GEN²

Model OI-7432

4x32² *ProSafe*

Operation Manual

Revision 2.4w

OTIS
INSTRUMENTS INC.

Product Overview

The Otis Instruments, Inc. GenII *ProSafe* 4x32^2 Model OI-7432 is a 32-channel gas monitor that functions as a transmission controller. The OI-7432 monitors toxic, combustible and oxygen gas levels in ambient air by receiving and displaying RS-485 Modbus signals from up to 32 wired sensor assemblies.

The OI-7432 features a 160x104 graphical LCD display and is equipped with four “dry contact” (Form C) 5 Amp alarm relays (with 4 Amp fuses) that are full-scale adjustable.

The OI-7432 operates with either 12-35 Volts DC or 110/240 Volts AC power-in and includes a Modbus output with optional real-time monitoring software.

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Introduction

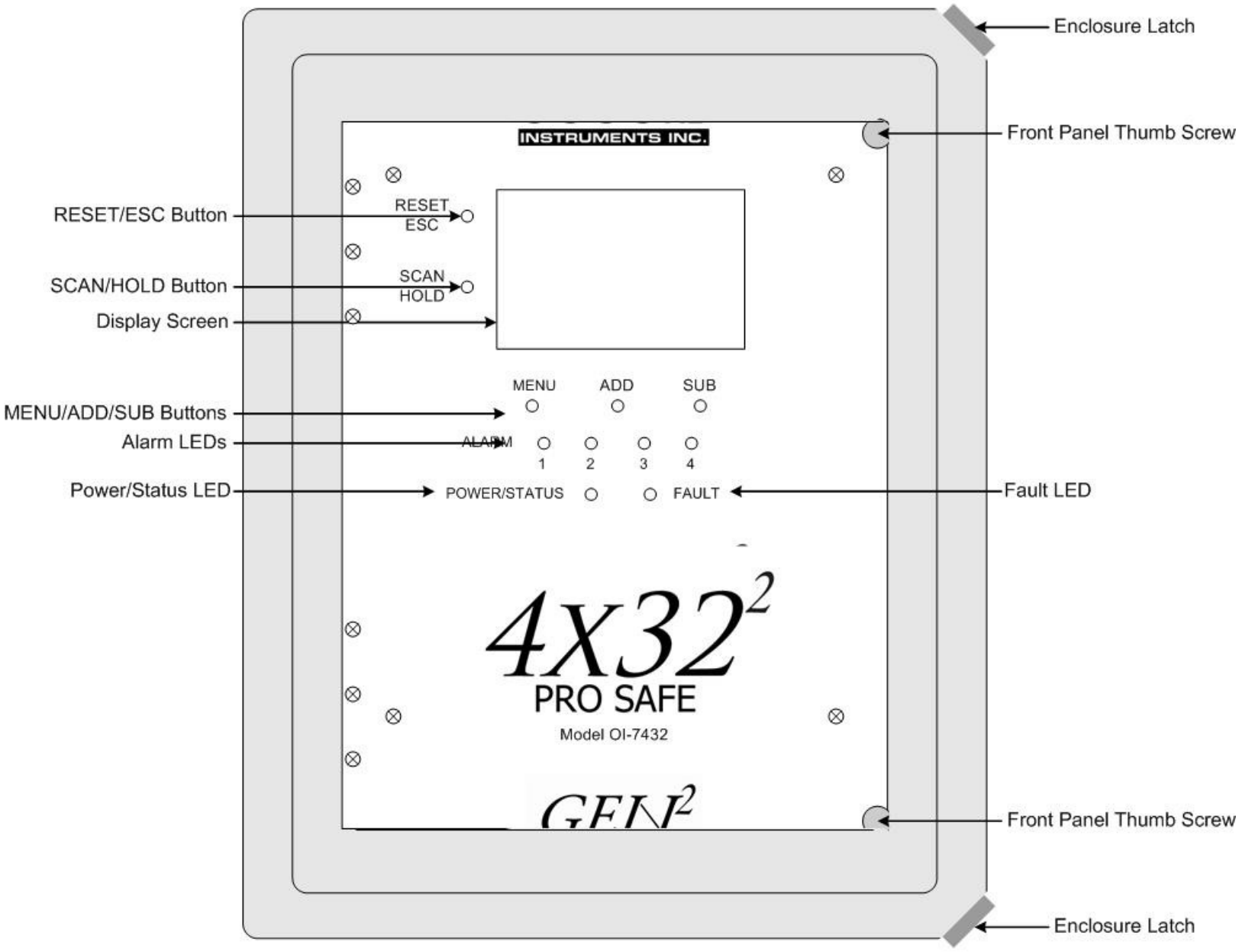
This document is an Operation Manual containing diagrams and step-by-step instruction for proper operation of the Otis Instruments, Inc. GenII *ProSafe* 4x32^2 OI-7432. This document should be read before initial operation of the product.

Should a question arise during the use of the product, this document will serve as a first reference for consultation. If further questions arise, or if the device is not working properly, please contact the sales representative of this product.

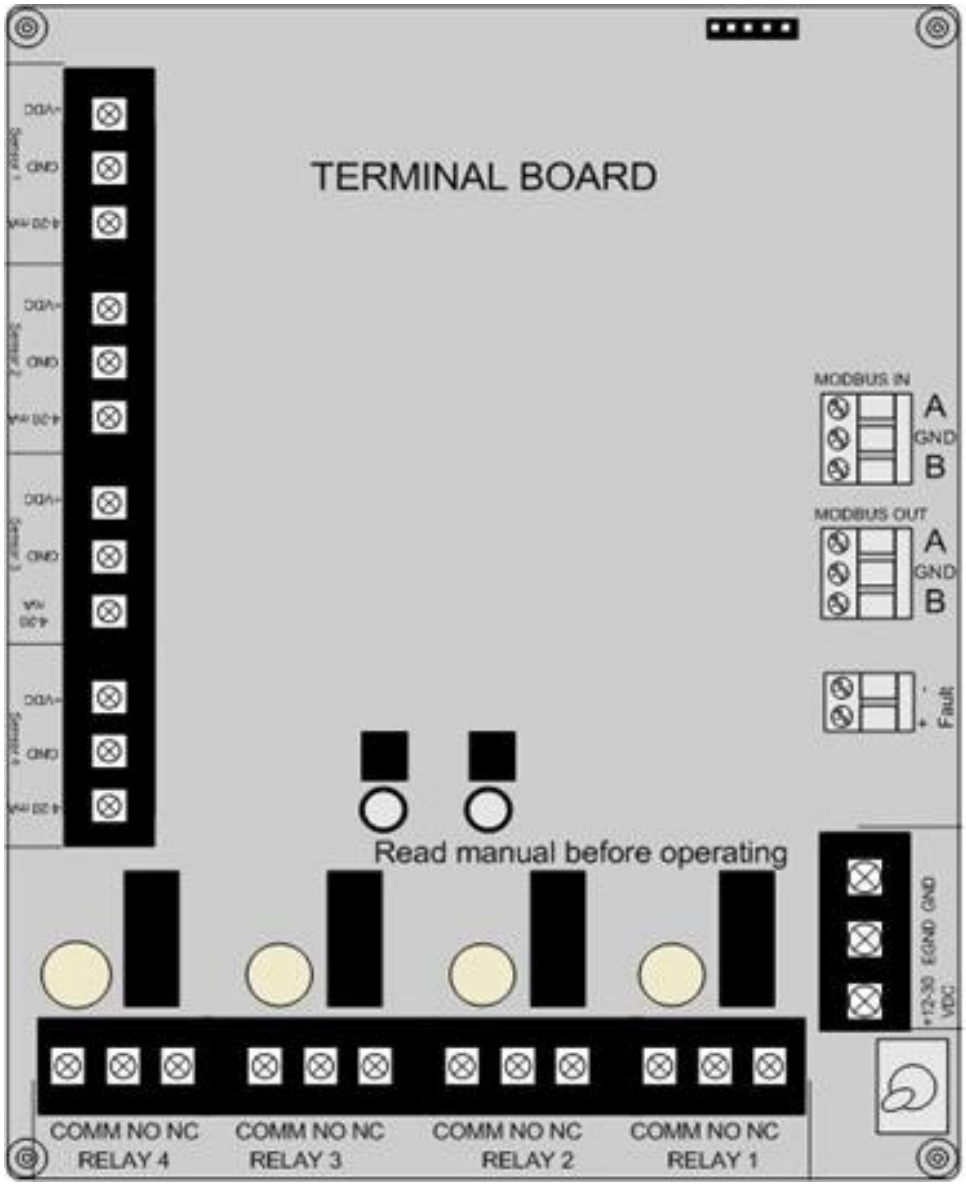
Complete System Diagrams

The following diagrams should be consulted for identification of Panels, Boards, and any other system part that may be referred to in this Operation Manual.

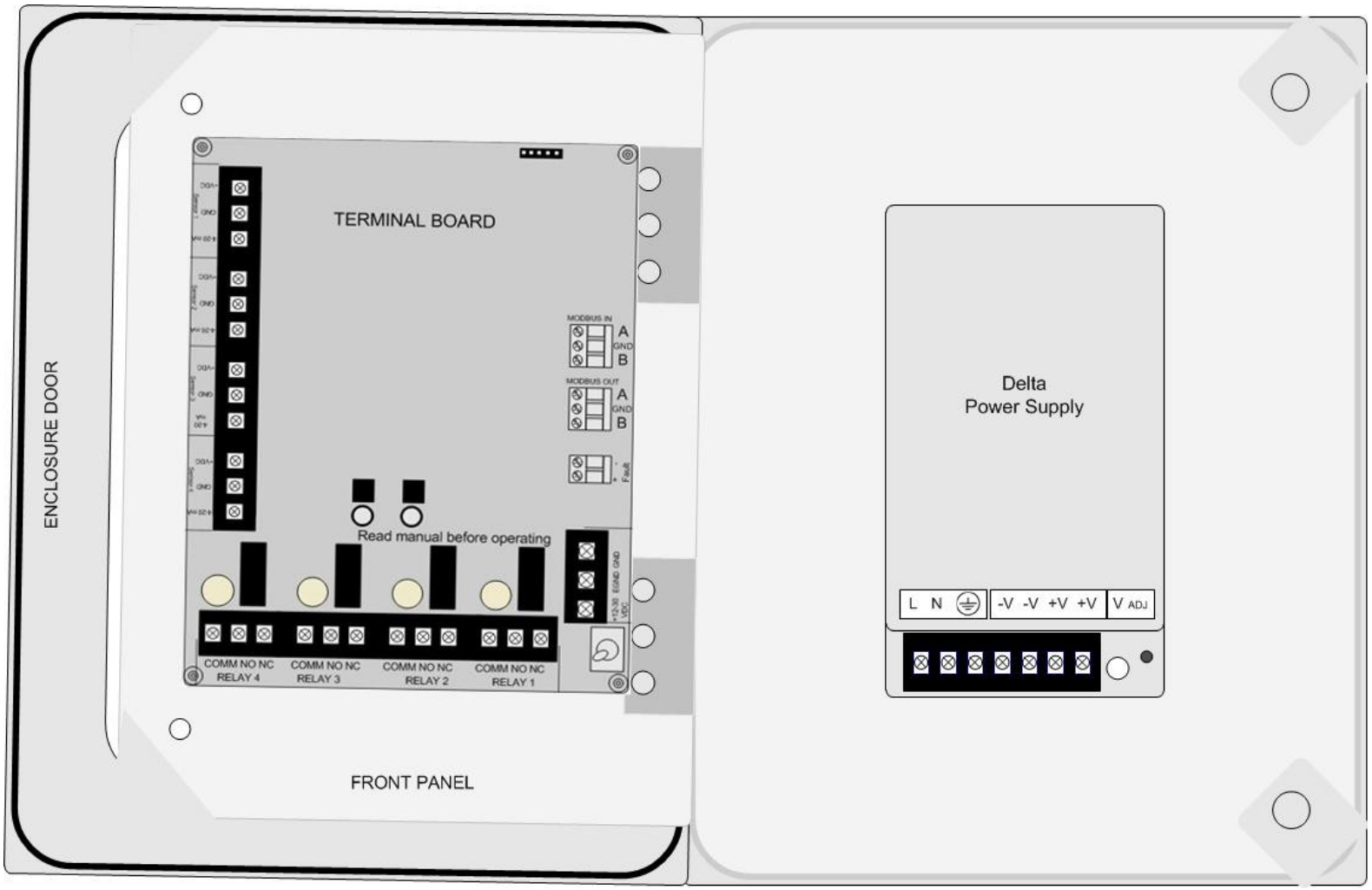
Front Panel



Terminal Board



Internal Diagram



Wiring Configurations

The following Wiring Configurations must be completed before initial operation of the product.

CAUTION: THE INTERNAL COMPONENTS CAN BE STATIC SENSITIVE. USE CAUTION WHEN OPENING THE ENCLOSURE AND HANDLING INTERNAL COMPONENTS.

DC Power-in (12-35 Volts DC)

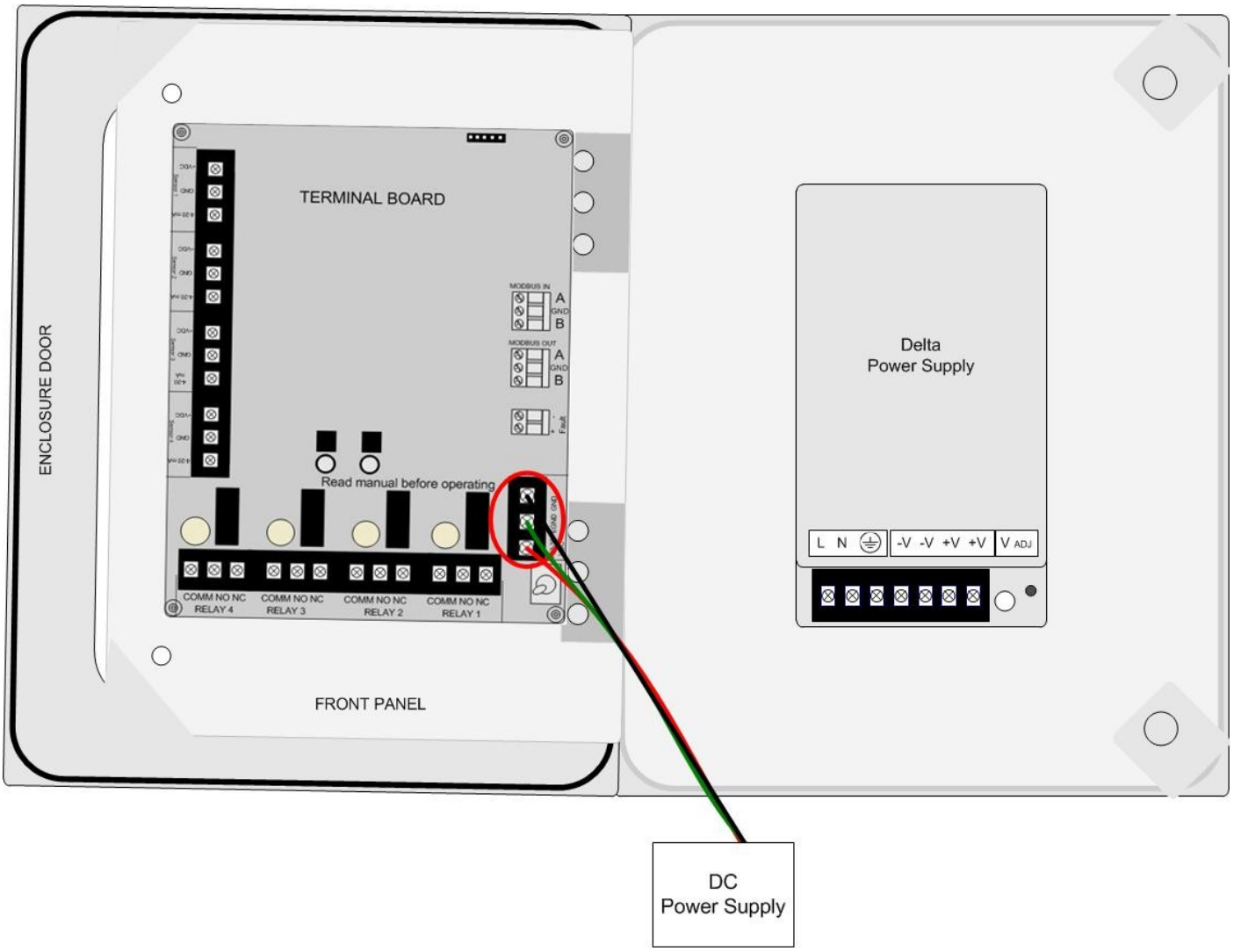
NOTE: The unit will be wired for the power-type that is requested by the purchaser when shipped from Otis Instruments, Inc.

- Provide a clean and stable 12-35 Volts DC voltage. Failure to to do so may cause the unit (and any wired sensors that are connected to the unit) to not operate properly.
- Voltage spikes higher than 35 Volts may damage the unit.
- Solar Panel power (with battery backup): This options may be used to power the unit, however, care must be taken to ensure the proper voltage and wattage is used.

NOTE: The size that the solar panel should be (10, 30, 50, or 100 watts, for example) depends on several factors, including: geographical area, line-of-sight access to the sun, number of wired sensors connected, and weather conditions.

Please consult a solar panel manufacture for specific details. Otis Instruments may also be contacted to provide guidance and recommendations.

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb screws on the Front Panel.
3. Open the Front Panel so that the Terminal Board is exposed (reverse of Front Panel).
4. Locate the Power Terminal (on the lower right side of the Back Panel) and connect the DC-live wire (red) to the terminal marked “+12-35 VDC”.
5. Connect the DC-ground wire (black) to the terminal marked “GND”.
6. If desired, connect an Earth Ground wire (green) to the terminal marked “EGND” (required for surge suppression).



