5.3 Fault Alarm

The terminal designations for the **Fault** outputs are:

Label	Term	Description
F-C	16z	Relay Common
F-1	18z	Relay Contact (NO)
F-2	20z	Relay Contact (NC)
F-OC	22z	Open Collector (OC)
FUA	32d	Open Collector (OC)

Figure 7 – Rear Terminal Designations for Fault Outputs

The **Fault** outputs are SPDT relays, 1 open collector output (**F-OC**) that follows the logic of the relays and 1 open collector output (**FUA**) dedicated to new fault indications.

NOTE - If the Backward Compatible configuration is ordered, the FUA will not be present (pin 32d will be for +B).

The Fault outputs are always normally energized when power is applied to the module. The contact ratings for the A2 & A1 alarm and Fault relays are 4A @ 250 Vac, 3A @ 30 Vdc, Resistive, maximum.

Inductive loads (bells, buzzers, relays, etc.) on dry relay contacts must be clamped down. Unclamped inductive loads can generate voltage spikes in excess of 1000 volts. Spikes of this magnitude may cause false alarms and contact damage. Figure 8 shows recommended relay protection circuits for AC and DC loads, respectively.

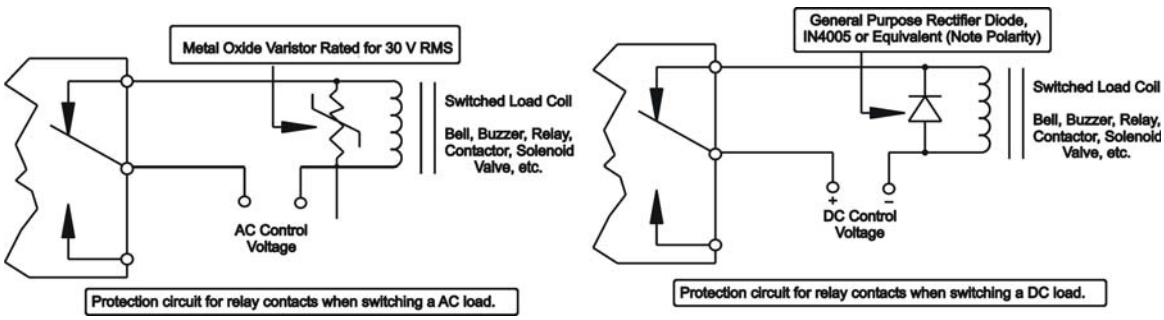

Figure 8 – Relay Protection Circuits for AC and DC Loads

1.5.4 Other Open Collector Outputs

The terminal designation for the **Unaccept** and the Discrete **Calibration / Inhibit** Mode outputs are:

Label	Term	Description
UA-OC	18d	Unaccept Output
CAL/INH	32z	CAL-Inhibit Mode Output

Figure 9 – Terminal Designations for Unaccept and Calibration/Inhibit Mode Outputs

NOTE - If the Backward Compatible configuration is ordered, the CAL/INH will not be present (pin 32z will be for 0v).

The electrical rating for all open collector outputs is 100mA @ 35Vdc.

Figure 10 illustrates some typical open collector external circuits.

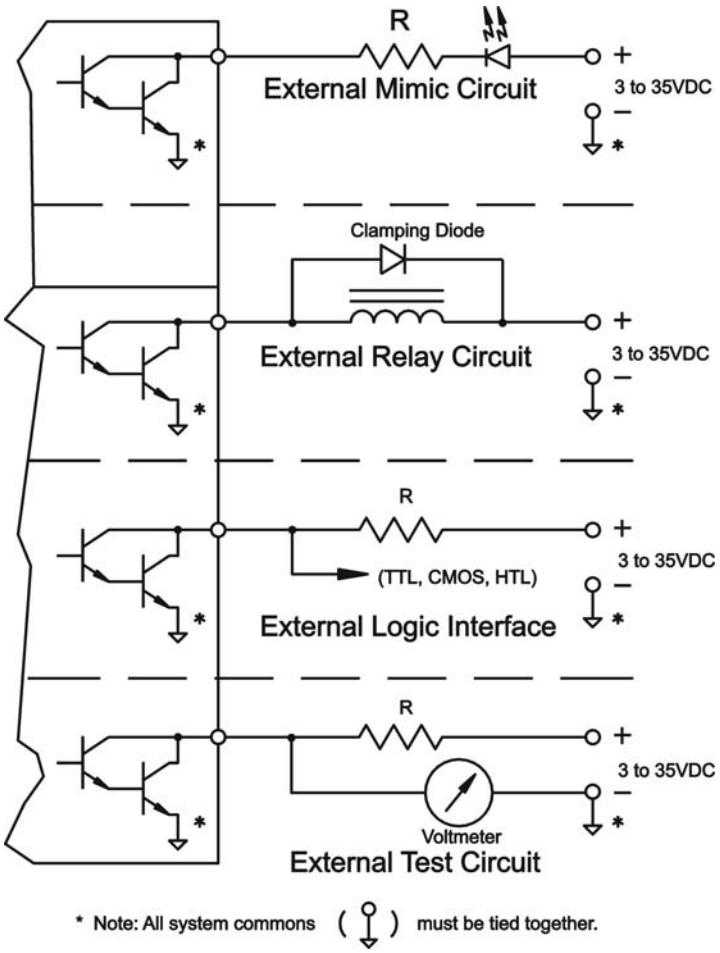

Figure 10 – Open Collector External Circuits

1.5.5 Sensor Connections

The terminal designations for the Sensor wires are:

Label	Term	Description
BLK	26d,z	Black Sensor Wire
RED	28d,z	Red Sensor Wire
WHT	30d,z	White Sensor Wire

Figure 11 – Terminal Designations for Sensor Wires

NOTE - Only 1 sensor may be connected to a Model 4802A.

Figure 12 illustrates the Sensor/Controller connections.

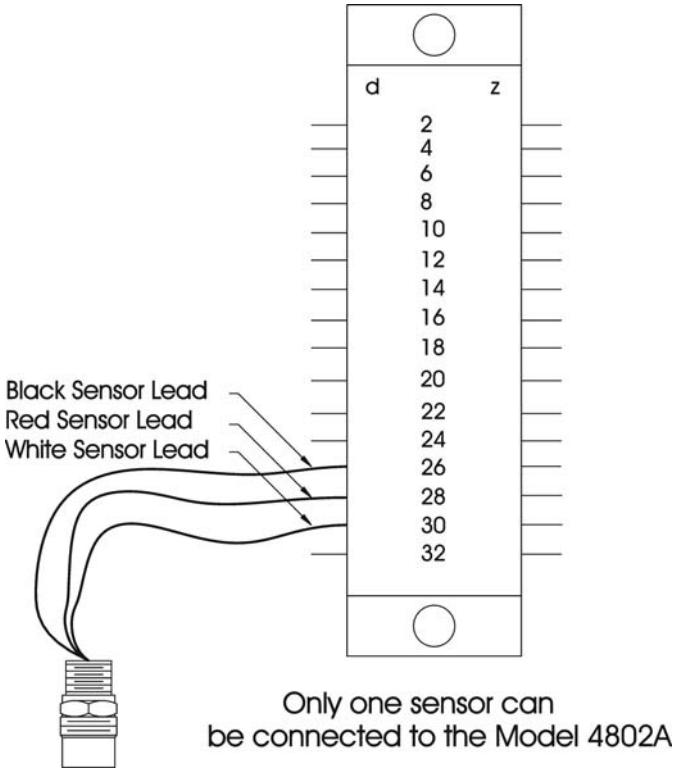

Figure 12 – Sensor/Controller Connections

1.5.6 Card Test Switch

The terminal designation for the **Card Test** Input is:

Label	Term	Description
CT	16d	Switch Connection

Figure 13 – Card Test Input

Figure 14 is a block diagram that shows the switch connections for the **Card Test** feature.

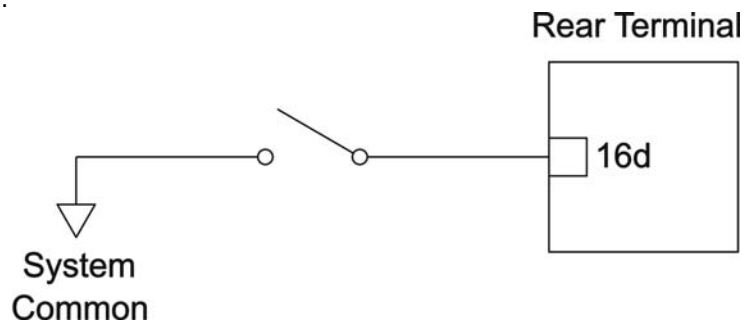

Figure 14 – Switch Connections for Card Test

The Card Test Input is provided so that the user can access the **Card Test** feature remotely. One end of a normally open SPST switch is connected to this termination. The other end is connected to system common. To activate the feature, simply press and hold the switch for as long as the test time is to be run.

1.5.7 Analog Output Signal

The terminal designations for the **Analog Output** Signal are:

Label	Term	Description
AO+	20d	Analog Signal (plus)
AO-	22d	Analog Signal (minus)

Figure 15 – Terminal Designations for Analog Output

NOTE - If the Analog Signal is not used, a jumper must be placed between 20d & 22d.

Figure 16 is a diagram of the **Analog** Signal connections.

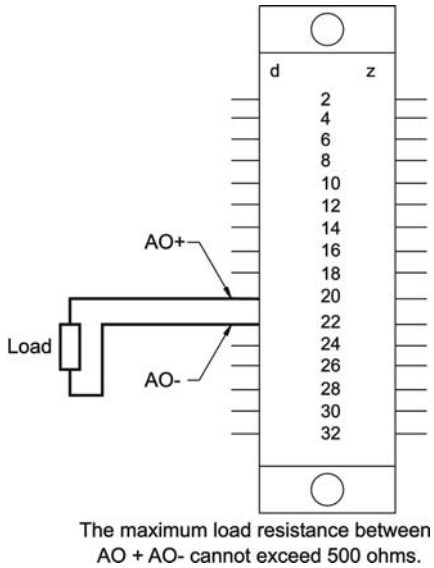

Figure 16 – Analog Signal Connections

1.6 Applying Power

Zero Two Series Modules do not have an **ON/OFF** power switch. Each module in the Zero Two Series operates from 24Vdc. Current requirements will vary according to the number and type of modules in the system, as well as the number and type of field devices.

NOTE - If the application of power does not turn **ON** the unit, check fuse F1 on the control board.

NOTE - If the unit displays an F4 condition upon power-up first try to clear this condition by calibrating the sensor. If this condition persists, replace the sensor.

Figure 17 indicates where the power connections for the chassis are made.

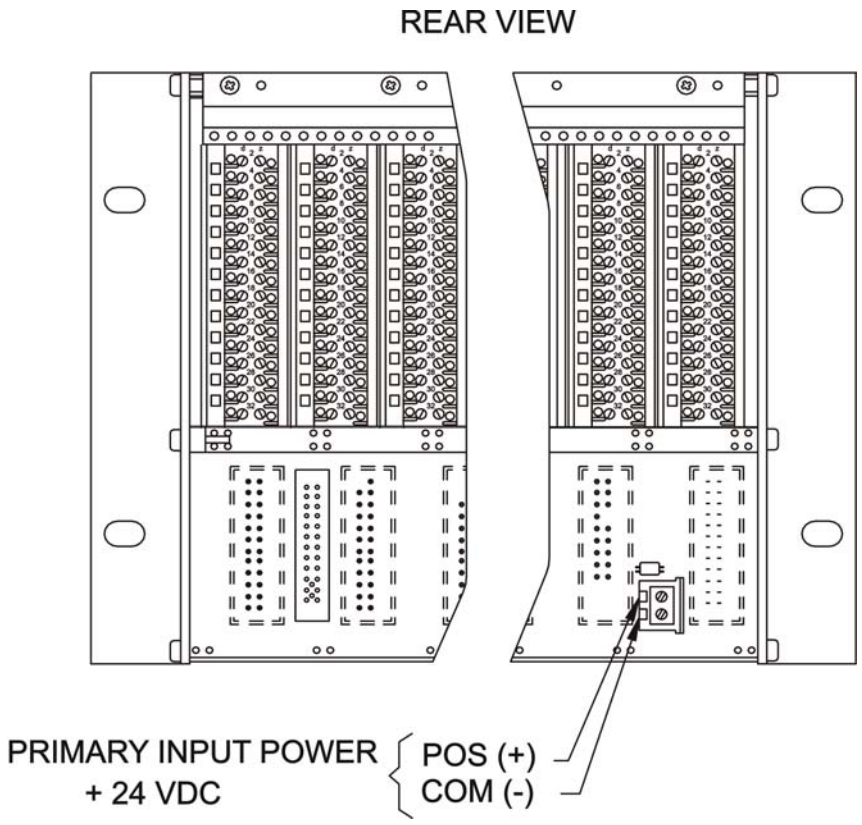

Figure 17 – Rear Power Connections

NOTE - The instrument is now ready to operate! Please consult the manual for more information on the instrument's many features.

NOTE - If you have any problems in the setup or testing of the detector, please refer to the "Troubleshooting Section", or call the factory direct.

Worldwide Service is available by calling:

Lake Forest, California	**Phone:**	**+1-949-581-4464**
(24 hr. service)	**Fax:**	**+1-949- 581-1151**
Houston, Texas	**Phone:**	**+1-281-855-6000**
	Fax:	**+1-281-855-3290**
Ireland	**Phone:**	**+353-91-751175**
	Fax:	**+353-91-751317**
Singapore	**Phone:**	**+65-6748-3488**
	Fax:	**+65-6748-1911**
United Arab Emirates	**Phone:**	**+971-4-8815751**
	Fax:	**+971-4-8817927**
United Kingdom	**Phone:**	**+44-1625-619583**
	Fax:	**+44-1625-619098**

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2.0 Introduction

This chapter provides a brief description of the Model 4802A, its features & benefits and a list of some of its applications. More detailed information on the features and benefits listed in Section 2.2 will be presented in later chapters.

WARNING - Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

2.1 General Description

The General Monitors Model 4802A (see Figure 18) is a single channel Combustible Gas detection Control Module designed for use in Zero Two Series Gas and Flame Detection Systems. This Module connects to the wires from a field mounted General Monitors Catalytic Bead Sensor and monitors the presence of combustible gases and vapors. The Model 4802A is electrically and physically compatible with the other gas detection, flame detection and system modules in the Zero Two Series. It is distinguished from the other modules by its blue border and “4802A" in the upper right corner of the front panel. The Model 4802A is designed for use in non-hazardous environments.

Figure 18 – Model 4802A

2.2 Features & Benefits

2.2.1 Automatic Calibration
The unit's display indicates simple automated calibration prompts to the operator with no calibration adjustments.

2.2.2 Calibration Check Mode
Verifies the integrity of the sensor by allowing the operator to apply a test gas and view the response on the display.

