GENERAL MONITORS

Model TA202A

Zero Two Series Trip Amplifier Module For Hydrogen Sulphide Applications

Instruction Manual **08/04**

Part No. MANTA202A - EU
Revision K/08-04

Warranty Statement

General Monitors warrants the Model TA202A 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 –HYDROGEN SULPHIDE GAS IS AN EXTREMELY TOXIC GAS AND EXPOSURE MAY RESULT IN A LOSS OF CONCIOUSNESS OR DEATH.

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.

Smart Sensors designed by General Monitors will work with the TA202A. Any attempt to use a Field Device that has not been approved by General Monitors will void the warranty.

Fuses F2 and F3 must have an HBC of >/= 1500A in order to comply with approval requirements and good installation practice.

WARNING - suitably skilled and competent personnel must carry out Installation and Maintenance 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 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 + Amd 93/68/EEC relating to Electromagnetic Compatibility, by the application of:

A Technical Construction File No: GM 95005 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 as applicable) relating to safety by the application of:

A Technical Construction File No: GM 95005 and Competent Body Certificate No 4146/699L-6870, 4146/1119/9150 and 4146/1119/9507 issued by:

ERA Technology Ltd. Cleeve Road, Leatherhead Surrey KT22 7SB, England. Tel: +44 1372 367000

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

PRODUCT: Trip Amplifier Module for Hydrogen Sulphide Applications
MODEL: TA202A

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.

Responsible Person: _____ Date: 15-07-97

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 be 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
- Trip Amplifiers
- 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
- Trip Amplifiers
- 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 TA202A 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 – suitably skilled and competent personnel must carry out Installation and Maintenance 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:

- Glycol
- Halides (compounds containing Fluorine, Chlorine, Bromine and Iodine)
- Heavy Metals (e.g. Tetraethyl lead)
- Sulphur

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 MOS 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.

The Red Cap, complete with desiccant, must be replaced when sensor is off power for prolonged periods.

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).

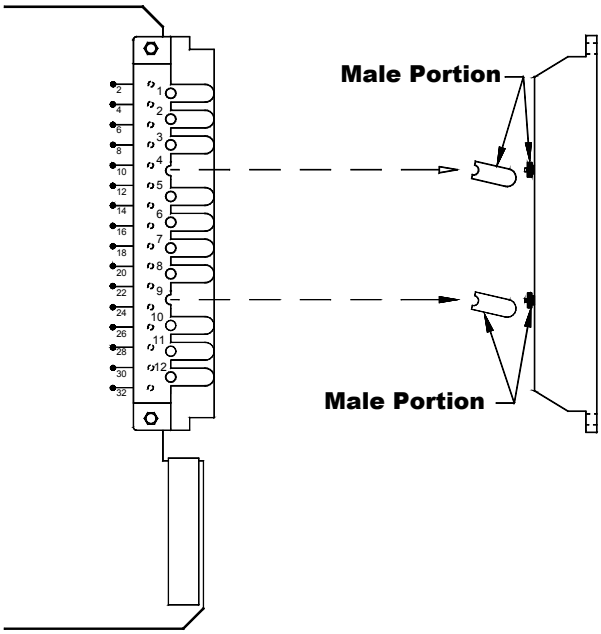


Figure 1 – Trip Amplifier Coding Strip

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 Trip Amplifiers 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 TA202A 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.

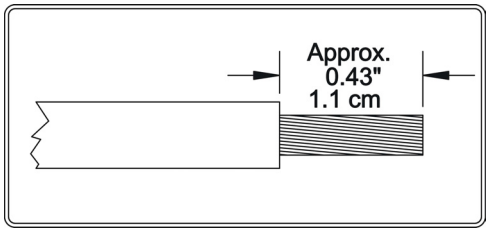


Figure 2 – Wire Strip Length

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 TA202A, loosen the desired screw, insert the stripped end of the wire and tighten.

For the rear terminal designations refer to Figure 3 below:

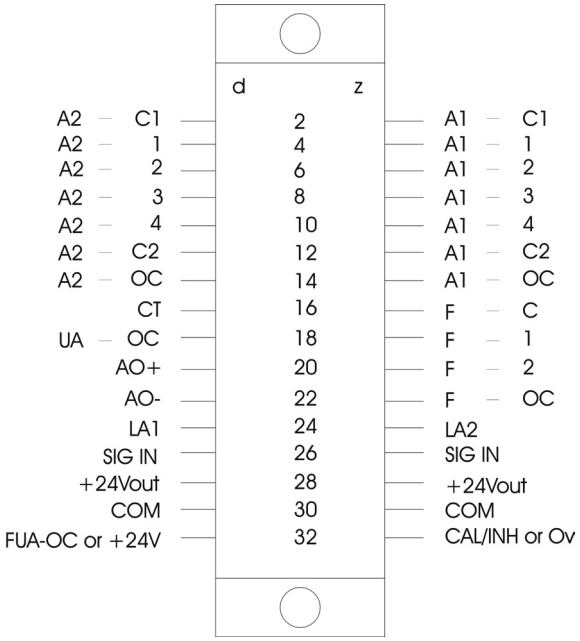


Figure 3 – Rear Terminal Designations

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 Energised	A2-C1 & A2-1, A2-C2 & A2-4	A2-C1 & A2-2, A2-C2 & A2-3
Normally De-Energised	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 Energised	A1-C1 & A1-1, A1-C2 & A1-4	A1-C1 & A1-2, A1-C2 & A1-3
Normally De-Energised	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 +24VDC Input).

The Fault outputs are always normally energised 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.

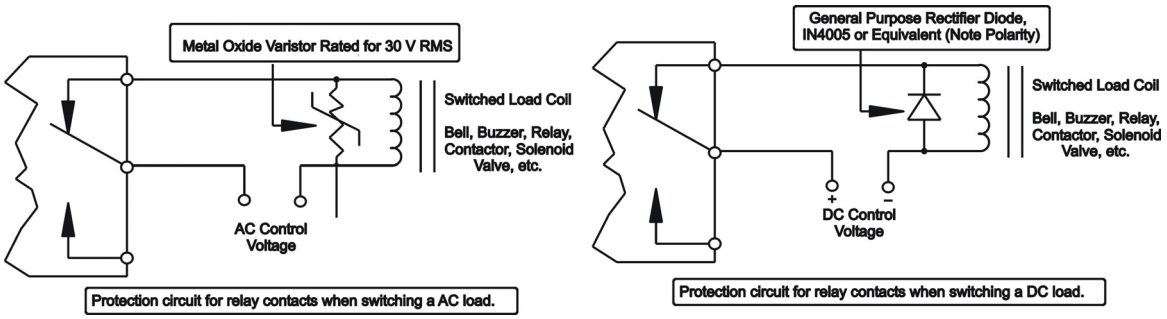


Figure 8 – Relay Protection Circuits for AC and DC Loads

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	Open Collector Output
CAL/OC	32z	CAL-Inhibit Mode Output

Figure 9 – Terminal Designations for Unaccept and Calibration Mode Outputs

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

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

Figure 10 illustrates some typical open collector external circuits.

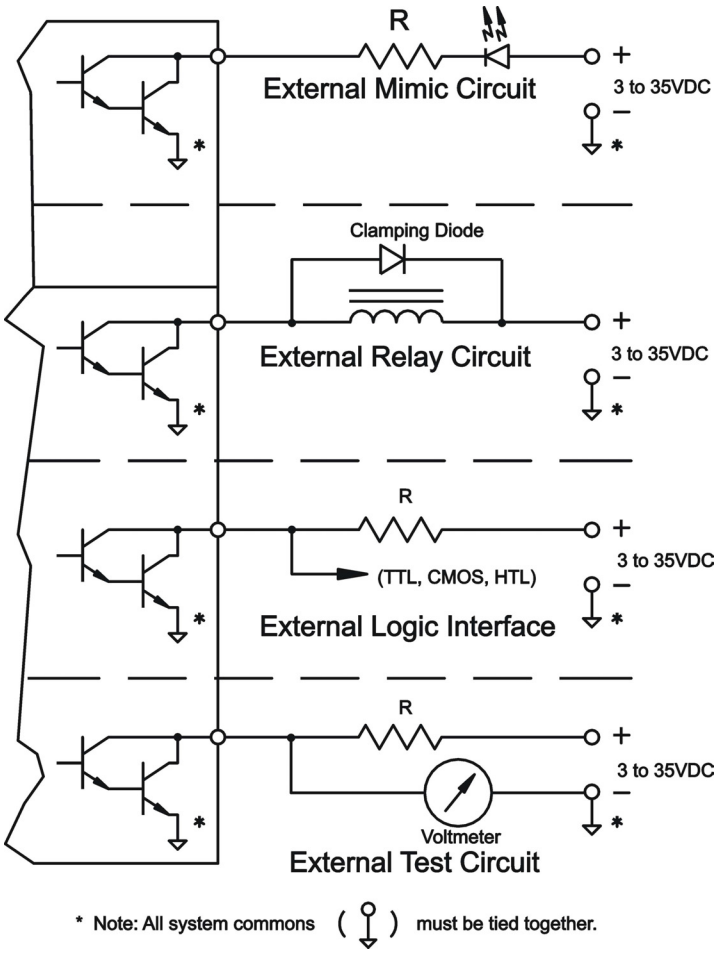


Figure 10 – Open Collector External Circuits

1.5.5 Field Device Connections

The terminal designations for the Field Device are:

Term	Description
26d,z	Signal IN (analogue)
28d,z	VDC Out (+24VDC)
30d,z	DC Common

Figure 11 – Terminal Designations for Field Device

NOTE - Only 1 Field Device may be connected to a Model TA202A.

Figure 12 illustrates the Field Device/Controller connections.

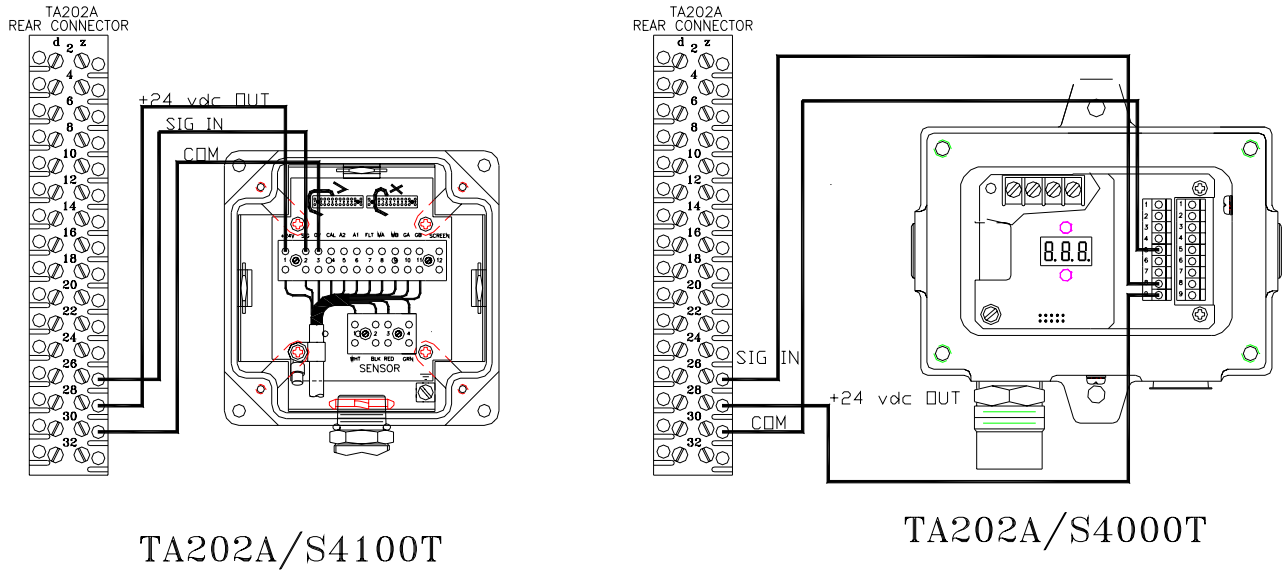


Figure 12 – Field Device/Controller Connections

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.

