



Model TA502A

Zero Two Series Generic
Trip Amplifier Module



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Instruction Manual

02/07

General Monitors reserves the right to change published specifications and designs without prior notice.

**Part No.
Revision**

**MANTA502A-EU
G/02-07**

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Warranty Statement

General Monitors warrants the Model TA502A 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 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.



Warning

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

Installation and maintenance must be carried out by suitably skilled and competent personnel only.

Toxic, combustible, and flammable gases and vapors are very dangerous. Extreme caution should be used when these hazards are present.

EC 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 relating to Electromagnetic Compatibility, by the application of:

A Technical Construction File No: GM 2001-3 and Certificate of Compliance EM01006463

And

- b) Conforms with the protection requirements of EN 61010-1 1993 +Amd A3: 1995 relating to safety by the application of:

A Technical Construction File No: GM 2001-3 and Competent Body Report No 01006321 issued by:

ITS Testing & Certification Ltd. Cleeve Road, Leatherhead Surrey KT22 7SB, England.
Tel: +44 1372 370900

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

PRODUCT: TA502A 3 Digit Display Trip-Amp Card

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: 01-05-02

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
- 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, and 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
- For flame detectors, use the appropriate test lamp

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
- Signal output devices
- Accessories connected to field and signal 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.

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Mount and Wire the Card and Card Rack.

A rack or panel mounted chassis will be required when installing any Zero Two Series Module. The 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 2-, 4-, 8-, and 16-channel sizes. Multiple 16-channel chassis may be connected to each other to form larger systems.

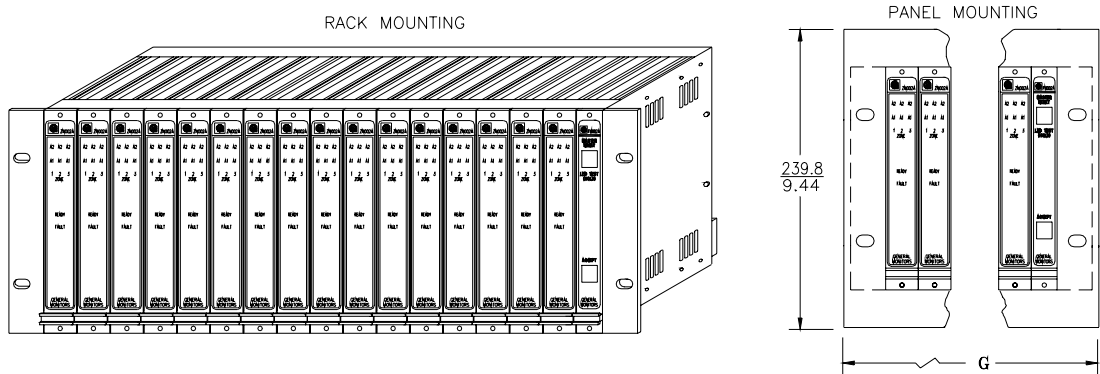


Figure 1: Rack & Panel Mounting

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 to mate with its counterpart on the module (see Figure 2 below).

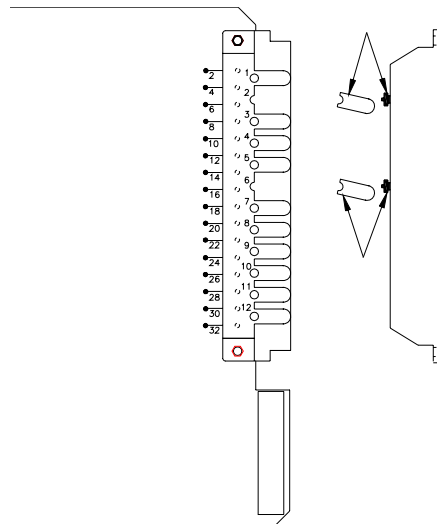


Figure 2: Control Module Coding Strip

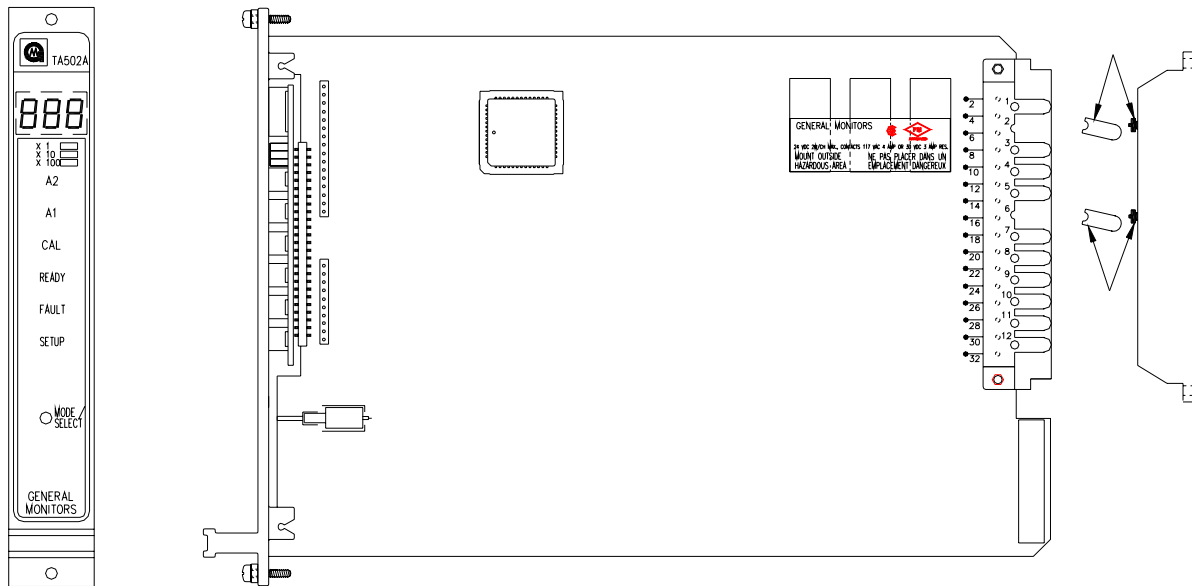


Figure 3: Outline Drawing

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 Amplifier Modules are, largely, immune to electromagnetic interference (EMI). However, they should not be mounted in close proximity to radio transmitters or similar equipment.

Wire Field Devices

All wire connections to the Model TA502A 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 as shown in Figure 4.

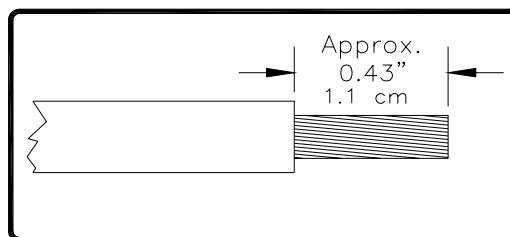


Figure 4: Wire Strip Length

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 TA502A, loosen the desired screw, insert the stripped end of the wire, and tighten. Gently tug on the wire to ensure it is securely fastened.

Rear Terminal Designations

For the rear terminal designations refer to Figure 5 below:

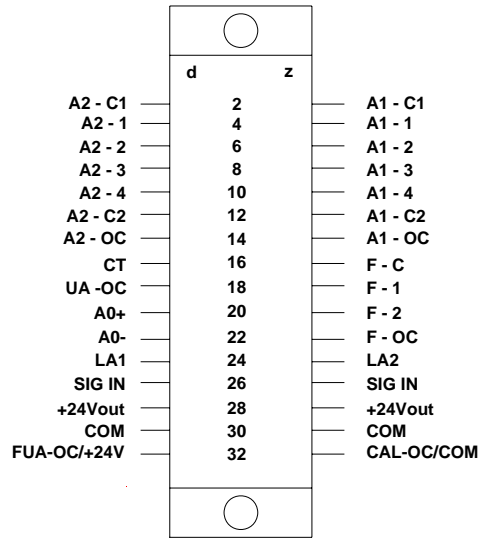


Figure 5: Rear Terminal Designations

Figure 6 illustrates the inter-connections for the TA502A & various types of Field Transmitters.