2.2.3 Calibration Level
The user specifies the gas concentration to be used for calibration.

2.2.4 Microprocessor Based Electronics
Monitors fault conditions; sensor inputs and provides outputs in the form of display codes, analog signal, relay contact and open collector activation.

2.2.5 Setup Mode
Allows the user to set parameters such as alarm output options, test options, etc. These parameters are viewed on the display during the Setup Mode.

2.2.6 Password Option
Prevents unauthorized alteration of the setup parameters (can be disabled).

2.2.7 Setup Check Mode
Allows the user to view the parameters that have been set by the factory and/or an operator.

2.2.8 LED Test
Tests the integrity of each LED and each segment of the digital display on the front panel.

2.2.9 Card Test
Tests the functionality of the card through the microprocessor, ramping the signal from 0 to full-scale.

2.2.10 Live Insertion/Removal
Allows the user to insert or remove a module while power is applied to the system, without damage to any of the components in the system.

2.3 Applications

The General Monitors Model 4802A is a Combustible Gas Control Module designed for Zero Two Series Applications. Below is a partial list of applications:

- Refineries
- Gas and oil production platforms
- Oil well logging operations
- Gas Turbines
- Hydrogen Storage
- Chemical plants
- Drilling platforms and rigs
- Gas collection facilities
- LPG/LNG processing and storage
- Solvent Vapors
- Wastewater treatment plants

3.0 Installation

This chapter discusses what to do when a Model 4802A is received, the terminal connections & designations, sensor location considerations and what to be aware of when applying power.

3.1 Upon Receipt of Equipment

All equipment shipped by General Monitors is packaged in shock absorbing containers, which provides considerable protection against physical damage. The contents should be carefully removed and checked against the packing slip. If any damage has occurred or if there is any discrepancy in the order, notify General Monitors as soon as possible. All subsequent correspondence with General Monitors must specify the equipment part and serial numbers.
Each Model 4802A is completely checked at the factory; however, a complete checkout is necessary upon initial installation and start-up to ensure system integrity.

3.2 Control Module Installation

A rack or panel mounted chassis will be required when installing any Zero Two Series Module. These chassis should be mounted in non-hazardous, weather-protected locations and should be subjected to minimal shock and vibrations. The rack and panel mounted chassis are available in 4, 8, and 16 channel sizes. Multiple 16-channel chassis may be connected to each other to form larger systems.

In installations where two or more module types are to be mixed in the same chassis, ensure that the individual coding strips match the channel application. The coding strips are pre-configured at the factory and the male portion is already on each module.

The female portion, if un-mounted, must be fastened into position on the mounting strip of the desired chassis channel so as to mate with its counterpart on the module (see Figure 19).

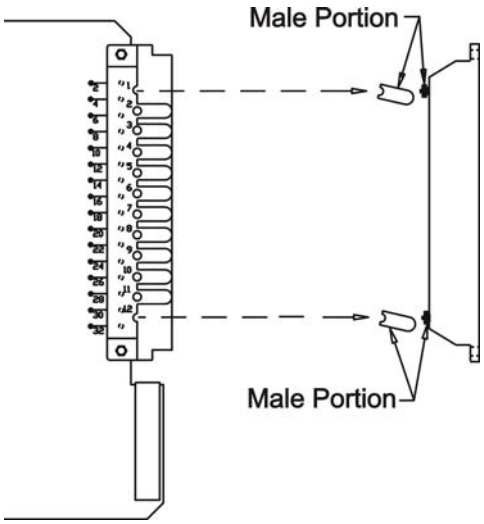


Figure 19 – Control Module Coding Strip

NOTE - Zero Two series modules require air circulation to avoid excessive heat build-up. If chassis are stacked vertically within an enclosure, forced air circulation may be required. The Control Modules are, to a great extent, immune to electromagnetic interference (EMI). However, they should not be mounted in close proximity to radio transmitters or similar equipment.
If the installation is subjected to a strong Radio Frequency Electromagnetic Field (10V/m @ 27-1000Mhz), the Control Module may respond with a display deviation of +/-10% FSD. This deviation will disappear following removal of the field. Functionality is otherwise unaffected.

3.3 Rear Terminal Connections

All wire connections to the Model 4802A are made to the terminal block located at the rear of the chassis. The terminal block accepts 16 AWG to 20 AWG (1.5mm^2 to 0.75mm^2), stranded or solid core wire.

14 AWG wire may be used if it is properly stripped according to Figure 20.

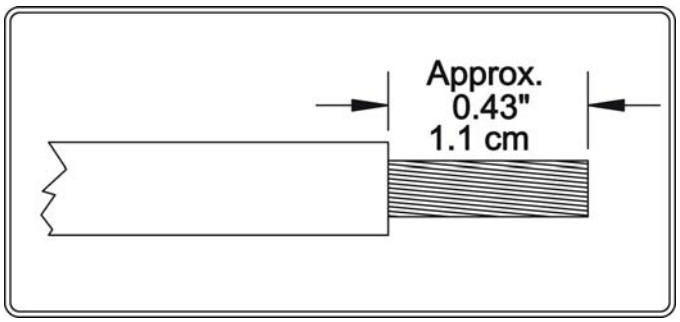


Figure 20 – Wire Strip Length

CAUTION - Contact with PC Board components should be avoided in order to prevent damage by static electricity.

To connect wires to the terminal block on the Model 4802A, loosen the desired screw, insert the stripped end of the wire and tighten. (Alternate connector styles available – contact the factory).

For the rear terminal designations refer to Figure 21 below:

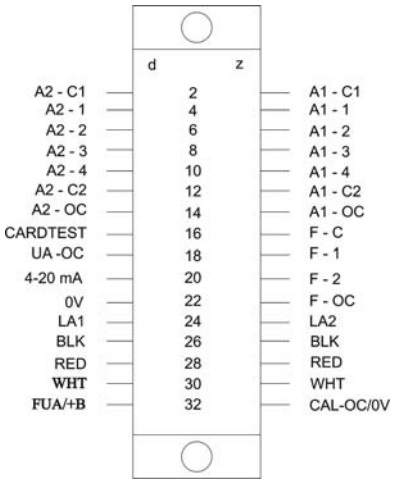


Figure 21 – Rear Terminal Designations

3.3.1 A2 Alarm

The terminal designations for the **A2** alarm outputs are:

LABEL	TERM	DESCRIPTION
A2-C1	2d	Relay Common (1 & 2)
A2-1	4d	Relay Contact
A2-2	6d	Relay Contact
A2-3	8d	Relay Contact
A2-4	10d	Relay Contact
A2-C2	12d	Relay Common (3 & 4)
A2-OC	14d	Open Collector (OC)
LA2	24z	OC Logic for A2 LED (mimic)

Figure 22 – Terminal Designations for A2 Alarm Outputs

The **A2** alarm outputs are DPDT relays, 1 open collector output (**A2-OC**) that follows the logic of the relays and 1 open collector output (**LA2**) that follows the blinking pattern of the front panel LED. The A2-C1 designation is common for A2-1 & A2-2. The A2-C2 designation is common for A2-3 & A2-4. The normally open (**NO**) and normally closed (**NC**) contacts depend on a user selectable option (see Chapter 5). The table below refers to the proper open and closed **A2** alarm relay contacts while the unit is on power:

User Selected Relay State	Normally Open	Normally Closed
Normally Energized	A2-C1 & A2-1, A2-C2 & A2-4	A2-C1 & A2-2, A2-C2 & A2-3
Normally De-Energized	A2-C1 & A2-2, A2-C2 & A2-3	A2-C1 & A2-1, A2-C2 & A2-4

Figure 23 – A2 Alarm Relay Contacts

3.3.2 A1 Alarm

The terminal designations for the **A1** Alarm outputs are:

Label	Term	Description
A1-C1	2z	Relay Common (1 & 2)
A1-1	4z	Relay Contact
A1-2	6z	Relay Contact
A1-3	8z	Relay Contact
A1-4	10z	Relay Contact
A1-C2	12z	Relay Common (3 & 4)
A1-OC	14z	Open Collector (OC)
LA1	24d	OC Logic for A1 LED (mimic)

Figure 24 – Terminal Designations for A1 Alarm Outputs

The **A1** Alarm outputs are DPDT relays, 1 open collector output (**A1-OC**) that follows the logic of the relays and 1 open collector output (**LA1**) that follows the blinking pattern of the front panel LED. The A1-C1 designation is common for A1-1 & A1-2. The A1-C2 designation is common for A1-3 & A1-4. The normally open (**NO**) and normally closed (**NC**) contacts depend on a user selectable option (see Chapter 5).

The table below refers to the proper open and closed **A1** alarm relay contacts while the unit is on power:

User Selected Relay State	Normally Open	Normally Closed
Normally Energized	A1-C1 & A1-1, A1-C2 & A1-4	A1-C1 & A1-2, A1-C2 & A1-3
Normally De-Energized	A1-C1 & A1-2, A1-C2 & A1-3	A1-C1 & A1-1, A1-C2 & A1-4

Figure 25 – A1 Alarm Relay Contacts

3.3.3 Fault Alarm

The terminal designations for the **Fault** outputs are:

Label	Term	Description
F-C	16z	Relay Common
F-1	18z	Relay Contact (NO)
F-2	20z	Relay Contact (NC)
F-OC	22z	Open Collector (OC)
FUA	32d	Open Collector (OC)

Figure 26 – Terminal Designations for Fault Outputs

The **Fault** outputs are SPDT relays, 1 open collector output (**F-OC**) that follows the logic of the relays and 1 open collector output (**FUA**) dedicated to new fault indications.

NOTE - If the Backward Compatible configuration is ordered, the FUA will not be present (pin 32d will be for +B).

The Fault outputs are always normally energized when power is applied to the module. The contact ratings for the A2 & A1 alarm and Fault relays are 4A @ 30V RMS/42.4V Pk, 3A @ 30 VDC, Resistive, maximum.

Inductive loads (bells, buzzers, relays, etc.) on dry relay contacts must be clamped down. Unclamped inductive loads can generate voltage spikes in excess of 1000 volts. Spikes of this magnitude may cause false alarms and contact damage. Figure 27 shows recommended relay protection circuits for AC and DC loads, respectively.

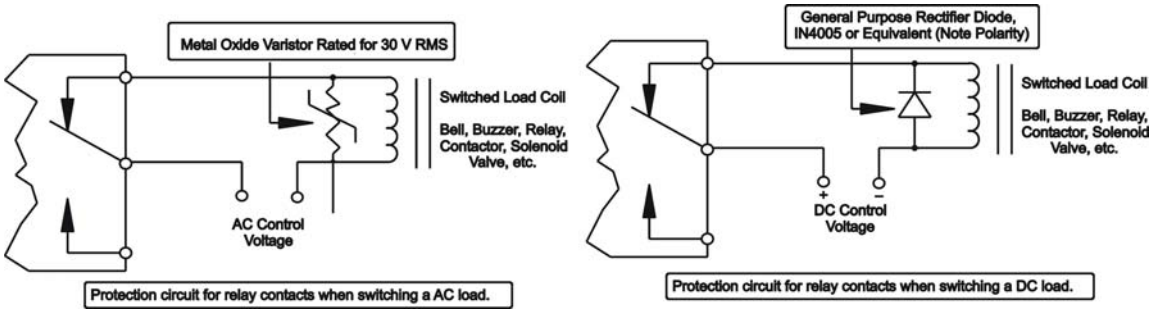


Figure 27 – Recommended Relay Protection Circuits

3.3.4 Other Open Collector Outputs

The terminal designation for the **Unaccept** and the Discrete **Calibration / Inhibit** Mode outputs are:

Label	Term	Description
UA-OC	18d	Unaccept Output
CAL/INH	32z	CAL-Inhibit Mode Output

Figure 28 – Terminal Designations for Unaccept and Calibration/Inhibit Mode

NOTE - If the Backward Compatible configuration is ordered, the CAL/INH will not be present (pin 32z will be for 0v).

The electrical rating for all open collector outputs is 100mA @ 35Vdc.

Figure 29 illustrates some typical open collector external circuits.

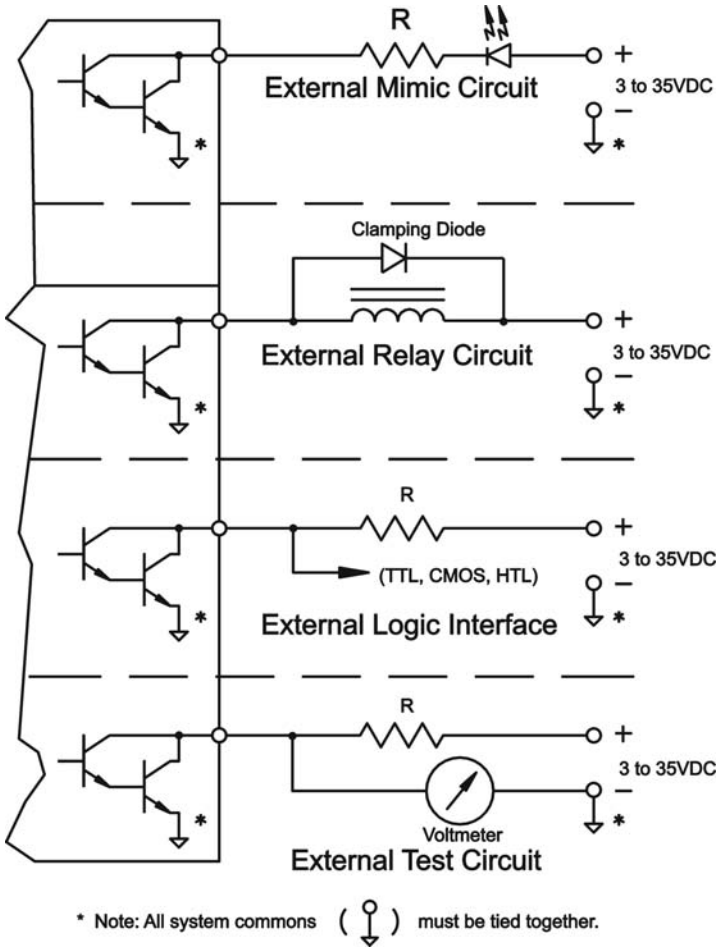


Figure 29 – Open Collector External Circuits

3.3.5 Sensor Connections

The terminal designations for the Sensor wires are:

Label	Term	Description
BLK	26d,z	Black Sensor Wire
RED	28d,z	Red Sensor Wire
WHT	30d,z	White Sensor Wire

Figure 30 - Terminal Designations for Sensor Wires

NOTE - Only 1 sensor may be connected to a Model 4802A.

Figure 31 illustrates the Sensor/Controller connections.