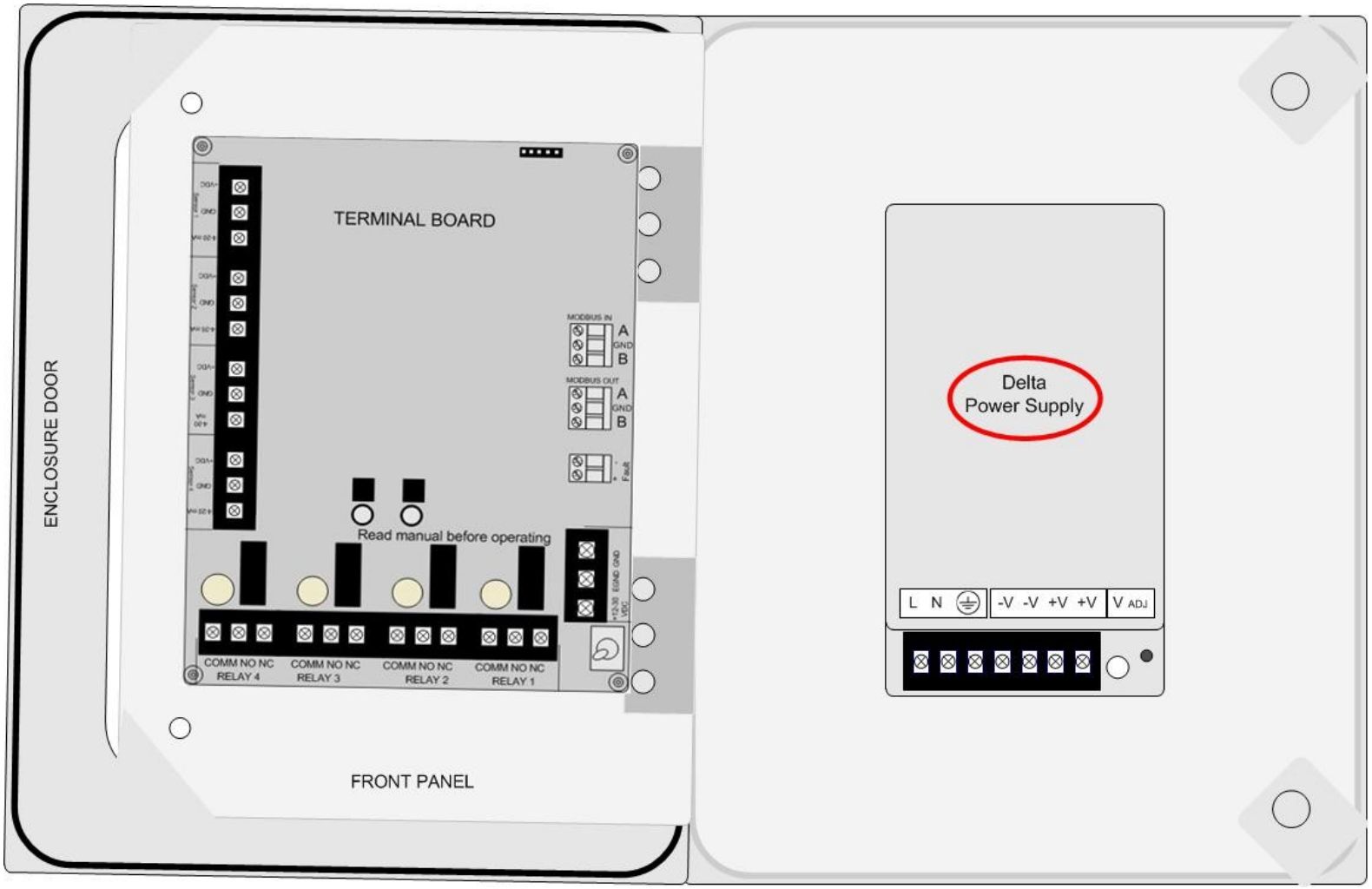
7. Close the Front Panel.
8. Screw in the thumb-screws.
9. Close the enclosure box.
10. Clamp down the enclosure latches.

AC Power Supply Connection

For AC Power applications, the Delta Power Supply (located inside the enclosure box) should be used.

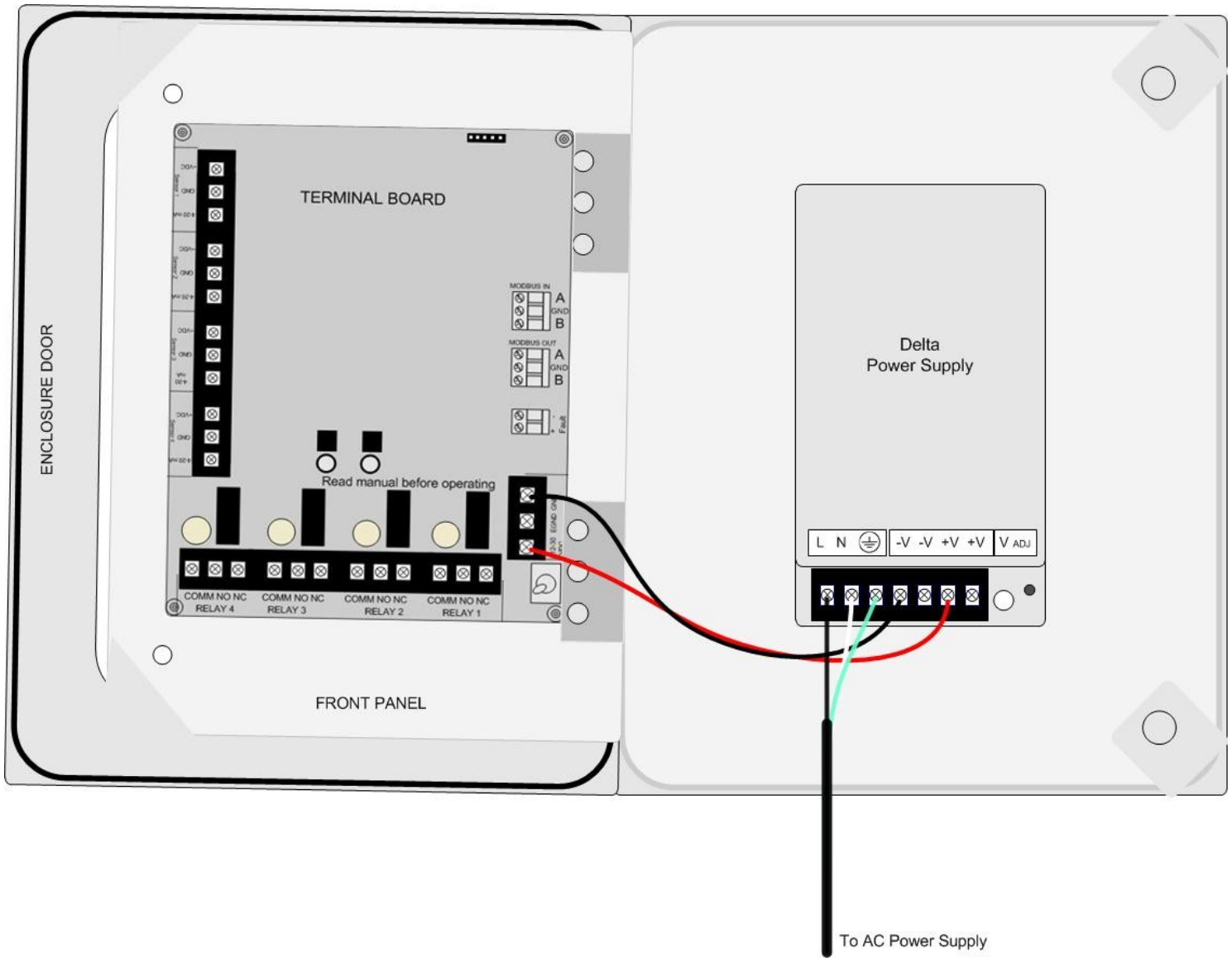
NOTE: The unit will be wired for the power-type that is requested by the purchaser when shipped from Otis Instruments, Inc.

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb-screws on the Front Panel.
3. Open the Front Panel so that the AC (Delta) Power Supply is exposed.



4. Connect a positive (red) wire to the Power Terminal terminal labeled “+12-35 VDC” on the Terminal Board.
5. Connect the other end of that same positive (red) wire from the Terminal Board to the terminal labeled “+V” on the Delta power supply.

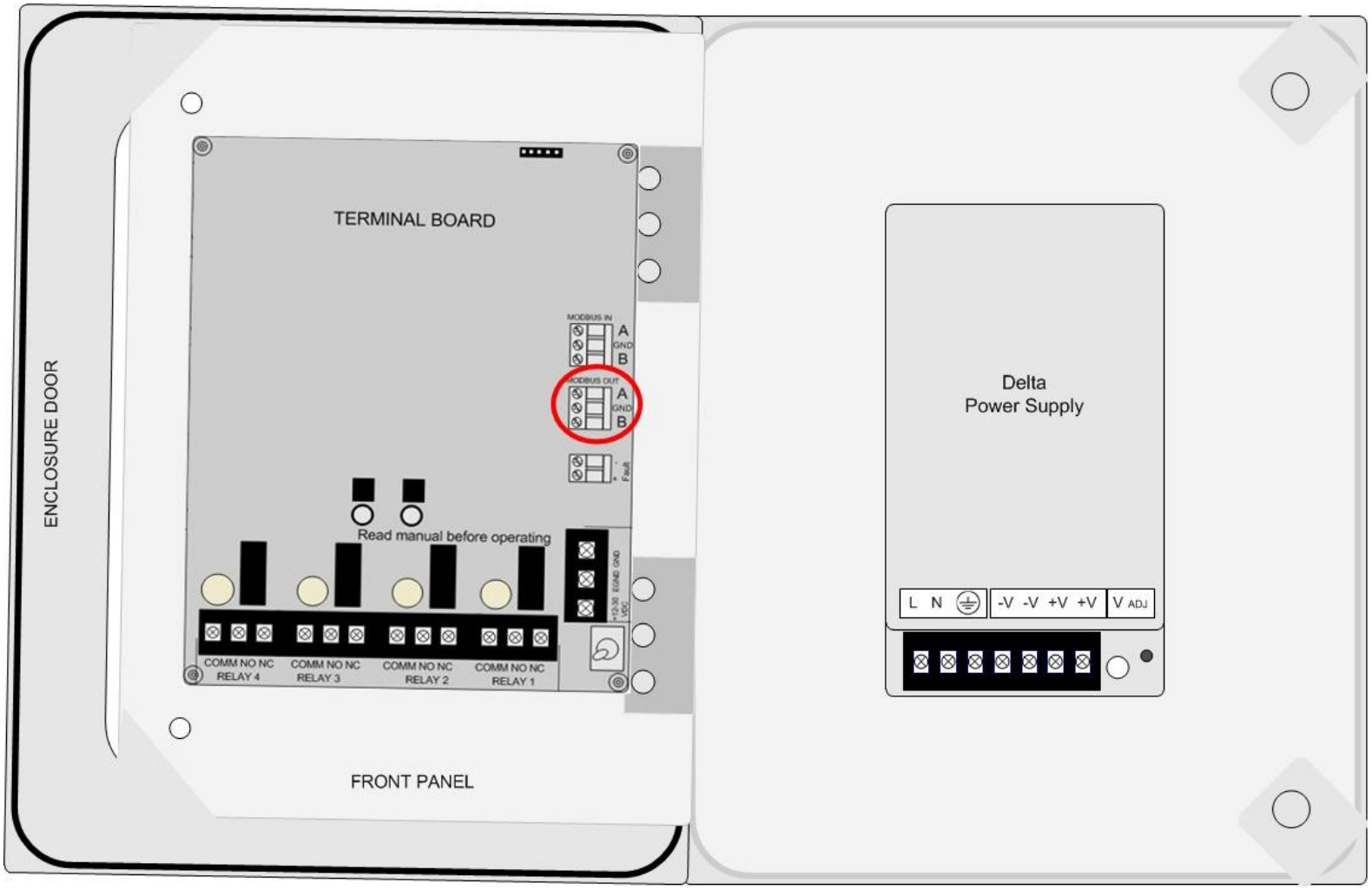
6. Connect a negative (black) wire from the Power Terminal terminal labeled “GND” on the Terminal Board.
7. Connect the other end of that same negative (black) wire from the Terminal Board to the terminal labeled “-V” on the Delta power supply.
8. There will be three wires (black, white and green) pre-wired from the Delta power supply terminals “L” (AC Load IN), “N” (AC Neutral IN), and “EG” (Chassis GND or Earth GND). This set of wires will be used to plug into an AC power outlet ONCE ALL WIRING CONFIGURATIONS ARE COMPLETE.



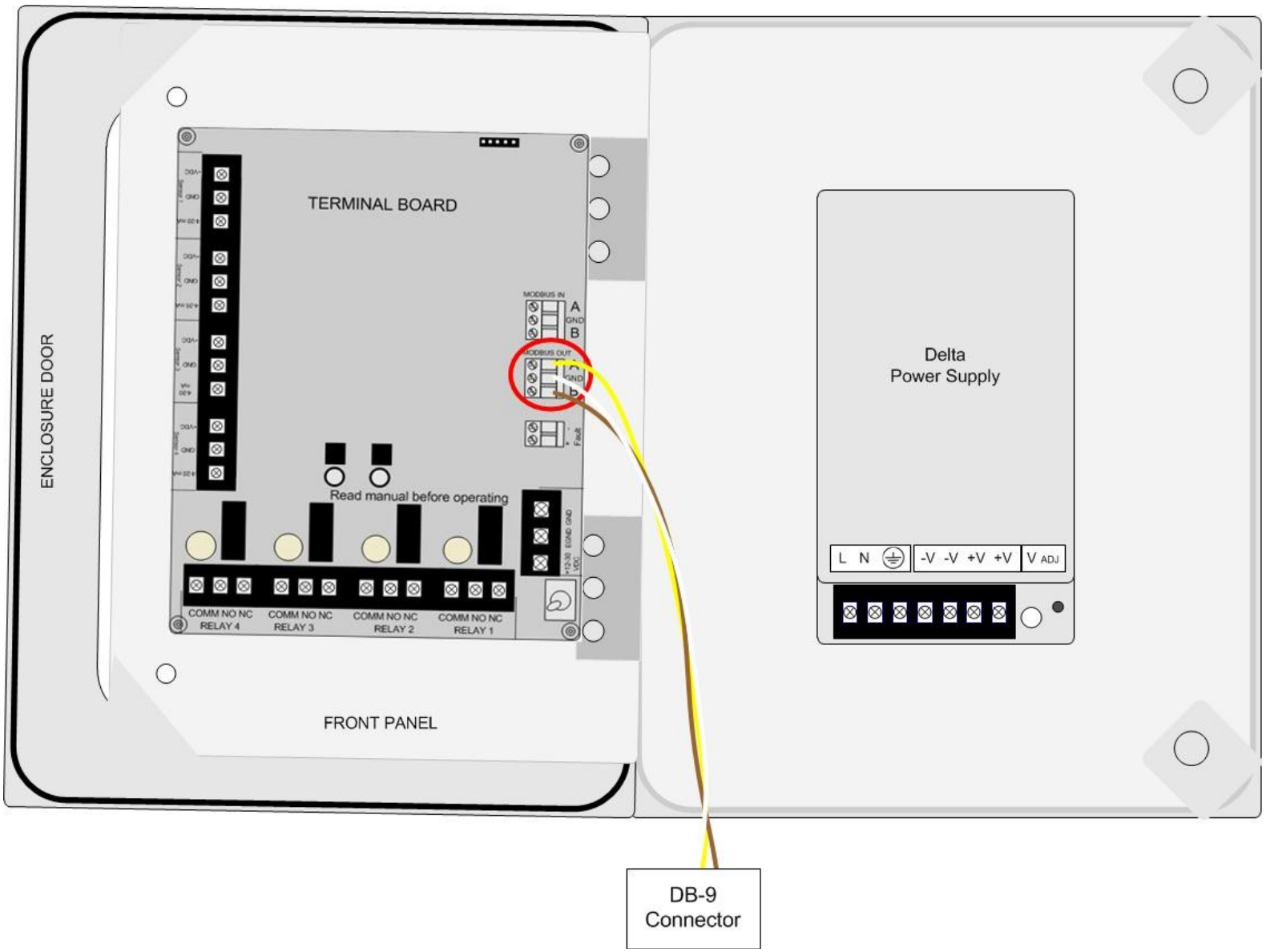
9. Close the Front Panel.
10. Screw in the thumb-screws.
11. Close the enclosure box.
12. Clamp down the enclosure latches.

RS-485 Modbus Connection (Modbus Out)

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb-screws on the Front Panel.
3. Open the Front Panel so that the back of the Terminal Board is exposed.
4. Locate the Modbus Out Terminal Block.



5. Connect the yellow wire from a DB-9 connector (or the connector-type that best suits your application) to the terminal labeled “A” on the Modbus Out Terminal Block.
6. Connect the white wire from a DB-9 connector to the terminal labeled “GND” on the Modbus Out Terminal Block.
7. Connect the brown wire from a DB-9 connector to the terminal labeled “B” on the Modbus Out Terminal Block.
8. Plug the DB-9 connector into a PLC.

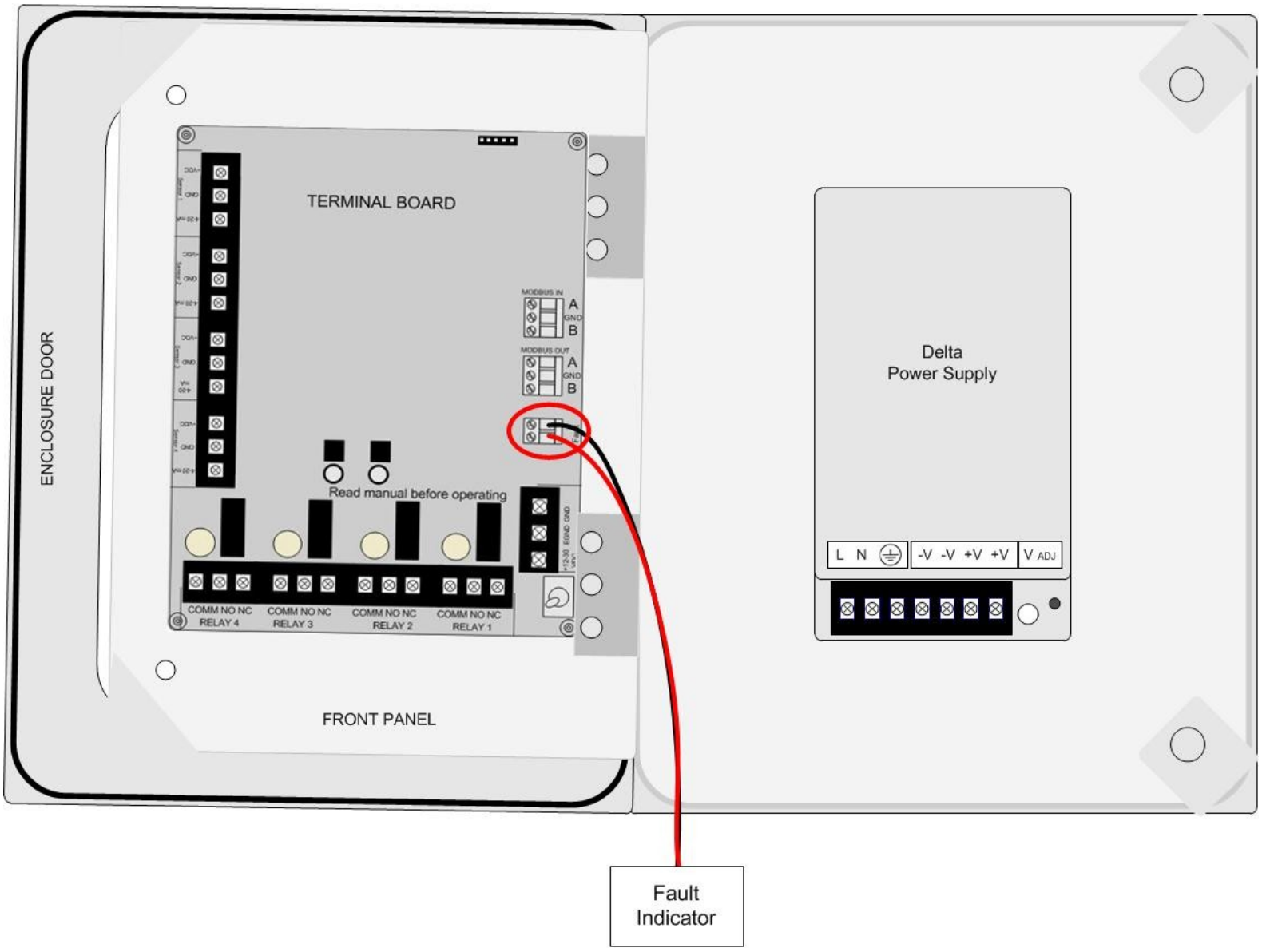


9. Close the Front Panel.
10. Screw in the thumb-screws.
11. Close the enclosure box.
12. Clamp down the enclosure latches.