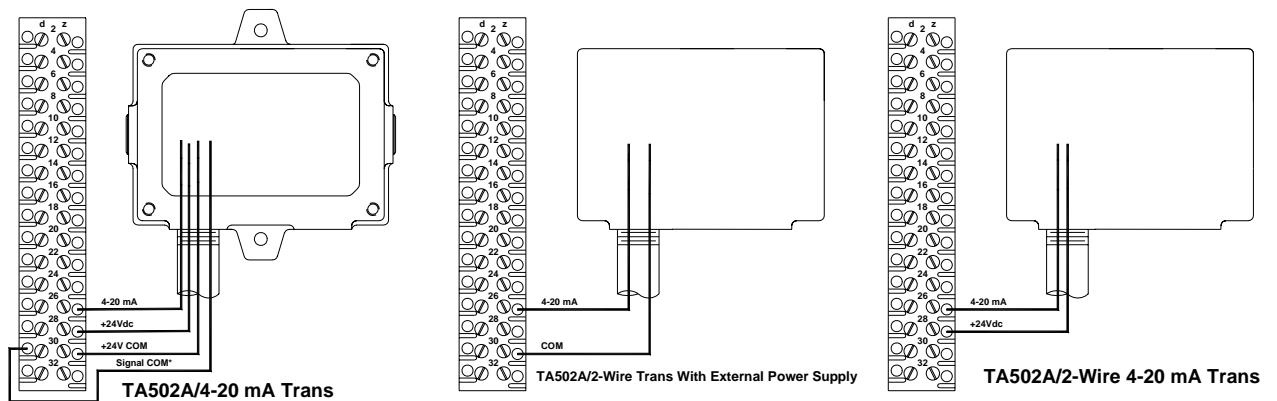


Figure 6: TA502A Inter-Connections

NOTE: Only one Field Transmitter may be connected to a Model TA502A. 4-conductor cable is recommended if cable length is greater than 400 ft. See Device Instruction Manual for connecting other Field Devices.

Wire Outputs of Model TA502A

Inductive loads (bells, buzzers, relays, etc.) on dry relay contacts must be clamped down. Unclamped inductive loads can generate voltage spikes in excess of 100 volts. Spikes of this magnitude may cause false alarms and contact damage. Figure 7 shows the recommended relay protection circuits for AC and DC loads, respectively.

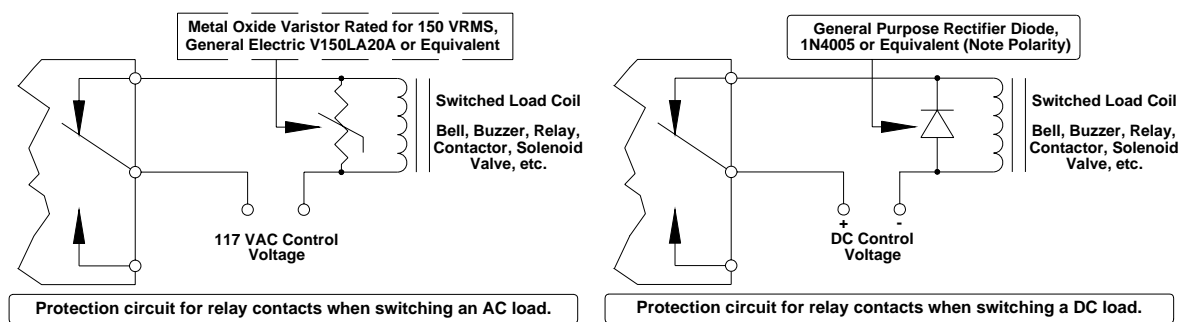
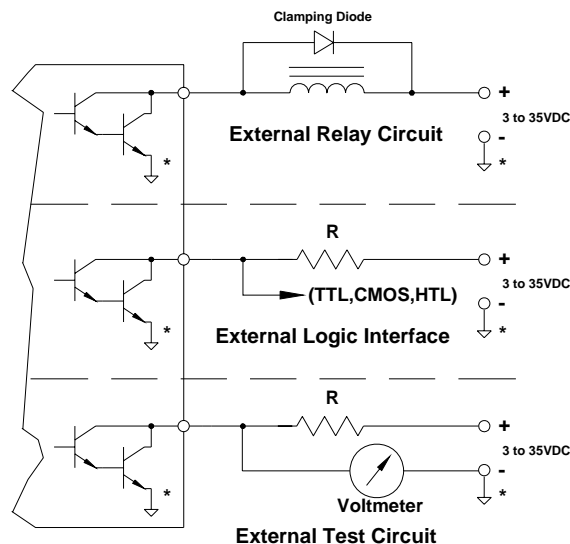


Figure 7: Relay Protection Circuits

The electrical rating for all open collector outputs is 100 mA @ 35 VDC. Figure 8 illustrates some typical open-collector external circuits.



* Note: All system commons (⏚) must be tied together.

Figure 8: External Test Circuits for Open Collectors

Apply Power

Zero Two Series Modules do not have an ON/OFF power switch. Each module in the Zero Two Series operates from 24 VDC. Power 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 the Model TA502A 'ON', check Fuse F1.

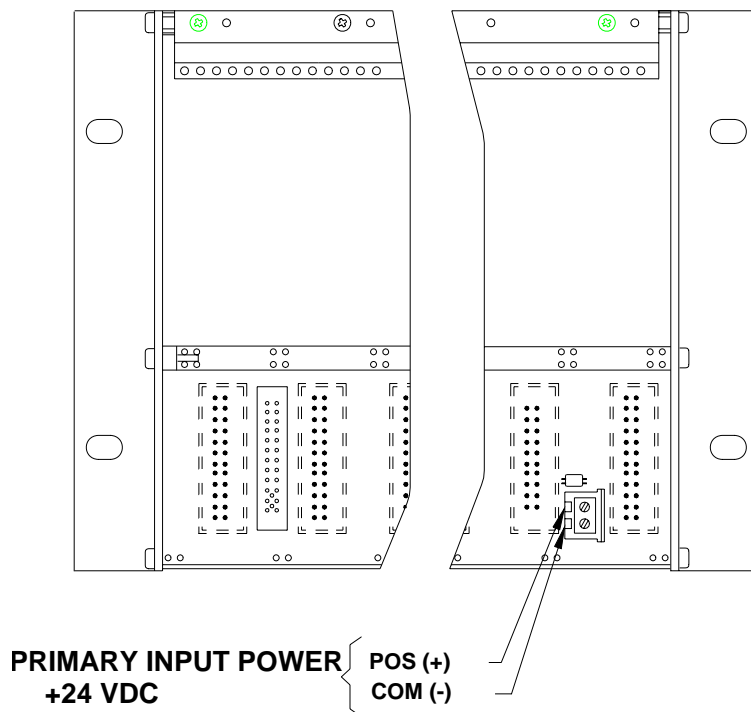


Figure 9: Power Connections Rear Chassis

Figure 9 indicates where the power connections for the chassis are made.

NOTE: The instrument is now ready to operate. Please consult the manual for more information on the instrument's many features. If you have any problems in the set-up or testing of the detector, please refer to the "Trouble Shooting Section", or call the factory direct.



Worldwide Service is available by calling:

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1.0 Introduction

This chapter provides a brief description of the Model TA502A, its features and benefits and a list of some of its applications. More detailed information on the features and benefits listed in Section 1.2 will be presented in later chapters.

1.1 General Description

The General Monitors Model TA502A (see Figure 10) is a single channel Generic Trip Amplifier designed for use in Zero Two Series Gas and Flame Detection Systems. This Module connects to a field mounted 4-20 mA transmitter.

The Model TA502A 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 gray border and "TA502A" in the upper right corner of the front panel. The Model TA502A is designed for use in non-hazardous environments.



Figure 10: Model TA502A

1.2 Features & Benefits

Microprocessor Based Electronics

Monitors fault conditions; field device inputs and provides outputs in the form of display codes, analog signal, relay contacts and open collector activation.

Setup Mode

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

Password Option

Prevents unauthorized alteration of the setup parameters (can be disabled) **Setup Check Mode**: allows the user to view the parameters that have been set by the factory and/or an operator.

LED Test

Tests the integrity of each front panel LED, and each segment of the digital display.

Card Test

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

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.

TS400 Mode

Allows the TA502A to be used with the Model TS400 Toxic Gas Detector.

TS420 Mode

Allows the TA502A to be used with the Model TS420 Oxygen Deficiency Gas Detector.

1.3 Applications

The General Monitors Model TA502A is a Generic Trip Amplifier designed for use with the Zero Two Series. Below is a partial list of applications:

- Refineries
- Drilling platforms and rigs
- Gas and oil production platforms
- Gas collection facilities
- Oil well logging operations
- Sulfur recovery plants
- De-sulfurization facilities
- Sewage disposal and treatment plants
- Chemical plants

2.0 Installation

This chapter discusses what to do when a Model TA502A is received, the terminal connections and designations, field-device location considerations, and what to be aware of when applying power.