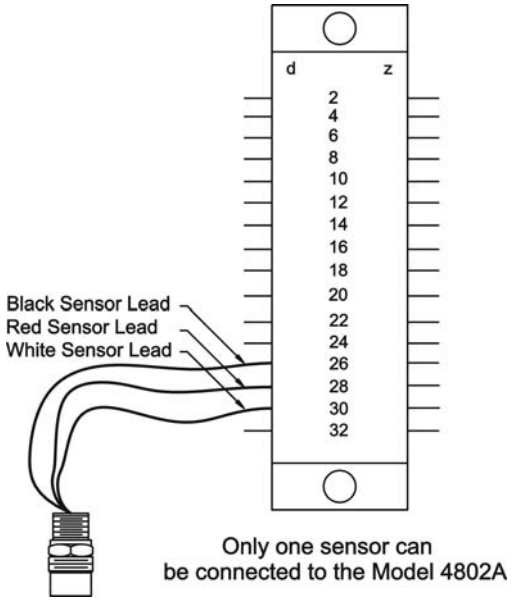


Figure 31 – Sensor/Controller Connections

3.3.6 Card Test Switch

The terminal designation for the **Card Test** Input is:

Label	Term	Description
CT	16d	Switch Connection

Figure 32 – Terminal Designation for Card Test Input

Figure 33 is a block diagram that shows the switch connections for the **Card Test** feature.

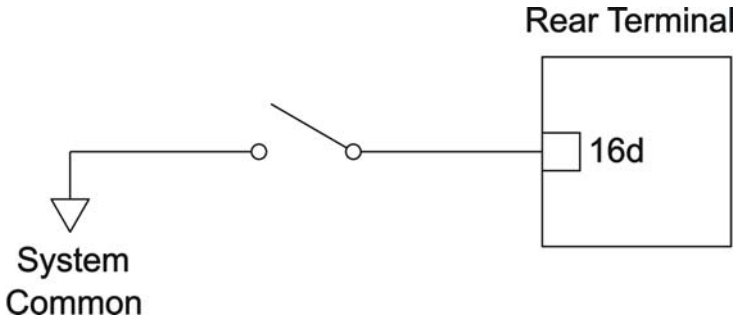


Figure 33 - Switch Connections for Card Test Feature

The Card Test Input is provided so that the user can access the Card Test feature remotely. One end of a normally open SPST switch is connected to this termination. The other end is connected to system common. To activate the feature, simply press and hold the switch for as long as the test time is to be run.

3.3.7 Analog Output Signal

The terminal designations for the **Analog Output** Signal are:

Label	Term	Description
AO+	20d	Analog Signal (plus)
AO-	22d	Analog Signal (minus)

Figure 34 – Terminal Designations for Analog Output

NOTE - If the Analog Signal is not used a jumper must be placed between 20d & 22d.

Figure 35 is a diagram of the **Analog** Signal connections.

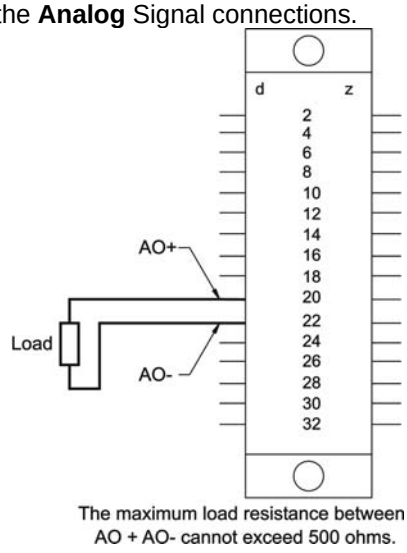


Figure 35 – Analog Signal Connections

Figure 36 indicates where the power connections for the chassis are made.

Do not daisy chain +24V and Common on chassis. Apply separate power to each chassis.

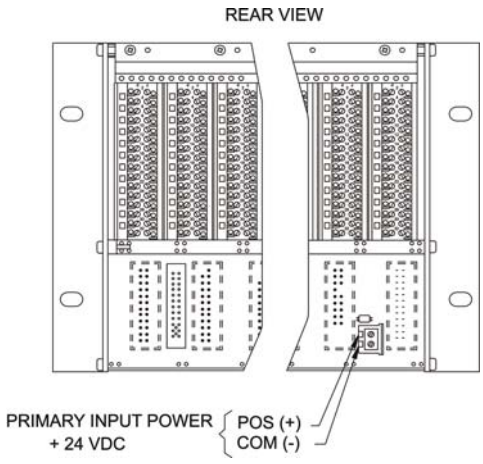


Figure 36 – Power Connections

3.4 Sensor Location Considerations

There are no standard rules for sensor placement, since the optimum sensor location is different for each application. The customer must evaluate conditions at the sensor site in order to make this determination.

WARNING – Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

3.4.1 General Sensor Location Considerations

- The sensor should be easily accessible for calibration checks. Ensure that sufficient clearance exists to allow the use of field calibration devices such as a Portable Purge Calibrator for combustible gas applications.
- The sensor head should always be pointing down to prevent water build up on the sensing element. Remember that some combustible gases are heavier than air; however, do not rely too heavily on this fact when selecting a sensor position.
- The sensor should be located in areas where leaks are suspected (i.e. near valves & pipe connections, etc.).
- The sensor should not be placed where it may be coated by contaminating substances may coat it.

3.5 Sensor Poisons

Sensors may be adversely affected by prolonged exposure to certain atmospheres. The more important poisons are:

- Prolonged exposure to Hydrogen Sulfide (H_2S) Gas
- Halides (compounds containing Fluorine, Chlorine, Bromine and Iodine)
- Heavy Metals (e.g. Tetraethyl lead)

Silicones contained in greases or aerosols are the most common “coating” agents. These are not true sensor poisons, but reduce sensor response. Other damaging materials, which attack the sensor physically, include mineral acids and caustic vapors. The presence of such poisons and vapors does not exclude the use of General Monitors Catalytic Bead Sensors. A careful analysis of ambient conditions should be undertaken and the customer should be aware that sensor calibration might need to occur at more frequent intervals.

3.6 Applying Power

Zero Two Series Modules do not have an **ON/OFF** power switch. Each module in the Zero Two Series operates from 24Vdc. Current requirements will vary according to the number and type of modules in the system, as well as the number and type of field devices.

NOTE - If the application of power does not turn **ON** the unit, check fuse F1 on the control board.

NOTE - If the unit displays an F4 condition upon power-up first try to clear this condition by calibrating the sensor. If this condition persists, replace the sensor.

3.7 Installation Instructions for the Sensor

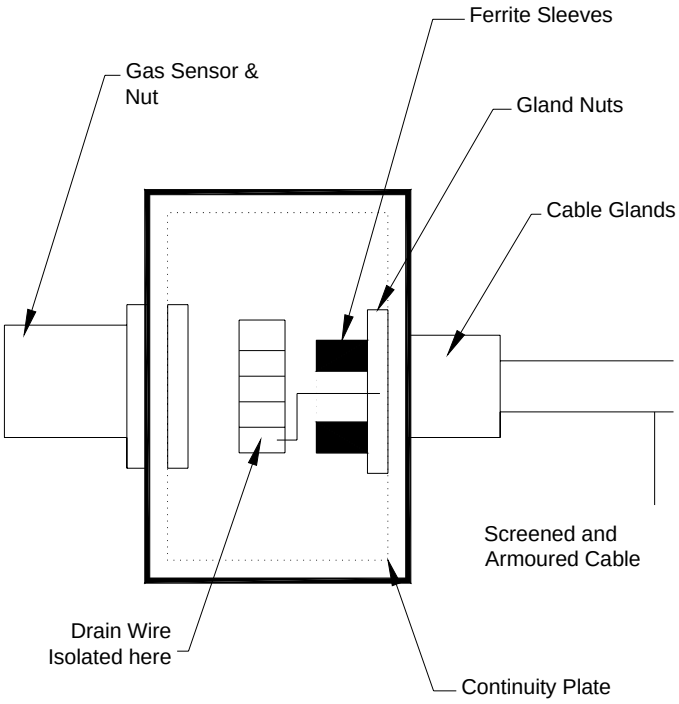
The interconnecting cable should have an overall screen or screen and armour. Cables to BS5308 or equivalent are suitable. Note that the terms “screen” and “shield” are equivalent for the purposes of this manual.

Interconnecting cables should be segregated from power and other “noisy cables. Avoid proximity to cables associated with radio transmitters, welders, switch mode power supplies, inverters, battery chargers, ignition systems, generators, switchgear, arc lights and other high frequency or high power switching process equipment.

In general, maintain a separation of at least 1m between instrument and other cables. Greater separations are required where long parallel cable runs are unavoidable. Avoid running instrument cable trenches close to lightning conductor earth pits.

General Monitors do not recommend the use of cable shoes or crimps on any junction box or housing wiring terminals. Poor crimping can cause bad connection when unit experiences temperature variations. We therefore recommend good practice is to just terminate cable or sensor wires as is, especially in remote sensor applications.

Complete all cable insulation testing **before** connecting the cable at either end.



Ensure that approved Ex”e” cable glands are used in the junction box and that these are correctly installed according to the manufacturer’s instructions. The cable glands must be electrically connected to the continuity plates by means of suitable nuts. The cable armour must be terminated in the glands so as to ensure positive electrical connections.

A ferrite sleeve (P/N 363-005) must be placed over all cores and the screen drain wire immediately adjacent to the junction box, as shown in the above illustration.

Connect the corresponding conductors of the interconnecting cable to the appropriate terminals in the function box.

The cable screens (drain wires) are interconnected in the housing as shown in figure 12.

The drain wire entering the junction box must be terminated on the SCReen terminal to isolate it from all other circuits. It must not be connected to the sensor circuitry at any point.

Connect the external earth stud in accordance with local practices if required.

Screw the lid down tightly to the base in order to ensure electrical continuity.

4.0 Operation

This chapter discusses what general maintenance to perform and describes the electrical inputs, outputs, accepting & resetting alarm & fault conditions and fault diagnostics.

4.1 General Maintenance

Once the Model 4802A has been installed, very little maintenance is required other than periodic checks to verify the integrity of the system.

- The user should evaluate conditions at the sensor site to determine how frequent calibration checks should be performed.
- A functional test of the system should be performed at least once each year. This test should include full operation of stand-by systems or back up power for the prescribed period.
- The power, sensor and output wiring should be checked for tightness, verifying that all of the components and devices are connected correctly.
- If the “Password” is disabled, periodic checks of the setup parameters should be performed.

4.2 Field Calibration

4802A Zero Two Series Control Module needs to be calibrated in field upon installation. Therefore, please adhere to the following instructions upon receipt and installation of your system.

- The 4802A should be calibrated soon after the initial power-up using a known concentration of the target gas IN AIR.

  Gas mixed with nitrogen is unsuitable.
  The ideal concentration is 50% LEL but the control card is able to be adjusted to different concentrations by inserting that known value during the card set-up.
  Gas flow-calibrators set at the corect 450 mls/minute flow rate, as well as a chamber for calibrating with a variety of solvents are available from General Monitors.

- It is recommended that the maximum period between calibration checks is 3 months. It is unusual for major shifts in zero or response level to occur, but to be sure environmental conditions are not affecting individual sensors, it is advisable to perform an initial 2-weekly check which should provide early indication of the need for more frequent calibrations.

4.3 Electrical Inputs

There are two electrical inputs to the Model 4802A. They are the:

- General Monitors Catalytic Bead Sensor (field device) and
- Card Test input

Both of these input connections (sensor and card test) are made to the rear terminal block (see Chapter 3 for more detailed installation information).

- The Catalytic Bead Sensor input consists of the standard three lead connections used with General Monitors Catalytic Bead Sensors, see Figure 31.

- The Card Test input consists of a single termination for remote testing of the Model 4802A's functions. For detailed information on the Card Test, refer to Figure 33.

4.4 Electrical Outputs

The electrical outputs on the Model 4802A consist of relay contacts, open collectors and an analog current signal.

The following outputs have rear terminal relay contacts:

Output	Rear Terminal Relay Contacts
A1 Alarm	DPDT relay contacts
A2 Alarm	DPDT relay contacts
Fault	SPDT relay contacts

Figure 37 – Rear Terminal Relay Contacts

All of the relay contacts on the Model 4802A have a maximum rating of:

- 4A @ 30V RMS/42.4V Pk., 3A @ 30Vdc resistive

The following outputs have rear terminal open collectors:

- A1 Alarm & LED Mimic
- A2 Alarm & LED Mimic
- Fault
- UA - Unaccepted Alarm
- FUA - Unaccepted Fault
- CAL/INH - Inhibit, Calibration & Calibration Check Modes

All of the open collector outputs on the Model 4802A have a maximum rating of:

- 100mA @ 35Vdc
- The Analog Output Signal is used for sending gas concentrations and status information to remote devices. The maximum analog load may not exceed 500 ohms including the wire/cable that the signal is sent on.

The Analog Output is a 0 to 22mA current signal with 4 to 20mA being proportional to 0 to 100% of full scale.

When the Model 4802A is placed in the calibration, calibration check, setup, setup check or inhibit mode a 1.5mA signal is generated by this output. During the calibration mode the digital display will indicate prompts associated with the calibration procedure. During the calibration check mode, the digital display will indicate the gas concentration with a flashing digit, or pair of digits.

When the Model 4802A enters into a fault condition a 0mA signal is generated by this output. During a fault the display will indicate a fault code ("**F**" followed by a digit).
If the sensor attached to the Model 4802A is seeing gas in excess of 100% of full scale, this output will generate a signal between 20 and 21.7mA (not proportional). An over

range condition is indicated by a flashing digital display reading full-scale (**99**). Overrange conditions are latching.

4.5 Accepting Alarm Conditions

Whenever a new alarm condition occurs, the front panel LED and open collector associated with that alarm (LA1 or LA2) would begin to flash. In addition, the associated alarm outputs and the unaccept outputs (4802A UA open collector & FM002A UA relay) will activate, unless they are already activated. The flashing front panel alarm LED and rear terminal open collector indicate that a new alarm has been activated. New alarms should be acknowledged, or accepted. This is accomplished with the **Master Accept** Button located on the Facilities Module, (FM002A).

Pressing the **Master Accept** Button de-activates the UA outputs and causes the associated front-panel alarm LED, and rear terminal open collector to stop flashing and energize.

NOTE - Alarms that latch must be Accepted before they can be Reset (see Section 5.5).

There is a unique situation that may occur with some frequency in certain applications. An alarm may occur and the operator will accept this alarm by pressing the **Master Accept** Button. If the alarm output is latching and the condition at the sensor returns to normal (safe) the alarm output will need to be reset, as previously stated in Section 4.4. If, however, the alarm output is not reset and that alarm set point is exceeded again, the front panel LED, the associated mimic open collector, and the unaccept outputs will re-flash or re-activate. This gives the operator an indication of a new alarm condition that must be re-accepted.
A type of alarm, other than the A1 & A2 alarms, is the fault alarm. The fault alarm can be accepted similarly to the A1 & A2 alarms. The front panel **Fault** LED will flash and the fault unaccept (FUA) open collector will energize when a fault is detected. By pressing the **Accept** button on the front panel, the FUA output will de-energize and the **Fault** LED will stop flashing. It will stay illuminated until the fault condition is corrected.