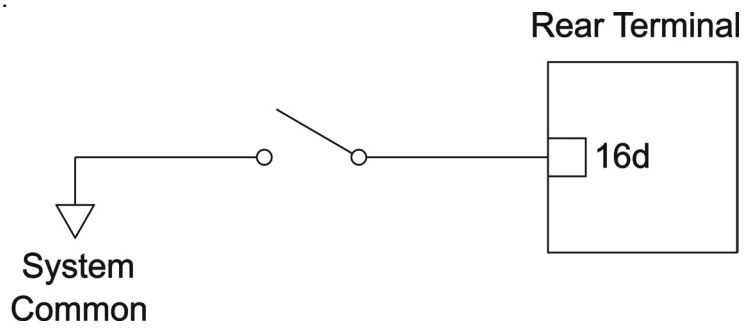


Figure 14 – Switch Connections for Card Test

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.

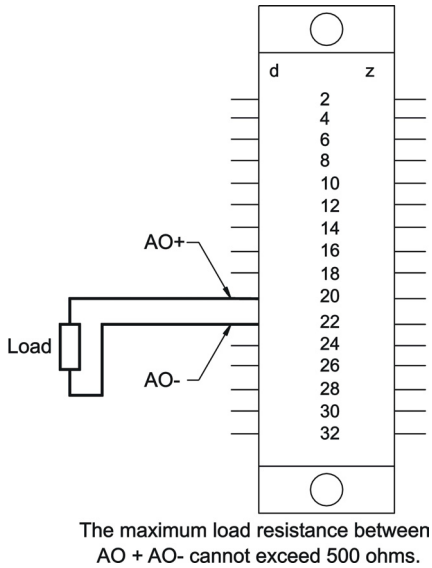


Figure 16 – Analog Signal Connections

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.

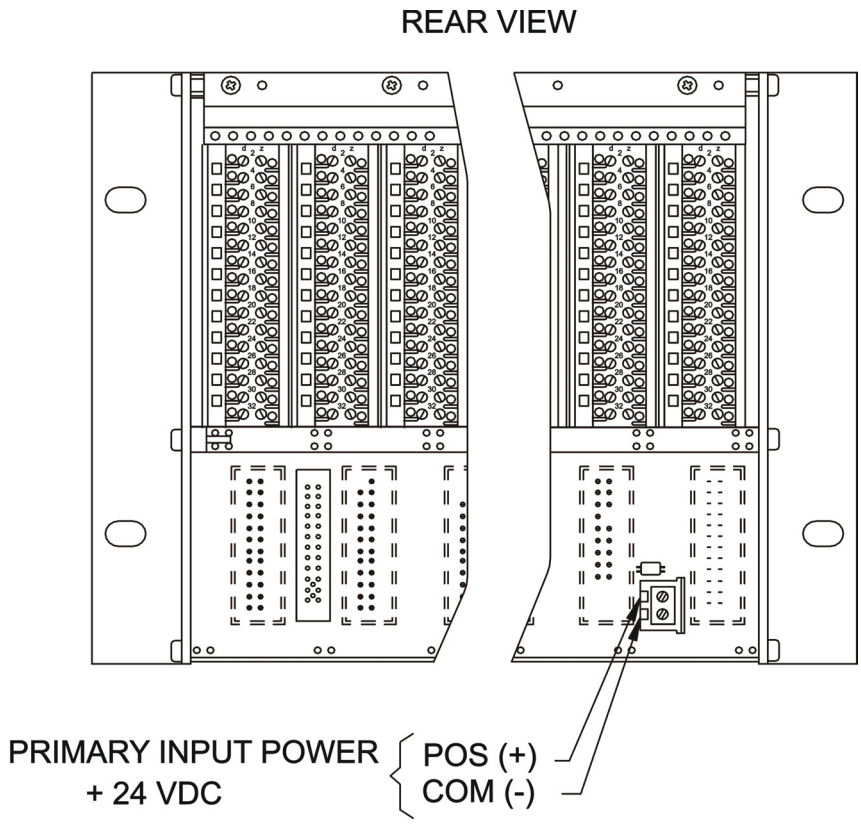


Figure 17 – Rear Power Connections

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**

Table of Contents

Table of Figures

2.0 Introduction

This chapter provides a brief description of the Model TA202A, 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 TA202A (see Figure 18) is a single channel Hydrogen Sulphide Trip Amplifier designed for use in Zero Two Series Gas and Flame Detection Systems. This Module connects to the wires from a field mounted General Monitors Smart Sensor which monitors for Hydrogen Sulphide gas leaks.. The Model TA202A 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 “TA202A" in the upper right corner of the front panel. The Model TA202A is designed for use in non-hazardous environments.

Figure 18 – Model TA202A

2.2 Features & Benefits

2.2.1 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.

2.2.2 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.

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

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

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

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

2.2.7 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.

2.2.8 Power on Self Test (POST)
This is a test that is performed by the microprocessor each time power is applied to the module. Display shows ‘SU’.

2.3 Applications

The General Monitors Model TA202A is a Trip Amplifier designed for Zero Two Series Hydrogen Sulphide Gas Applications. Below is a partial list of applications:

- Refineries
- Gas and oil production platforms
- Oil Well logging operations
- Desulphurisation facilities
- Chemical plants
- Drilling platforms and rigs
- Gas collection facilities
- Sulphur recovery plants
- Sewage disposal/treatment plants

3.0 Installation

This chapter discusses what to do when a Model TA202A 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 TA202A 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).

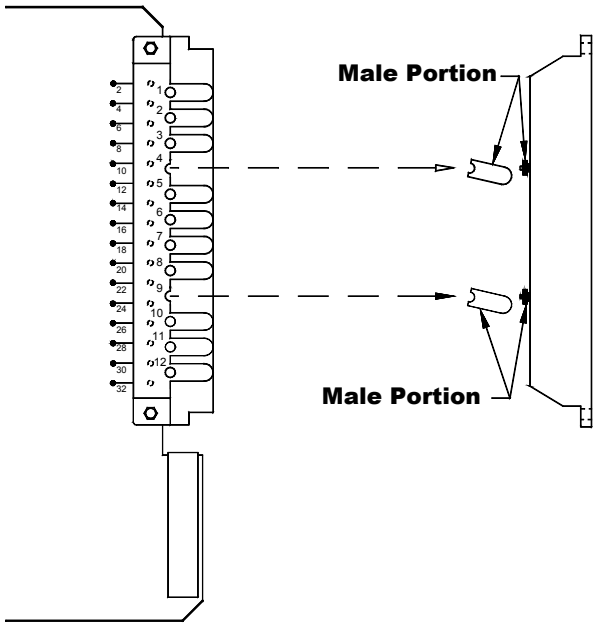


Figure 19 – Trip Amplifier Coding Strip

NOTE – Equipment is to be installed in Rack System or cabinet meeting the fire enclosure requirements of IEC 1010-1

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.

Permissible performance loss the user can expect in the presence of Radio Frequency Electromagnetic Field, per EN50082-2 : 1995 is:

If the installation is subjected to a strong Radio Frequency Electromagnetic Field (10V/m @ 27-1000Mhz), the Trip Amplifier 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 TA202A 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.

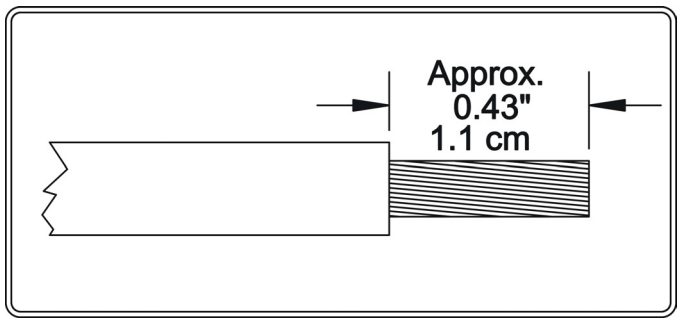


Figure 20 – Wire Strip Length

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 TA202A, 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 on the next page:

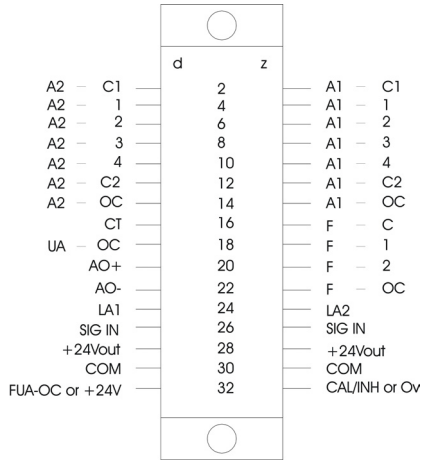


Figure 21 – Rear Terminal Designations

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 Energised	A2-C1 & A2-1, A2-C2 & A2-4	A2-C1 & A2-2, A2-C2 & A2-3
Normally De-Energised	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 Energised	A1-C1 & A1-1, A1-C2 & A1-4	A1-C1 & A1-2, A1-C2 & A1-3
Normally De-Energised	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 +24VDC input).

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.

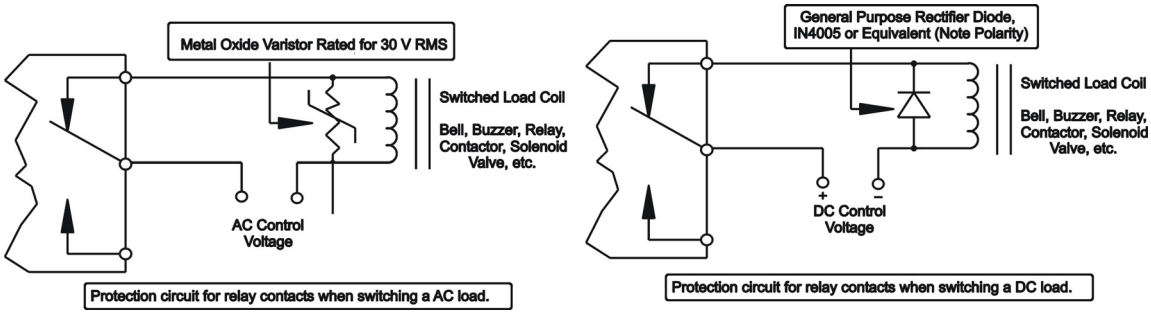


Figure 27 – Recommended Relay Protection Circuits

3.3.4 Other Open Collector Outputs

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

Label	Term	Description
UA	18d	Open collector Output
CAL/OC	32z	CAL-Inhibit Mode Output

Figure 28 – Terminal Designations for Unaccept and Calibration

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

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

Figure 29 illustrates some typical open collector external circuits.