2.1 Upon Receipt of Equipment

All equipment shipped by General Monitors is packaged in shock absorbing containers, which provide 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 TA502A is inspected at the factory; however, a complete assessment is necessary upon initial installation and start-up to ensure system integrity.

2.2 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 2-, 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 to mate with its counterpart on the module (see Figure 11).

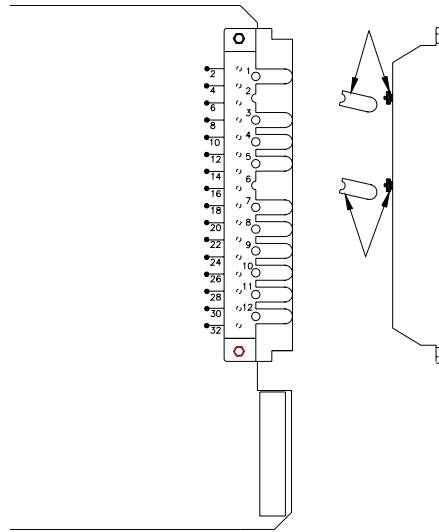


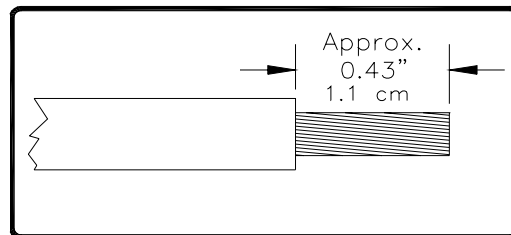
Figure 11: Control Module Coding Strip

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 Amplifier Modules are largely immune to electromagnetic interference (EMI). However, they should not be mounted in close proximity to radio transmitters or similar equipment.

2.3 Rear Terminal Connections

All wire connections to the Model TA502A 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 as shown in Figure 12.

Figure 12: Wire Strip Length



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

NOTE: To connect wires to the terminal block on the Model TA502A, loosen the desired screw, insert the stripped end of the wire and tighten.

2.3.1 Rear Terminal Designations

For the rear terminal designations refer to Figure 13 below:

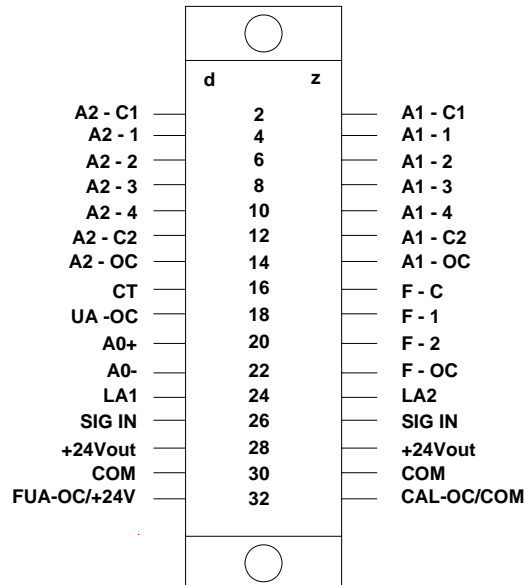


Figure 13: Rear Terminal Designations

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

Table 1: A2 Alarm

The A2 alarm outputs are DPDT (Double Pole Double Throw) relay contacts, one open collector output (A2-OC) that follows the logic of the relays and one 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 Section 4.0).

The table below refers to the proper open and closed A2 alarm relay contacts while the unit is powered:

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

Table 2: A2 Alarm Relay Contacts

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

Table 3: A1 Alarm

The **A1** Alarm outputs are DPDT relay contacts, one open collector output (A1-OC) that follows the logic of the relays and one 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 Section 4.0).

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-C1 & A1-3
Normally De-Energized	A1-C1 & A1-2, A1-C2 & A1-3	A1-C1 & A1-1, A1-C2 & A1-4

Table 4: A1 Alarm Relay Contacts

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-OC	32d	Open Collector (OC)

Table 5: Fault Alarm

The Fault outputs are SPDT (Single Pole Double Throw) relay contacts, one open collector output (F-OC) that follows the logic of the relays and one open collector output (FUA-OC) dedicated to new fault indications. With the Backwards Compatibility option, the FUA-OC will not be present (pin 32d will be for +24VDC). 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 @ 30 V RMS/42.4V Pk, 3A @ 30 VDC, Resistive maximum.

Field Connections

Inductive loads (bells, buzzers, relays, etc.) on dry relay contacts must be clamped down. Unclamped inductive loads can generate voltage spikes in excess of 100 volts. Spikes of this magnitude may cause false alarms and contact damage. Figure 14 shows recommended relay protection circuits for AC and DC loads, respectively.

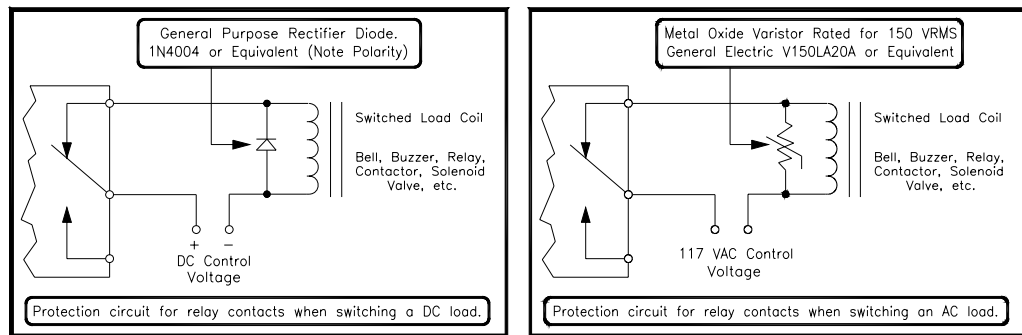


Figure 14: Relay Protection for AC and DC Loads

The terminal designation for the **Un-accept** output is:

Label	Term	Description
UA	18d	Open Collector Output

Table 6: Un-accept output

The terminal designations for the Discrete **Calibration** Output is:

Label	Term	Description
CAL-OC	32z	Open Collector Output

Table 7: Calibration Output

If the Backwards Compatible configuration is ordered, the CAL-OC will not be present (pin 32z will be for the COM).

The terminal designations for the **Field Transmitter connections** are:

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

Table 8: Field Transmitter Connections

NOTE: Only one Field Transmitter may be connected to a Model TA502A. 4-conductor cable is recommended if cable length is greater than 400 ft.

Figure 15 illustrates the inter-connections for the TA502A & various types of Field Transmitters.

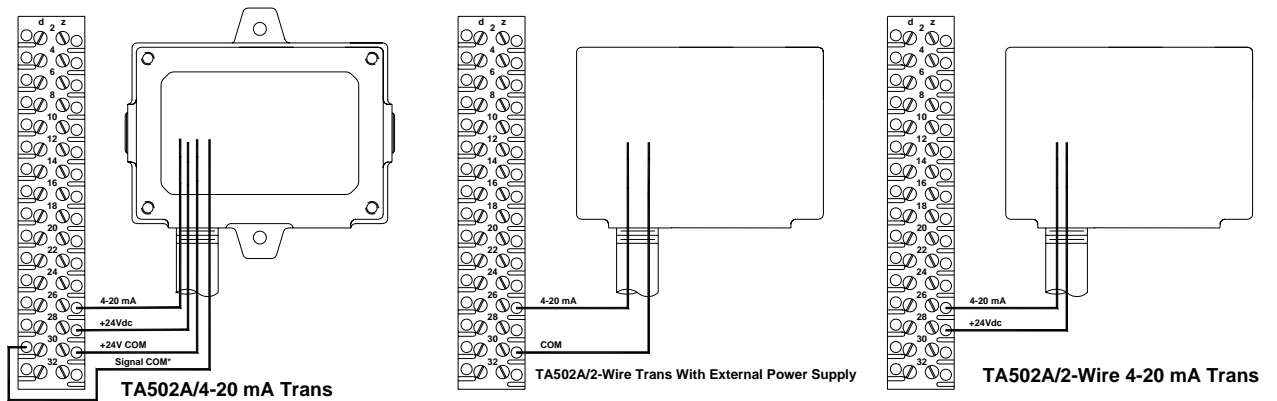
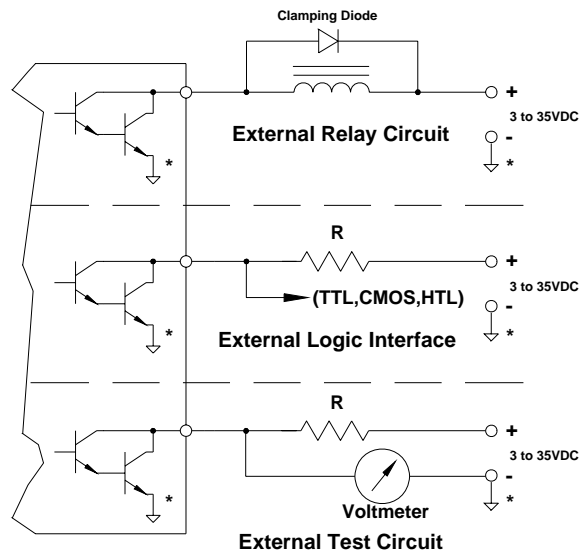


Figure 15: TA502A Inter-Connections

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

Figure 16 illustrates some typical open-collector external circuits.