4.6 Resetting Latched Alarms

The user may select a “latching” or “non-latching” alarm output for A1 and/or A2. If an alarm output activates and the condition that caused that activation is no longer present, a non-latching alarm output will reset automatically. A latched alarm output needs to be reset manually.

Resetting latched alarm outputs is accomplished with the **Master Reset** Button located on the Facilities Module (FM002A). Pressing the **Master Reset** Button will reset any latched conditions that are no longer valid.

NOTE - Latched alarm conditions cannot be Reset until they have been Accepted (see Section 4.4).

EXAMPLE - The sensor detects a gas concentration in excess of an alarm set point (trip level). The associated alarm outputs will activate. After a few moments, the gas concentration drops below the alarm set point. If the alarm outputs are latched and Accepted, the operator can press the Master Reset Button and the latched alarm outputs will return to their normal (safe) state.

4.6.1 LED Test

The **Master Reset** Button performs another function. If the operator presses and holds the **Master Reset** Button for two or more seconds, all of the LED's and LED segments in the digital display will illuminate for as long as the operator presses the button. This is called the LED Test. The LED test cannot be performed while the unit is in alarm or fault, or during a Card Test.

4.7 CAL/INH Open Collector

There is an open collector that will energize anytime the unit is put in the:

- calibration
- calibration check
- setup
- setup check, or
- inhibit mode.

This open collector output is referenced to the system's ground/common. Energizing this output merely provides a path to ground as is the case with all energized open collector outputs. De-energized, this output will be in a high impedance state.

4.8 Card Test Feature

The Card Test Input is provided so that the user can access the Card Test feature remotely. One end of a normally open SPST switch is connected to this termination and the other end is connected to system common (see Figure 33).

To activate the Card Test feature, simply press and hold the switch. The front panel LED's and digital display will begin ramping up at the start of the card test. They will continue to ramp-up for the software selectable ramp time specified by the operator (3 or 10 seconds) during the Setup Mode (see Section 5.4). Each alarm level (A1 & A2) will trip when the alarm set point is exceeded. The analog output signal will ramp from 4 to 20mA during the test, if the active option has been selected during the Setup Mode. At the conclusion of the Card Test, the A1 & A2 outputs will automatically reset (overriding any latching option). A Card Test cannot be initiated if the unit is in alarm or fault or during an LED Test.

NOTE - There is an option that allows active outputs during a Card Test. If this option has been selected the relays (A1 & A2) and open collector outputs are active, and will trip during the Card Test. This can be treated as a functional test of a Zero Two System

4.9 Fault Diagnostics

In addition to the Fault LED on the front panel, the Model 4802A provides a fault code on the digital display whenever a fault condition occurs. The Fault Codes that can appear on the digital display are summarized below.

4.9.1 F1- Open analog output signal

Check connections on rear terminal pins 20d & 22d.

4.9.2 F2 - Failed to complete calibration

If this fault occurs, remove the gas and allow the sensor to see clean air for at least five minutes. Then attempt another calibration. If the second attempt fails, replace the sensor. If this fault continues to occur after the sensor has been replaced, consult the factory or your GMI Representative.

4.9.3 F3 - Software checksum error

This fault occurs during initial power-up of the unit. If this fault occurs, remove and reapply power to the unit. If the fault continues to occur, replace the unit and consult the factory or your GMI Representative.

4.9.4 F4 - Sensor connections are open or short-circuited or there is excessive zero drift

Make sure the sensor wires are connected properly (in the field and at the rear of the unit) and re-calibrate if necessary. If this fault continues to occur, replace the sensor.

4.9.5 F5 - Not used at this time

This code has been reserved for future use.

4.9.6 F6 - Low supply voltage

Make sure the supply voltage level at the chassis is 24Vdc.

4.9.7 F7 - EEPROM verification failure

This fault will occur if the microprocessor cannot store calibration or setup information in the EEPROM. If this fault occurs consult the factory or your GMI Representative.

4.9.8 F8 - Failed to complete setup

This fault may occur during or immediately after the Setup Mode. Press the Master Reset Switch on the Facilities Module to clear this fault.

4.9.9 F9 - Calibration check period exceeded

If the calibration checks gas is left on the sensor for more than 6 minutes, this fault will occur. Remove the gas and allow the sensor to see clean air.

In each of the fault cases listed on this page, when the fault occurs the FUA output is activated. Pressing the **ACCEPT** button on the Facilities Module (FM002A) will acknowledge the fault, de-activate the FUA output and the fault LED will stop flashing and remain **ON** until the fault is corrected.

5.0 User Interfaces

This chapter discusses the user interfaces along with the Calibration Check Mode, the Calibration Mode, the Setup Check Mode and the Setup Mode.

WARNING - Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

5.1 Types of User Interfaces

User interfaces are provided so that the operator may interpret and direct the Model 4802A in the performance of its various functions. User interfaces (Figure 38) consist of a digital display, status indicators and a Mode/Select switch.

- The digital display provides the user with the gas concentration at the sensor site, fault diagnostic codes, calibration prompts and setup parameters.
- The status indicators provide the user with an indication of the current mode of operation (alarm, fault, ready, calibration and setup).
- The Mode/Select switch provides the user access to the Calibration, Setup/Inhibit, Calibration Check and Setup Check modes.

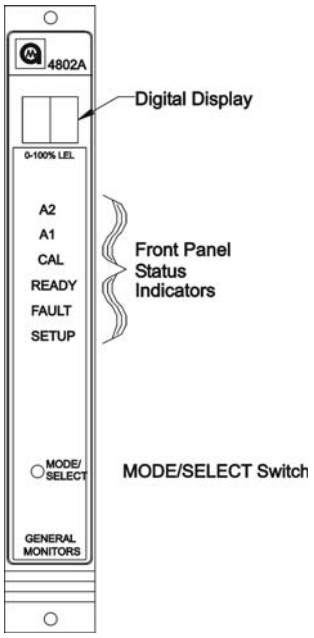


Figure 38 – Front Panel Display

5.2 Calibration Check Mode

To perform a calibration check, follow the procedure listed below.

1. Place the cup from the portable purge calibrator over the sensor (Figure 39) **NOTE:** Do not attach the cup from the portable purge calibrator to the sensor, until display shows a flashing Zero.

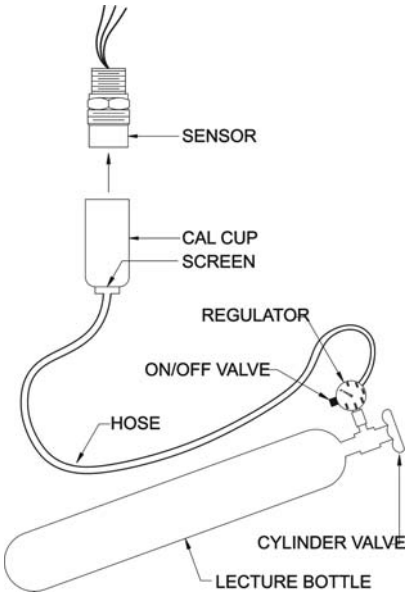


Figure 39 – Portable Purge Calibrator

* The Calibration Check Mode cannot be entered if the 4802A is in alarm.

2. Enter the Calibration Check mode by pressing and holding the Mode/Select switch until the **CAL** LED begins to flash (about ten seconds). When the **CAL** LED begins to flash, release the Mode/Select switch. The unit is now in the Calibration Check Mode (Figure 40).

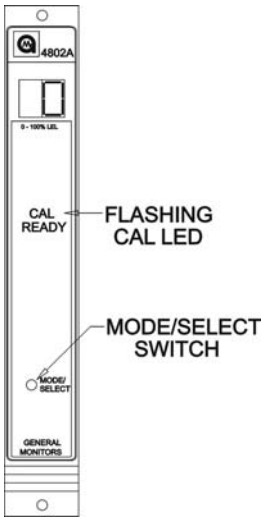


Figure 40 – Entering CAL Check Mode

3. When the Mode/Select switch is released, the display will indicate a flashing pair of bars (**- -**) for about ten seconds.

4. When the display indicates a flashing **0**, apply the test gas to the sensor (open the valve on the cylinder and the ON/OFF valve) and wait for a few seconds. The display will begin to go up scale as the sensor sees the gas. If the display does not change after 6 minutes, the unit will return to the normal operating mode.

5. If the sensor does see the gas, the read-out on the display will be flashing for as long as the unit remains in the Calibration Check mode.

6. The reading will stabilize after 30 to 60 seconds of exposure to the test gas. This response time may increase due to the presence of the TGA-1, RC-3, Dust Guard, Splash-Guard or other sensor accessories.

7. The operator should compare the reading with the gas concentration applied and determine if it is necessary to calibrate the sensor.

8. The A1 & A2 alarms are disabled during the Calibration Check Mode. Use the Setup Check Mode to verify the alarm set points for A1 and A2.

9. If the reading is acceptable remove the gas and allow the sensor to see clean air.

10. If the operator determines that a calibration is necessary, do one of the following:

    - If the applied gas concentration is equivalent to the user specified calibration level, place the unit in the calibration mode by pressing the Mode/Select switch, or
    - If the applied gas concentration is not equivalent to the user specified calibration level, remove the gas, allowing the sensor to see clean air, then follow the calibration procedure listed in Section 5.3 of this chapter.

NOTE - If the 3-Liter Calibration Chamber is used with vapors or fumes from a volatile liquid/solvent, use the procedures listed in Section 6.8.

5.3 Calibration Mode

To calibrate the Model 4802A, follow the procedure listed below:

1. Make sure the calibration gas is the same concentration as the user specified calibration level.
2. Make sure the sensor is seeing clean air.
3. Place the cup from the portable purge calibrator over the sensor (Figure 41).
   NOTE: Do not attach cup from the portable purge calibrator over the sensor, until the display shows “AC”.

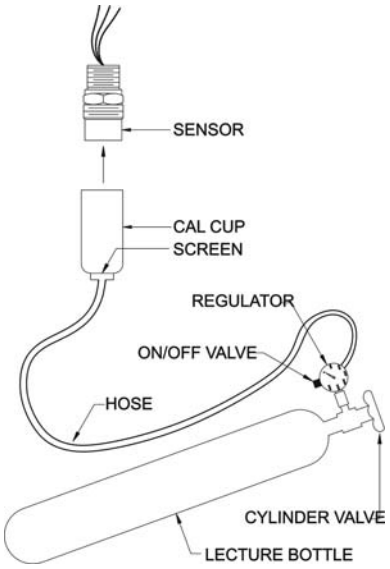


Figure 41 – Portable Purge Calibrator

4. Enter the Calibration mode by following the procedure for entering the Calibration Check mode, continuing to press and hold the Mode/Select switch until the **CAL** LED turns on steady, about fifteen seconds (Figure 42).

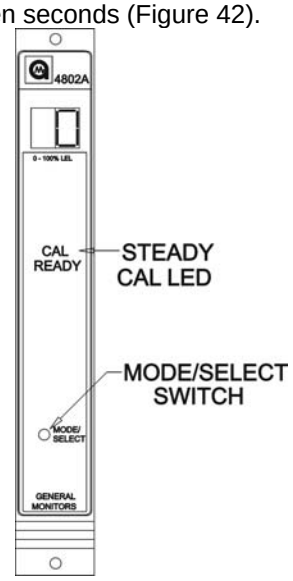


Figure 42 – Entering CAL Mode

When the **CAL LED** is on steady, release the Mode/Select switch. The display will show flashing bars (**- -**) for about ten seconds, then an **AC** indication on the display. The unit is now in the Calibration Mode (Figure 43).

Figure 43 – AC Display During CAL Mode

Apply the gas by opening the valve on the cylinder and the ON/OFF valve and watch the display change from **AC** to **CP** as the sensor sees gas (Figure 44). If the display does not change from **AC** to **CP** after six minutes, the Model 4802A will return to normal operation.

Figure 44 – CP Display During CAL Mode

Wait for the display to change from **CP** to **CC** when the calibration routine is complete (about 1 minute, Figure 45). If the display indicates **F2** remove the gas and recalibrate after 5 minutes.

Figure 45 – CC Display During CAL Mode

Remove the gas and watch the display return to normal operation, **0**, when the new calibration values have been stored in the EEPROM.
If the unit cannot store the new calibration values in the EEPROM, the Model 4802A will display an "**F7**" fault code (EEPROM verification failure, Figure 46). If an **F7** calibration fault occurs, it will be necessary to replace the Model 4802A.

If the Model 4802A fails to calibrate, the unit will use the previously stored calibration values.

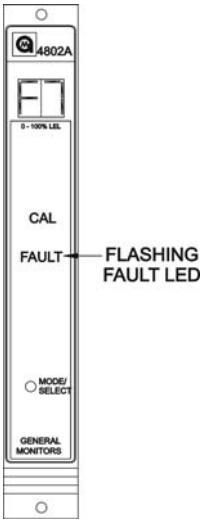


Figure 46 – F7 Display During CAL Mode

5.4 Setup & Setup Check Modes

The **Setup Check** Mode allows the operator to view the selected options for the module without allowing any changes to be made. Once this mode has been entered, the module will automatically display each of the selected options for a short period of time and then it will return to normal operation. The **Setup** Mode allows the operator to change the operating parameters by making choices for selected options.

The **Setup Check** & **Setup** Modes display identical information with the following exceptions:

- The **Setup Check** Mode allows the user to view the operating parameters of the Model 4802A, whereas the **Setup** Mode allows the user to change the operating parameters of the Model 4802A.
- Entering the optional Password is only available in the **Setup** Mode.
- The **Inhibit** Mode may only be entered from the **Setup** Mode. If the Inhibit Mode is entered, the A1 & A2 outputs will be inhibited until the **Mode/Select** switch is pressed.

NOTE - The **Setup** and **Setup Check** Modes cannot be entered if the unit is in alarm or fault.

During the Setup Mode the operator will be allowed to select options.
The selection procedure is the same for most of the options. Pressing the **Mode/Select** Switch toggles the available choices. When the display has indicated a choice for five consecutive seconds, without the operator pressing the **Mode/Select** Switch, the **Setup** routine will accept that selection and move on to the next option available.

NOTE - Before entering the **Setup** Mode to make changes, the user should fill out the form and become familiar with the block diagram, Section 5.6, of this manual. This will aid the user during the selection process in the **Setup** Mode.

The Password, the A1 & A2 Alarm set points and the calibration level options offer the operator more than two choices. While these options are being selected, pressing the **Mode/Select** Switch repeatedly will sequence the display to the next available choice for that option.