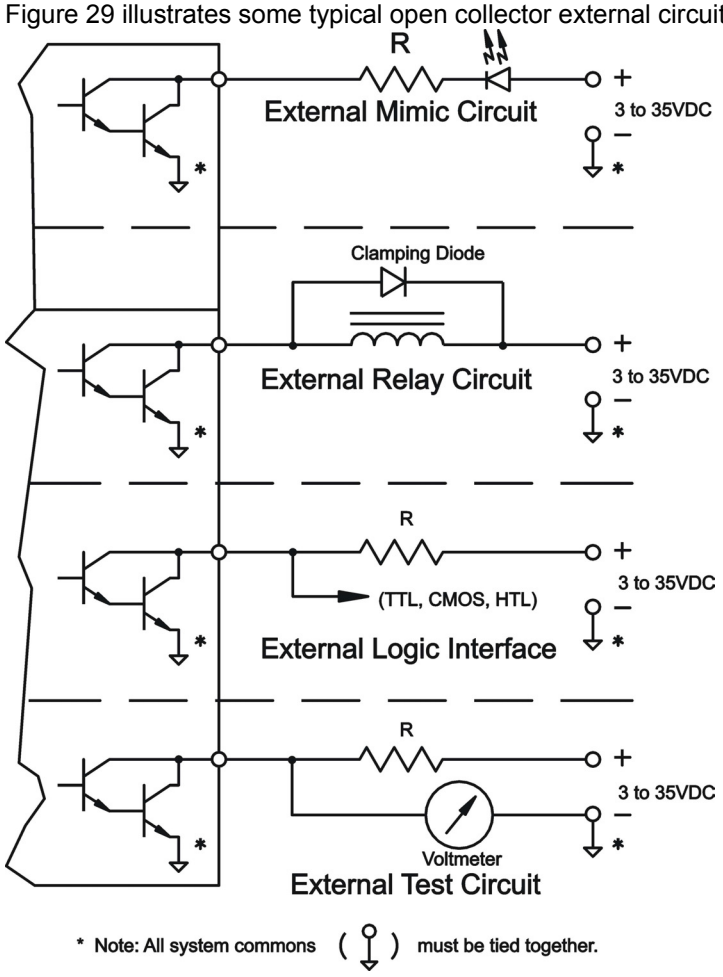


Figure 29 – Open Collector External Circuits

3.3.5 Field Device Connections

The terminal designations for the Field Device connections are:

Term	Description
26d,z	Signal IN (analogue)
28d,z	VDC Out (+24VDC)
30d,z	DC Common

Figure 30 – Terminal Designations for the Field Device connections

NOTE - Only 1 sensor may be connected to a Model TA202A.

Figure 31 illustrates the Field Device/Controller connections.

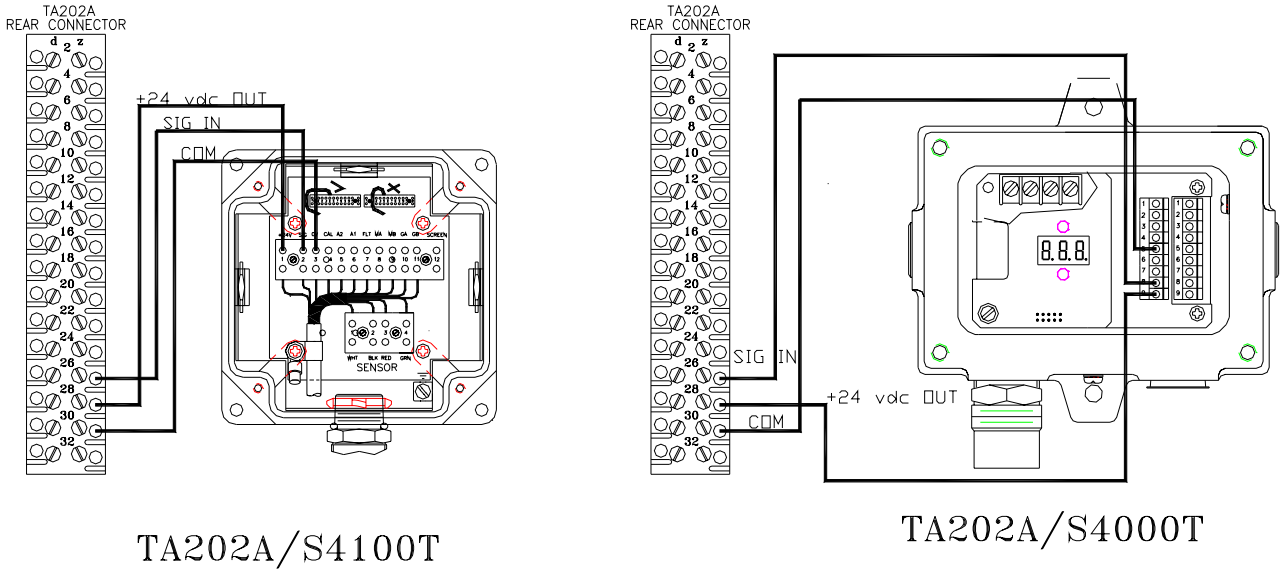


Figure 31 – Field Device/Controller Connections

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.

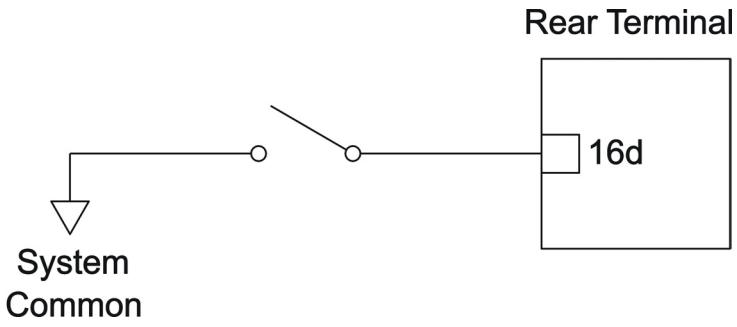


Figure 33 – Switch Connections for Card Test Feature

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. (runtime is 3 or 10 seconds, software selectable)

3.3.7 Analog Output Signal

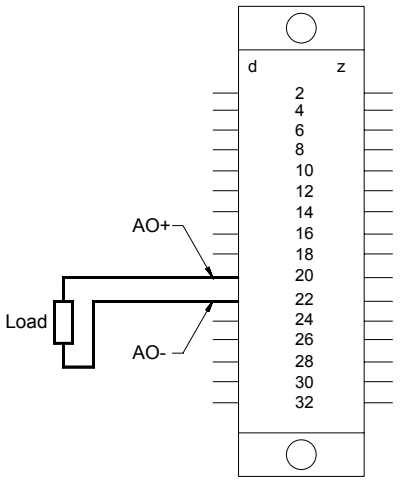
The terminal designations for the **Analog Output** Signal are:

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. If required to test card at full load, add 300ohm 1% resistor between AO+ and AO-.

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



The maximum load resistance between AO + AO- cannot exceed 300 ohms.

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.

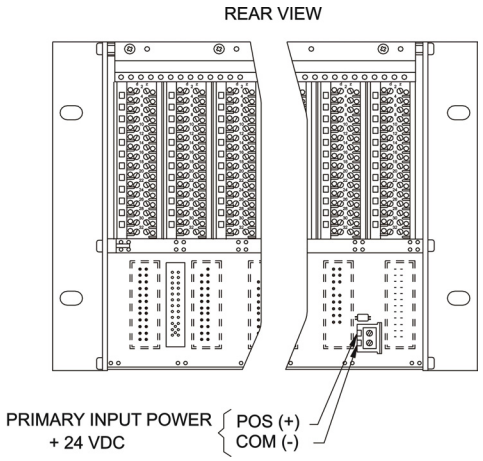


Figure 36 – Power Connections

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 – suitably skilled and competent personnel must carry out Installation and Maintenance 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 hydrogen sulphide 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:

- Glycol
- Halides (compounds containing Fluorine, Chlorine, Bromine and Iodine)
- Heavy Metals (e.g. Tetraethyl lead)
- Sulphur

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 MOS 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.
The Red Cap, complete with desiccant, must be replaced when sensor is off power for prolonged periods.

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 Interconnecting cable guidelines

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.

Refer to Smart Sensor Manual for installation instructions.

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 TA202A 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.
- GM recommends the use of the password to prevent unauthorized changes to set-up parameter.

4.2 Electrical Inputs

There are two electrical inputs to the Model TA202A. They are the:

- General Monitors 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 Smart Sensor input consists of the standard four lead connections used with General MonitorsField Devices. (Common, Signal, +24 VDC) See figure 8 on page 8 of this Manual.
- The Card Test input consists of a single termination for remote testing of the Model TA202A's functions. For detailed information on the Card Test, refer to Figure 9.

4.3 Electrical Outputs

The electrical outputs on the Model TA202A consist of relay contacts, open collectors and an analogue 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 – Field Device/Controller Connections

All of the relay contacts on the Model TA202A 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 – Calib. & Calib. Check modes. Also indicates Inhibit Mode.

All of the open collector outputs on the Model TA202A have a maximum rating of:

- 100mA @ 35Vdc

The Analogue Output Signal is used for sending gas concentrations and status information to remote devices. The maximum analogue load may not exceed 300 Ohms from the Field Device to the Trip Amplifier, to any other remote device and back to the Field Device including the wire/cable that the signal is sent on.

The Analogue Output is generated by the Field Device and passed through the Model TA202A. This signal is 0 to 20mA current signal with 4 to 20mA being proportional to 0 to 100% of full scale.

When the Model TA202A is placed in the calibration or calibration check 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 or calibration check mode the display on the TA202A will indicate CA if the CAL current is 1.5mA. If the CAL current is 0mA the display on the TA202A will indicate F$ (field device error)

When the Model TA202A 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 TA202A 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.

4.4 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 (TA202A, 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 an alarm has been activated. New alarms should be acknowledged, or accepted. This is accomplished with the **Accept** Button located on the Facilities Module.

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 energise.

NOTE - Alarms that latch must be Accepted before they can be Reset (see Section 4.5).