Fault Indicator Connection

The Fault terminal provides an output to power some form of Fault indicator. The Fault terminal uses the same supply voltage that is fed into the board, and is a DC only output.

1. Locate the Fault Terminal Block on the terminal board.
2. Connect a positive (red) wire to the terminal labeled “+”.
3. Connect a negative (black) wire to the terminal labeled “-”.

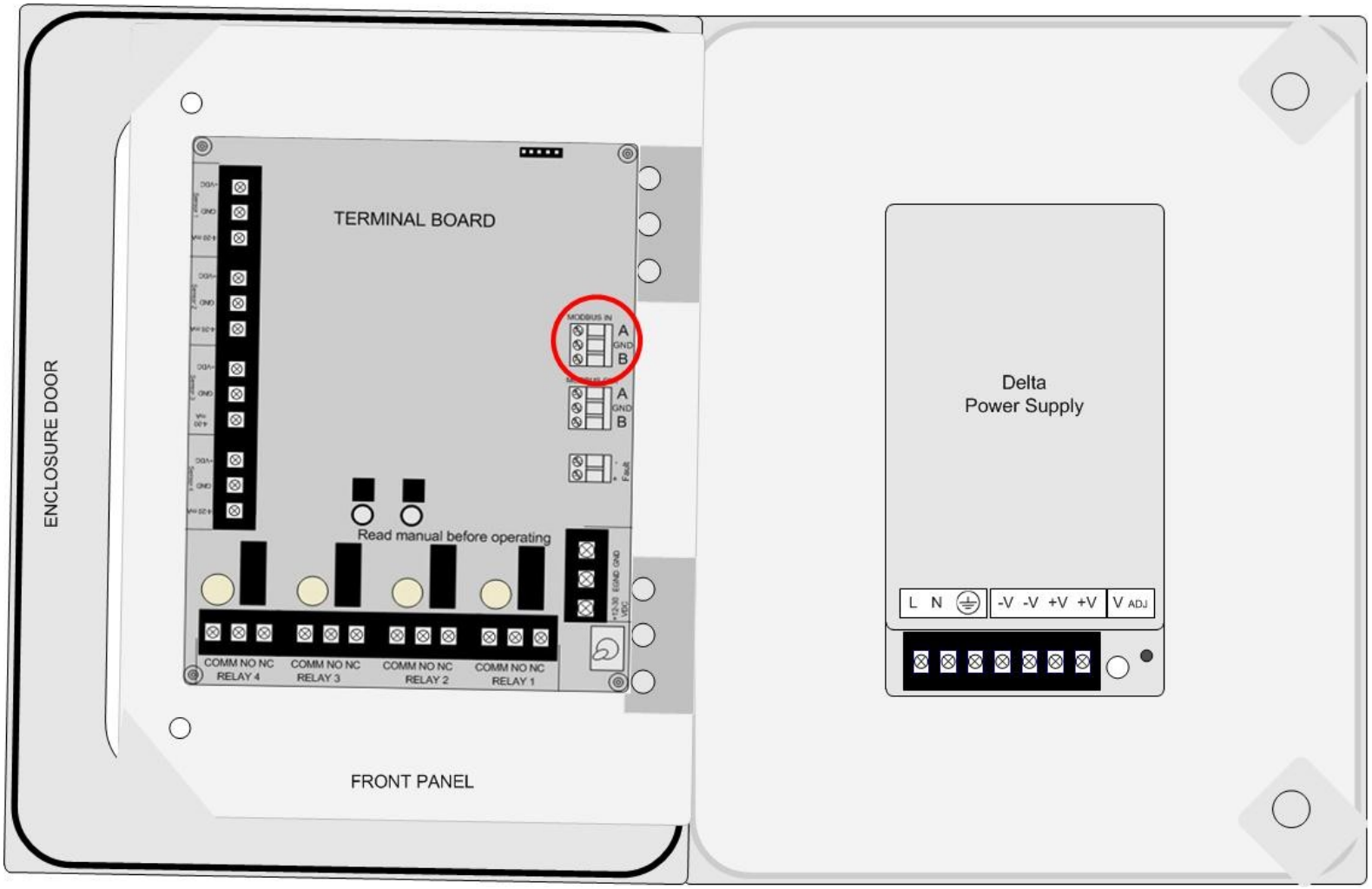


Connecting Sensors

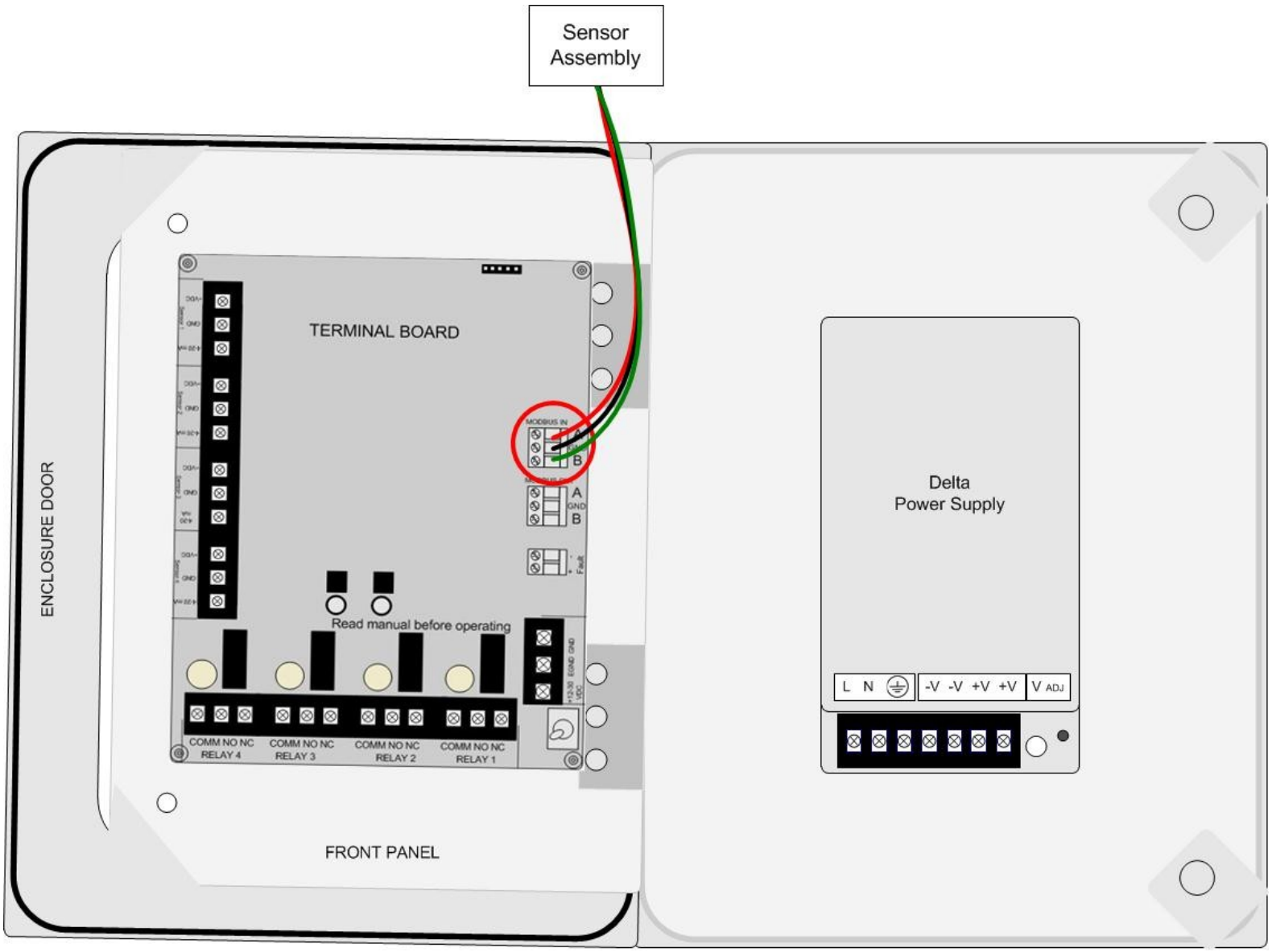
The OI-7432 allows up to 32 Modbus sensor assemblies to be monitored. Proper wiring for Modbus sensor assemblies requires that one sensor assembly be wired to the Modbus In terminal, and then all consecutive sensor assemblies be daisy-chain wired to one another.

NOTE: Sensors must be wired using the Modbus In Terminal Block. Sensor 1-4 Terminal Blocks are not used on the OI-7432.

1. Locate the Modbus In Terminal Block on the terminal board.



2. Connect a red wire from the sensor assembly to the terminal labeled “A”.
3. Connect a ground (black) wire from the sensor assembly to the terminal labeled “GND”.
4. Connect a green wire from the sensor assembly to the terminal labeled “B”.



Using Modbus Sensors with Otis Instruments, Inc. Monitors

NOTE: For additional Modbus information, see Appendix B.

Certain monitors sold by Otis Instruments, Inc. have the capability of accepting Modbus sensor inputs. Modbus is a communication protocol that uses an RS-485 serial connection, and can accept a number of different devices.

Based on the type of circuit used, there is a limit on how many devices can be connected to a Modbus sensor network. Currently at Otis Instruments, there is a limit of 32 devices on a single network. The data is transferred along the Modbus network at a specified rate, which means that there will be a small delay proportional to the number of connections.

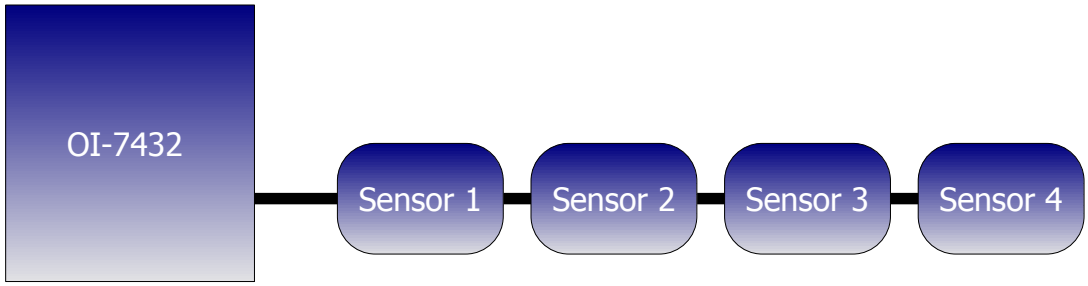
Proper Connection

The physical length of a Modbus connection from the monitor to the last sensor cannot exceed 4000 feet. Twisted pair is required for connections, and shielded twisted pair is recommended if there will be any additional noise in the area of operation (such as motors, switching relays, etc.). Also, with distances greater than 100ft, 18-20 gauge wire is recommended, where 22-24 gauge wire will be sufficient for short distances.

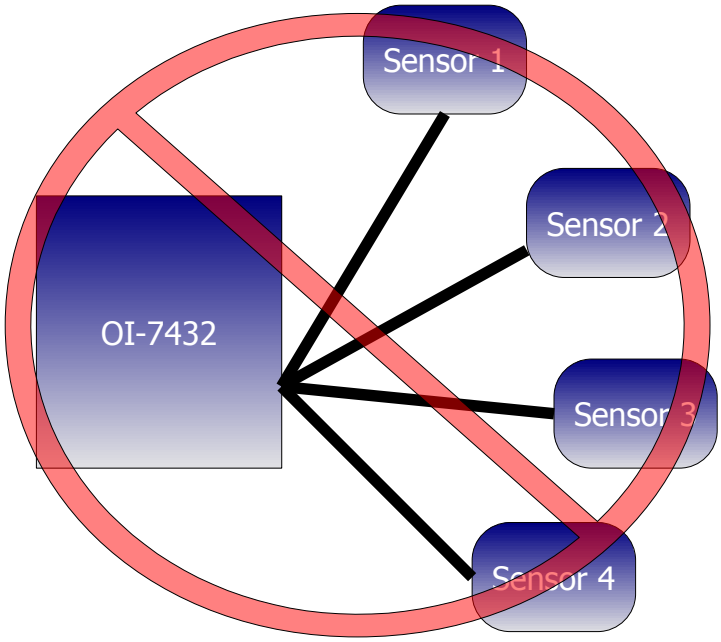
The proper way to connect a Modbus network is to "daisy-chain" the devices. This means that the signal of each sensor is run to the signal of the following sensor and so on. Each sensor is connected to the previous sensor via the signal wire, therefore the first sensor is connected directly to the monitor.

Terminating resistors should also be taken into consideration for long distances, while short and medium lengths can function normally without the resistor. Short lengths are generally less than 100ft, medium lengths range from 100-1000ft, and long lengths can be considered any distance greater than 1000ft. In the daisy-chained network, if the terminating resistor is required it should be placed at the last device in the chain.

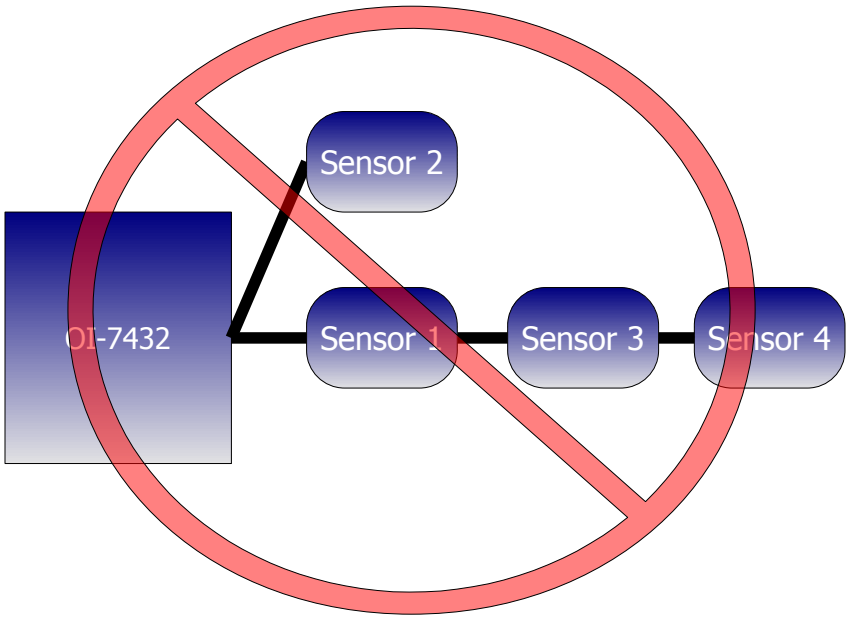
Consult the following diagrams for proper (and improper) daisy-chain wiring methods.



Drawing 1: PROPER METHOD



Drawing 2: IMPROPER METHOD



Drawing 3: IMPROPER METHOD

Requirements Summary

Short Distances:
- Less than 100 ft.
- 22-24 gauge wire.
- Twisted Pairs (shielded if in area of high noise).

Medium Distances
- 101 – 1000ft.
- 18-20 gauge wire.
- Twisted Pairs (shielded if in area of high noise).

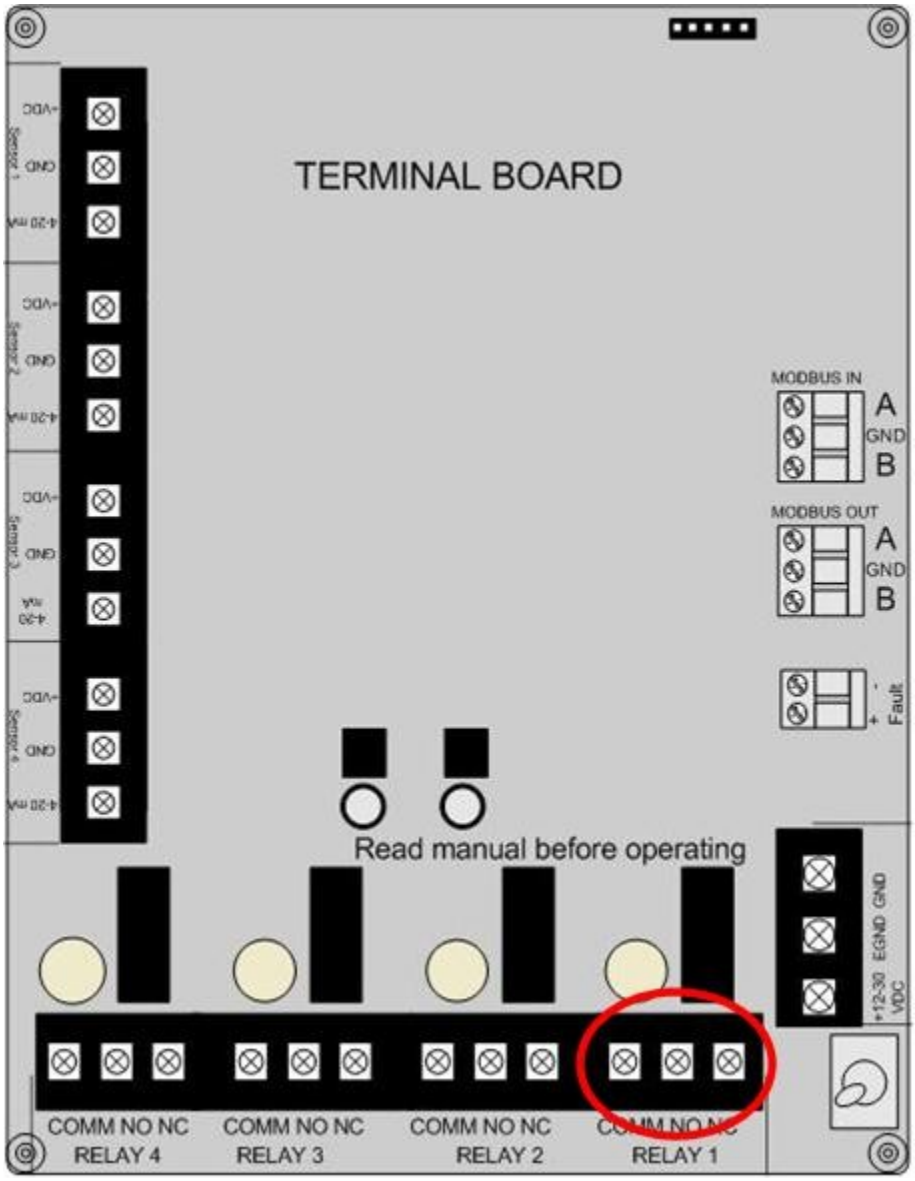
Long Distances
- 1001 – 4000ft.
- 18-20 gauge wire.
- Twisted Pairs (shielded if in area of high noise).
- Terminating resistors may be required (on last device in chain).