To Enter the **Setup Check** Mode or the **Setup** Mode. Press and hold the Mode/Select switch until the **SETUP** LED begins flashing (about twenty seconds). When the **SETUP** LED is flashing, release the **Mode/Select** switch to enter the **Setup Check** Mode (Figure 47). Continuing to press and hold the Mode/Select switch until the **SETUP** LED stops flashing (about five seconds more) will allow the operator to enter the Setup Mode. When the **SETUP** LED stops flashing and stays on, release the **Mode/Select** switch and the unit will enter the Setup Mode (Figure 47).

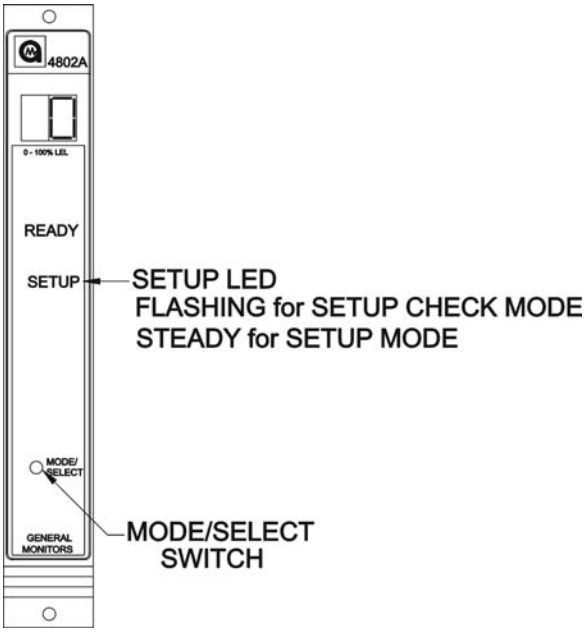


Figure 47 – Entering Setup and Setup Check Modes

5.4.1 Entering the Password

This option applies to the **Setup** Mode only:

- If the password option is enabled, the right digit of the display will be blank and a **0** will appear in the left digit on the display (Figure 48). Press the **Mode/Select** switch until the first number of your password is displayed, and then wait about five seconds.
- The left digit of the display will then blank out and a **0** will appear in the right digit on the display (Figure 48). Press the **Mode/Select** switch until your correct password number is displayed, then wait about five seconds. If the password is correct the unit will proceed to the inhibit option. If the password is incorrect the user will not be able to proceed and the unit will return to the normal operating mode. Once in the operating mode the user may attempt to re-enter the **Setup** Mode. The factory default password is **00**.

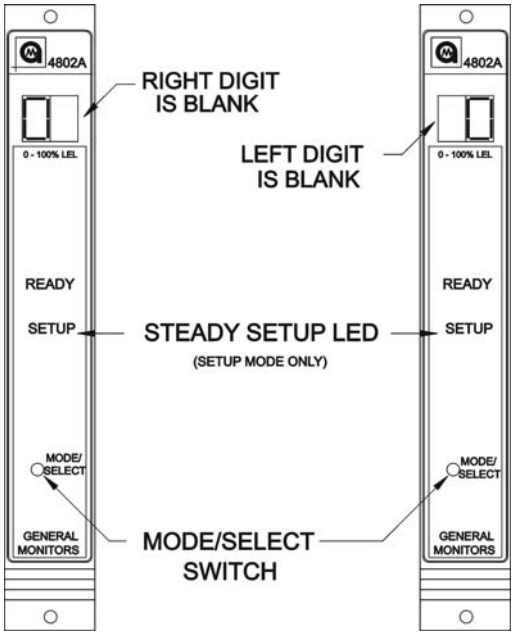


Figure 48 – Entering the Password

5.4.2 Inhibit Mode

This option applies to the Setup Mode only:

- If the password option is disabled, or after the correct password has been entered, the display will indicate **In** for five seconds (Figure 49). Pressing the **Mode/Select** switch while **In** is displayed, will cause the unit to enter the **Inhibit** mode by inhibiting the alarm outputs. As the unit enters the **Inhibit** mode, the Model 4802A will automatically return to normal operation. If it is desired to enter the **Setup** Mode, do not press the **Mode/Select** switch for the five seconds that **In** is displayed.

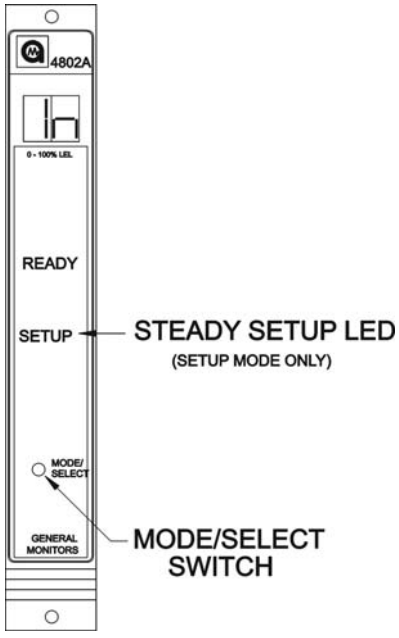


Figure 49 – Entering Inhibit Mode

5.4.3 A2 Alarm Options

Next, the **A2** LED will be flashing while the Energized/De-Energized option is displayed (Figure 50). The display will indicate the current selection, (**En** or **dE**). Press the **Mode/Select** Switch to toggle the selection. **De-Energized** is the factory default for this selection.

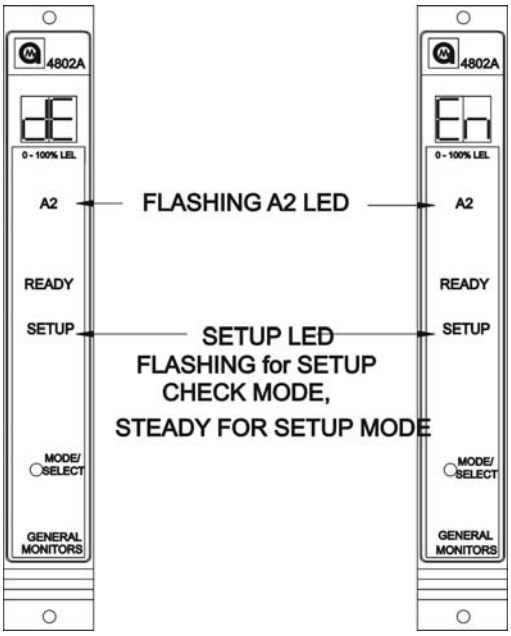


Figure 50 – A2 Energized/De-Energized Alarm Option

The **A2** LED on the front panel will be flashing while the latching/non-latching option is displayed (Figure 51). The display will indicate the current selection, (**nL** or **LA**). Press the **Mode/Select** Switch to toggle the selection. **Latching** is the factory default for this selection.

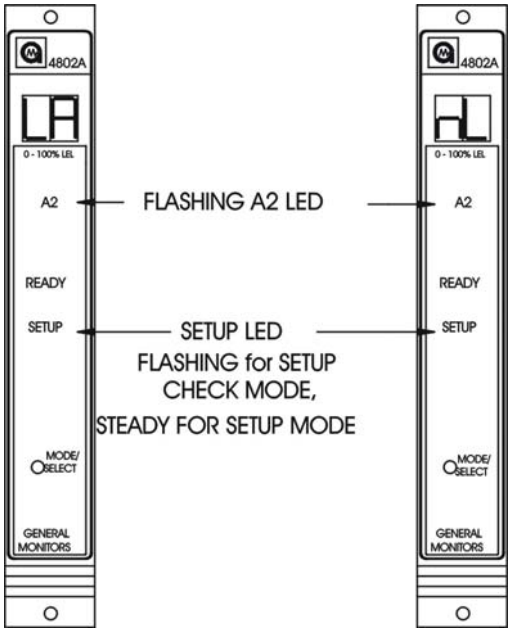


Figure 51 – A2 Latching/Non-Latching Alarm Option

The last A2 alarm option to appear on the display will be the alarm set point (trip level). If this level is reached or exceeded the A2 alarm outputs will activate. The display (Figure 52) will indicate the current A2 alarm set point (**10** to **60** in increments of 5). Press the Mode/Select switch repeatedly, until the desired A2 alarm set point appears on the display. **60** is the factory default for this selection.

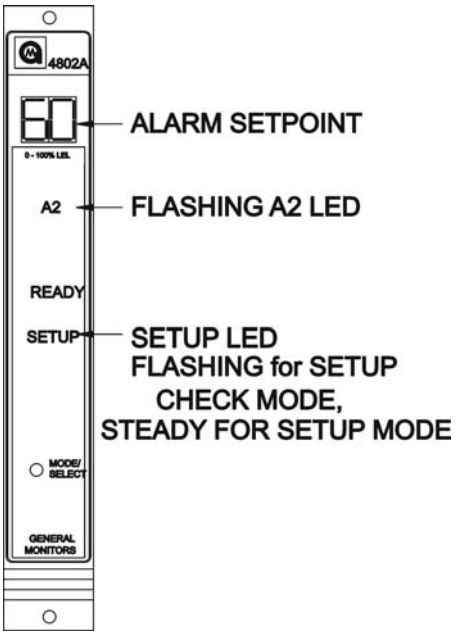


Figure 52 – A2 Alarm Set Point Option

NOTE - The **A2** set point cannot be set lower than the current **A1** set point. To accomplish this, you will need to go through Set-up twice. The **A1** set point should be set lower than the desired **A2** set point, then re-enter the Setup Mode and set the **A2** set point.

5.4.4 A1 Alarm Options

Next, the **A1** LED will be flashing while the Energized/De-energized option is displayed (Figure 53). The display will indicate the current selection, (**En** or **dE**). Press the **Mode/Select** Switch to toggle the selection. **De-Energized** is the factory default for this selection.

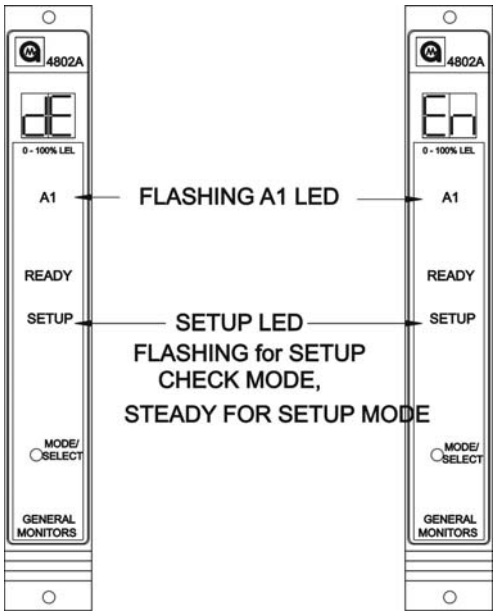


Figure 53 – A1 Energized-De-Energized Alarm Option

The **A1** LED on the front panel will be flashing while the latching/non-latching option is displayed (Figure 54). The display will indicate the current selection, (**nL** or **LA**). Press the **Mode/Select** Switch to toggle the selection. **Non-Latching** is the factory default for this selection.

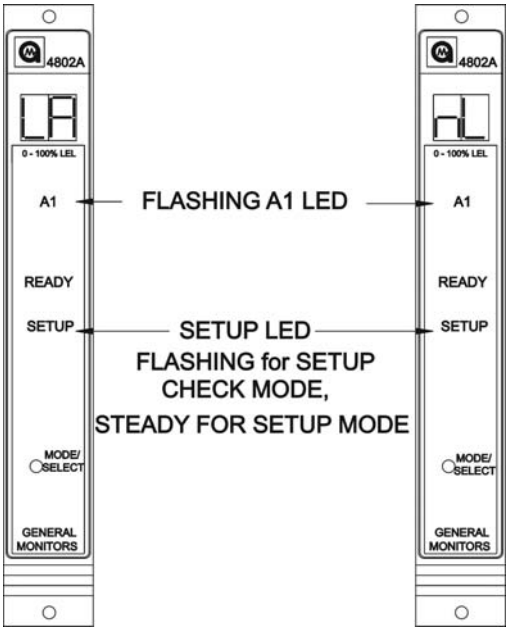


Figure 54 – A1 Latching/Non-Latching Alarm Option

The last **A1** alarm option to appear on the display will be the alarm set point (trip level). If this level is reached or exceeded the **A1** alarm outputs will activate. The display will indicate the current **A1** alarm set point (Figure 55). Press the **Mode/Select** switch repeatedly, until the desired **A1** alarm set point appears on the display (**10** to the **A2** set point in increments of **5**). The **A1** set point cannot be set higher than the **A2** set point. **30** is the factory default for this selection.

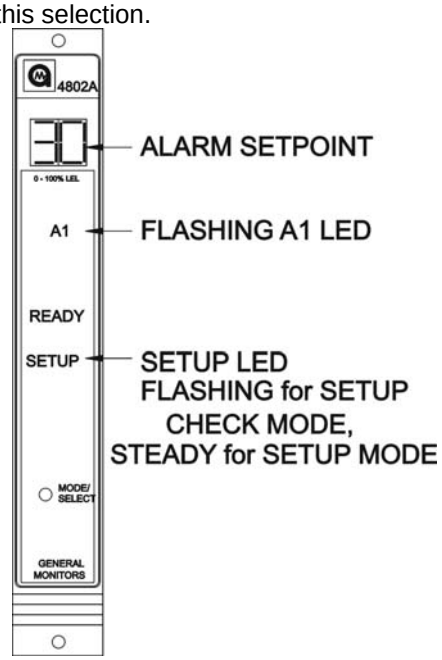


Figure 55 – A1 Set Point Option

5.4.5 Calibration Level Option

After the **A1** alarm options have been selected, the user will choose the calibration level (Figure 56). The CAL LED will flash and display will indicate current calibration level. The acceptable range, in % LEL (lower explosive limit), is between **25** and **90**, inclusive. **50%** is the factory default for this selection.

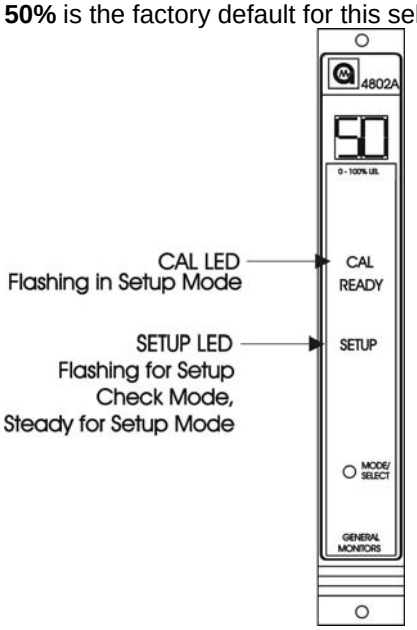


Figure 56 – Calibration Level

5.4.6 Fault/Inhibit Option

Next, the user will select the Fault/Inhibit option. The **FAULT** LED on the front panel will be flashing while the display indicates **Ac** or **nA** (Figure 57). An **Ac** selection specifies that the Model 4802A will activate the **Fault** circuit while the unit is in the Inhibit Mode. A **nA** selection specifies that the Model 4802A will not activate its **Fault** circuit when the unit is placed in the **Inhibit** Mode. A **nA** selection will not disable the **Fault** circuit, therefore, if a **Fault** occurs during the **Inhibit** Mode, the unit will activate the **Fault** circuit. **Not Active** is the factory default for this selection.