* Note: All system commons (⏏) must be tied together.

Figure 16: External Test Circuits for Open Collectors

The terminal designation for the Card Test Input is:

Label	Term	Description
CT	16d	Switch Connection

Table 9: Card Test Input

The Card Test Input is provided so that the user can access the Card Test feature remotely. One end of a normally open SPST (Single Pole Single Throw) switch is connected to this termination and 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 (minimum runtime is 3 or 10 seconds, software selectable). Figure 17 is a block diagram that shows the switch connections for the Card Test feature.

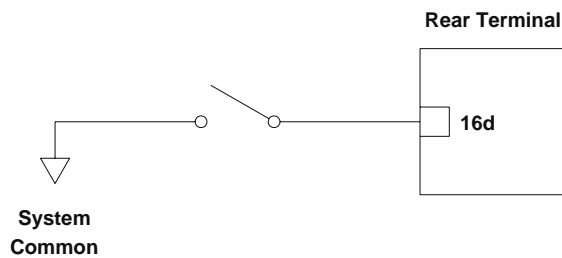


Figure 17: Card Test Switch Wiring

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

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

Table 10: Analog Signal Output

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

Figure 18 is a diagram of the Analog Signal connections.

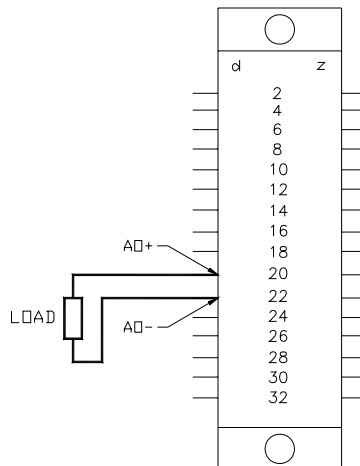


Figure 18: Analog Signal Connections

Figure 19 indicates where the power connections for the chassis are made.

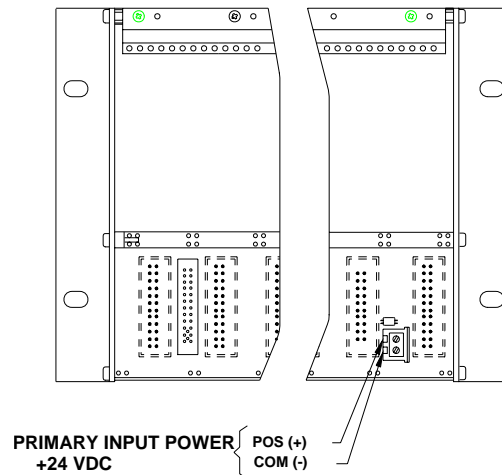


Figure 19: Power Connections Rear Chassis

2.4 Applying Power

Zero Two Series Modules do not have an ON/OFF power switch. Each module in the Zero Two Series operates from 24 VDC. Power 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 the Model TA502A 'ON', check Fuse F1.

- | | |
|-----------|---|
| F1 | 1 Amp "Slow Blow"
PART NO.: 915-212 |
| F3 | 500mA Fuse Anti-surge (Char. "T") with a high breaking capacity (HBC) PC 1500A at 250V, type IEC 127 ceramic.
PART NO.: 915-218
SAFETY COMPONENT – DO NOT SUBSTITUTE |
| F2 | 63mA Fuse "Quick Blow" with a high breaking capacity (HBC) PC 1500A, type IEC 127 Ceramic.
PART NO.: 915-219
SAFETY COMPONENT – DO NOT SUBSTITUTE WHEN CONNECTING TO IR5000, IR7000, IR2100 |
| F2 | PART NO.: 915-216 TO BE USED WITH FMD/TS400/TS420 ONLY |

3.0 Operation

This chapter discusses what general maintenance to perform. It also describes the electrical inputs, outputs, accepting and resetting of alarms, calibration, fault conditions, and fault diagnostics.

3.1 General Maintenance

Once the Model TA502A has been installed, very little maintenance is required other than periodic checks to verify the integrity of the system.

- 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, field device, and output wiring should be checked for tightness, verifying that all of the components and devices are connected correctly. Verify that the fuses (F1, F2, & F3) are operational.
- If the “**Password**” is disabled, periodic checks of the setup parameters should be performed.

3.2 Electrical Inputs

There are two electrical inputs to the Model TA502A. They are the Field Device and the Card Test input. Both of these input connections (field device and card test) are made to the rear terminal block (see Section 2.0 for more detailed installation information).

- The Field Transmitter input consists of a standard three lead connection, such as, (Black = Common, White = Signal, Red = +24 VDC). See Figure 19.
- The Card Test input consists of a single termination for remote testing of the Model TA502A’s functions. For detailed information on the Card Test, refer to Figure 21.

3.3 Electrical Outputs

The electrical outputs on the Model TA502A consist of relay contacts, open collectors, and an analog current signal.

The following outputs have rear terminal relay contacts:

- A1 Alarm - DPDT relay contacts
- A2 Alarm - DPDT relay contacts
- Fault - SPDT relay contacts

All of the relay contacts on the Model TA502A have a maximum rating of:

- 4A @ 30 V RMS/42.4V Pk, 3A @ 30 VDC 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 - Calibration Mode

All of the open collector outputs on the Model TA502A have a maximum rating of:

- 100 mA @ 35 VDC
- The Analog Output Signal is used for sending field transmitter readings and status information to remote devices. The TA502A has input impedance of 30 ohms. The rear termination labeled “**Signal IN**” is part of the overall analog loop. The analog signal is generated by the field device and passes through the Model TA502A. This signal is a 0 to 21.7 mA current-signal with 4 to 20 mA being proportional to 0 to 100% of full-scale. When the field device is placed in calibration mode, the TA502A will indicate **CA** if the current is 1 to 1.8 mA. (Standard Mode Only)
- When the field device output is between 1.8 and 2.5 mA, the TA502A will display **bb**, to indicate that the field device is in beam block or optical fault. (Standard Mode Only)
- If the signal from the field device is 0 to 1 mA, the TA502A display will indicate **F4** (field device error). When the Model TA502A enters a fault condition, the display will indicate a fault code (“**F**” followed by a digit). Verify fuses F2 & F3.
If the field transmitter attached to the Model TA502A is sensing a level in excess of 100% of full-scale, an over range condition is indicated by a flashing digital display reading full-scale.
- In TS400 or TS420 Mode, any input current below 3.85 mA will cause an **F4** (field device error) to be displayed. This will occur when the TS400 or TS420 is in Startup Mode, Calibrate Mode, or Fault Mode.

3.4 Accepting Alarm Conditions

Whenever a new alarm condition occurs, the front panel LED and open collector associated with that alarm (**LA1** or **LA2**) will flash. In addition, the associated alarm outputs and the unaccepted outputs (TA502A, 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. 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 3.5).

There is a unique situation, which 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. If the alarm output is accepted but not reset and that alarm set point is exceeded again, the front panel LED, the associated mimic open collector, and the un-accept outputs will re-flash or re-activate. This gives the operator an indication of a new alarm condition that must be re-accepted.

The fault alarm can be accepted similarly with the **A1 & A2** alarms. The front panel fault LED will flash and the fault un-accept (FUA) open collector will energize when a fault is detected. If the operator presses the accept button, the FUA output will de-energize and the **Fault** LED will stop flashing but stay illuminated until the fault condition is corrected.

3.5 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, whereas a latched alarm output will need 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. Latched alarm conditions cannot be reset until they have been accepted.