Relay Configurations

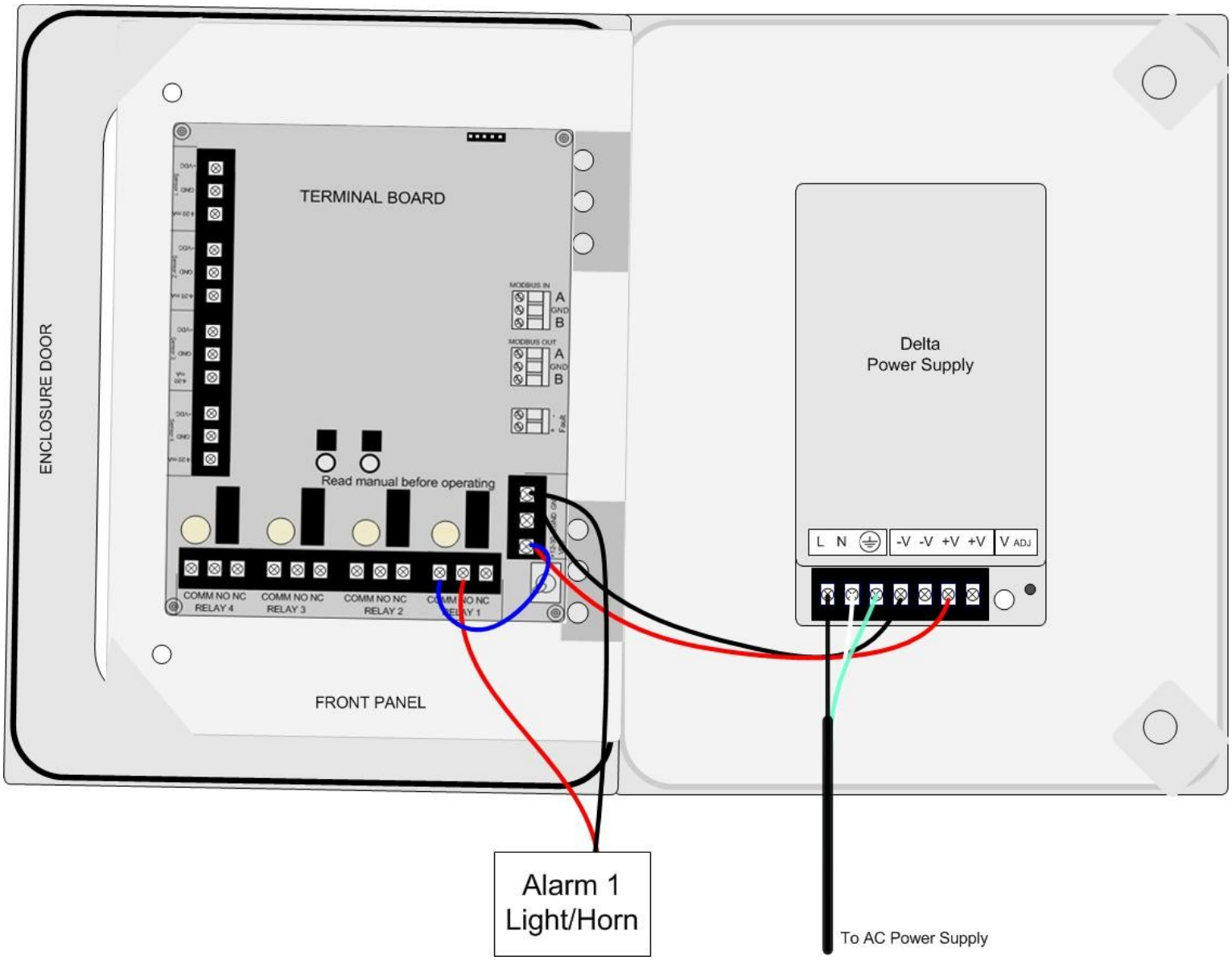
The OI-7432 offers four relays to be setup. Each of the four relays may be setup as Normally Open (NO) or Normally Closed (NC).

Connecting Relay 1

1. Locate the Relay 1 Terminal Block on the Terminal Board.

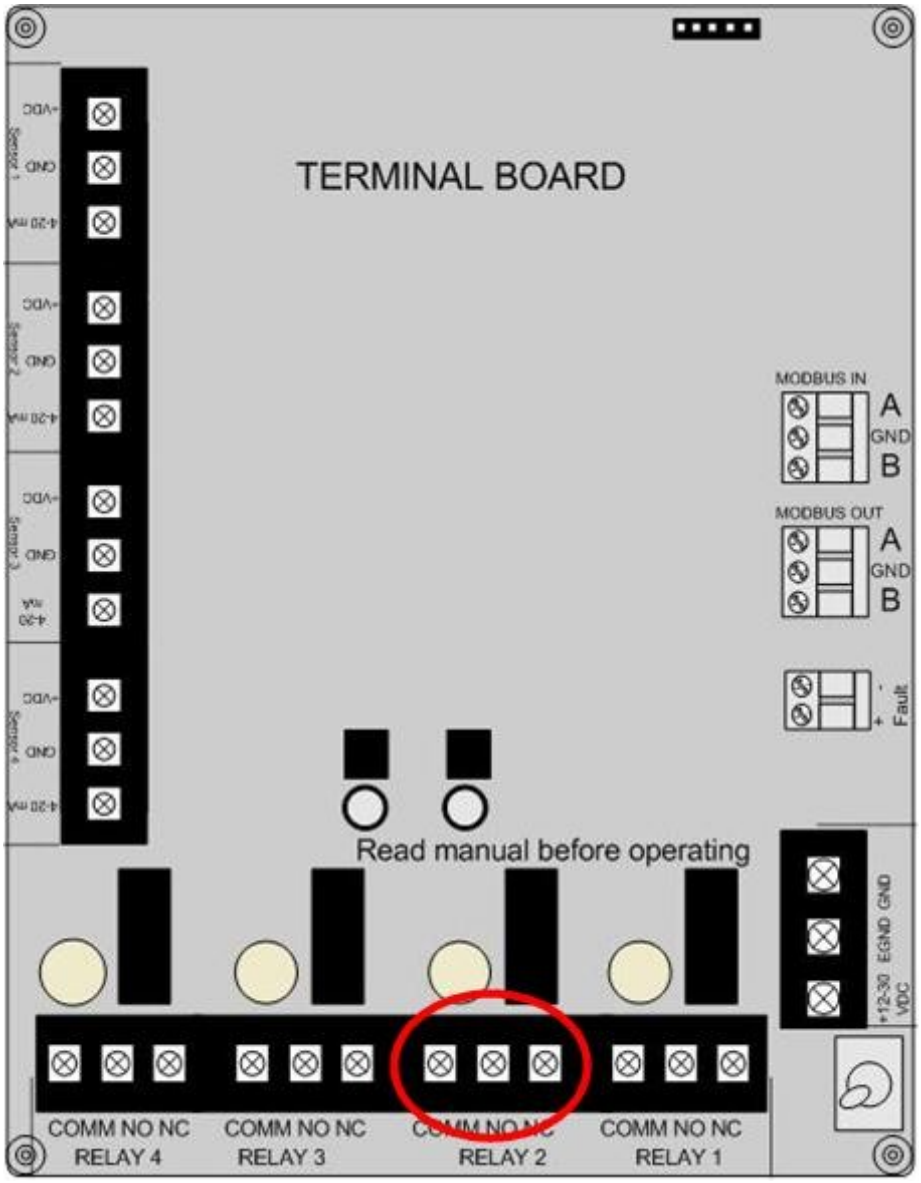


2. Connect the live wire (red) from the Relay 1 Alarm (light/horn) to the terminal labeled “NO” (or “NC”) on the Relay 1 Terminal Block.
3. Connect the neutral wire (black) from the Relay 1 Alarm (light/horn) to the terminal labeled “GND” on the DC Power Supply Terminal Block.
4. Connect the jumper wire (blue) from the terminal labeled “+12-35 VDC” on the DC Power Supply Terminal Block to the terminal labeled “COM” on the Relay 1 Terminal Block.

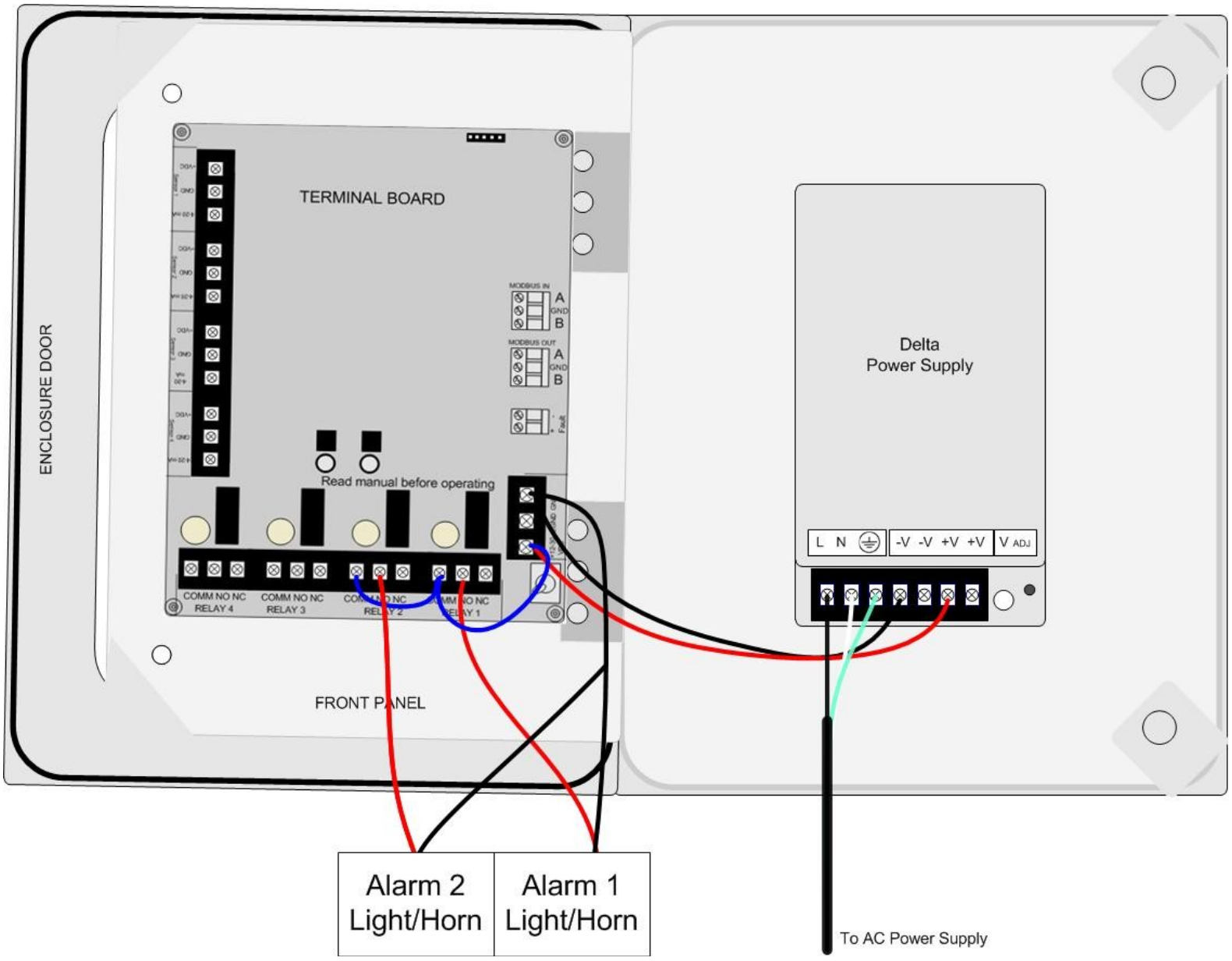


Connecting Relay 2

1. Locate the Relay 2 Terminal Block on the Terminal Board.

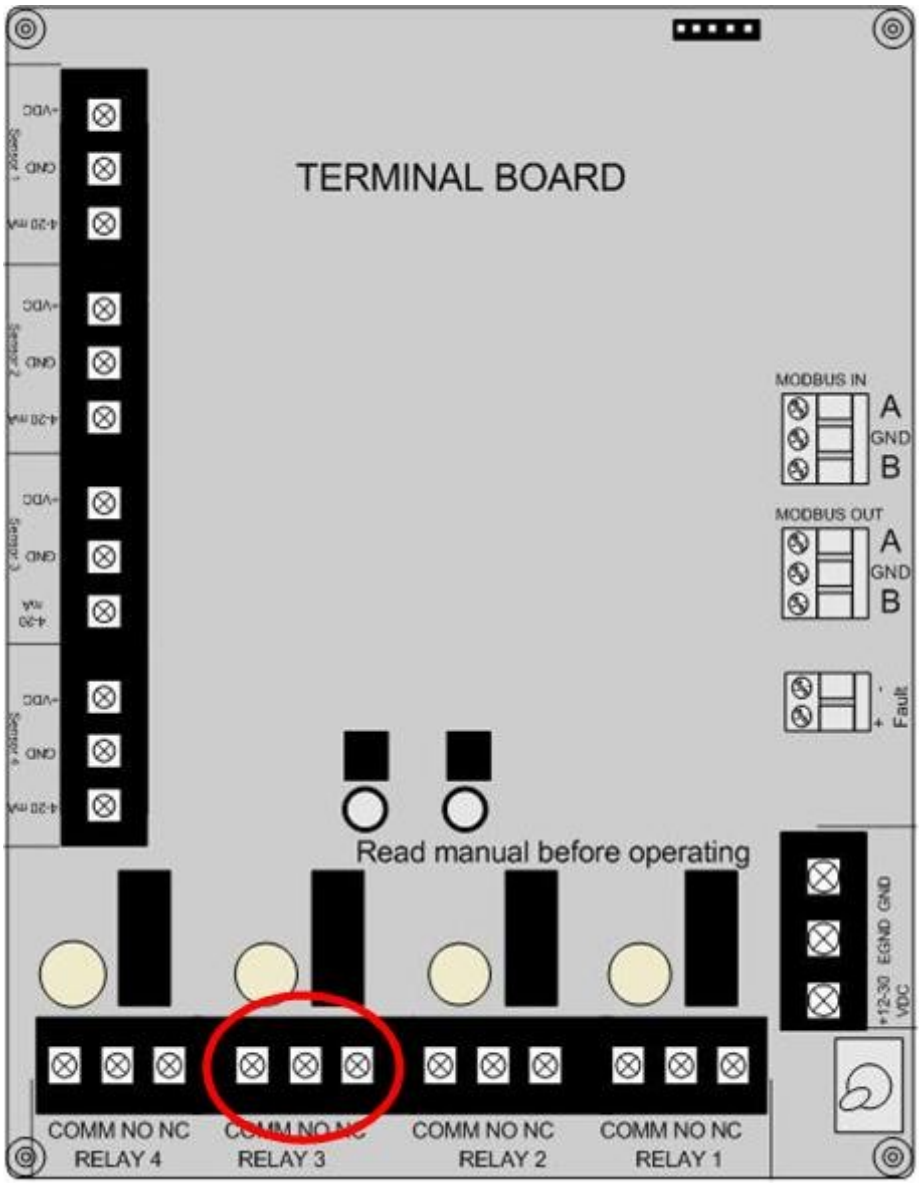


2. Connect the live wire (red) from the Relay 2 Alarm (light/horn) to the terminal labeled “NO” (or “NC”) on the Relay 2 Terminal Block.
3. Connect the neutral wire (black) from the Relay 2 Alarm (light/horn) to the terminal labeled “GND” on the DC Power Supply Terminal Block.
4. Connect a jumper wire (blue) from the terminal labeled “COM” on the Relay 1 terminal block to the terminal labeled “COM” on the Relay 2 terminal block.