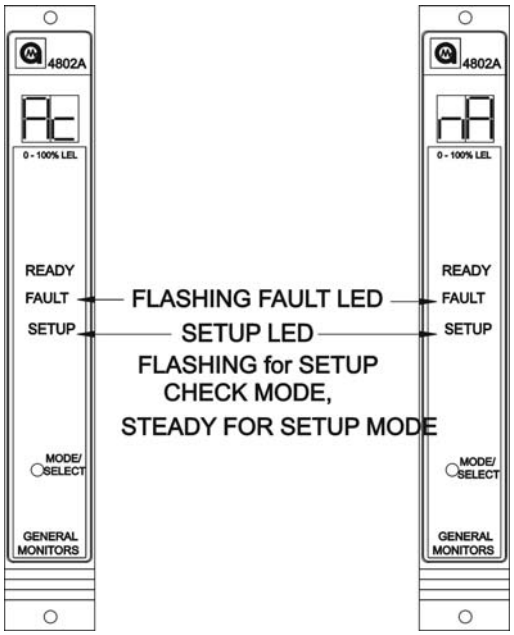


Figure 57 – Fault / Inhibit Option

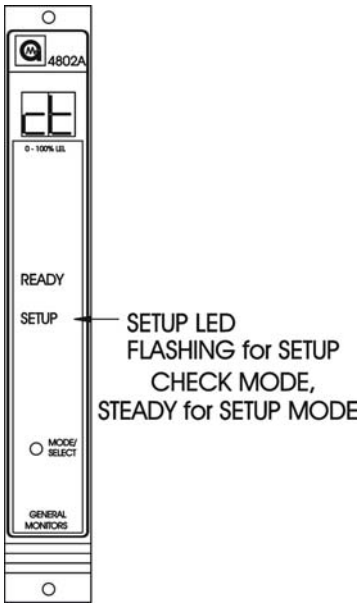


Figure 58 – Entering Card Test Options

5.4.7 Card Test Options

After the **Fault/Inhibit** option has been selected, the user will select the ramp time (3 or 10 seconds) and whether or not the alarm outputs will activate during a Card Test. The display will indicate **ct** for about five seconds (Figure 58) followed by the ramp up time (3 or 10) during the card test (Figure 59). **3** is the factory default for this selection.

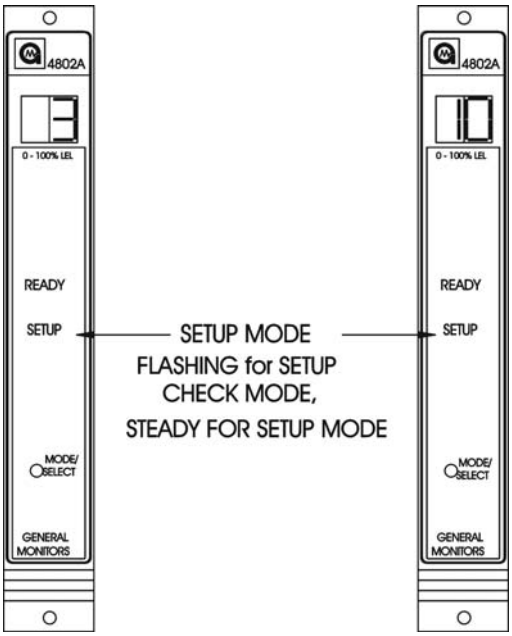


Figure 59 – Card Test Ramp Time

Next, the display will indicate the alarm output option during a Card Test as either **Ac**, active or **nA**, not active. (Figure 60). **Not Active** is the factory default for this selection.

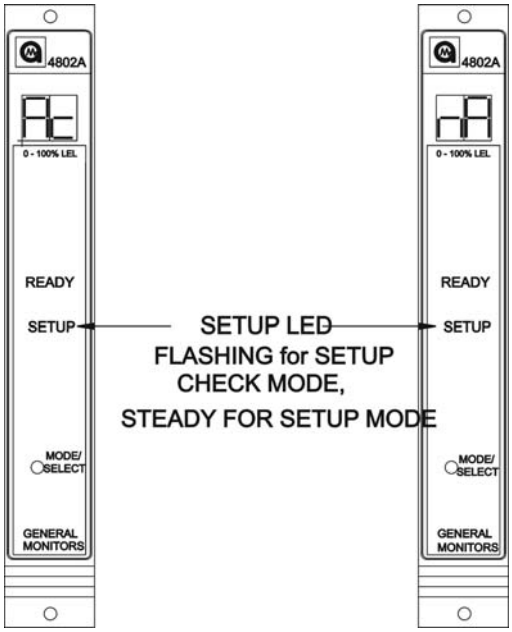


Figure 60 – Alarm Output During A Card Test

NOTE - Selecting **nA** option for the Card Test will not inhibit the **Fault** or **A1/A2** alarm circuits in the event of a malfunction or gas condition.

5.4.8 Password Options

Once the Card Test options have been selected, the user will either enable or disable the password option (Figure 61). The display will indicate either **PE**, for enabled or **Pd**, for disabled. **Password Disabled** is the factory default for this selection.

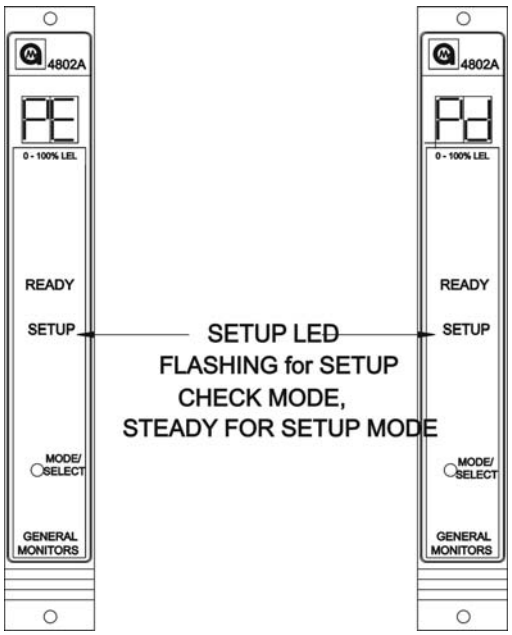


Figure 61 – Password Enabled/Disabled Option

This option applies to the **Setup Mode** only:
If the Password is disabled, the unit will return to normal operation. If the Password is enabled, the user will be able to enter a new password (Figure 62). The unit will display the left digit of the existing Password (flashing on the display). The right digit will be blank until the left digit has been selected. Press the **Mode/Select** switch repeatedly until the desired value is displayed. Once the left digit is correct, wait for five seconds and the right digit of the display will begin flashing and the left digit will be blank. Press the **Mode/Select** switch repeatedly, until the desired value is displayed. Wait about five seconds and the unit will execute the **Setup Check** Mode and then return to normal operation. See Section 5.4 for default Password.

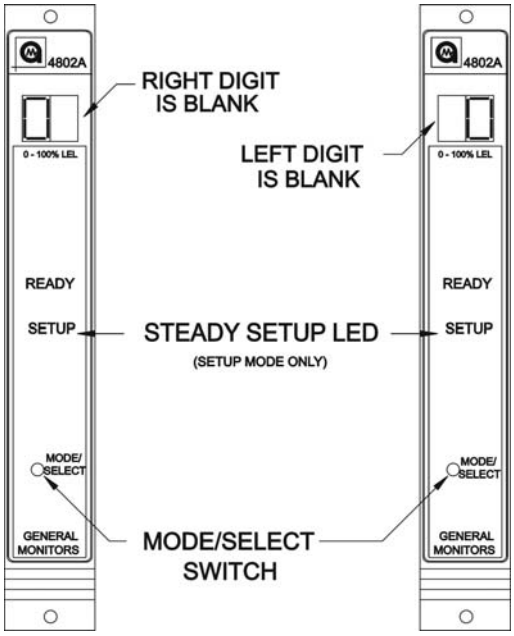


Figure 62 – Entering A New Password

5.5 Inhibit Mode

Whenever the **Inhibit** Mode is entered, the **A1** and **A2** alarm outputs are inhibited. The front panel LED's will still function normally in cases where sufficient gas is present at the sensor. Once this mode has been entered, the user may exit the **Inhibit** Mode by pressing the **Mode/Select** Switch.

NOTE: - Before exiting Inhibit mode, remove gas from sensor and ensure sensor is seeing clean air i.e. display shows zero.

NOTE - Any latched alarms must be reset before exiting the **Inhibit** Mode.

There is a user selectable option that will place the unit in **Fault** every time the **Inhibit** Mode is entered. If the user does not select this option, the **Fault** circuit will function normally during the **Inhibit** Mode.
While the unit is in the **Inhibit** Mode, the display will indicate **IN** for 5 seconds, then the gas concentration will be displayed for 5 seconds. This sequence will repeat for as long as the unit is in the **Inhibit** Mode.
The **Inhibit** Mode is provided so that the operation of the Model 4802A can be verified without tripping external devices that are connected to the **A1** and **A2** alarm outputs.

5.6 Setup Mode Selection Block Diagram

This section is provided to aid the operator in making selections during the Setup Mode. It is recommended that the operator fill-in the selections in the proper blanks and then use this page as a reference while programming the Model 4802A. The blocks shown below indicate the order of options in the **Setup** Mode. To the right of each block is a description of the choices that are available for that option. More information about making each selection is provided in Section 5.4.

Password	Enter the Password, if the Password is enabled.	
Inhibit Mode ?	Enter the Inhibit Mode, if desired.	ENTER SELECTION
A2 Alarm Options	Set the Energized (**En**) / De-Energized (**dE**) Option Set the Latching (**LA**) / Non-Latching (**n**L) Option Set the **A2** alarm set point (from 10 to 60, in increments of 5)	_____ _____ _____
A1 Alarm Options	Set the Energized (**En**) / De-Energized (**dE**) Option Set the Latching (**LA**) / Non-Latching (**nL**) Option Set the **A1** alarm set point (from 10 to 60, in increments of 5) The A1 Set Point cannot be higher than the A2 Set Point	_____ _____ _____
Calibration Level	Set the calibration level, LEL (from 25 to 90, in increments of 1)	_____
Fault/Inhibit Options	Set the Fault Activate (**Ac**) or not (**nA**) during Inhibit Mode	_____
Card Test Options	Display will indicate "**ct**" for 5 seconds Set the ramp time for the Card Test Mode (3 or 10 seconds) Set the Alarm outputs for Active (**Ac**) or not Active (**nA**)	_____ _____ _____
Password Options	Set the Password to be Disabled (**Pd**) or Enabled (**PE**) If the Password is Enabled: Set the password digits Left _____ Right _____	_____
Setup Check Mode	After all of the options have been selected, the 4802A will enter the Setup Check Mode.	

6.0 Appendix

6.1 Principle of Operation

General Monitors uses a low temperature catalytic bead to detect the presence of combustible gases and vapors. These gases and vapors are found in many applications. The catalytic bead converts the combustible gases and vapors to heat. This change in heat results in a change in the electrical resistance of the bead.

By taking a matched pair of catalytic beads and coating one, so that it does not respond to the presence of combustible gases and vapors, we can compare the change in resistance between the two beads. The bead that is coated is called the reference bead and the other bead is the active bead (Figure 63). Environmental factors can also influence the temperature of the catalytic beads. Because the beads are matched pairs, they will respond to changes in ambient temperature, humidity and pressure equally.

By connecting one end of each catalytic bead together, a series circuit is formed. This circuit is supplied with a constant current. The voltage drop across each bead will be identical in the absence of combustible gases and vapors. As combustible material is converted to heat, the resistance across the active bead increases, causing the voltage drop across each bead to be different. This difference is proportional to the amount of combustible gas or vapor that is present at the sensing elements (catalytic beads).

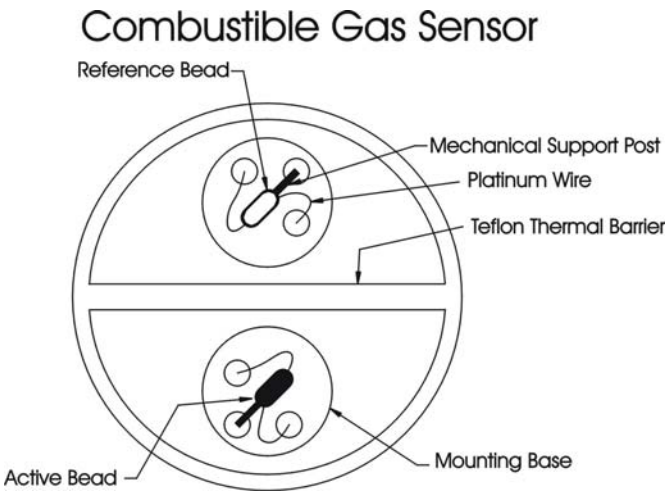


Figure 63 – Catalytic Sensor Diagram

6.2 Spare Parts and Accessories

This chapter provides a description of the types of field devices (sensors), and the accessories, which can be used with the Model 4802A.

6.2.1 Sensors

General Monitors offers a variety of Catalytic Bead Sensors with sensor bodies and flame arrestors:

11159-1	Stainless steel, CSA, ATEX, GOST approved, (120ºC max)
11159-2	Stainless steel, CSA, ATEX, GOST approved, (180ºC max)
11159-1L	Standard industrial hydrocarbon (w/lugs) stainless steel, ATEX
11159-2L	High temperature hydrocarbon (w/lugs), stainless steel, ATEX

6.2.2 Sensor Housing

General Monitors offers an explosion proof housing that is rated for use in Class I, Division 1, Group B, C & D or European Zones 1 & 2. hazardous locations (see Figure 64). The housing entries are tapped for ¾ NPT threads. The sensor connects to one of these entries, while the other entry is for conduit runs. The lid of the housing is also threaded to allow the user to gain entry to the sensor connections in the field.