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.

3.6 CAL Open Collector

There is an open collector that will energize anytime the Field Device is placed in the Calibration 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.

3.7 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 terminal and the other end is connected to system common (see Figure 19).



To activate the Card Test feature, simply press and hold the switch for at least three seconds. 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 (1, 3 or 10 seconds) during the Setup Mode (see Section 4.4). Each alarm level (**A1** & **A2**) will trip when the alarm set point is exceeded. 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: The relays (**A1** & **A2**) and open collector outputs are active and will trip during the Card Test, unless the user-specified option disabling these outputs is selected during the Setup Mode. This should be treated as a functional test of a Zero Two System.

3.8 Beam Block Feature

Some IR combustible gas detectors, such as the General Monitors Model IR5000 and IR2100, output a 2 mA signal when the optical path is blocked. When the TA502A, in standard mode, receives a signal between 1.8 and 2.5 mA, the display indicates **bb** to acknowledge this condition.

3.9 Operating Modes

The TA502A has several different operating modes to allow proper operation with different General Monitors field devices. The standard mode ("**std**") allows operation with devices such as the Model IR2100 or IR5000, which provide the standard 0 – 20 mA output. The TS400 mode ("**400**") allows operation with the full-range of Model TS400 product. When the TS400 is in either Fault Mode (3.50 mA), Startup Mode (3.60 mA), or Calibration Mode (3.75 mA), the TA502A will display "**F4**" and all fault circuits will be active. The TS420 mode ("**420**") allows operation with the Model TS420 Oxygen Deficiency Detector. The TA502A will also display "**F4**" when the TS420 is in Startup, Fault, or Calibration mode. However, alarms occur when the O₂ concentration falls **below** the alarm set points.

Table below summarizes the operating modes.

Input from field device	Standard "std"	TS400 "400"	TS420 "420"
0mA	F4	F4	F4
1.5mA	CA	F4	F4
3.5mA	-3	F4	F4
3.6mA	-2	SU	SU
3.75mA	-1	CA	CA
4mA	0	0	0
8mA	25%FS	25%FS	25%FS
12mA	50%FS	50%FS	50%FS
16mA	75%FS	75%FS	75%FS
20mA	100%FS	100%FS	100%FS
22mA	100%FS	100%FS	100%FS
Alarms	Input above set point	Input above set point	Input below set point

Table 11: TA502A Operating Modes

3.10 Fault Diagnostics

In addition to the Fault LED on the front panel, the Model TA502A provides a fault code on the digital display whenever a fault condition occurs. If the unit is not **ON**, check fuse, F1.

The Fault Codes that can appear on the digital display are summarized below:

F1, F2, F5 & F9

Are not used at this time. These codes have been reserved for future use.

F3: Program 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 your GM Representative or the factory.

F4: Field device error

Make sure the wires running to and from the Trip Amplifier and the Field Device are connected properly. Check for opens and shorts across the field wiring. Make sure the analog signal is returned to the field device or common (jumper AO+ & AO- if unused). Possibly a 0mA Calibration Current from the Field Transmitter. Check fuses F2 & F3.

F6: Low supply voltage

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

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 GM Representative.

F8: Failed to complete setup

This fault may occur during or immediately after the Setup Mode. If this fault occurs, consult the factory or your GM Representative.

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.

4.0 User Interfaces

This chapter discusses the user interfaces, the Setup Mode, the Setup Check Mode, and the Inhibit Mode.

4.1 Types of User Interfaces

User interfaces are provided so that the operator may interpret and direct the Model TA502A in the performance of its various functions. User interfaces (Figure 20) 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 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 Setup Check, Setup, and Inhibit modes.

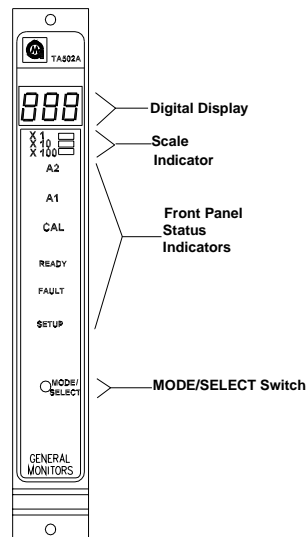


Figure 20: Front

Panel Display

4.2 Setup Check & Setup 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. The Setup Mode allows the operator to change the operating parameters by making choices for selected options.

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

- The Setup Check Mode allows the user to view the operating parameters of the Model TA502A, whereas the Setup Mode allows the user to change these 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 TA502A will enter 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 **SETUP** LED, the **CAL-OC** output, and the **CALBUSS**.

NOTE: Before entering the Setup Mode to make changes, the user should become familiar with the block diagram on the following page. Filling out the form will aid the user during the selection process in the Setup Mode.

Section 4.3 is provided to aid the operator in selecting 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 TA502A. The option entry indicates the order of options in the Setup Mode. To the right of the option entry is a description of the choices that are available for that option. More information about making each selection is provided in the pages that follow.

4.3 Setup Mode Selection Table

OPTION	DESCRIPTION	ENTER SELECTION
Password	Enter the Password, if the Password is enabled	_____
Inhibit Mode	Enter the Inhibit Mode, if Desired	_____
Operating Mode	Selection for use with Standard 4-20mA field devices (IR2100, IR5000) "Std", Model TS400 "400", Model TS420 "420"	_____
Set Display Range	Display will indicate "Sr" then select the Sensor Range 0-1.0, 0-2.0, 0-5.0, 0-10.0... Up to 0-100 (In increments of 5 units), 0-200, 0-500.	_____
Display Multiplier	Display will indicate "dis" then select the Display Multiplier X 1, x 10, or x 100.	_____
A2 Alarm	Set the Energized (En) / De-Energized (dE) Option Set the Latching (LA) / Non-Latching (nL) Option Set the High alarm set point	_____ _____ _____
A1 Alarm	Set the Energized (En) / De-Energized (dE) Option Set the Latching (LA) / Non-Latching (nL) Option Set the Low alarm set point	_____ _____ _____
Fault/Inhibit	Set the fault to Activate (Ac) or not (nA) during Inhibit Mode	_____
Card Test	The Display will indicate "ct" for 5 seconds	_____
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 TA502A will enter the Setup Check Mode.	

Table 12: Setup Mode Selection Table

NOTE: The Password, the **A1** & **A2** Alarm set points, the sensor range, and the display multiplier 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.

4.4 Entering the Setup Check Mode

To Enter the Setup Check Mode or the Setup 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 25). Continuing to press and hold the Mode/Select switch until the **SETUP** LED stops flashing (about fifteen seconds) will allow the operator to enter the Setup Mode. When the **SETUP** LED stops flashing (remains lit), release the Mode/Select switch and the unit will enter the Setup Mode (Figure 21).

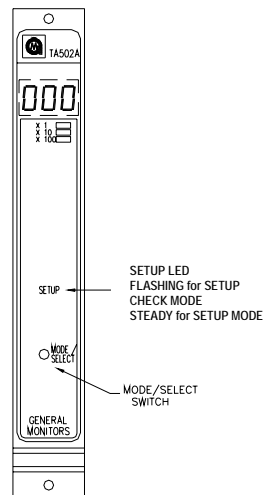


Figure 21: Entering the Setup & Setup Check Modes

4.4.1 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 “-” will appear in the left digit on the display (Figure 22).

Press the Mode/Select switch until the correct number is displayed, then wait until the TA502A accepts the first digit (approx. 5 seconds). The left digit of the display will now be blank and a “-” will appear in the right digit on the display (Figure 22). Press the Mode/Select switch until the correct number is displayed, then wait for password acceptance. If the password is correct the user will proceed with 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**.

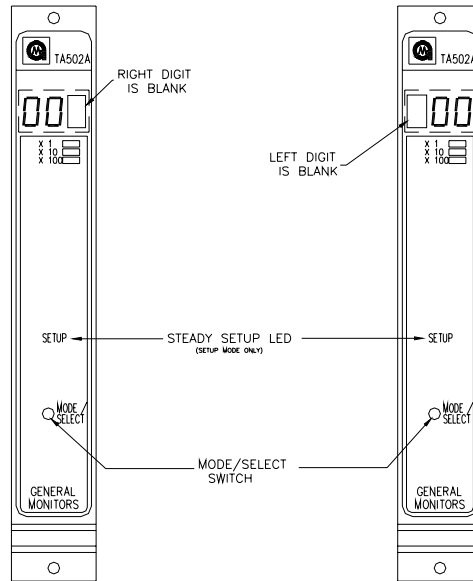


Figure 22: Entering the Password

4.4.2 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 23). 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 TA502A has entered the Inhibit Mode, pressing the Mode/Select switch causes the unit to return to normal operation (see Section 4.4). If it is desired to enter the Setup Mode, do not press the Mode/Select switch for the five seconds that **In** is displayed.