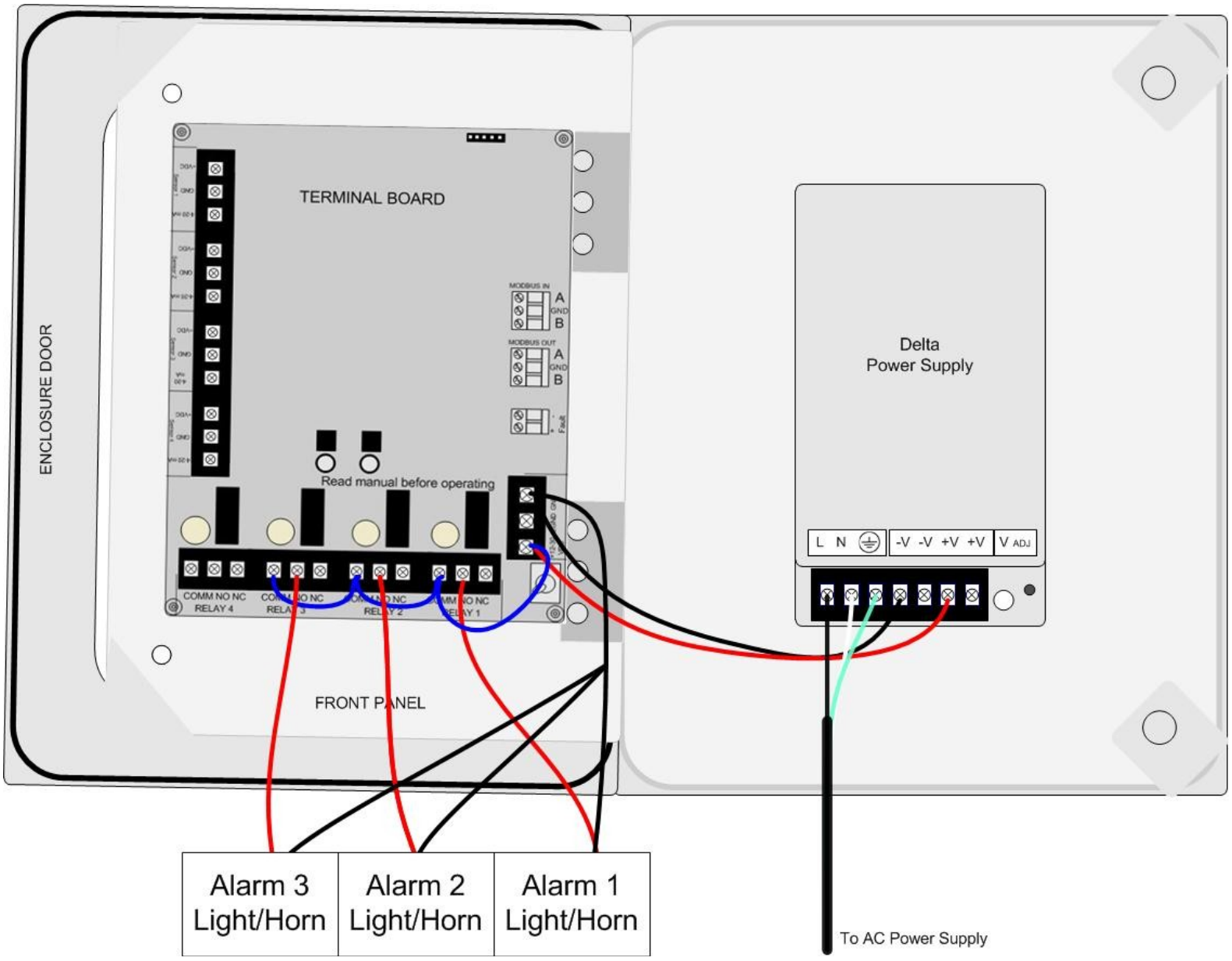


Connecting Relay 3

1. Locate the Relay 3 Terminal Block on the Terminal Board.

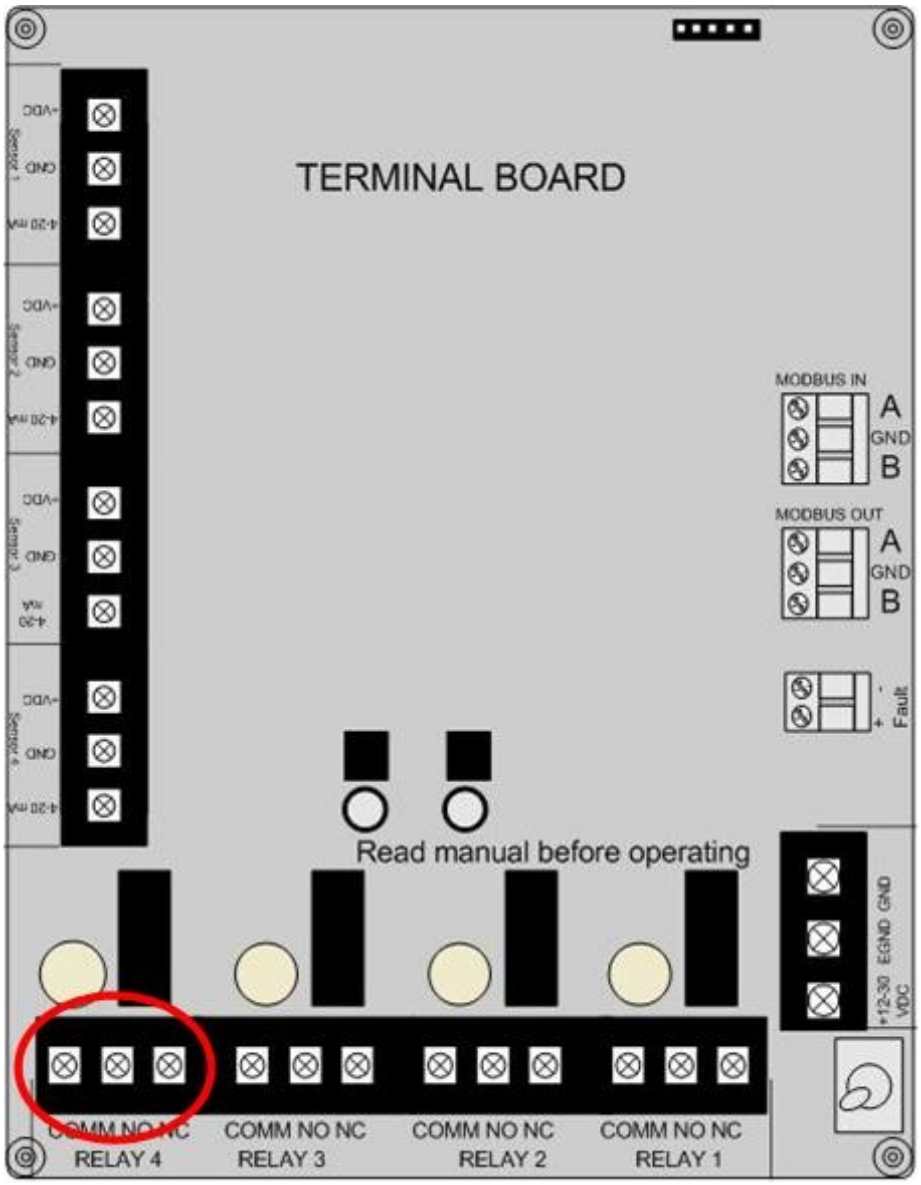


2. Connect the live wire (red) from the Relay 3 Alarm (light/horn) to the terminal labeled “NO” (or “NC”) on the Relay 3 Terminal Block.
3. Connect the neutral wire (black) from the Relay 3 Alarm (light/horn) to the terminal labeled “GND” on the DC Power Supply Terminal Block.
4. Connect a jumper wire (blue) from the terminal labeled “COM” on the Relay 2 terminal block to the terminal labeled “COM” on the Relay 3 terminal block.

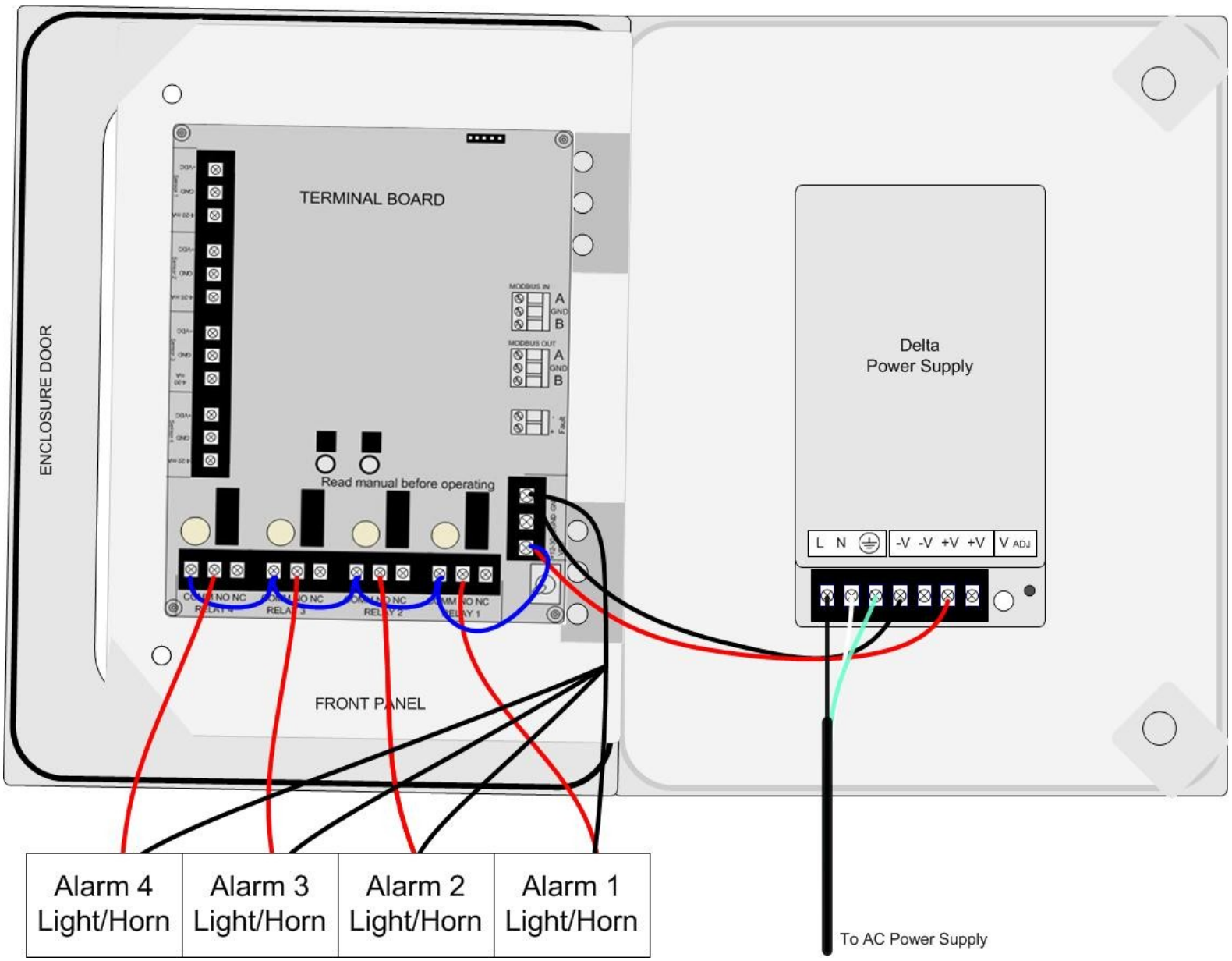


Connecting Relay 4

1. Locate the Relay 4 Terminal Block on the Terminal Board.



2. Connect the live wire (red) from the Relay 4 Alarm (light/horn) to the terminal labeled “NO” (or “NC”) on the Relay 4 Terminal Block.
3. Connect the neutral wire (black) from the Relay 4 Alarm (light/horn) to the terminal labeled “GND” on the DC Power Supply Terminal Block.
4. Connect a jumper wire (blue) from the terminal labeled “COM” on the Relay 3 terminal block to the terminal labeled “COM” on the Relay 4 terminal block.



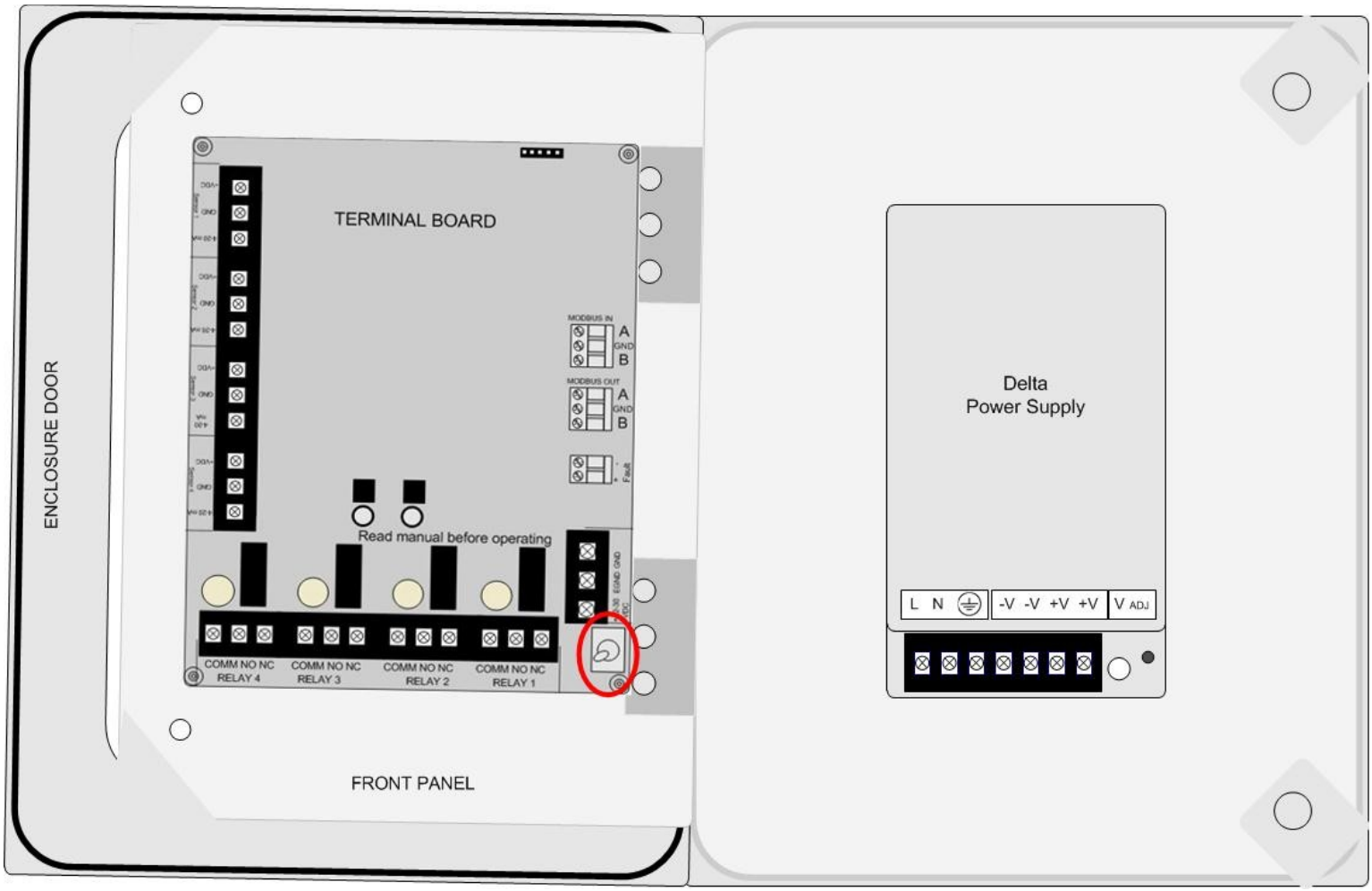
Power On/Off

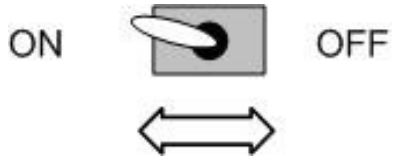
Powering on the device activates its functions. When powered on, the device is fully functional and access to system and settings menus is allowed.

CAUTION: THE INTERNAL COMPONENTS CAN BE STATIC SENSITIVE. USE CAUTION WHEN OPENING THE ENCLOSURE AND HANDLING INTERNAL COMPONENTS.

Once power is supplied to the OI-7432—by being plugged into an AC outlet or by being wired to a DC power supply—the display screen and LEDs will illuminate.

To cycle the Terminal Board power, flip the Power Switch (located on the lower right side of the Terminal Board) to the OFF (and then ON) position.





Basic Configuration Menu (Individual Channel Setup)

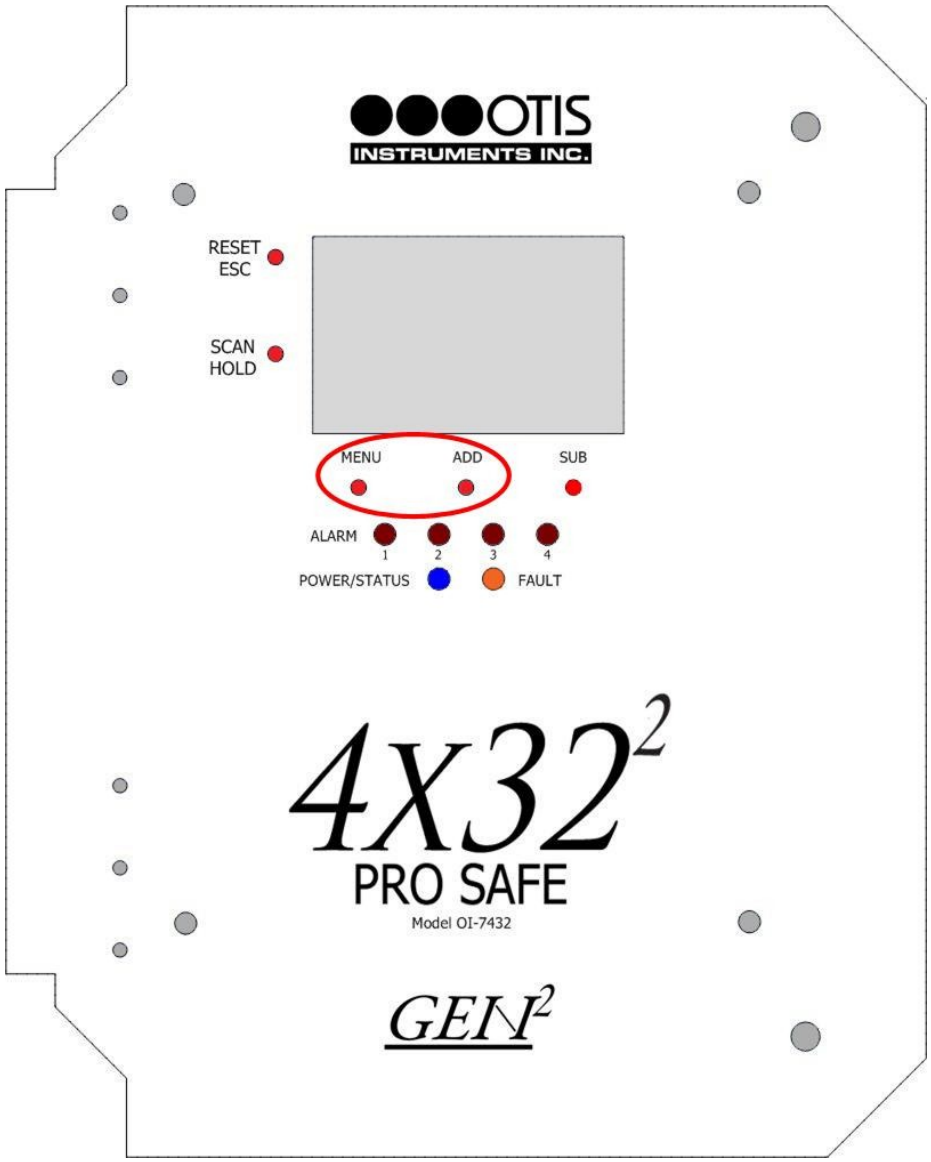
This feature is used to setup: Channel Selection, Channel On/Off, Modbus Address, Baud, and Relay Setup (On/Off, Low/High, Value, Latching/Unlatching)—for each of the channels that the device is monitoring. System Information is also viewable in Setup Mode.