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 detector returns to normal (safe) the alarm output will need to be reset. If, however, the alarm output is accepted but not reset and that alarm condition occurs 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 energise when a fault is detected. By pressing the **Accept** button on the front panel, the FUA output will de-energise and the **Fault** LED will stop flashing. It will stay illuminated until the fault condition is corrected.

4.5 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).

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.

4.6 CAL Open Collector

There is an open collector that will energise anytime the Field Device is put in the Calibration Mode or the Calibration Check Mode. This open collector output is referenced to the system’s ground or common. Energising this output merely provides a path to ground as is the case with all energised open collector outputs. De-energised, this output will be in a high impedance state.

4.7 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 9).

To activate the Card Test feature, simply press and hold the switch. If this option has been selected the relays (A1 & A2) and open collector outputs **are active** and **will trip** during the Card Test. This should be treated as a functional test of a Zero Two System.

4.8 Test Gas & Calibration Mode

In order to ensure the integrity of the life protecting equipment, General Monitors recommends that field devices have periodic calibration checks to determine if a calibration is necessary. General Monitors' Hydrogen Sulphide Gas Smart Sensors include a Calibration Check (Test Gas Mode) mode with a standard 1.5mA or optional 2.0mA or 0.0mA calibration output signal.

During this "Calibration Check" mode, the Smart Sensor will output a 1.5mA signal to the TA202A. The 1.5mA signal is the standard Calibration and Calibration Check output signal and will cause the **CAL** LED to illuminate and display to indicate **CA** on the Model TA202A. When the Model TA202A receives a 1.5mA signal from the Field Device, the CAL-OC output and the CALBUSS are activated also. The 0.0mA signal is an optional "Test Gas" output signal that activates the fault outputs, causes the FAULT LED to illuminate and displays F4 on the Model TA202A.

These 0.0mA Cal Smart Sensors may require periodic calibration of the sensing elements. Refer to the specific instruction manual for detailed information on calibrating the General Monitors field device. (S4100T & S4000T).

4.9 Fault Diagnostics

In addition to the Fault LED on the front panel, the Model TA102A 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, F2, F5 & F9 – Not in Use
Are not used at this time. These codes have been reserved for future use.

4.9.2 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.

4.9.3 F4 – Field Device Error
Check fuses F2 and F3. Make sure the sensor wires are connected properly (in the field and at the rear of the unit) and re-calibrate if necessary. Check for opens and shorts across the field wiring. Make sure the analogue signal is returned to the field device or common (jumper AO+ & AO- if unused). Possibly an optional 0mA Calibration Current from the Smart Sensor. The TA102A returns to SU when coming out of F4.

4.9.4 F6 – Low Supply Voltage
Make sure the supply voltage level at the chassis is 24Vdc. The TA102A trips at less than 18VDC.

4.9.5 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.

4.9.6 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.

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, Setup Mode and Inhibit 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 TA202A 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 and setup parameters.
- The status range is indicated by the illuminated LED located beneath the digital display.
- 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.

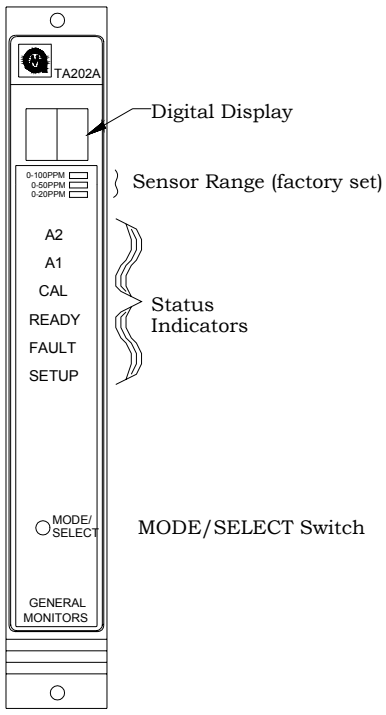


Figure 38 – User Interfaces

5.2 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 TA202A, whereas the **Setup** Mode allows the user to change the operating parameters.
- 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 unit will remain in the Inhibit Mode until the Mode/Select switch is pressed.
- After the Setup Mode is complete the TA202A will execute the Setup Check Mode to view the selected parameters.

NOTE - The **Setup** and **Setup Check** Modes cannot be entered if the unit is in alarm or fault. If the Field Device is in calibration, calibration check or test gas mode, the Setup and Setup Check Mode cannot be entered.

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. These modes will activate the CAL-OC output and the CALBUSS.

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

NOTE: The Password and the A2 Alarm time delay options offer the operator more than two choices. While these options are being selected, pressing the Mode/Select Switch will sequence the display to the next available choice for that option

Entering the Setup Check Mode

To Enter the **Setup Check** Mode. Press and hold the Mode/Select switch until the **SETUP** LED begins flashing (about ten seconds). When the **SETUP** LED is flashing, release the **Mode/Select** switch to enter the **Setup Check** Mode (Figure 39). Continuing to press and hold the Mode/Select switch until the **SETUP** LED stops flashing (about fifteen 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 39)

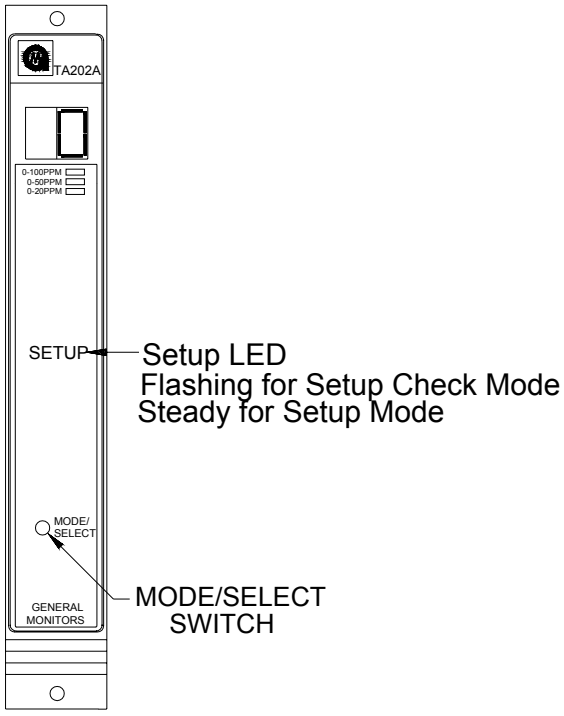


Figure 39 – Setup Check Mode

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 '**-**' will appear in the left digit on the display (Figure 40). 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 bar (**-**) will appear in the right digit on the display (Figure 14). 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**.

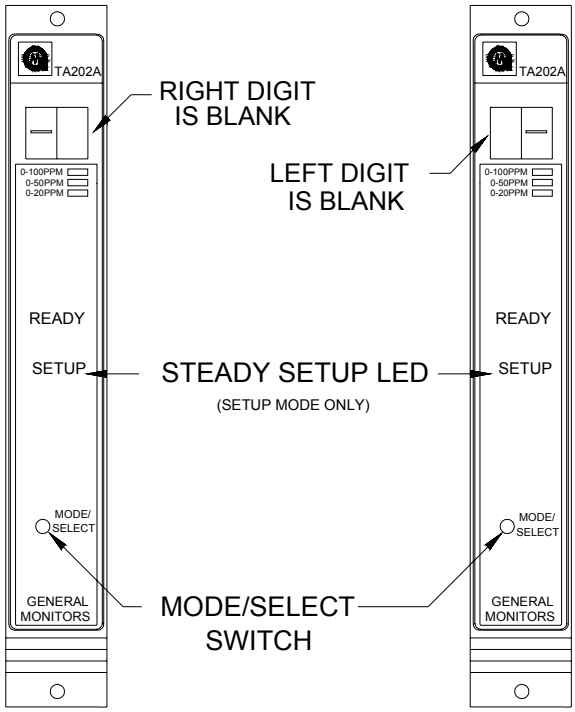


Figure 40 – Entering the Password

Entering the 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 41). Pressing the **Mode/Select** switch while **In** is displayed, will cause the unit to enter the **Inhibit** mode by inhibiting the alarm outputs. After the Model TA202A has entered the Inhibit mode, pressing the Mode/Select switch causes the unit to return to normal operation (see section 5.3). If it is desired to enter the **Setup** Mode, do not press the **Mode/Select** switch for the five seconds that **In** is displayed.

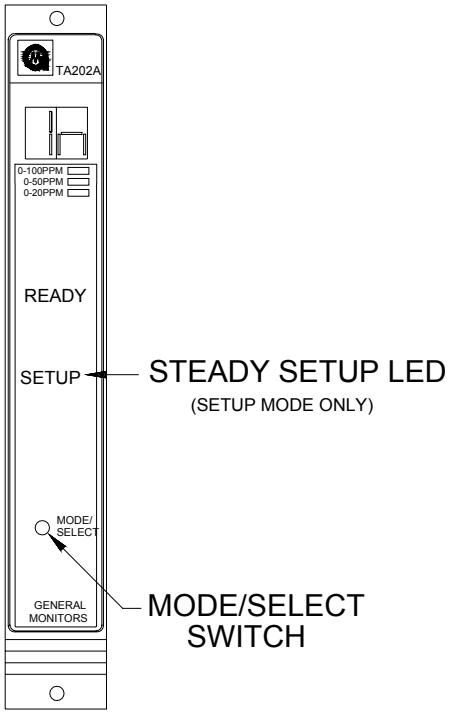


Figure 41 – Inhibit Mode

Sensor Range Option

Once the Card Test options have been selected, the user will select the Sensor Range (Figure 42). The display will indicate **Sr**, with the preset range LED illuminated. Press the Mode/Select Switch until the desired Sensor Range LED is illuminated. **The factory default for this selection is 0 to 20ppm.**

A2 & A1 trip level default settings automatically change when the range is changed.

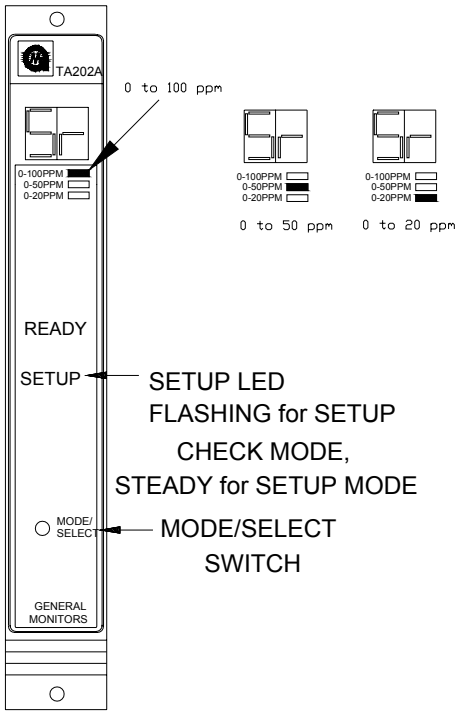


Figure 42 – Sensor Range Option

A2 Alarm Options

After the Inhibit mode option, the **A2** LED on the front panel will be flashing while the Energised/De-Energised option is displayed (Figure 43). The display will indicate the current selection, (**En** or **dE**). Press the **Mode/Select** Switch until the desired option is displayed. **De-Energised** is the factory default for this selection.