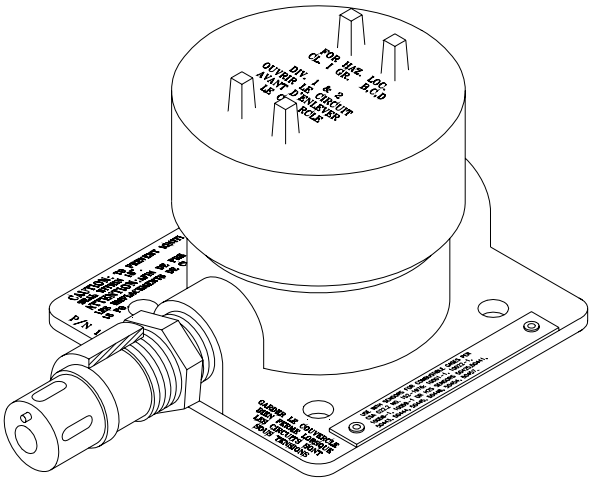


Figure 64 – Universal Sensor Housing With Sensor And Splash-Guard

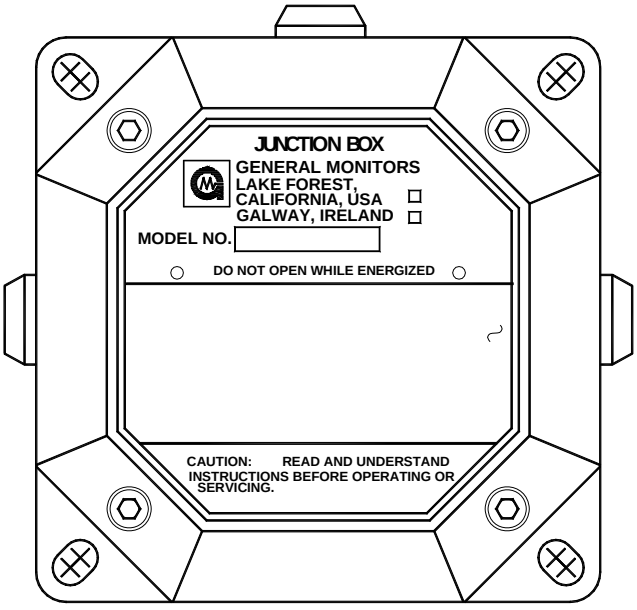


Figure 65 –NPT 45160-2 GRP Junction Box, M20

Once the sensor is installed/operating in the field, no attempt should be made to disconnect the sensor, the conduit of the housing lid without removing power from the Model 4802A, as such an act would compromise the explosion proof integrity of the field device.

6.2.3 Splash-Guard & TGA-1

General Monitors produces a universal Splash-Guard, P/N 10395-1, that has been designed for use on all General Monitors combustible gas and hydrogen sulfide gas sensors (Figure 66). In addition to the Splash-Guard, a Test Gas Applicator (TGA-1) is available for delivering a test gas to remotely located sensors, P/N 10460-2.

The Splash-Guard prevents water from rain or equipment wash-downs from being forced into the sensor cavity and affecting the response of the sensing element. Constructed of rugged Valox plastic, it has a series of internal baffles to deflect water down and away from the sensor. This guard (and the TGA-1) is threaded for simple screw-on installation. The Splash-Guard and TGA-1 are recommended for outside applications where rain or frequent hose downs occur, such as offshore platforms.

Figure 66 – Splash-Guard Picture

6.2.4 Dust Guard Assembly

The Dust Guard Assembly (Figure 67) is a simple, threaded stainless steel cylinder with a wire- screen at one end. It is easily removed for cleaning and/or replacement of the disposable screen.
This General Monitors accessory is specifically designed to prevent dust and particulate matter from reaching the sensor flame arrestor. Such debris can plug the screen and limit the amount of gas reaching the active surface of the sensor.

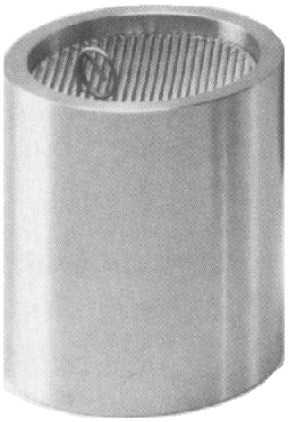


Figure 67 – Dust Guard Picture

The Dust Guard is also available in a kit with twelve replaceable screens (Figure 68). It can also be used as an effective windscreen, and is recommended for corrosive, windy or high temperature environments.

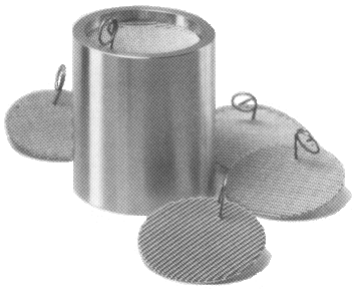


Figure 68 – Dust Guard Assembly Kit Picture

6.2.5 Duct Mounting Plates

General Monitors produces a Duct Mounting Plate (P/N 10041) for applications that require the sensor to be mounted in air-conditioning or heating duct. The Duct Mounting Plate is easy to install (Figure 69).

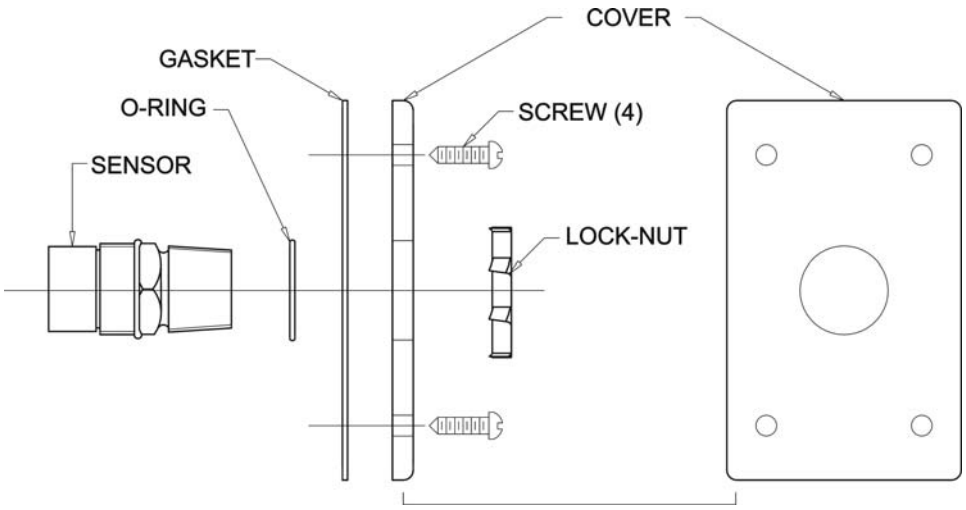


Figure 69 – Duct Mounting Plate, Assembly Drawing

Read and understand the bulleted list below before mounting the Sensor into a duct.

- Select a location on the duct and cut out a hole large enough for the Sensor to be inserted into the duct.
- Place the O-Ring over the Sensor threads, against the 1¼-inch hex on the wiring side of the sensor.
- Insert the wiring side of the Sensor through the Gasket and Cover.
- Screw the Lock Nut onto the wiring side of Sensor.
- Use the four screws to attach the mounted Sensor to the duct. The Sensor should be oriented so that when the plate is attached to the duct the sensing element is inside the duct.

6.2.6 Calibration Equipment

The Model 4802A uses a Portable Purge Calibrator (Figure 70) or the 3 Liter Chamber (Figure 71), to accomplish calibration. The calibration and calibration check procedures and use of the Portable Purge Calibrator is explained in Sections 5.2 and 5.3.

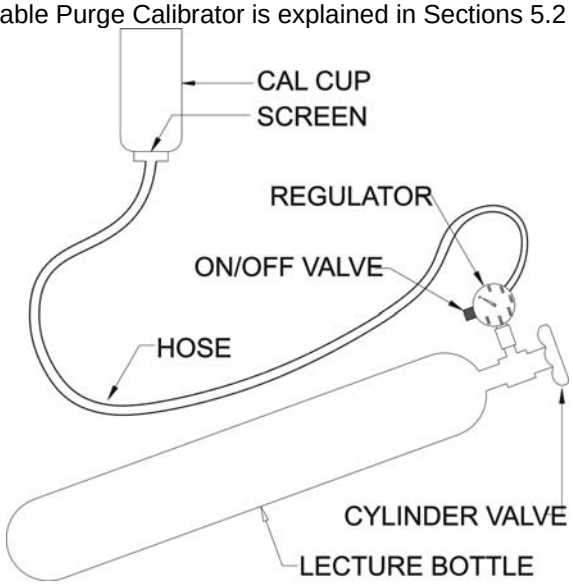


Figure 70 – Portable Purge Calibrator

The procedure using the 3-Liter Chamber (Figure 71) is explained below:

The 3-Liter Chamber is used when the 4802A is calibrated with liquid or solvent vapors. Before the Model 4802A is calibrated with any solvent or volatile liquid, consult the listing in Appendix B to determine the volume of solvent/liquid required to produce a 50% LEL concentration in the 3-Liter Chamber. However, if the user specified calibration level is not 50% LEL, consult the factory for the correct volume. Let the factory know the calibration level (25 to 90% LEL) and the solvent/liquid being used to calibrate the sensor.

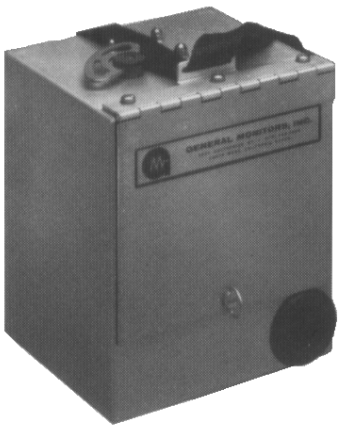


Figure 71 – 3-Liter Chamber

Before using the 3-Liter Chamber, make sure the following are present:
1. 3-Liter Chamber
2. Dish
3. 250 micro-liter syringe
4. Correct volume of solvent/liquid for calibration and calibration checks.

- Orient the chamber so that the lid and sensor hole is on top.
- After injection onto the evaporation dish, the lid is fastened quickly to contain vapors in the chamber.
- Placing the round General Monitors magnet onto the start switch locating post operates the fan.
- Draw the correct amount of solvent or liquid into the syringe, according to the listing in Section 6.6.
- Place the Model 4802A in the Calibration Check or Calibration Mode, following the instructions listed in Sections 5.2 and 5.3.

6.2.7 Calibration Check Mode

1. When **0** is flashing on the display (Calibration Check Mode) inject the solvent/liquid into the dish, reach underneath and behind the fan blades on the inside of the chamber, locate the fan switch; turn it on and close the lid on the 3-Liter Calibration Chamber.

2. As the sensor begins to respond to the combustible vapor in the chamber, the concentration will begin flashing on the display.

3. The reading will stabilize after one or two minutes.

4. Remove the sensor from the chamber and allow it to see clean air. When the display has stopped flashing and indicates a few % LEL and then zero (**0**), the Model 4802A has returned to normal operation.

6.2.8 Calibration Mode:

1. When **AC** (Calibration Mode) appears on the display, inject the solvent/liquid into the dish, reach underneath and behind the fan blades on the inside of the chamber, locate the fan switch; turn it on and close the lid on the 3-Liter Calibration Chamber.

2. As the sensor begins to respond to the combustible vapor in the chamber, the display will indicate **CP** (Calibration in Progress).

3. After one or two minutes the display will indicate **CC** (Calibration Complete).

4. Remove the sensor from the chamber and allow it to see clean air. When the display indicates a few % LEL and then zero (**0**), the Model 4802A has returned to normal operation.

6.2.9 Calibration Check & Calibration Modes
- Remove the Dish from the 3-Liter Chamber and clean thoroughly before using it again.

6.2.10 Calibration Equipment and Part Numbers

6.2.10.1 Portable Purge Calibrator Assembly:

with 50% LEL Methane Gas	1400150-M
with 50% LEL Hydrogen Gas	1400150-H
with 50% LEL Ammonia Gas	1400150-A
with 50% LEL Butadiene Gas	1400150-BD
with 50% LEL Butane Gas	1400150-B
with 50% LEL Ethane Gas	1400150-E
with 50% LEL Ethylene Gas	1400150-EY
with 50% LEL Propane Gas	1400150-P

6.2.10.2 Portable Purge Replacement Cylinder

with 50% LEL Methane Gas	1400155-M
with 50% LEL Hydrogen Gas	1400155-H
with 50% LEL Ammonia Gas	1400155-A
with 50% LEL Butadiene Gas	1400155-BD
with 50% LEL Butane Gas	1400155-B
with 50% LEL Ethane Gas	1400155-E
with 50% LEL Ethylene Gas	1400155-EY
with 50% LEL Propane Gas	1400155-P

6.2.10.3 Replacement Parts

Small Calibration Cup	1400152-1
Large Calibration Cup	1400154
Pressure Gauge Regulator	922-009
Methane Gas 50% LEL	140155-M
Hydrogen 50% LEL	140155-H
Butadine Gas 50% LEL	140155-BD
Butane Gas 50% LEL	140155-B
Ethane Gas 50% LEL	140155-E
Propane Gas 50% LEL	140155-P

6.2.10.4 Cylinder Refills

50% LEL Methane Gas	140015-M
50% LEL Hydrogen Gas	140015-H
50% LEL Propane Gas	140015-P
50% LEL Butane Gas	140015-B

6.2.10.5 3-Liter Chamber Replacement Parts

3 Liter Chamber with syringe	1400200
Dish for 3 Liter Chamber	928-700
250 microliter syringe	928-718
Motor for 3 Liter Chamber	1400204
Fan for 3 Liter Chamber	1400207

6.3 System Specifications

6.3.1 Application
Combustible & Flammable Gas and Vapor Detection.

6.3.2 Sensor Type
General Monitors Low Temperature, Diffusion Limited, Catalytic Bead Sensor.

6.3.3 Typical Sensor Life
4 to 5 years, in normal service.

6.3.4 Measuring Range
0 to 100% LEL.

6.3.5 Converting Test and Calibration Gas Concentrations for % LFL to % LEL
Using %LFL as described in *NFPA 325 Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids 1994 Edition* it is then used as 100% LEL fraction. Example Hydrogen has a 4% LFL (Lower Flammable Limit) is then used as 100% LEL fraction, so that when an environment that has 2% LFL (Lower Flammable Limit) would indicate 50% LEL

6.3.6 Accuracy
The accuracy the 4802A is limited by the accuracy of the standard used to calibrate the system. For many combustible gases, obtaining a high accuracy standard that is suitable for field calibration use may be difficult (about the best accuracy of gas concentration achievable is +/-5%, using a permeation system with good temperature control). For this reason, no fixed accuracy statement is possible. The accuracy cannot be better than the accuracy of the calibration gas.

The best accuracy to be expected, assuming a perfect standard, is ± 3% LEL up to 50% LEL and ± 5% LEL $\geq$ 51% LEL, at reference ambient conditions and when the unit has been calibrated using 50% LEL.

6.3.7 Relative Sensitivities

Methane	100.0
Hydrogen	64.7
Ammonia	132.8
Butadiene	84.6
Butane	66.4
Ethane	86.2
Ethylene	87.1
Propane	77.6

NOTE: The above are approximate values only

Beyond the standard gases the sensor is configured for, each gas sensor can be configured to be gas specific. General Monitors, Inc. can conduct an evaluation study to custom configure a gas sensor.