NOTE: Each channel must be setup individually for each sensor.

NOTE: To Exit Channel Setup at any time, press ESC.

Entering Setup Mode

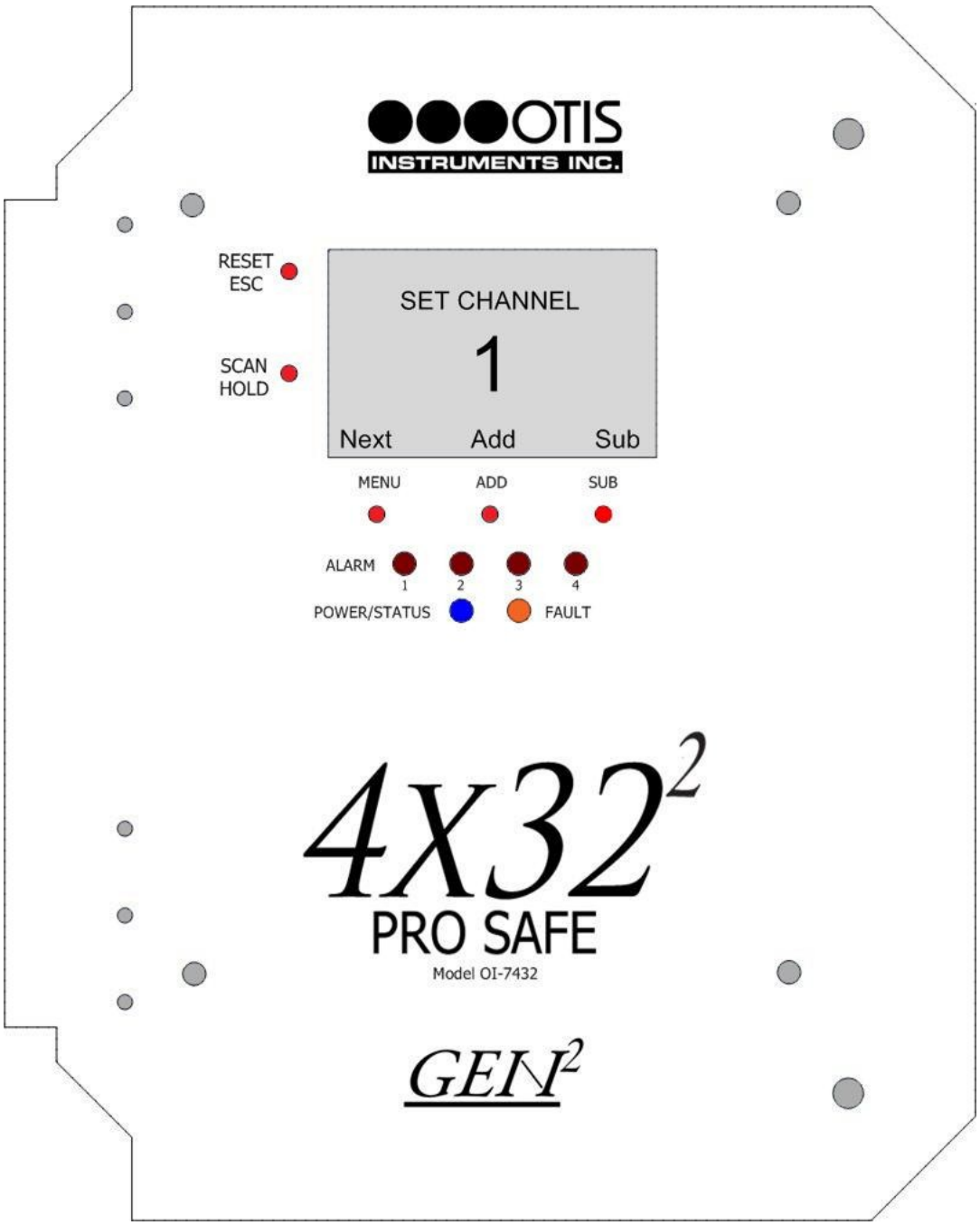
1. Open the enclosure box.
2. Press and hold *MENU* and *ADD* for 6 to 8 seconds to enter Setup Mode.



Channel Selection

1. Once in Setup Mode, press *ADD* (increase) or *SUB* (decrease) to select the desired channel to be setup (1-32).

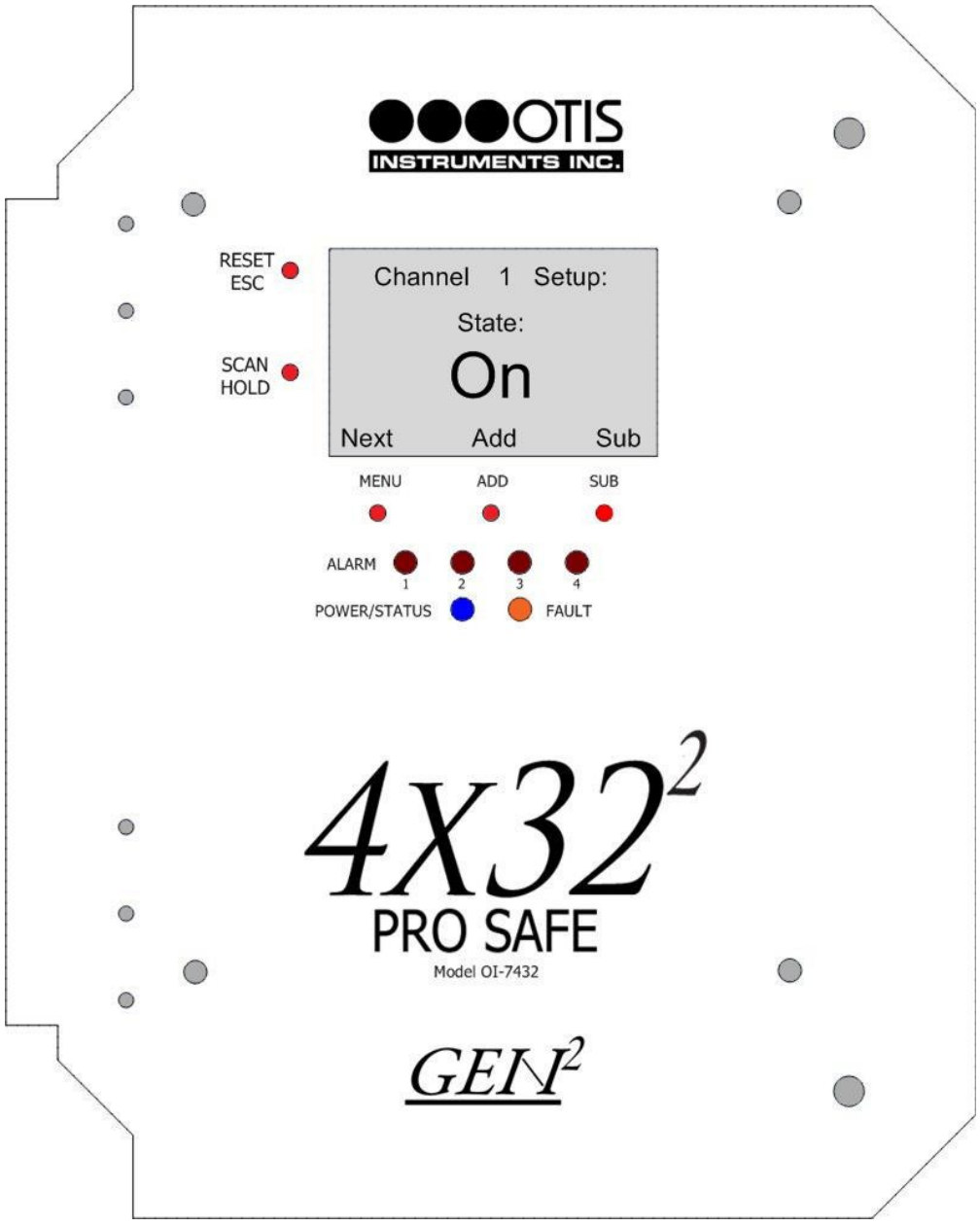
   NOTE: To view system information, press ADD (or SUB) is greater than "32" (or less than "1").



2. Once the desire channel is selected press *MENU* (Next), then proceed to the next step.

Channel On/Off

1. After the Channel Selection has been made, press *ADD* or *SUB* to change the state of the channel to On or Off.
2. Once the desired setting is selected press *MENU* (Next), then proceed to the next step.



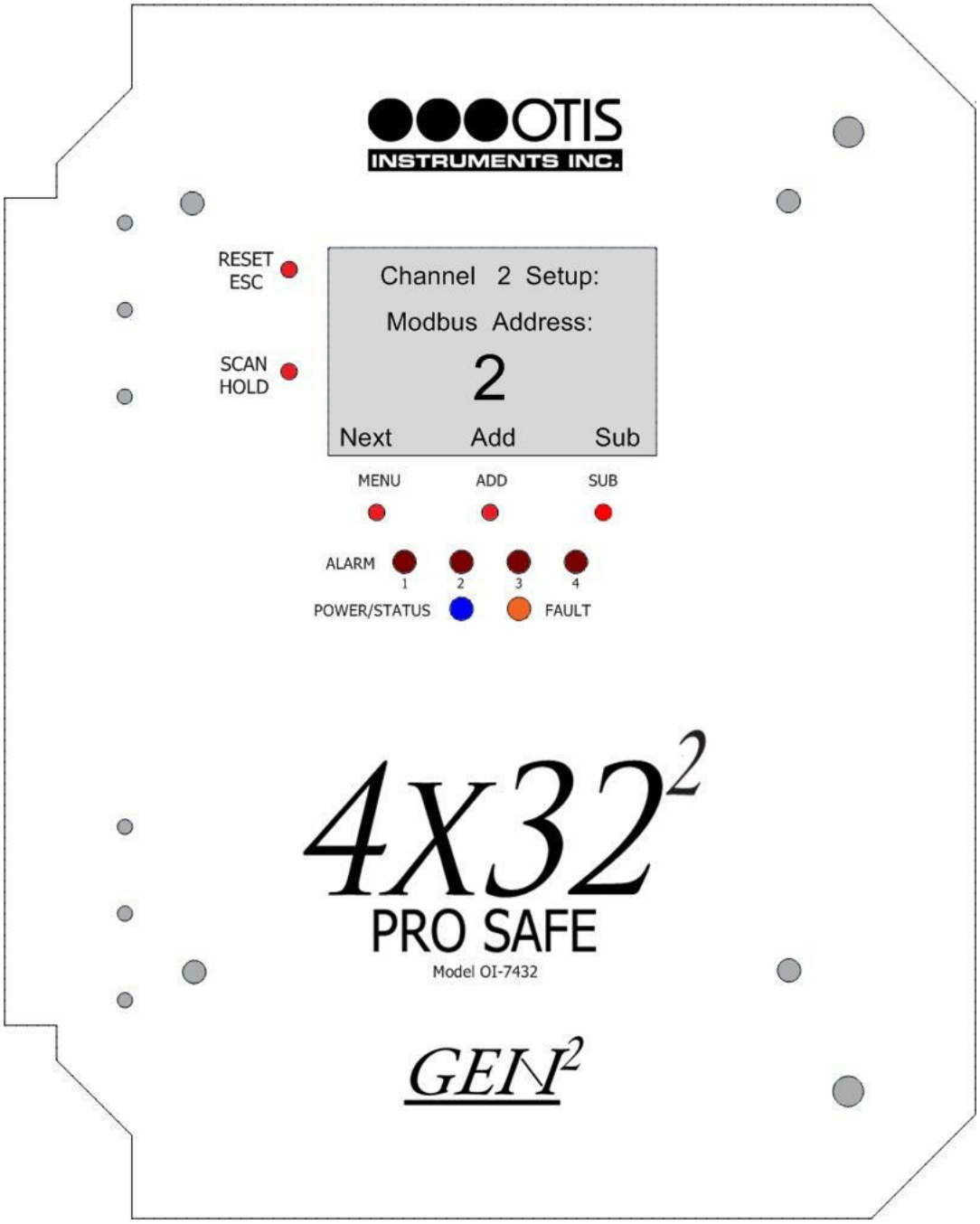
NOTE: All channels must be setup as On/Off before the information screen is available. If the channel is set to "On", additional settings will be available to set. If the channel is set to "Off", there will be no additional settings available for that channel, and pressing MENU will allow the user to move to the next channel to be set to On/Off. Once all 32 channels are set, press MENU once more to view System Information (see page 41).

Settings for Channels Designated as "On"

The following settings will be available for channels that have been set to "On".

Set Modbus Address

1. Press *ADD* (increase) or *SUB* (decrease) to manipulate the Modbus Address setting (between 1 and 247) for the channel being setup.

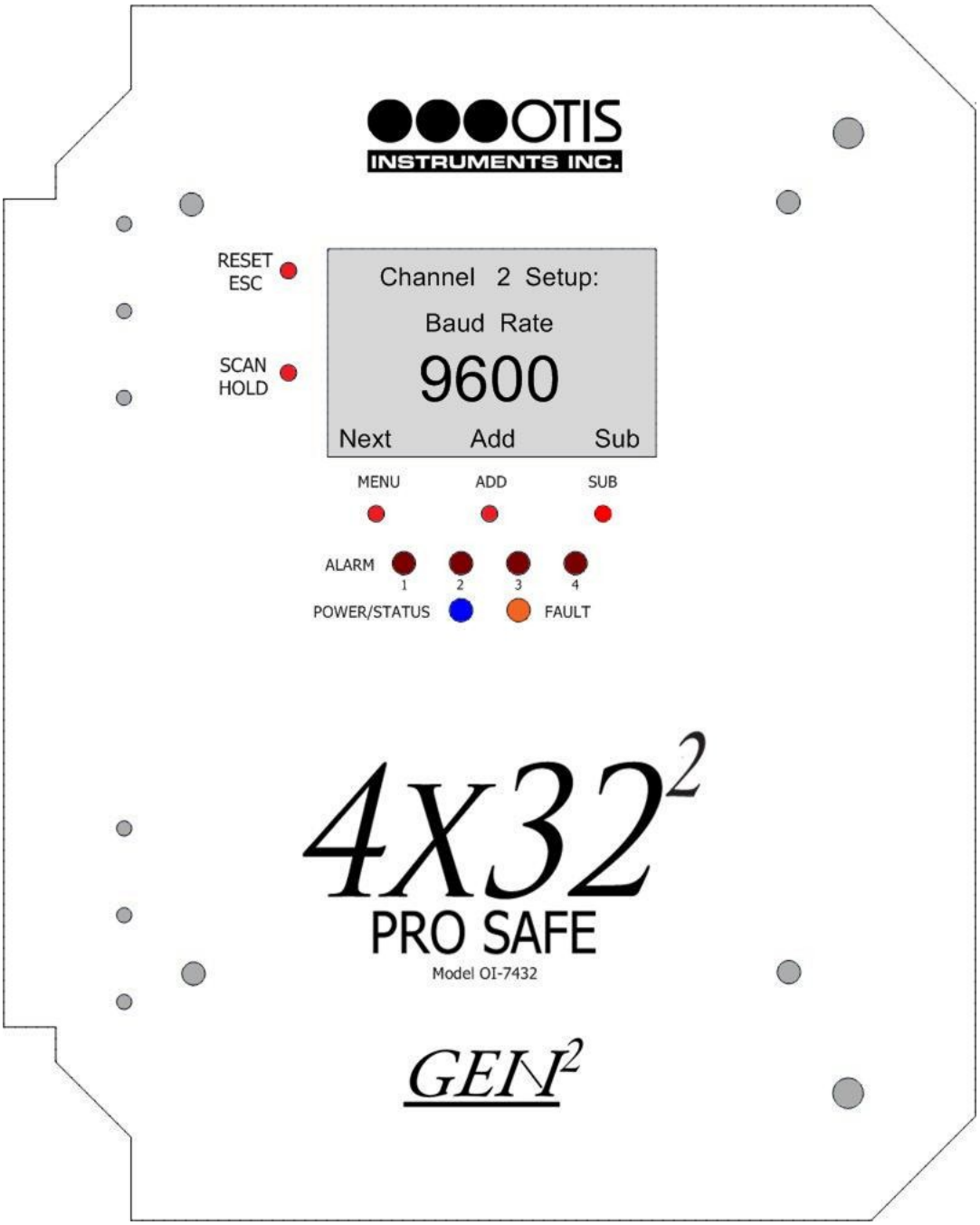


2. Press *MENU* (Next) to continue to the next menu option.

Set Baud

3. Press *ADD* (increase) or *SUB* (decrease) to manipulate the Baud setting to 4800, 9600, or 19200 for the channel being setup.

NOTE: Baud default is 9600.