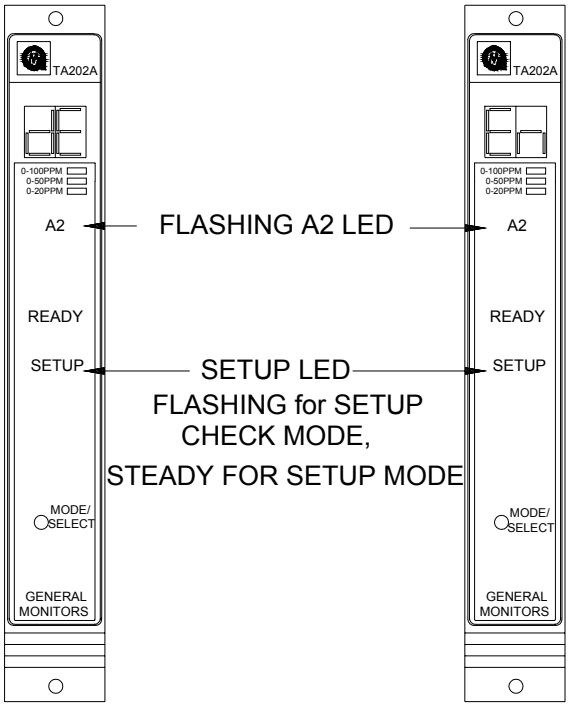


Figure 43 – A2 Alarm Options

The **A2** LED on the front panel will be flashing while the latching/non-latching option is displayed (Figure 44). The display will indicate the current selection, (**nL** or **LA**). Press the **Mode/Select** Switch until the desired option is displayed. **Latching** is the factory default for this selection.

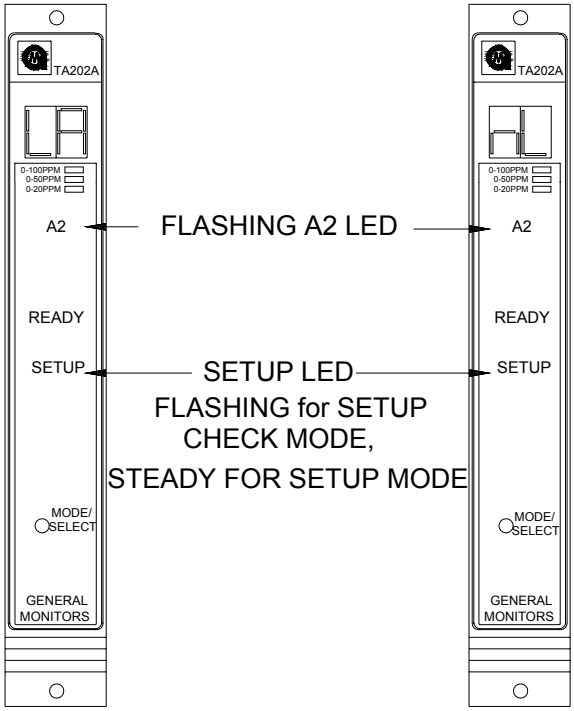


Figure 44 – A2 Latching

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 will indicate the current A2 setpoint (figure 45). Press the Mode/Select switch repeatedly, until the desired A2 alarm setpoint appears o n the display, **10 is the factory default for this selection.**

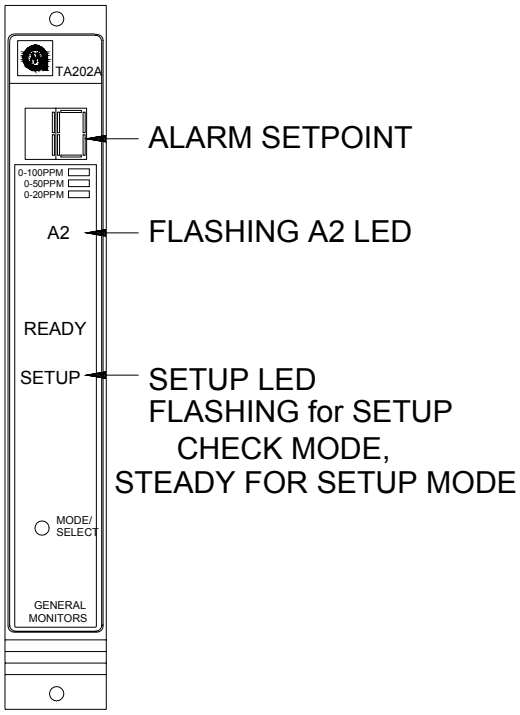


Figure 45 – A2 alarm Set Point

A1 Alarm Options

Next, the **A1** LED on the front panel will be flashing while the Energised/De-energised option is displayed (Figure 46). The display will indicate the current selection, (**En** or **dE**). Press the **Mode/Select** Switch until the desired option is displayed. **De-Energised** is the factory default for this selection.

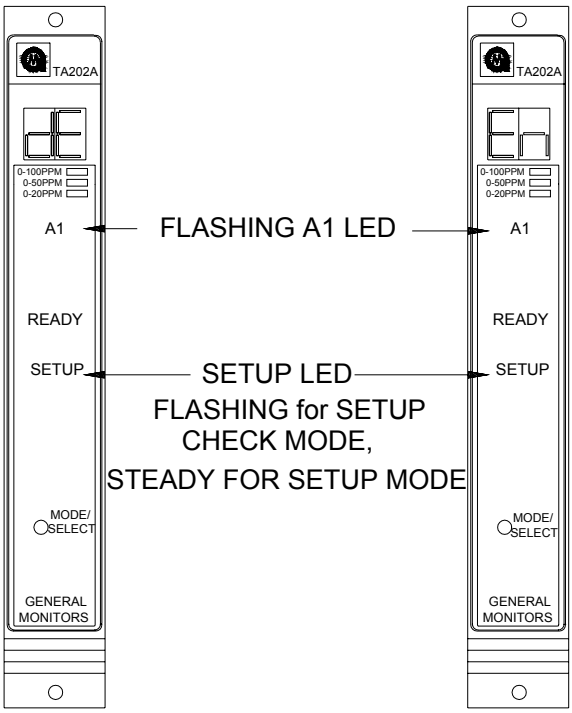


Figure 46 – A1 Alarm Options

The **A1** LED on the front panel will be flashing while the latching/non-latching option is displayed (Figure 47). 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.

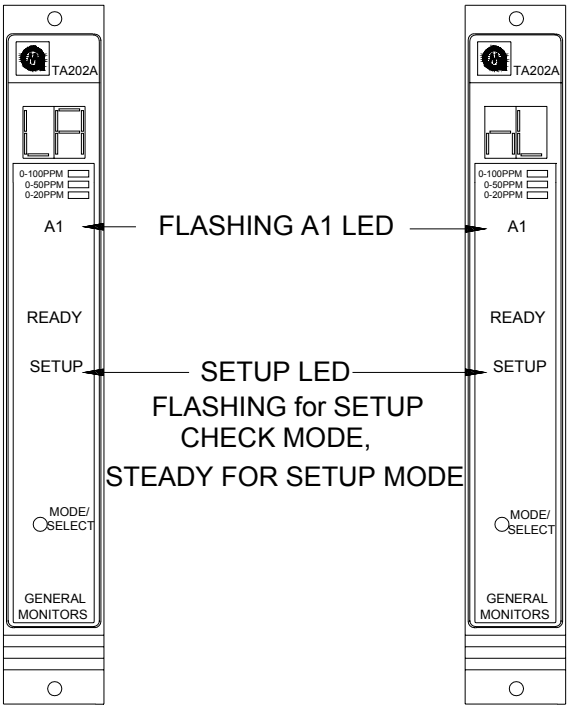


Figure 47 – A1 Non-Latching

The last A1 alarm option to appear on the display will be the alarm set point (trip level). (The A1 set point cannot be set higher than the current A2 set point.) If this level is reached or exceeded the A1 alarm outputs will activate. The display will indicate the current A1 alarm setpoint (figure 48). Press the Mode/Select switch repeatedly until the desired A1 alarm setpoint appears on the display. **5 is the factory default for this selection.**

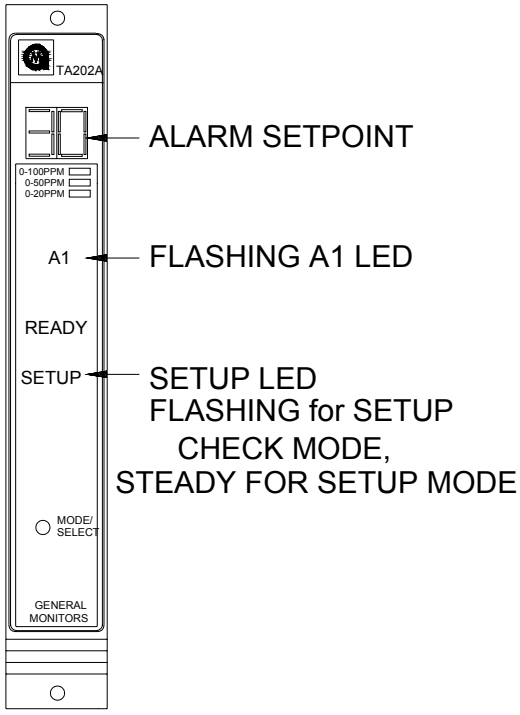


Figure 48 – A1 Alarm Setpoint

Fault/Inhibit Option

After the A1 alarm options have been selected, 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 49). An **Ac** selection specifies that the Model TA202A will activate the **Fault** circuit while the unit is in the Inhibit Mode. A **nA** selection specifies that the Model TA202A will not activate its **Fault** circuit when the unit is placed in the **Inhibit** Mode (see section 5.3). 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**.

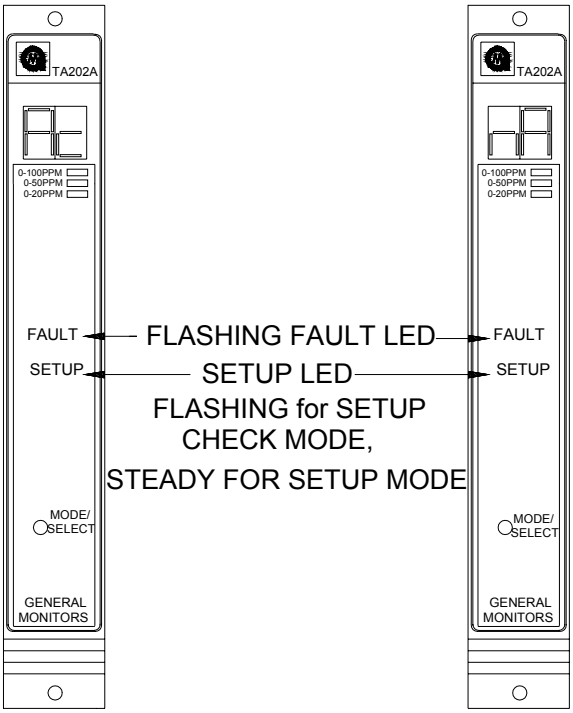


Figure 49 – Fault Inhibit Option

Card Test Options

After the **Fault/Inhibit** option has been selected, the user will select whether or not the alarm outputs will activate during a Card Test. The display will indicate **ct** for about five seconds (figure 50).