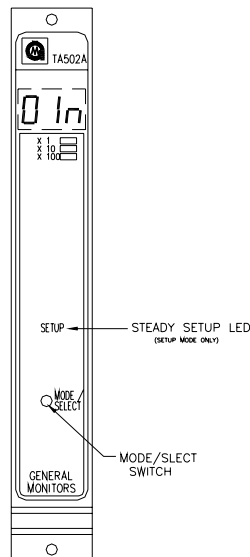


Figure 23: Entering the Inhibit Mode

4.4.3 Operating Mode

When the operating mode is selected, the display will indicate the current selection (“Std”, “400” or “420”). Press the Mode/Select switch until the desired operating mode is displayed. The factory default is “Std” Mode.

NOTE: If the Sensor Range is changed, the alarm set points (A1 & A2) must be reset.

4.4.4 Display Multiplier Option

Next, the user will select the Display Multiplier (Figure 24). The display will indicate **dl**, and the x 1, x 10 or x 100 LED will be lit. Press the Mode/Select Switch until the desired LED is illuminated. The factory default for this selection is **x 1**.

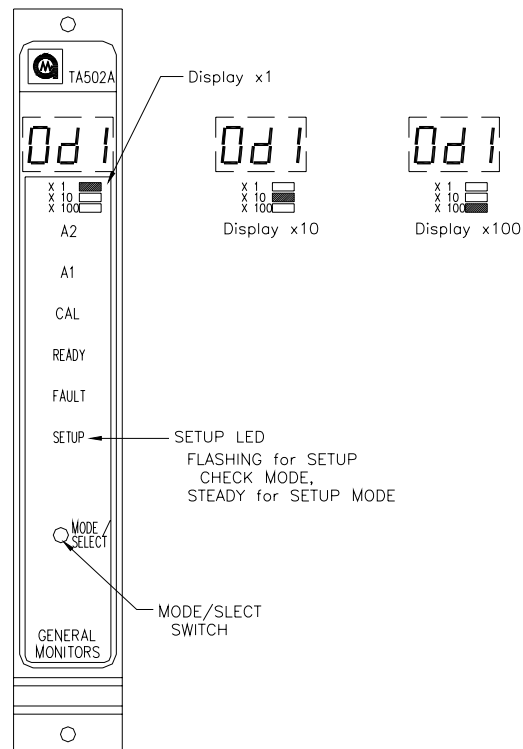


Figure 24: Display Multiplier Option

4.4.5 A2 Alarm Options

After the Sensor Range option has been selected, the **A2** LED on the front panel will be flashing while the Energized/De-Energized option is displayed (Figure 25). The display will indicate the current selection, (**En**, or **dE**). **De-Energized** is the factory default for this selection.

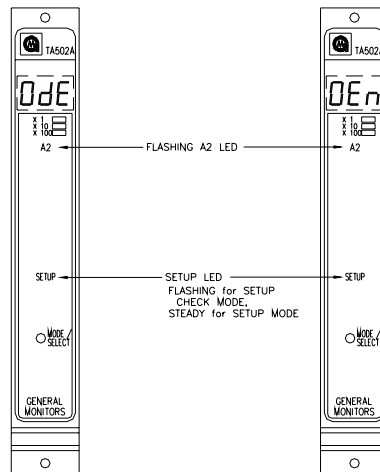


Figure 25: A2 Energized/De-Energized Alarm Option

The **A2** LED on the front panel will be flashing while the Latching/Non-latching option is displayed (Figure 26). The display will indicate the current selection, (**nL**, or **LA**). **Latching** is the factory default for this selection.

The last **A2** alarm option to appear on the display will be the alarm set point (trip level). The **A2** set point cannot be set lower than the current **A1** set point. To accomplish this, the operator must set the **A1** set point lower than the desired **A2** set point, then re-enter the Setup Mode, and select the desired **A2** set point.

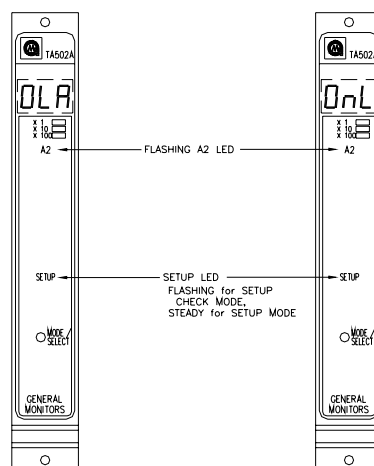


Figure 26: A2 Latching/Non-Latching Alarm Option

If the set point is reached or exceeded, the **A2** alarm outputs will activate. The display will indicate the current **A2** alarm set point (Figure 27). 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.

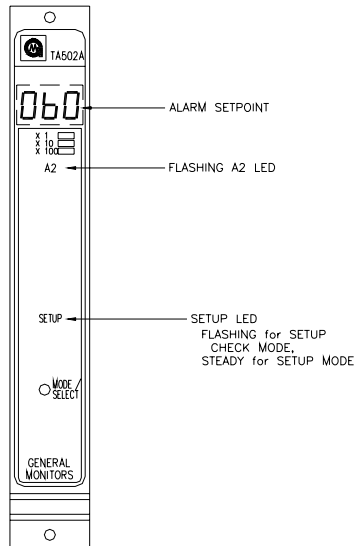


Figure 27: A2 Alarm Set Point Option

4.4.6 A1 Alarm Options

Next, the **A1** LED on the front panel will be flashing while the Energized/De-Energized option is displayed (Figure 28).

The display will indicate the current selection, (**En** or **dE**). **De-Energized** is the factory default for this selection.

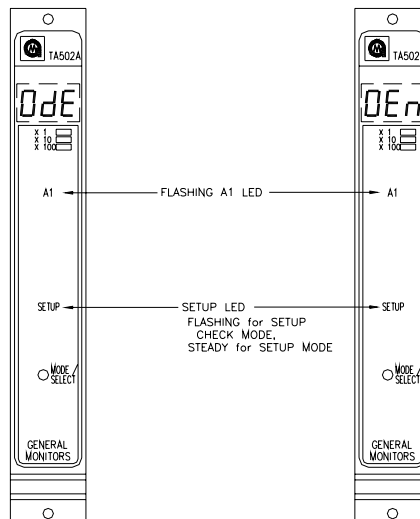


Figure 28: A1 Energized/De-Energized Alarm Option

The **A1** LED on the front panel will be flashing while the latching/non-latching option is displayed (Figure 29). The display will indicate the current selection, (**nL** or **LA**). **Non-Latching** is the factory default for this selection.

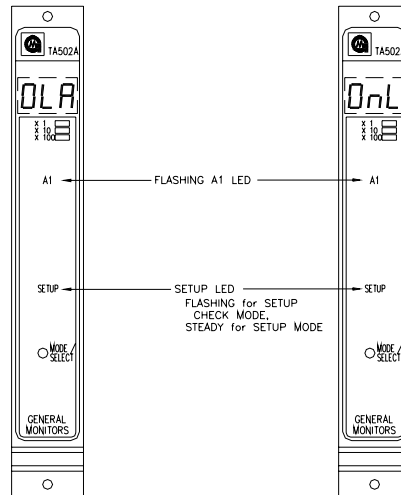


Figure 29: A1 Latching/Non-Latching Alarm Option

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 set point (Figure 30). Press the Mode/Select switch repeatedly, until the desired **A1** alarm set point appears on the display. The factory default for this selection is **30**.

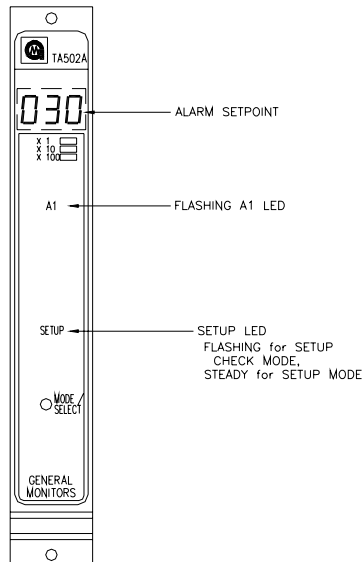


Figure 30: A1 Alarm Set Point Option

4.4.7 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 31). An **Ac** selection specifies that the Model TA502A will activate the Fault circuit while the unit is in the Inhibit Mode. A **nA** selection specifies that the Model TA502A will not activate its Fault circuit when the unit is placed in the Inhibit Mode (see Section 4.3). 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.