6.3.8 Zero Drift
Less than 5% of span, per year.

6.3.9 Stability
Adheres to FM Class 6310 & Class 6320 and CSA 22.2 No. 152-M1984. Stabilization occurs in approximately two (2) minutes.

6.3.10 Response Time
T50 < 8 seconds with 100% LEL concentration of Methane (CH_4) applied.
T90 < 18 seconds with 100% LEL concentration of Methane (CH_4) applied.

6.3.11 Warm-up Time
The catalytic bead sensor warm-up time is fifty (50) seconds.

6.3.12 Poisons and Interfering Gases
Sensors require a minimum of 20.9% oxygen for continuous and reliable operation.

Sensors operating in conditions of less than 20.9% Oxygen will provide erroneous or unstable concentration data.

Fluctuating oxygen concentration during calibration will result in erroneous concentration readings during system operation. For optimal sensor performance the Oxygen level during calibration should be consistent with the expected normal ambient atmosphere.

The presence of certain gases and vapors may interfere with sensor operation. General Monitors has tested and documented some of the known interferents. These include but are not limited to, low vapor silicon, H2S, heavy hydrocarbons, and light chlorinated products.

6.3.13 Approvals

CSA certified to CSA 22.2 No. 152-M2984 and Atex  II (2) G

6.3.14 Storage
Place the 4802A in the original storage container that was shipped with the unit. This container guards against contamination from solvents, lubricants, humidity, etc. In the case of long-term storage, the 4802A should be stored as above in a cool, dry, place, preferably between 0 and 20ºC.

6.3.15 Warranty
2 Years

6.4 Mechanical Specifications

Weight:	11.2 oz.	(318 grams)
Length:	9.9 inches	(251 mm)
Height:	6.825 inches	(173 mm)
Width:	1 inch	(25 mm)

6.5 Electrical Specifications

6.5.1 Input Power Requirement

20 to 35Vdc, (24Vdc @ 250mA, 4.8W nominal) (300 mA max).
PSU noise and ripple voltage 1.0Vpp max. The customer supplied PSU must comply with IEC 1010-1, limiting current to 8A under Fault conditions, in order to comply with CE Marking requirements.

6.5.2 Electrical Classification

The Sensor is rated for used in Class I, Division 1, Groups B, C & D or European Zones 1 & 2. The Model 4802A is designed for use in non-hazardous environments.

6.5.3 Relay Contact Rating

4A @ 30V RMS/42.4V PK, 3A @ 30VDC resistive. DPDT for A1 & A2, SPDT for Fault.

6.5.4 Open Collector Rating

100mA @ 35Vdc for A1, A2, Fault, UA, FUA, CAL-OC, LA1 & LA2.

6.5.5 Cable Parameters

Recommended 3-wire screened or screened and armoured per BS5308 or equivalent. Maximum cable lengths allowable between module and sensor with one way resistance of 5 Ohms per sensor lead (10 Ohms loop)

mm^2	AWG	Feet	Meters
2.5	14	7600	2320
1.5	16	4800	1460
1.0	18	3000	910
.75	20	1900	580

Figure 72 – Recommended Maximum Cable Lengths Between Module & Sensor

The maximum allowable cable lengths between the analog output connections on the control module with a remote device in series (maximum loop resistance of 500 Ohms between AO+ & AO-):

mm^2	AWG	Feet	Meters
2.5	14	9000	2740
1.5	16	5200	1585
1.0	18	3800	1160
.75	20	2400	730

Figure 73 – Maximum Allowable Cable Lengths Between Analog Output Connections On Control Module

6.6 Environmental Specifications

6.6.1 Operating Temperature Range

Sensor (11159-1)	-40°F to +248°F -40°C to +120°C
Sensor (11159-2)	-40°F to +356°F -40°C to +180°C
4802A	0°F to +150°F -18°C to +66°C

6.6.2 Storage Temperature Range

4802A	-40°F to +150°F -40°C to +66°C

6.6.3 Pressure Limits

1/2ATM to 3ATM with no impact on performance or operation

6.6.4 Operating Humidity Range

5% to 100% Relative Humidity, non-condensing

6.7 Engineering Specifications

6.7.1 Zero Two System

Each system shall utilize modules capable of monitoring gas sensing elements, or a 0 to 21.7mA analog signal from gas or flame detection transmitters. The system chassis shall be available in 4, 8 and 16 channels. Each chassis shall contain a bus for the following independent signals:

- A1 Alarm
- A2 Alarm
- Fault
- Master Reset
- Master Accept
- Unaccept
- CAL
- +24Vdc
- System Common

Module signals shall be capable of being bussed from one chassis to another, so that up to 100 modules can comprise a single system. The gas and flame detection modules shall be electrically and physically compatible and capable of being used in the same chassis to form combined fire and gas detection systems. The system shall consist of Zero Two Series component modules as manufactured by General Monitors, Lake Forest California, U.S.A. or General Monitors, Galway, Ireland.

6.7.2 4802A Control Module

The control module, with sensor, shall meet the performance requirements of CSA 22.2 No. 152-M1984 & FM Classes 6310 & 6320. It shall be capable of monitoring 0 to 100% LEL concentration of combustible gases/vapors. The control module shall have an interface panel, providing a mode/select switch and the following indications:

- 2 discrete alarm threshold level indicators
- a “fault” or “malfunction” indicator
- a “ready” indicator
- a calibration mode indicator
- a setup mode indicator
- a 2 digit digital display

All alarm parameters and user options shall be software selectable. A functional card test and a front panel LED test shall be switch capable without interrupting normal on-line services.
The control module shall be capable of insertion and removal during power on conditions without damage to any component module in the system. The control module shall meet level 3 for severity and comply with BS 6667 Part 3 / IEC 801-3 for Radio Frequency Interference (RFI) susceptibility. The control module will generate display codes associated with fault conditions whenever a fault or malfunction occurs. A mode/select switch shall provide the operator front panel access to:

- a calibration check mode
- a calibration mode
- a setup check mode
- a setup mode
- inhibit mode

The control module shall have a 100% backward compatible option available at the time of order. The control module, with sensor, shall be capable of calibration with the following display prompts during the calibration routine:

AC = Calibration routine activated,
CP = Calibration in progress and
CC = Calibration complete.

The control module shall have a password protected setup routine capable of having the password disabled.

6.8 Volatile Liquids and Solvents

Volatile liquids and solvents are not supplied by General Monitors. This page provides a listing of volatile liquids and solvents and the respective volumes required (in microliters) to produce a 50% LEL vapor concentration in the **3 Litre Portable Calibration Chamber (P/No. 10543-1)** – a hypodermic syringe is provided for the accurate measurement and insertion of the precise volumes into the Chamber. (These volumes are correct at 25ºC and 1 Atmosphere pressure. If using significantly outside these "STP" values, please consult the factory.)

Acetaldehyde	136
Acetic Acid	140
Acetone	112
Acetonitrile	96
Acrylonitrile	120
Amyl Acetate	100
Benzene	65
Butyl Acetate	137
Butyl Alcohol (1-Butanol)	78
sec-Butyl Alcohol (2-Butanol)	95
tert-Butyl Alcohol	138
Butyraldehyde	102
Cyclohexane	86
Diethyl Ketone (3-Pentanone)	103
p-Dioxane	104
Ethanol (Ethyl Alcohol)	118
Ethyl Acetate	119
Ethyl Amine	140
Ethyl Benzene	60
Ethyl Ether	120
Gasoline	107
Heptane	94
Hexane	86
Isopentane (2-Methylbutane)	99
Isoprene (2-Methyl-1,3-Butadiene)	89
JP-4, Jet Fuel mainly Kerosene)	183
Methanol (Methyl Alcohol)	148
Methyl Ethyl Ketone (MEK)	76
Methyl Metacrylate	111
Methyl-t-Butyl Ether (MTBE)	109
Naptha (Petroleum Ether)	96
Octane	99
Pentane, Normal	105
Isopropyl Alcohol (IPA)	93
n-Propanol	100
Propylacetate	120
Propylamine	103
Propylene Oxide	98
Styrene (Vinly Benzene)	63
Tetrahydrofuran	99
Toluene (Methylbenzene, Toluol)	78
Triethylamine	102

6.9 Engineering & Technical Drawings

6.9.1 Outline & Terminal Connections

Reference Drawing # 11221

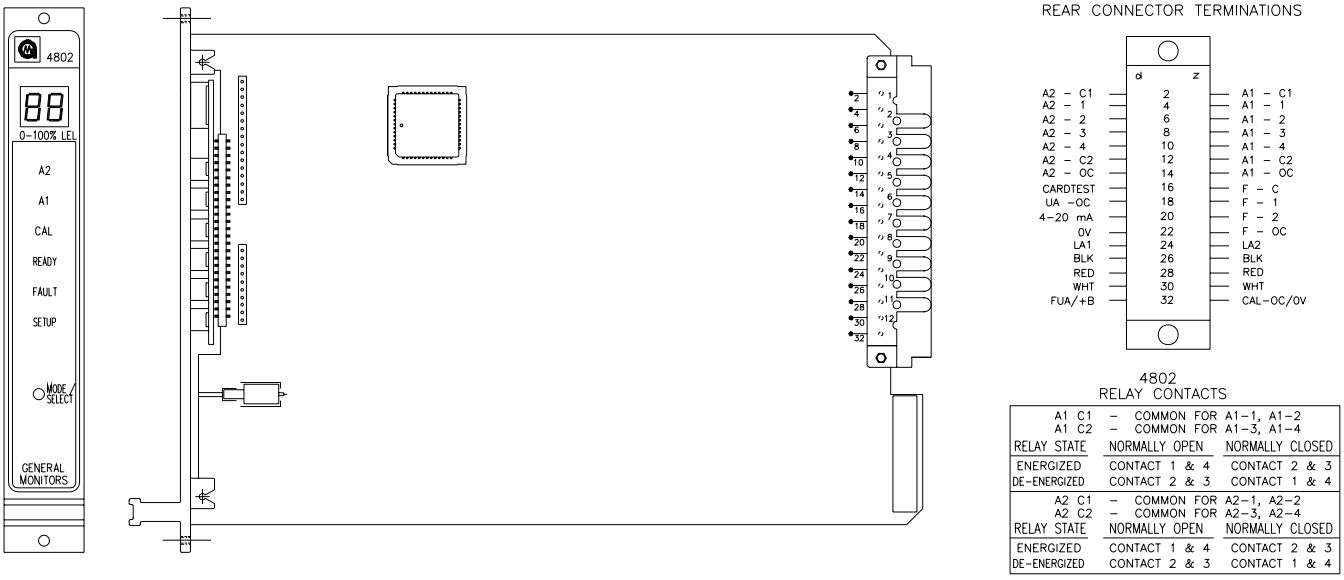
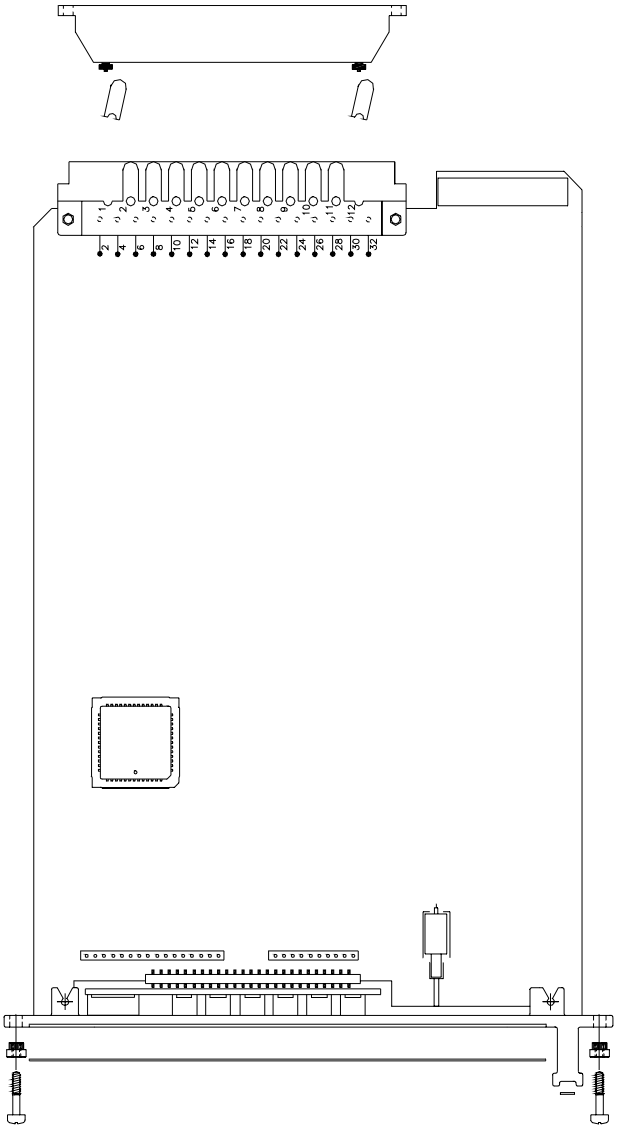


Figure 74 – Outline and Terminal Connections 4802A

6.9.2 Final Assembly

Reference Drawing # 11220-1



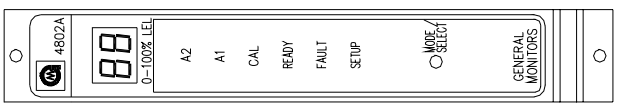


Figure 75 – Final Assembly, 4802A

6.10 Zero Two Series Modules

Model 2602A
Zero Two Series Control Module for Hydrogen Sulfide Gas Applications

Model 4802A
Zero Two Series Control Module for Combustible Gas Applications

Model TA102A
Zero Two Series Trip Amplifier Module for Combustible Gas Applications

Model TA202A
Zero Two Series Trip Amplifier Module for Hydrogen Sulfide Gas Applications

Model TA402A
Zero Two Series Trip Amplifier Module for Flame Detection Applications

Model TA502A – 3 DIGIT
Zero Two Series 3 Digit A flexible multipurpose module for a variety of GM products.

Model FM002A
Zero Two Series Facilities Module Performs Common Functions for Zero Two Systems

Model RL002*
Zero Two Series Relay Module Provides Extra Output Capacity for Zero Two Systems

Model ZN002A
Zero Two Series Zone Control Module Performs Zoning and Voting Functions for Zero Two Systems

Model MD002
Zero Two Series Driver Card for Monitoring / Driving High-Current Output Devices

Model IN042
Zero Two Series Four Zone Input Card for Callpoints, Smoke & Thermal Detectors

Model PS002*
Zero Two Series Power Supply Module for Zero Two Systems

***** = Non-European Countries Only.