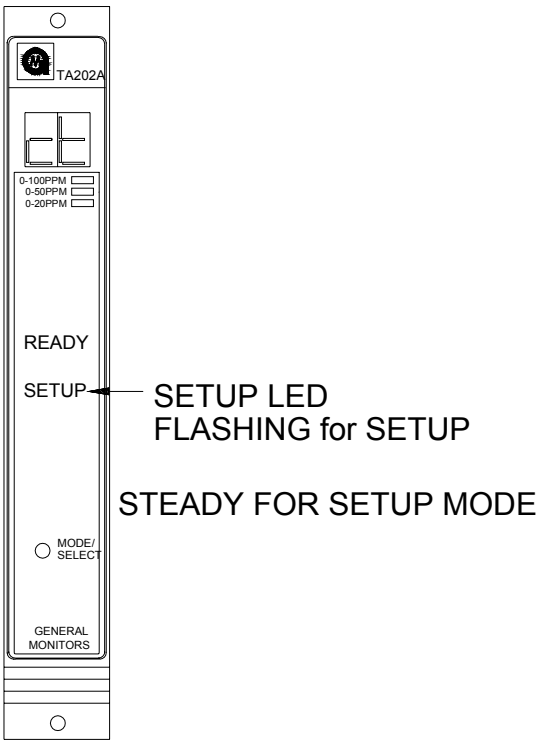


Figure 50 – Card Test Options

Following **ct**, the ramp up time (3 or 10) during the Card Test (figure 51) will be displayed**. 3 is the factory default for this selection**.

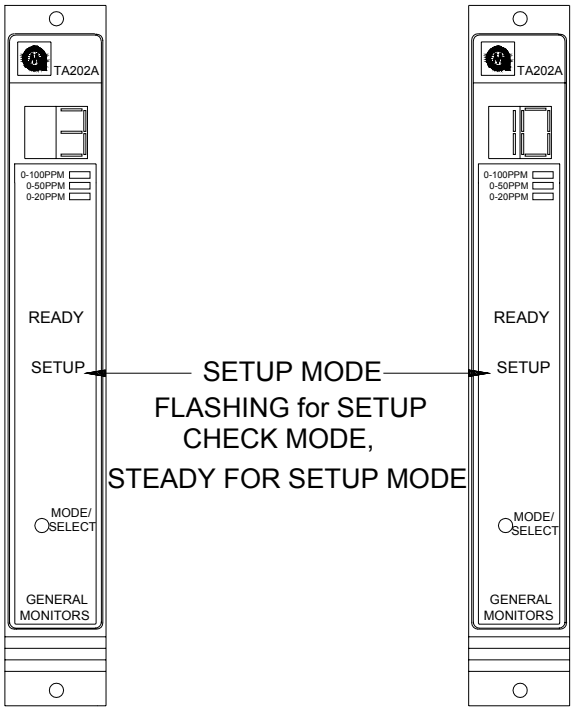


Figure 51 – Card Test Ramp Up Time

Next, the display will indicate the alarm output option during a Card Test as either **Ac**, active or **nA**, not active (figure 52). **Not Active is the factory default for this selection**.

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 during normal operation.

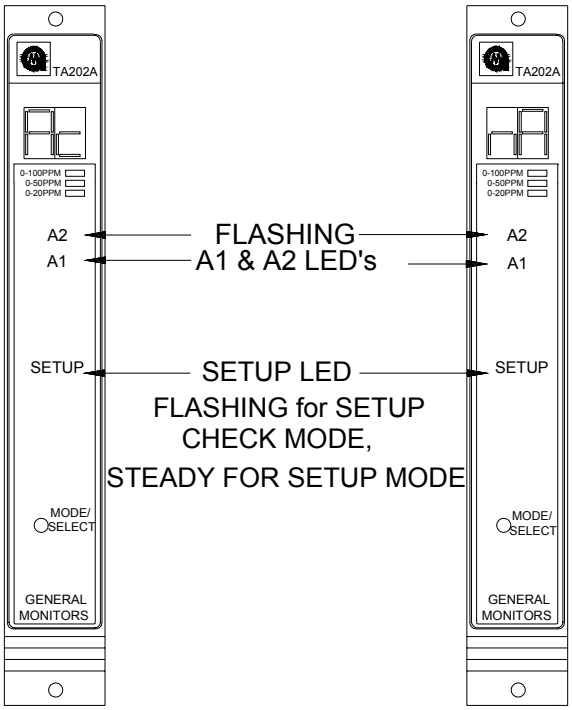


Figure 52 – Alarm Output Option During a Card Test

Password Option
Once the Card Test options have been selected, the user will either enable or disable the password option (Figure 53). The display will indicate either PE, for enabled or Pd, for disabled. **Password Disabled is the factory default for this selection**.

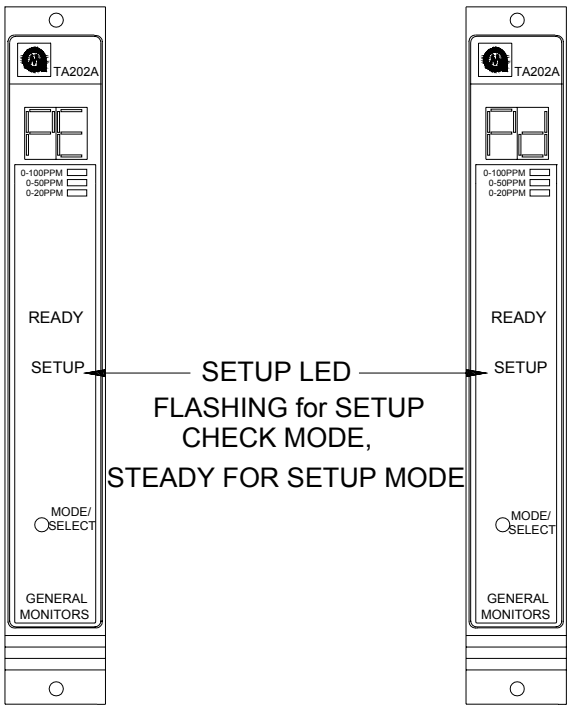


Figure 53 – Password Option

Entering a New Password

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

If the Password is disabled, the unit automatically enter the Setup Check Mode. If the Password is enabled, the user will be able to enter a new password. The unit will display the left digit of the Password on the display. The right digit will be blank until the left digit has been selected, wait for five seconds. Next, the right digit will be displayed and the left digit will be blank until the right digit has been selected. Once the right digit has been selected, wait for five seconds (figure 54).

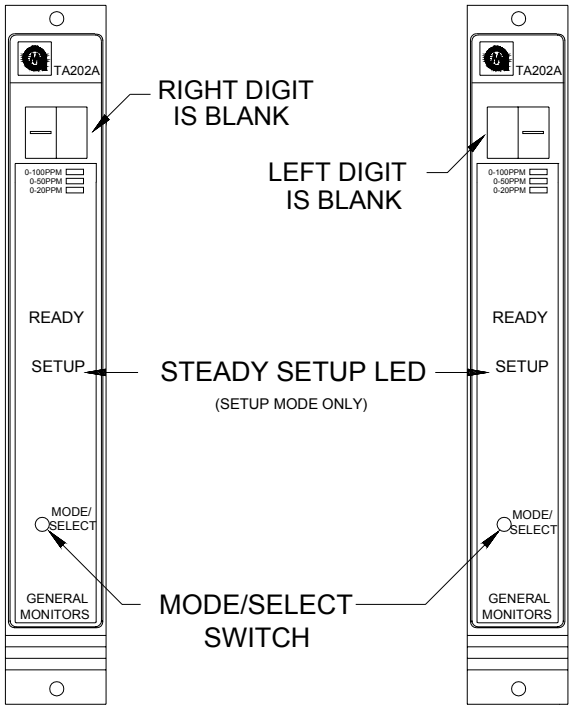


Figure 54 – Entering a New Password

When the Setup Mode is complete, the Model TA202A will automatically enter the Setup Check Mode. This allows the operator to view the newly selected options.

The unit will return to normal operation after completing the Setup Mode and the Setup Check Mode.

5.3 Inhibit Mode Description

Whenever the **Inhibit** Mode is entered (see section 5.2), the **A1** and **A2** rear terminal alarm outputs are inhibited. The front panel A1 and A2 LED's will still function normally in cases where sufficient UV/IR radiation is present. If the password option is disabled, or after the correct password ahs been entered, the display will indicate **In** for five seconds (figure 41 on page 10). Pressing the Mode/Select switch while **In** is displayed, will cause the unit to enter the Inhibit mode by inhibiting the alarm outputs. After the Model TA202A has entered the Inhibit mode, pressing the Mode/Select switch causes the unit to 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.

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 be blank 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 TA202A can be verified without tripping external devices that are connected to the **A1** and **A2** outputs. This type of verification usually occurs during “Initial Start-Up” and/or “Commissioning”

NOTE – Calibration and Calibration Check Modes are accessed at the Field Device. Refer to the instruction Manual of the specific Field Device for entering and using the Calibration and Calibration Check Modes (Also see Sensor Assembly/ Accessories Section of this Manual). The Calibration Check Mode is sometimes referred to as the Test Gas Mode.

5.4 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 TA202A. 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
Set Display Range	Display will indicate "Sr" until the sensor range is selected 0 to 100 ppm, 0 to 50 ppm, or 0 to 20 ppm	_____
A2 Alarm Options	Set the Energised (**En**) / De-Energised (**dE**) Option Set the Latching (**LA**) / Non-Latching (**n**L) Option Set the **A2** alarm set point (from A1 set point to 100, increments of 1 or 5)	_____ _____ _____
A1 Alarm Options	Set the Energised (**En**) / De-Energised (**dE**) Option Set the Latching (**LA**) / Non-Latching (**nL**) Option Set the **A1** alarm set point (from A1 set point to 100, increments of 1 or 5)	_____ _____ _____
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 TA202A will enter the Setup Check Mode.	

6.0 Appendix

6.1 Applications and Accessories

This chapter provides a description of the types of field devices (Smart Sensors)and the accessories, which can be used with the Model TA202A.

6.1.1 Smart Sensors

Generally speaking, General Monitors field devices for the TA202A consist of Smart Sensors.
There are different types of General Monitors Smart Sensors.

The Model S4100T (figure 55) is a Smart Sensor that was developed for Hydrogen Sulphide Applications
The General Monitors Model S4100T Smart Transmitter is a highly reliable, self contained, microprocessor controlled, single point calibration Hydrogen Sulphide monitor with integral 3-digit readout. The Transmitter is connected to the user's indicating and shut-down equipment by means of a screened and armoured cable.