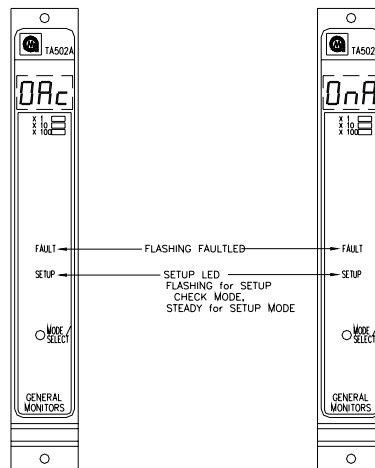


Figure 31: Fault / Inhibit Option

4.4.8 Card Test Options

After the Fault/Inhibit option has been selected, the user will select the ramp time (1, 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 32).

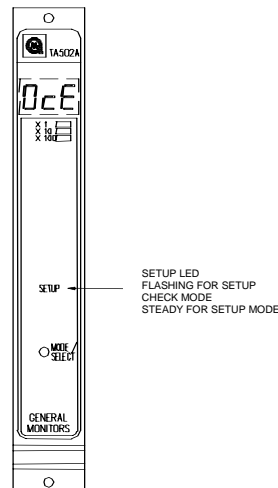


Figure 32: Entering Card Test Options

Following **ct**, the ramp-up time (**1**, **3** or **10**) during the card test (Figure 33) will be displayed. **3** as the factory default for this selection.

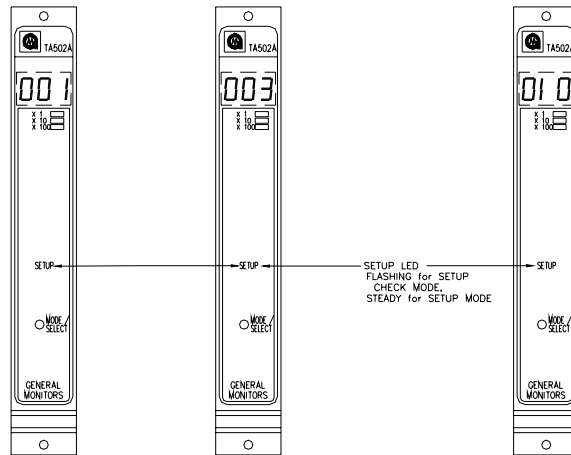


Figure 33: Card Test Ramp Time, 1 / 3 / 10

Next, the display will indicate the alarm output option during a Card Test as either **Ac**, active or **nA**, not active (Figure 34). **Not Active** is the factory default for this selection.

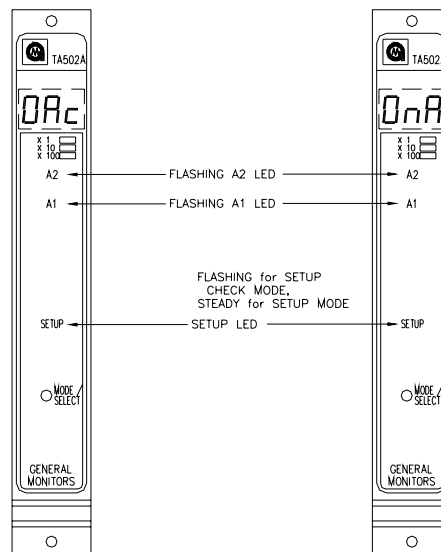


Figure 34: Alarm Output Option during a Card Test, AC / nA

NOTE: Selecting the **nA** option for the Card Test will not inhibit the Fault or **A1/A2** alarm circuits in case of a malfunction or gas condition during normal operation.

4.4.9 Password Option

Once the Card Test options have been selected, the user will either enable or disable the password option (Figure 35). The display will indicate either **PE** for enabled or **Pd** for disabled. **Password Disabled** is the factory default for this selection.

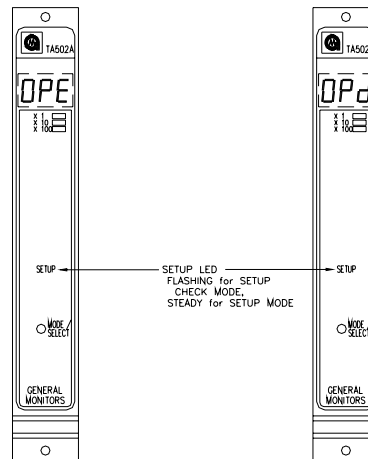


Figure 35 Password Enabled / Disabled Option

4.4.9.1 Entering a New Password

This option applies to the Setup Mode only. If the Password is disabled, the unit will automatically enter the Setup Check mode. If the Password is enabled, the user will be able to enter a new password. (refer to the NOTE on page 21). 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. Once the left digit is 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 36).

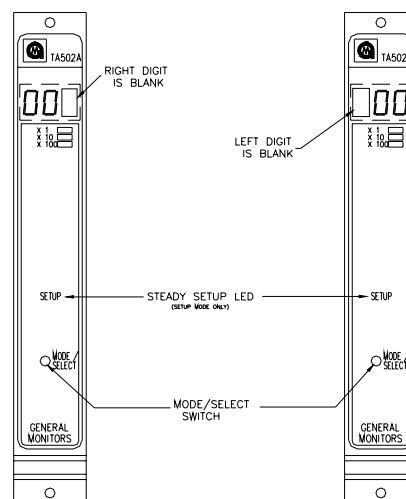


Figure 36: Entering a New Password

When the Setup Mode is complete, the Model TA502A 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.

4.5 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.

If the password option is disabled, or after the correct password has been entered, the display will indicate **In** for five seconds (Figure 27). 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 TA502A 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 operator does not select this option, the Fault circuits will function normally during the Inhibit Mode (i.e. they will not be inhibited).

While the unit is in the Inhibit mode, the display will indicate **In** for 5 seconds, then the field device input level 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 TA502A 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: The Calibration Mode is accessed at the field device. Refer to the Instruction Manual of the specific field device for entering and using the Calibration Mode.

5.0 Appendix

5.1 Engineering & Technical Drawings

5.1.1 Reference Drawing #11271, Outline & Terminal Connections

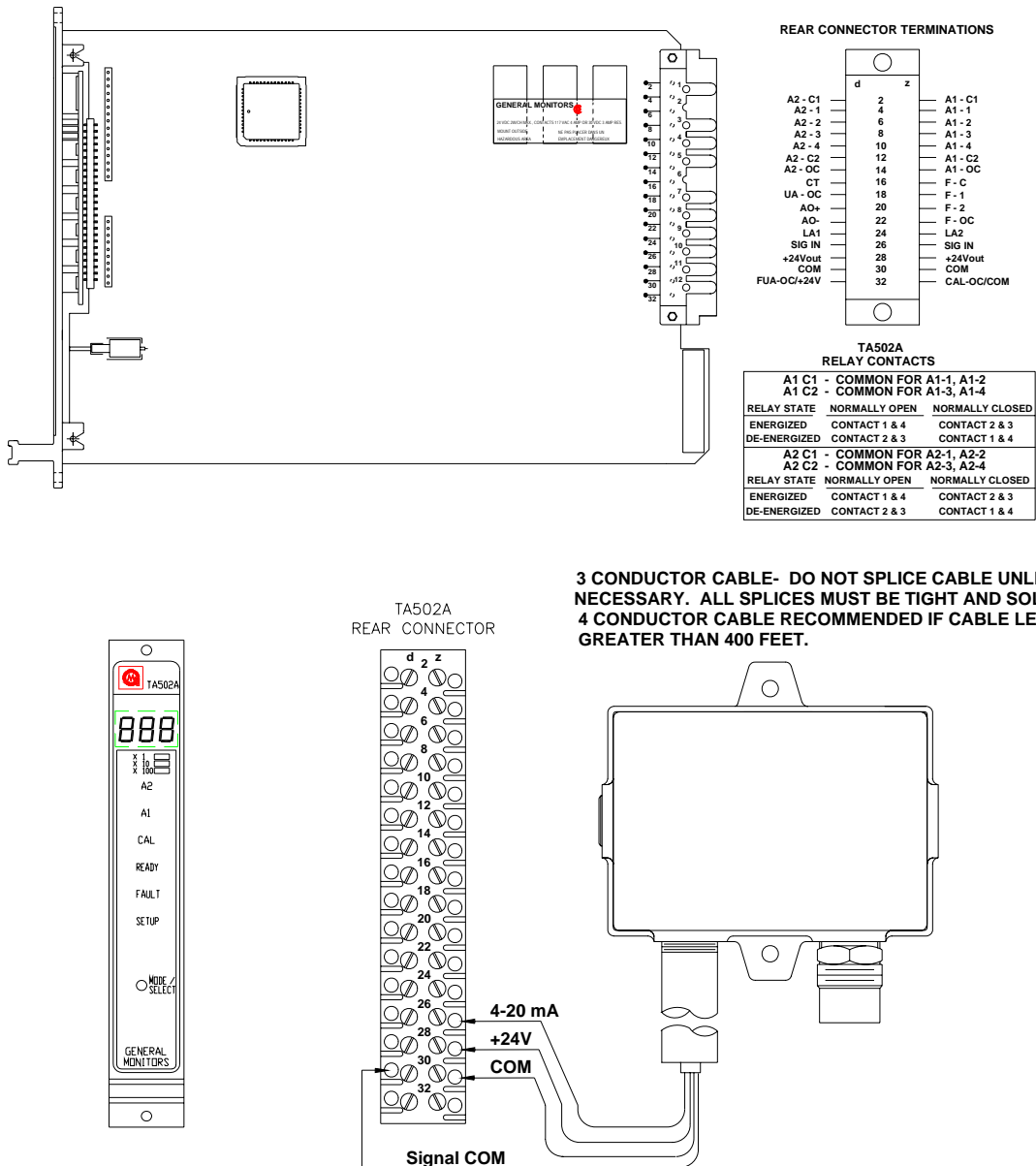


Figure 37: Outline & Terminal Connections

5.1.2 Reference Drawing #11270-1, Final Assembly

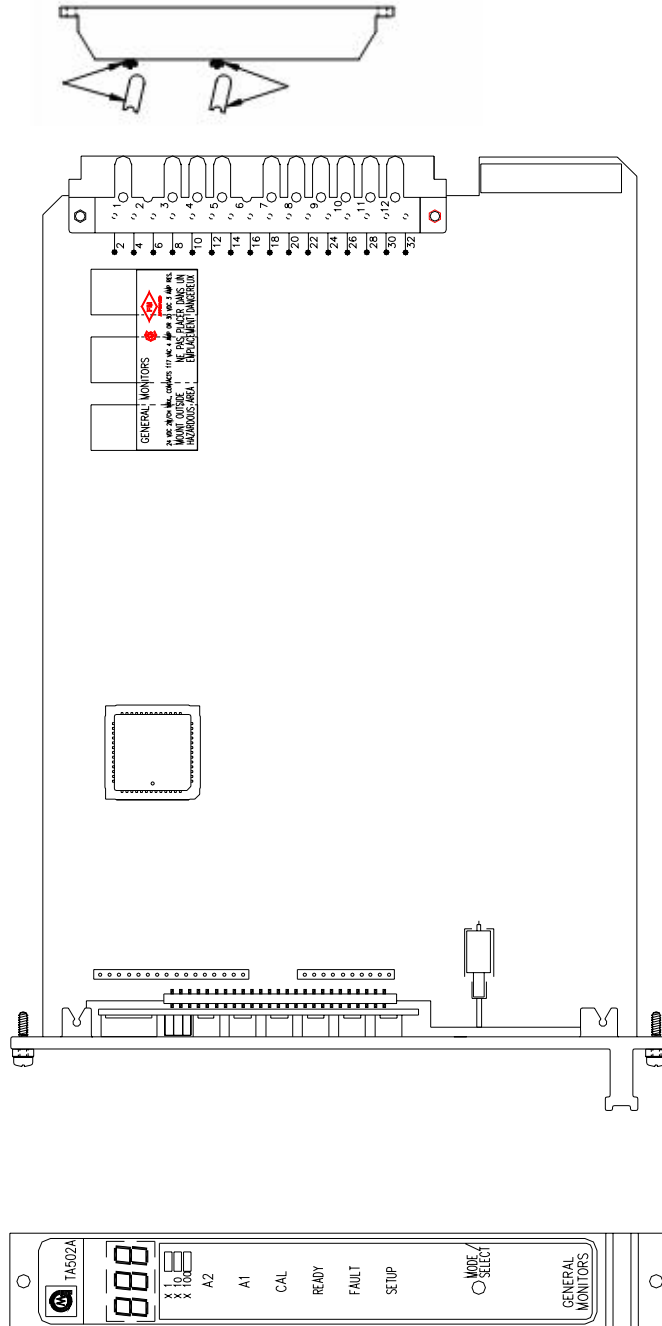


Figure 38: Final Assembly Drawing

5.2 Specifications

5.2.1 System Specifications

Application:	Generic 4-20mA input module
Device Type:	Any 4-20mA field-transmitter.
Sensor Ranges:	Allows many different sensor outputs to be displayed properly. Ranges include 0-1, 0-2, 0-5 and 0-10. Up to 0-100, 0-200, 0-500 (in increments of 5 units). Used in conjunction with the Display Multiplier Option to provide a wide variety of display options.
Display Multipliers:	Three multiplier LED's on front panel x1, x10 or x100.
Approvals:	CSA certified, CE, SIL
Warranty:	Two years.
Performance	
Accuracy:	±1% of input signal.

5.2.2 Mechanical Specifications

Weight:	11.2 oz (318 grams)
Length:	9.9 inches (251 mm)
Height:	6.8 inches (173 mm)
Width:	1.0 inch (25 mm)

5.2.3 Electrical Specifications

Input Power Requirement:	20 to 36Vdc @ 300mA max. (24Vdc, 7W nominal).
Electrical Classification:	The Model TA502A is designed for use in non-hazardous environments.
Relay Contact Rating:	4A @ 30 V RMS/42.4V PK, 3A @ 30 VDC, resistive max. DPDT for A1 & A2, SPDT for Fault. 4A @ 30V rms 42.4V PK
Open Collector Rating:	100 mA @ 35 VDC for A1, A2, Fault, UA, FUA, CAL, LA1 & LA2.
Cable Parameters:	3-wire shielded recommended (4 wire shielded when cable length >400 ft). Maximum cable lengths allowable between module and the Field Device with 24Vdc nominal at the sensor/detector as shown below:

AWG	FEET	METERS
14	4500	1372
16	2250	685
18	1600	488
20	1100	335
22	750	228

Table 13: Cable Lengths

Analog Output:	30 Ohm input impedance.
Analog Signal	Normal Mode TS400 Mode TS420 Mode

5.2.4 Environmental Specifications

Operating Temperature Range:	0°F to +150°F (-18°C to +66°C)
Storage Temperature Range:	-40°F to +150°F (-40°C to +66°C)
Operating Humidity Range:	5 % to 99 % Relative Humidity Non-condensing

5.2.5 Engineering Specifications

5.2.5.1 Zero Two System

Each system shall utilize modules capable of monitoring gas sensing elements or a 0 to 21.7mA analog signal from field detection transmitters. The system chassis shall be available in 2, 4, 8 or 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, and 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 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.

5.2.5.2 TA502A Trip Amplifier Module

The trip amplifier module has an interface panel, a mode/select switch, and the following indications:

- 2 discrete alarm threshold level indicators
- Fault or malfunction indicator
- Ready indicator
- Calibration mode indicator
- Setup mode indicator and
- 3-digit digital display

All alarm parameters and user options are software selectable. A power on self-test (POST) automatically is performed each time the trip amplifier module is powered-up. A functional card test and a front panel LED test are switch capable without interrupting normal on-line services.

The trip amplifier module is capable of insertion and removal during power 'on' conditions without damage to any component module in the system. The trip amplifier module generates display codes associated with fault conditions whenever a fault or malfunction occurs. A mode/select switch provides the operator with front panel access to a setup check mode, a setup mode, and an inhibit mode. The trip amplifier module has a password protected setup routine capable of having the password disabled.



ADDENDUM
Product Disposal Considerations

This product may contain hazardous and/or toxic substances.

EU Member states shall dispose according to WEEE regulations. For further General Monitors' product WEEE disposal information please visit:

www.generalmonitors.com/customer_support/faq_general.html

All other countries or states: please dispose of in accordance with existing federal, state and local environmental control regulations.