The S4100T is designed to measure and display concentrations of Hydrogen Sulphide in one of three ranges: 0 to 20ppm, 0 to 50ppm and 0 to 100ppm, but will continue to display concentrations up to 120% of FSD.

No user adjustments are required. The instrument will record the number of successful calibrations, compute the sensor resistance in kohm during calibration and store in non-volatile memory, along with calibration and setup parameters.

The entire electronics modules is fully encapsulated in compliance with the relevant standards.

The Smart Transmitter's user interface is menu driven. In addition the instrument may be addressed via the dual Modbus RTU serial interface.

Figure 55 – S4100T Smart Sensor

The Model S4000T is an Intelligent Sensor for the detection of Hydrogen Sulfide (H_2S) gas (figure 56). The microprocessor-based electronics process information at the sensor site, within an explosion-proof housing.

A digital display provides indications and display codes that can be viewed through a window in the cover. A red LED above the digital display signifies an ALARM condition, while a red LED below the digital display signifies a WARN condition. Analog signal (4-20mA) optional Dual Redundant Modbus communications and relays, provide remote and/or discrete indications of the sensor's operation.

The model S4000T Intelligent Sensor is rated explosion-proof for use in hazardous areas

Figure 56 – S4000T Smart Sensor

The detection elements for the General Monitors S4100T & S4000T Smart Sensors are

`51457-1,5,9` General Purpose, SST, Sintered Steel Arrestor Sensors

6.1.2 Splash-Guard & TGA-1

General Monitors produces a universal Splash-Guard, P/N 10395-1, that has been designed for use on all General Monitor's combustible gas and hydrogen sulfide gas sensors (Figure 57). 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 57 – Splash-Guard Picture

6.1.3 Dust Guard Assembly

The Dust Guard Assembly (Figure 58) 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.

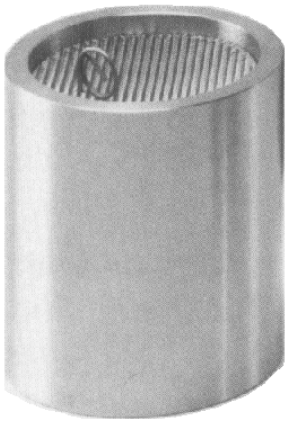


Figure 58 – Dust Guard Picture

The Dust Guard is also available in a kit with twelve replaceable screens (Figure 59). It can also be used as an effective windscreen, and is recommended for corrosive, windy or high temperature environments.

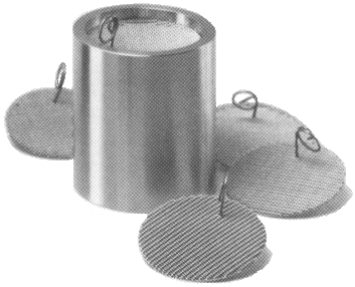


Figure 59 – Dust Guard Assembly Kit Picture

6.1.4 Duct Mounting Plates

General Monitors produces a Duct Mounting Plate (P/N 10041-1 and –2. Dash 2 has a sensor mounted from inside of cover) for applications that require the sensor to be mounted in air-conditioning or heating duct. The Duct Mounting Plate is easy to install (Figure 60).

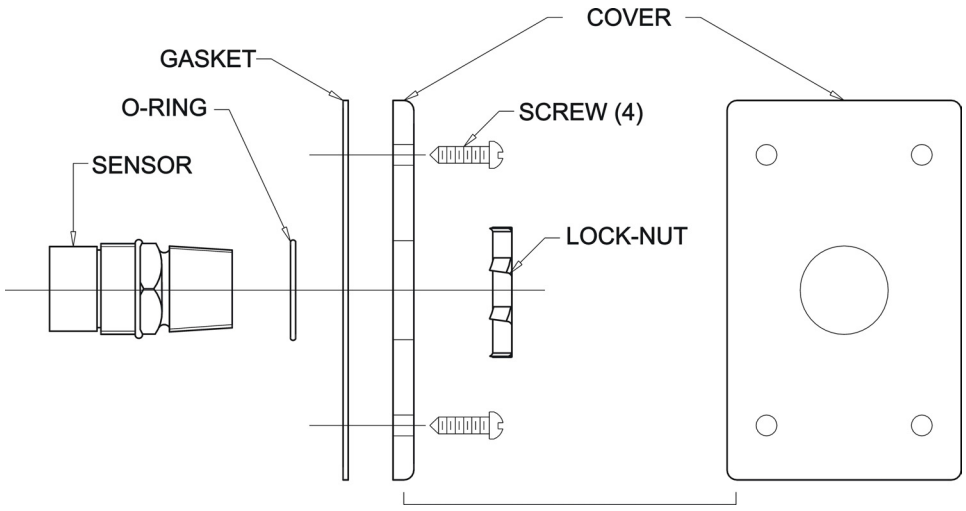


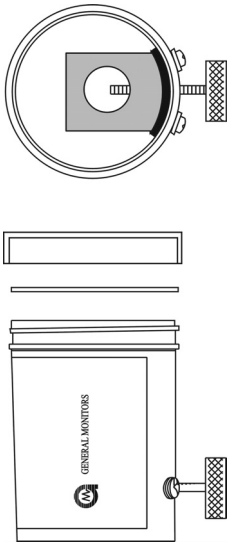
Figure 60 – Duct Mounting Plate, Assembly Drawing

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.

The Duct Mounting Plate (P/N 10041) is designed for use with General Monitors Catalytic Bead and MOS Sensors.

6.1.5 Field Calibrator (P/N 50000)



The General Monitors Field Calibrator provides a simple and efficient means of calibrating H_2S sensors in the field (figure 61).

It consists of a plastic jar fitted with a removable lid and a seal which fits snugly over the sensor cap. An integral aluminium block with external thumb screw performs the dual functions of retaining and breaking replaceable glass ampoules.

Figure 61 – Breaker Jar

Operating Instructions

a) Ensure that the calibrator is clean and dry and that all fragments of broken glass have been removed.

b) Insert an ampoule of the desired concentration into the hole in the aluminium block, with its base resting on the bottom of the jar. Replace lid and seal.

c) Place calibrator in position on sensor. If a background gas level is suspected! Purge the calibrator with clean air and seal the opening in the lid until just before the calibrator is slipped onto the sensor.

d) Screw thumb screw until ampoule shatters.

e) Leave the calibrator in position until display shows code as per calibration instructions.

Remove the calibrator and dispose of the glass fragments safely.

6.1.6 Ampoules of Hydrogen Sulphide (P/N 50004)

These glass ampoules are manufactured under strict control procedures for use with the Field Calibrator (P/N 50000). They are marked with a gas concentration in ppm H_2S which corresponds to the concentration when released within the Field Calibrator.

Ampoules may start to lose concentration after a specified period. The Ampoule will state: "EXP (date)". Please adhere to this cut-off date.

Out-of-date ampoules should therefore be regarded with suspicion, particularly if erratic results are obtained in calibration.

Ampoules are manufactured in various concentrations and distinguished by the addition of a suffix to the part No. See table for details.

Part Number	Suffix	Concentration ppm H_2S
50004	-25	4
50004	-11	5
50004	-3	10
50004	-9	20
50004	-21	25
50004	-13	50
50004	-5	100

6.1.7 Portable Flow Calibrator Model 1400250

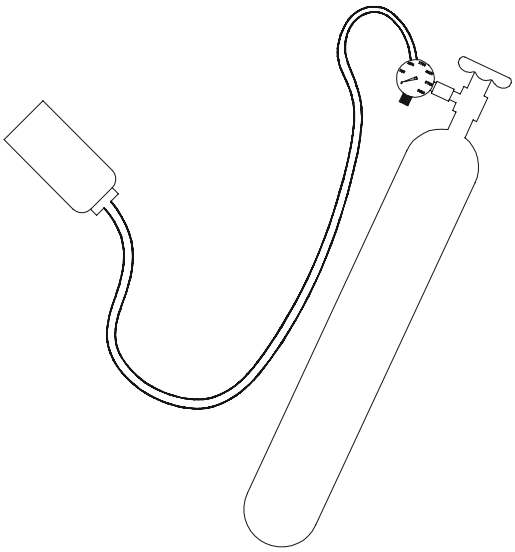


Figure 62 – Portable Flow Calibrator

The General Monitors Portable Flow Calibrator is a compact, accurate and safe field calibrator which is used as an alternative to the H_2S Field Calibrator for sensors located in high humidity environments (figure 62). The calibrator uses gas bottles filled with known concentrations of H_2S in dry air. Spare gas bottles are inexpensive and may be returned for refilling. Refer to the table below for the respective part numbers for ordering calibrators and replacement cylinders.

Concentration (ppm)	**Flow Calibrator Assembly**	**Replacement Cylinders**
10	1400250-1	1400255-1
20	1400250-2	1400255-2
25	1400250-3	1400255-3
35	1400250-4	1400255-4
50	1400250-5	1400255-5
70	1400250-6	1400255-6
100	1400250-7	1400255-7

Other Calibration Equipment included:

Description	**Part No.**
Case (holds 2 cylinders)	914-135
Regulator	922-016
Teflon Hose	925-430
Cup with Screen	1400152
Cable Tie	960-331

6.2 System Specifications

Application:
Hydrogen Sulphide (H_2S) Gas Detection.

Sensor Type:
General Monitors MOS, diffusion, adsorption, H_2S specific sensor.

Typical Sensor Life:
2 to 6 years in normal service

Measuring Ranges (in parts per million):
0 to 100ppm, 0 to 50ppm or 0 to 20ppm

Approvals:
CSA Certified

Warranty:
Two Years

Accuracy:
±2ppm or ±10% of applied gas, whichever is greater at reference ambient conditions.
LED – Integrity of LED's & Display

Temperature Variation:
±4ppm or ±10% of applied gas, whichever is greater over a -40°C to +60°C temperature range.

Humidity Variation:
±4ppm or ±10% of applied gas whichever is greater over a 15% to 90% relative humidity range.

Long Term Stability:
±4ppm or ±10% of applied gas whichever is greater over 21 day period.

Response Time:
T50≤2 minutes with full scale concentration applied to sensors with sintered flame arrestors.

6.3 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)

6.4 Electrical Specifications

Input Power Requirement:
20 to 35Vdc @ 200mA max. (24Vdc, 4.8W nominal). 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.

Electrical Classification:
The Sensor is rated for use in Class I, Division 1, Groups B, C & D in North America, and Group II applications in Europe. The Model TA202A is designed for use in non-hazardous environments.

Relay Contact Rating:
4A @ 30V RMS/42.4V Pk, 3A @ 30 VDC, Resistive, maximum.
DPDT for A1 & A2, SPDT for Fault.

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

Cable Parameters:
Recommended four wire screened or screened and armoured, to BS5308 or equivalent (figure 63). Maximum cable lengths allowable between module and sensor with one way resistance of 10 Ohms, black and white sensor leads (20 Ohms loop resistance, black and white sensor leads) @ 24VDC nominal.

mm^2	AWG	Feet	Meters
2.5	14	3375	1029
1.5	16	2250	686
1.0	18	1350	411
.75	20	900	274

Figure 63 – Maximum cable lengths Between Module & Sensor

The maximum allowable cable lengths between the analogue output connections on the Trip Amplifier with a remove device in series (maximum loop resistance of 500 Ohms between A0+ & A0-): (figure 64)

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 64 – Maximum cable lengths Between Analogue Output Connections

6.5 Environmental Specifications

Operating Temperature Range:
-18°C to +66°C (0°F to 150°F)

Storage Temperature Range:
-40°C to +66°C (-40°F to 150°F)

Operating Humidity Range:
5% to 100% Relative Humidity, non-condensing

EMC Susceptability:
10V/m max.

6.6 Engineering Specifications

Zero Two System

Each system shall utilize modules capable of monitoring gas sensing elements, or a 0 to 22mA analogue signal from gas or fire detection transmitters. The system chassis available in 4, 8 and 16 channels. Each chassis shall contain a bus for the following independent signals:

- A1 Alarm
- A2 Alarm
- Fault Alarm
- 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.

TA202A Trip Amplifier

The Trip Amplifier with sensor/detector, meets the performance requirements of ISA S12.15 Part I, 1990 and is capable of monitoring 0 to 100 parts per million (ppm) 0 to 50 ppm or 0 to 20 ppm of hydrogen sulphide gas. The Trip Amplifier has an interface panel providing a mode/select switch and the following indicators: 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 digial display and a sensor range indicator. Alarm parameters and user options are software selectable. A functional card test and front panel LED test can be performed without interrupting normal on-line services. The Trip Amplifier is capable of insertion and removal during power-on conditions without damage to any component module in the system. The Trip Amplifier generates display codes associated with fault conditions whenever a fault or malfunction occurs. A mode/select switch provides the operator front panel access to a calibration check mode, a calibration mode a setup check mode, a setup mode and inhibit mode. The Trip Amplifier module has a password protected setup routine capable of having the password disabled.

6.7 Glossary of Terms

Analogue – Continuous, without steps.

Ambient Temperature – Surrounding or background Temperature

AWG – American Wire Gauge

Calibration– Applying a known level of gas to a sensor and making adjustments so that the output signal matches the level of applied gas.

Canadian Standards Association – CSA is an approval agency. Testing laboratories will test Gas Detection Equipment to the Standards that are set by approval agencies such as CSA. CSA certification is required for selling equipment in Canada. CSA standards are recognized by many organizations outside Canada.

Catalyst (Catalytic) – A substance that speeds up or slows down the rate of a chemical reaction. Any substance acting as the stimulus in bringing about or hastening a result.

Class 1, Division 1 – This is a national Electric Code (USA) (NEC) classification dealing with hazardous locations and the degree with which the hazard is present. Class 1, Division 1 is defined as any location where ignitable concentrations of flammable gases or vapours may be present under normal operating conditions. For more information on hazardous locations, refer to the NEC Handbook, Article 500.

COM – Common

DC – Direct Current

DCS – Distributed Control Systems.

Diffusion – A process by which molecules or other particles intermingle as a result of random thermal motion.

Drain Loop – The purpose of a drain loop is to collect condensation so as to prevent moisture from entering the housing.

EEPROM – Electrically Erasable Programmable Read Only Memory.

Digital – Stepped in specific increments.

FMRC – Factory Mutual Research Corporation.

Group B – Atmospheres containing more than 30% Hydrogen or gases/vapours of equivalent hazard.

Group C – Atmospheres such as cyclopropane, ethyl ether, ethylene, or gases/vapours of equivalent hazard.

Group D – Atmospheres such as acetone, ammonia, benzene, butane, ethanol, gasoline, hexane, methanol, methane, natural gas, propane, or gases/vapours of equivalent hazard.

Halogen Free Solvent – Solvent that does not contain any of the following: astatine, bromine, chlorine, fluorine, or iodine.

mA – Milliampere, one thousandth (.001) of an amp.

Microprocessor Based Electronics – All of the input signal processing, fault monitoring, calibrating routines, setup routines, and the outputs are under the control of a microprocessor unit (MPU).

mV – Millivolt, one thousanth of a volt.

PCB – Printed Circuit Board.

PLC – Programmable Logic Controller

Potentiometer – An adjustable resistor

T50 – Time taken to reach 50% of final reading.

TB – Terminal block.

6.8 Engineering & Technical Drawings

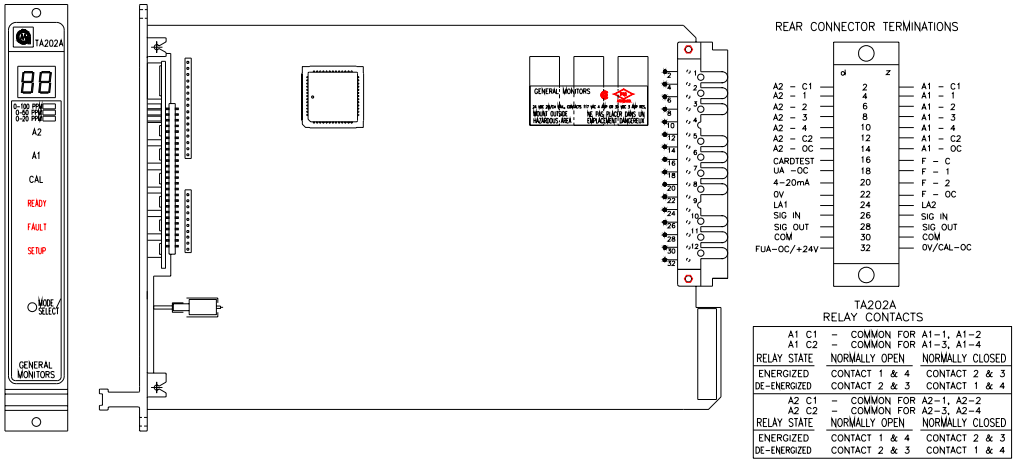
6.8.1 Circuit Card Assembly – Display Board

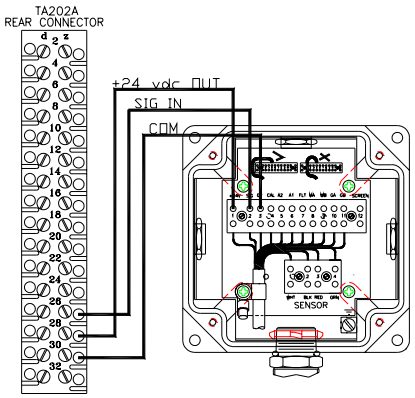
Reference Drawing # 11151-1

Figure 65 – Circuit Card Assembly – Display Board

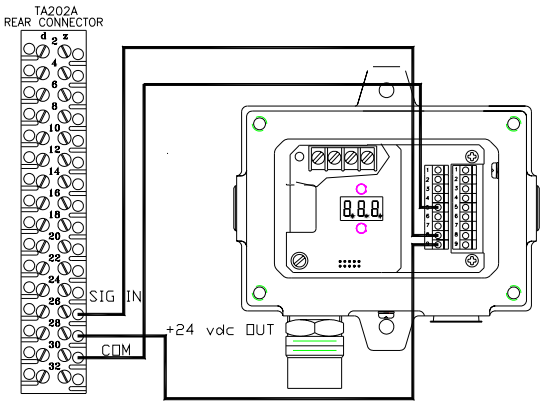
6.8.2 Outline & Terminal Connections

Reference Drawing # 11301-1





TA202A/S4100T



TA202A/S4000T

Figure 66 – Outline & Terminal Connections

6.8.3 Final Assembly

Reference Drawing # 11300-1

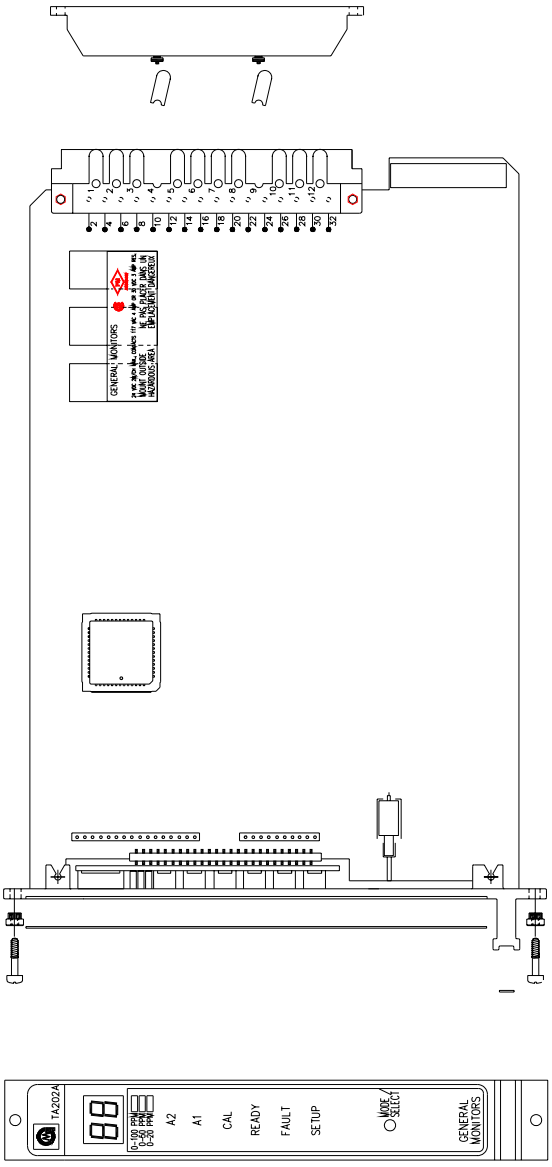


Figure 67 – Final Assembly

6.9 Zero Two Series Modules

Model TA102A
Zero Two Series Trip Amplifier for Combustible Gas Applications

Model TA202A
Zero Two Series Trip Amplifier Module for Hydrogen sulphide 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 Trip Amplifier 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.

Customer Satisfaction Questionnaire

Attention Field Operations:

We would appreciate your help in assessing and thus improving the quality of our Equipment and Service and would therefore be grateful if you would complete the Questionnaire below and return it to:

General Monitors Ireland Ltd,
Ballybrit Business Park,
Galway,
Republic of Ireland.

Thank you for your assistance

Client _____

Client Order No. _____

General Monitors Sales Order No. _____

(Please tick appropriate box)	Yes	No
1. Was the equipment the correct option?	☐	☐
2. Are sensors correct type and range?	☐	☐
3. Is mechanical assembly good? (everything proper fit and tight)	☐	☐
4. Did you receive the necessary accessories to commission the equipment?	☐	☐
5. Has the equipment been commissioned?	☐	☐
6. Any problems encountered during commissioning?	☐	☐
7. Is the equipment functioning correctly at present?	☐	☐

If you have answered **NO** to any of the above, please provide further details overleaf. **Thank you.**

Completed by: _____ Date: _____