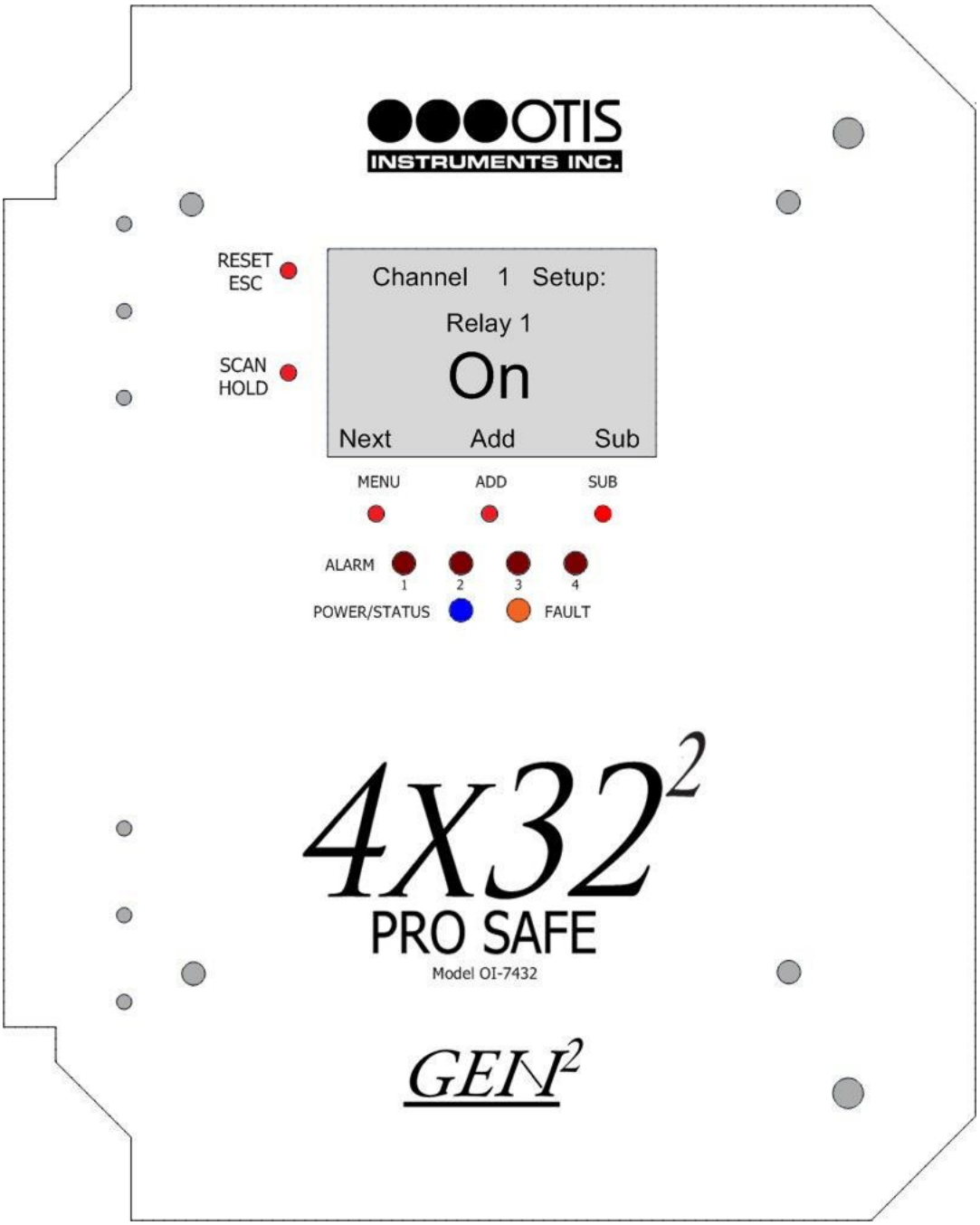
4. Press *MENU* (Next) to continue to the next menu option.

Individual Relay Setup

NOTE: Repeat the Individual Relay Setup process for each —and each channel—to be setup.

Relay On/Off

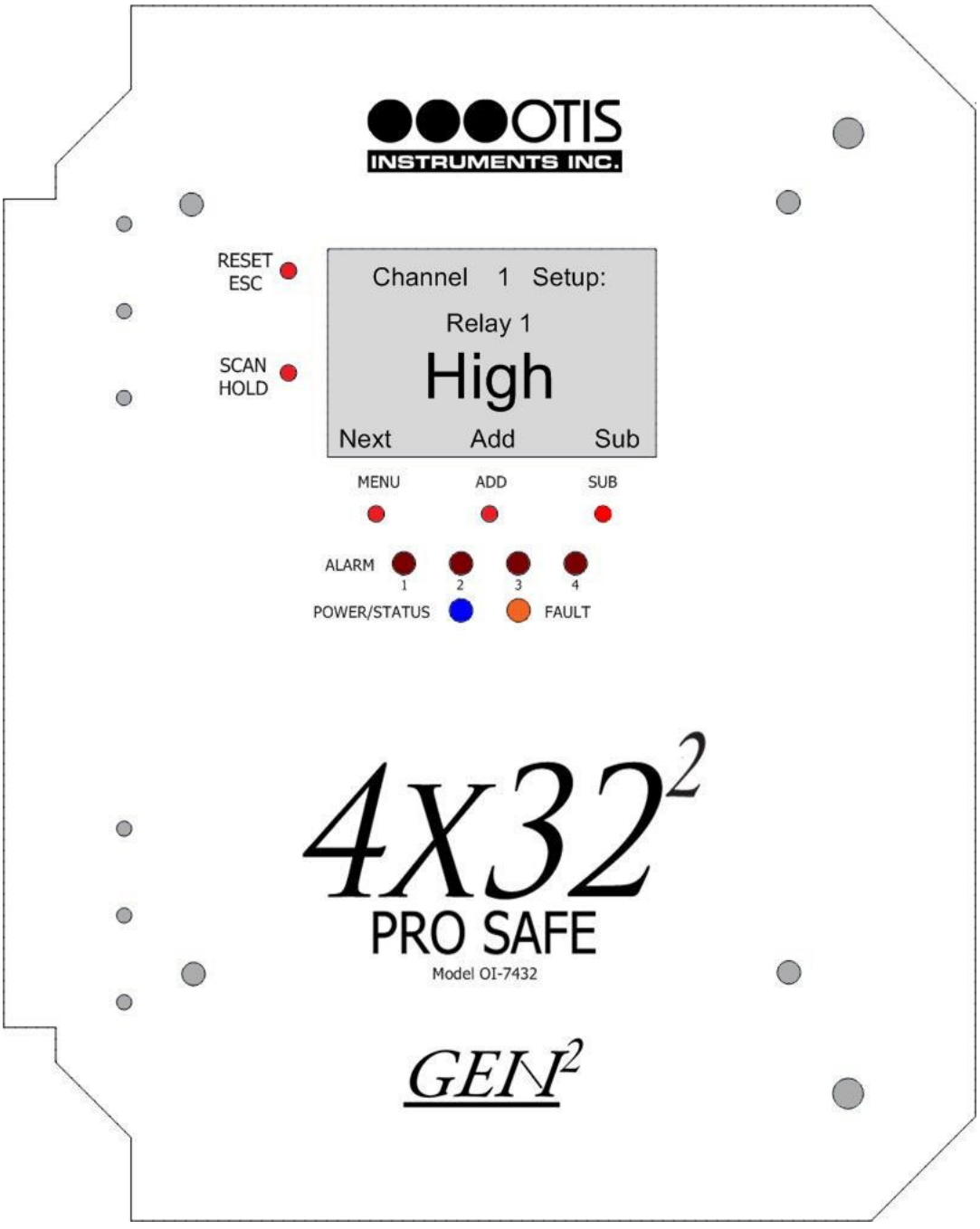
1. Press *ADD* or *SUB* to manipulate the 's On/Off status.



2. Press *MENU* (Next) to continue to the next menu option.

Relay Low/High

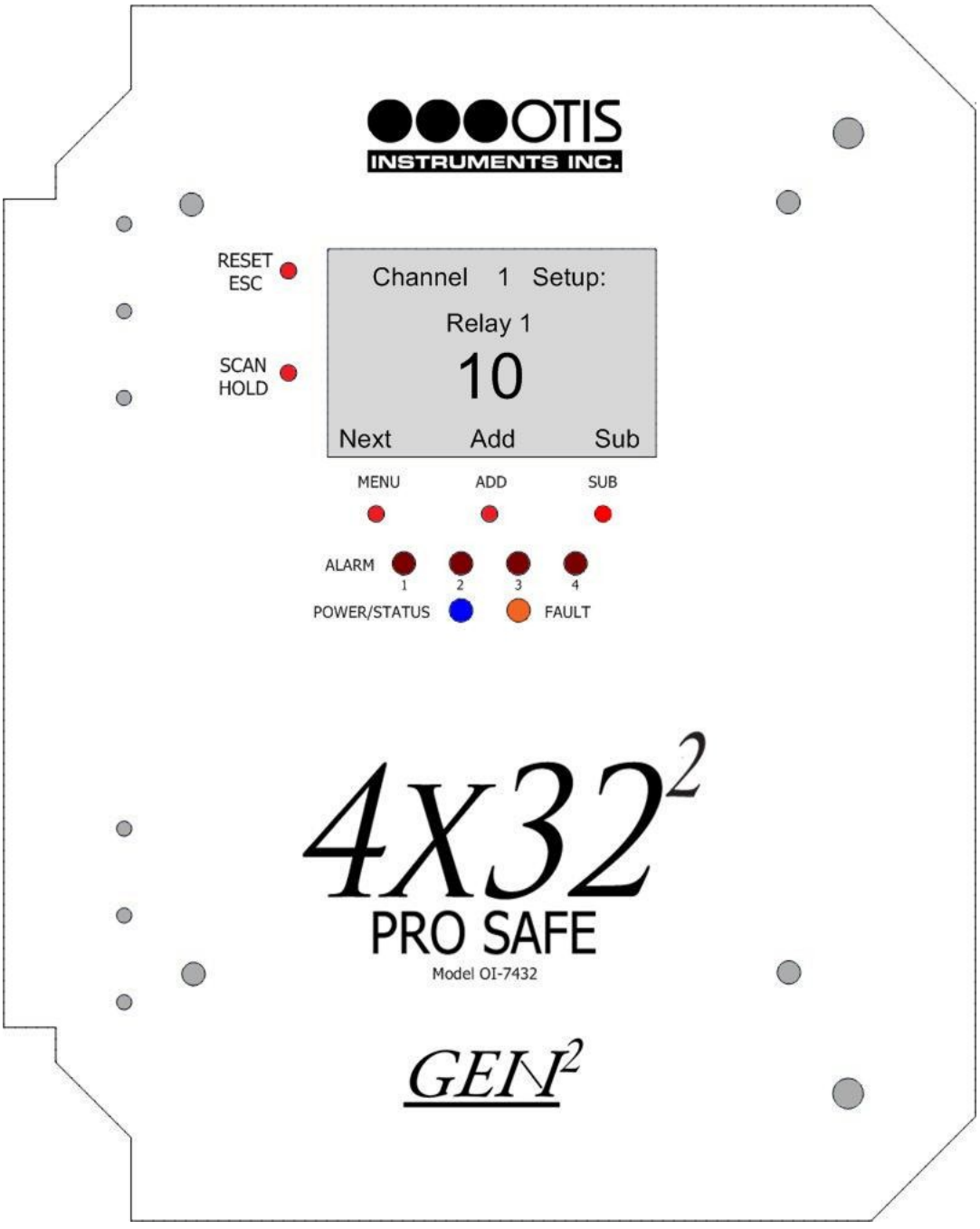
1. Press *ADD* or *SUB* to manipulate the 's High/Low status.



2. Press *MENU* (next) to continue to the next menu option.

Relay Value

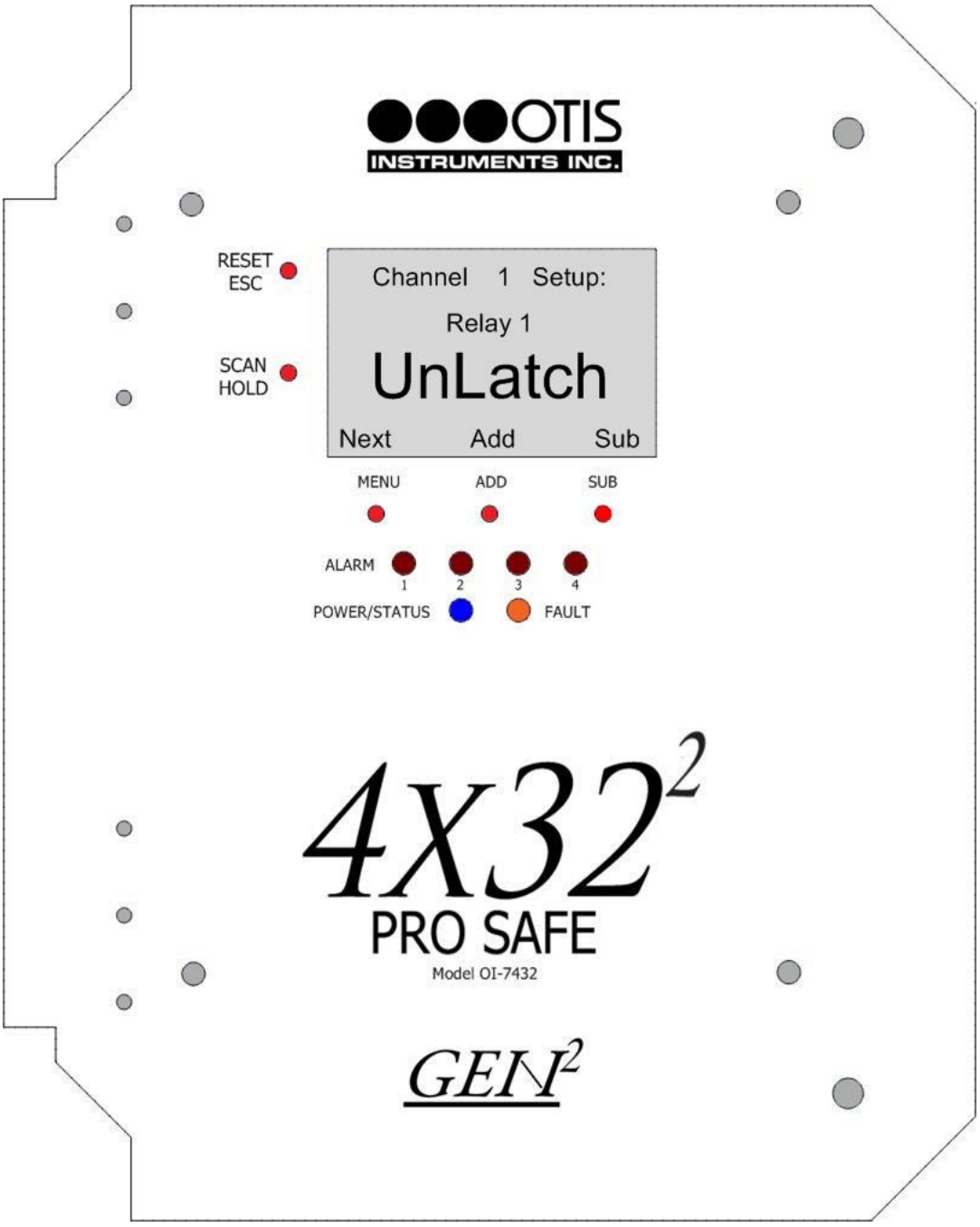
1. Press *ADD* (increase) or *SUB* (decrease) to manipulate the threshold value (1-65,000).



2. Press *MENU* (Next) to continue to the next menu option.

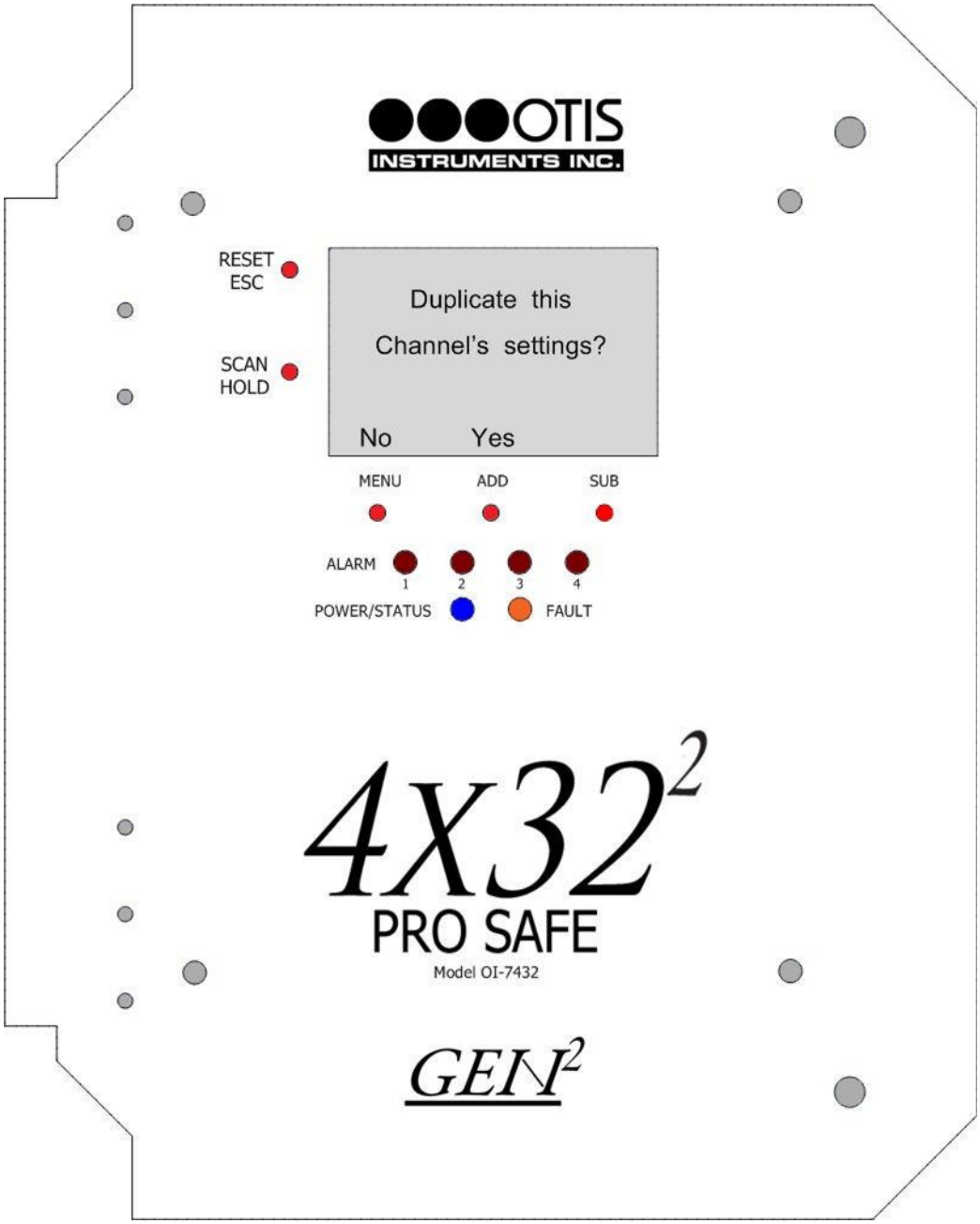
Relay Latching/Unlatching

1. Press *ADD* or *SUB* to manipulate the 's Latching/Unlatching status.



2. Press *MENU* (Next) to continue to the next option—setting up the next consecutive relay.

Once all four relays have been setup, the display screen will show the following:



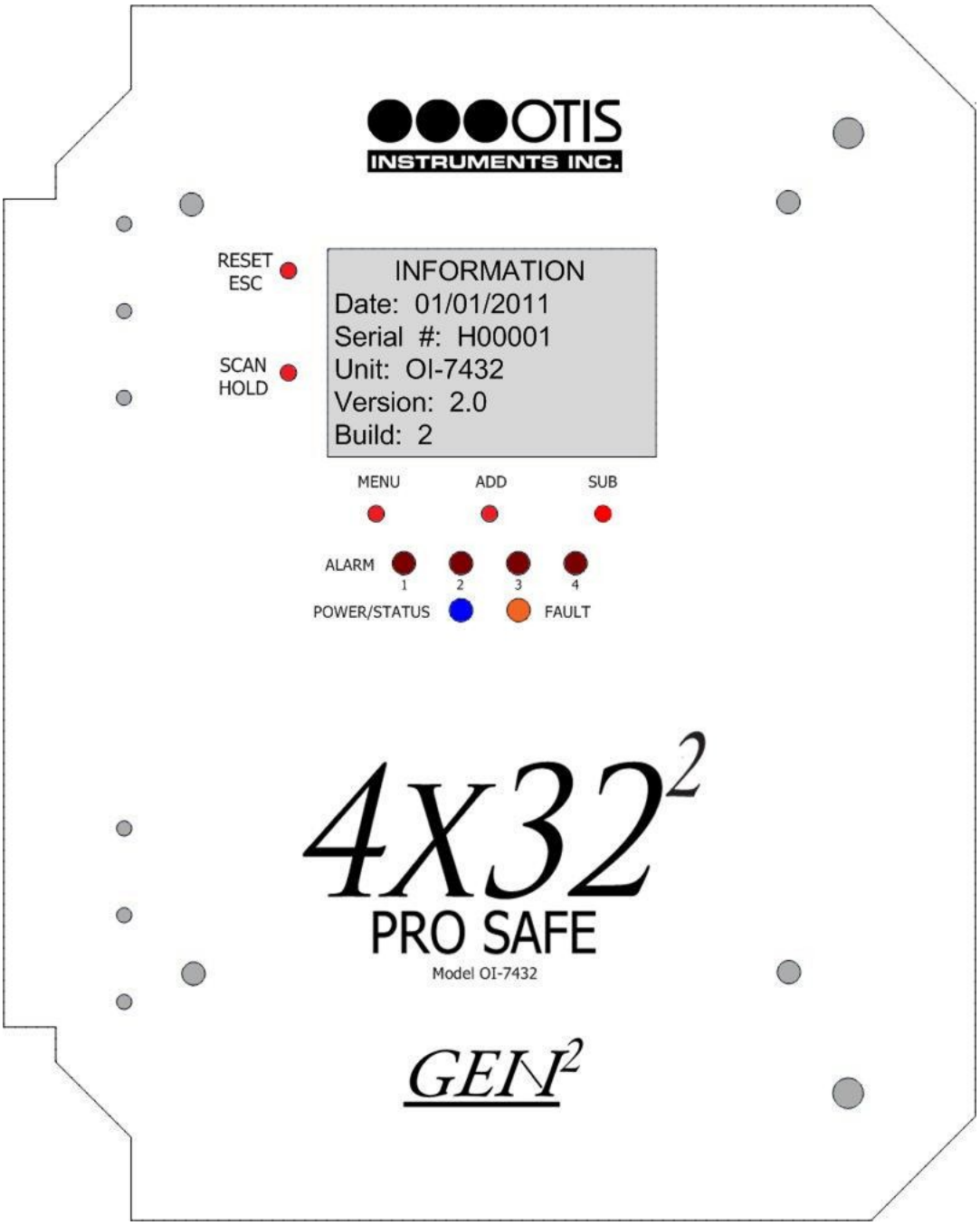
3. Based on the specific application, choose <u>one</u> of the following steps to complete:

   - Press *MENU* (Next) to setup the next channel
   - Press *ADD* (Yes) to duplicate the settings to all consecutive channels—and *ADD* (Yes) again to confirm the operation
   - Continue to the next section, "Exiting the Basic Configuration Menu"

View System Information

After the last channel is set, press *MENU* to view the system's information, including the:

- Build Date (Example: 01/01/2011)
- Serial # (Example: H00001)
- Unit Type: OI-7432
- Version (Example: 2.0)
- Build (Example: 2)

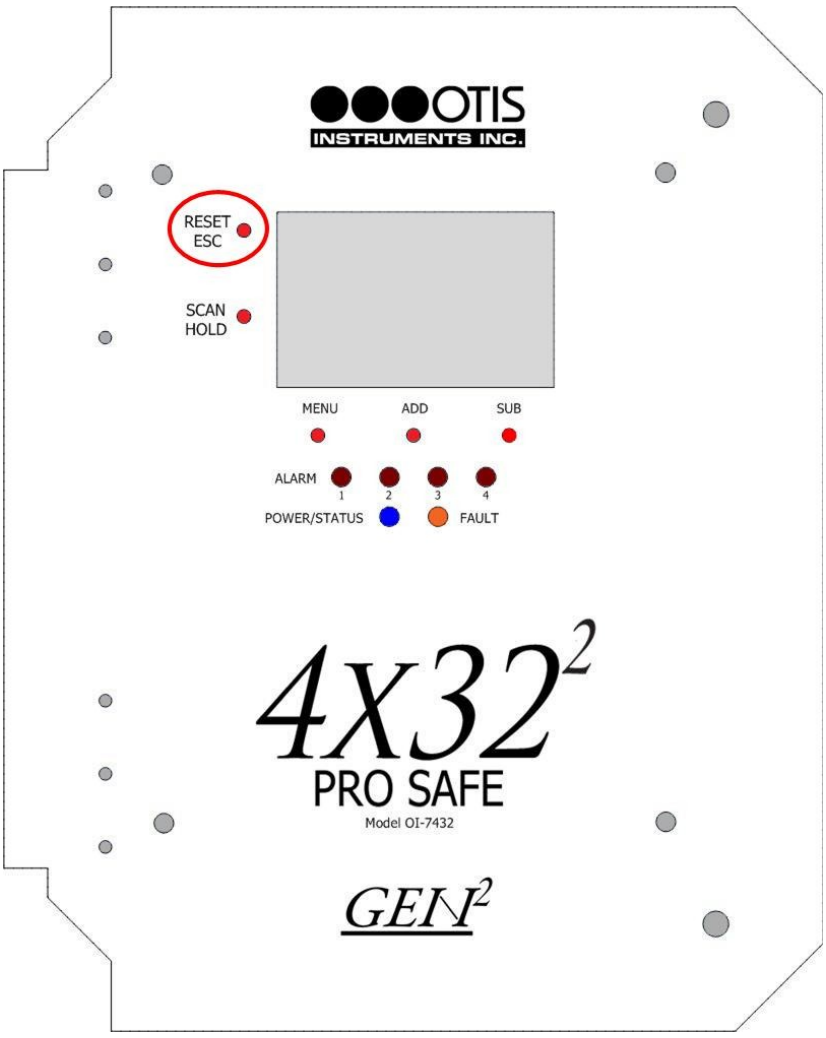


Exiting the Basic Configuration Menu

Complete the following steps to exit the Basic Configuration Menu at any time.

1. Press *ESC* to exit the Basic Configuration Menu.

NOTE: After channel 32 is set—and if MENU is pressed instead of ESC—there is an information-update on the display screen indicating the build date, serial #, unit type, version, and build of the OI-7432.



2. Close the enclosure box**.**
3. Screw in the thumb-screws.
4. Clamp down the enclosure latches.

NOTE: The monitor will automatically exit Chanel Setup after 15 minutes.

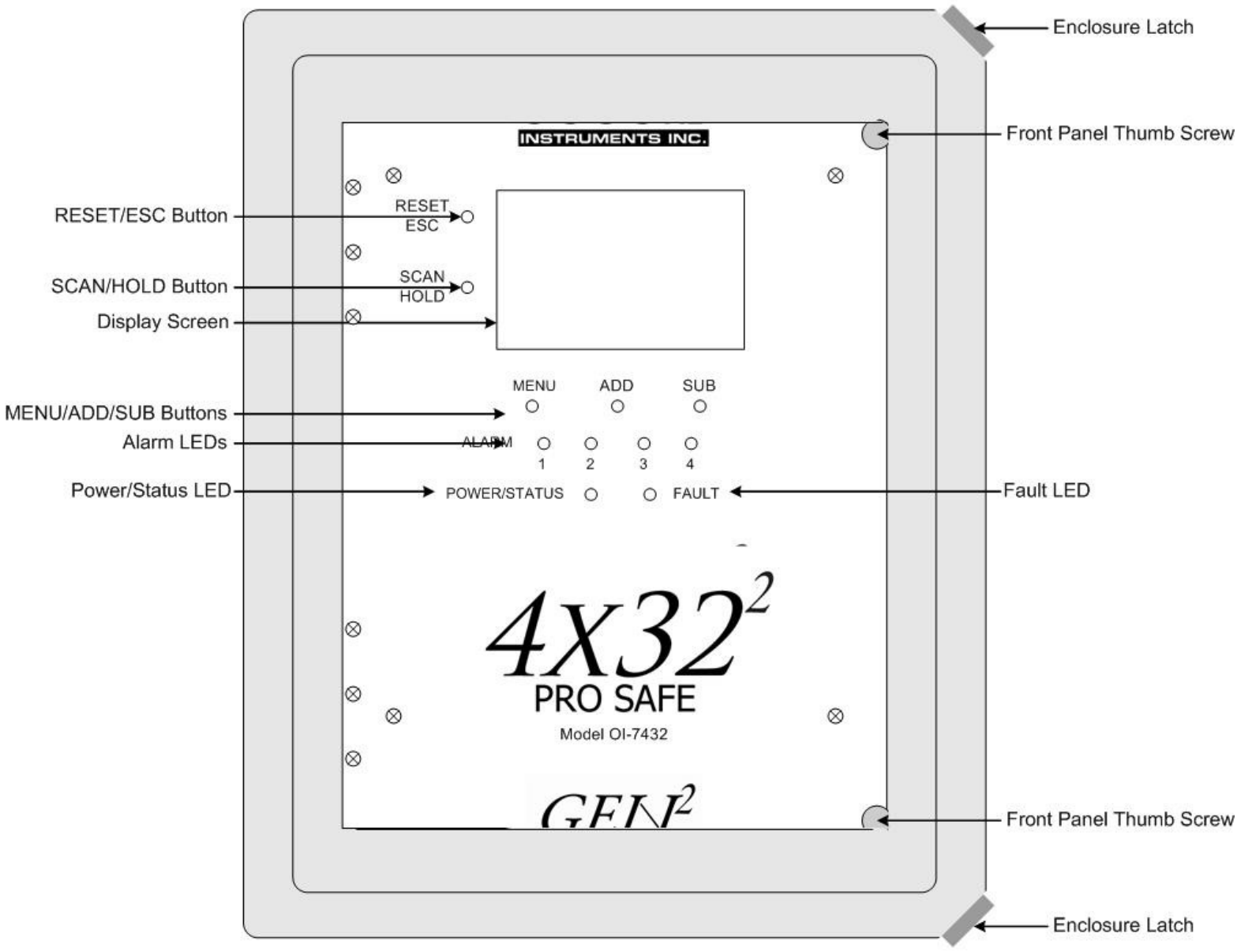
CHANNEL SETUP MUST BE COMPLETED INDIVIDUALLY FOR *EACH* CHANNEL.
REPEAT THE CHANNEL SETUP INSTRUCTIONS FOR EACH CHANNEL.

Advanced Configuration Menu (Global Settings)

The Advanced Configuration Menu is used to manipulate global settings. To setup individual channels, use the Basic Configuration Menu.

Entering Advanced Configuration Menu

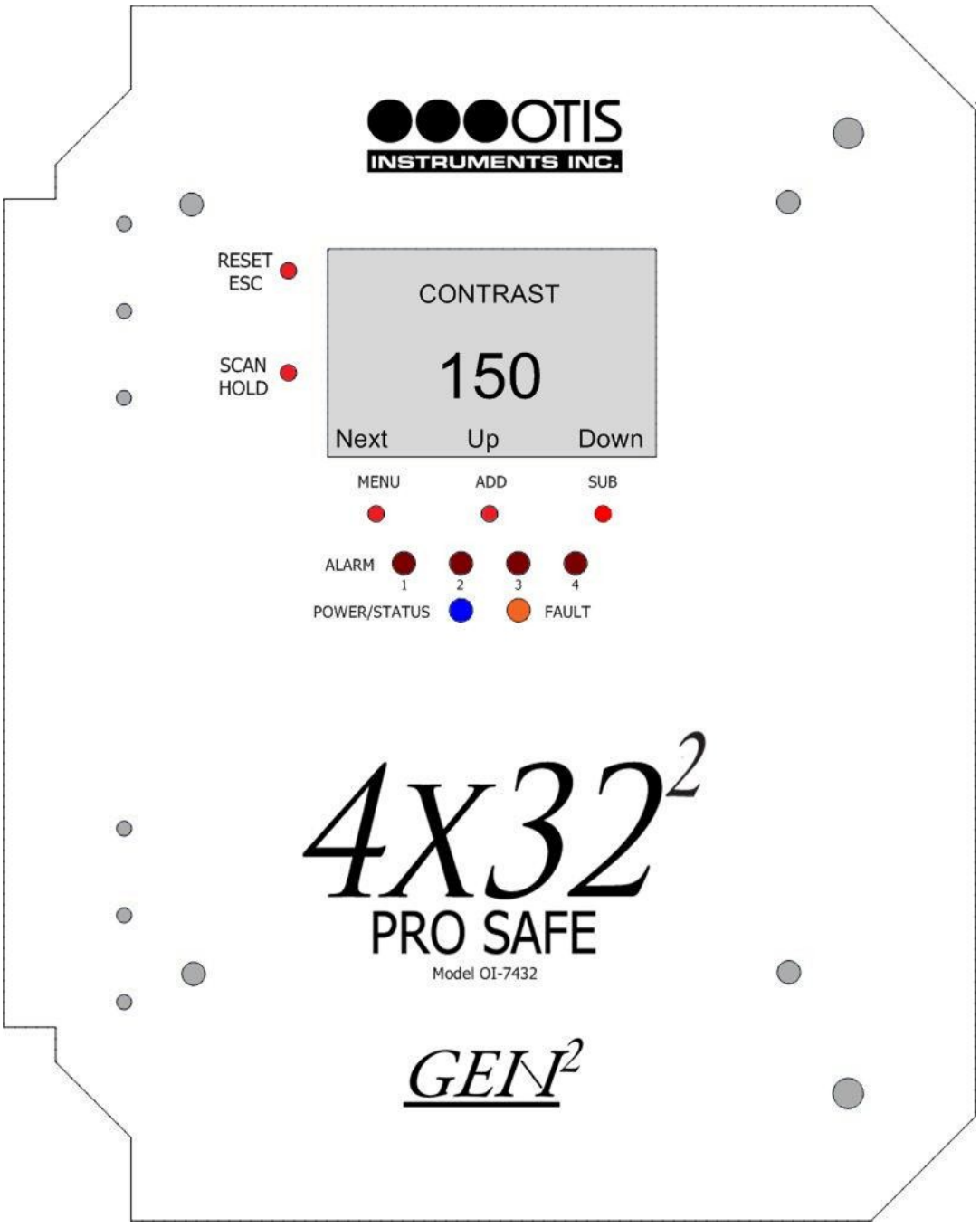
1. Open the enclosure box to expose the Front Panel.



2. Cycle the unit's power (turn OFF, then ON). For instructions on how to cycle the unit's power, refer to the “Power On/Off” section of this manual (see page 30).
3. When the Otis Logo is shown on the Display Screen, press *MENU*.

Adjusting LCD Contrast

1. Press *ADD* (increase) or *SUB* (decrease) to manipulate the LCD contrast.



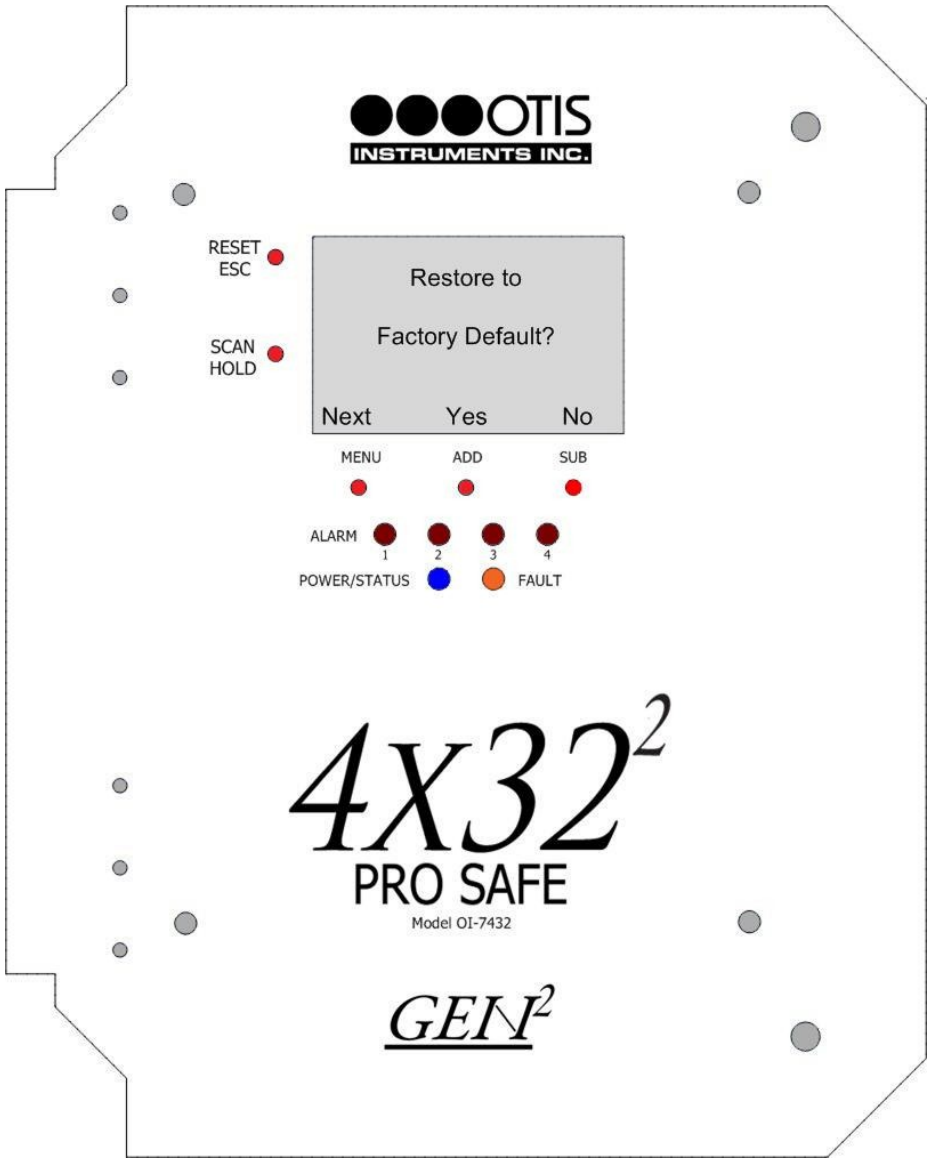
2. Press *MENU* to continue to the next Advanced Configuration Menu option.

Restore Factory Default Settings

Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to set the unit back to the factory's default settings. To leave the settings as they are, press *MENU* (Next).

Factory settings are:

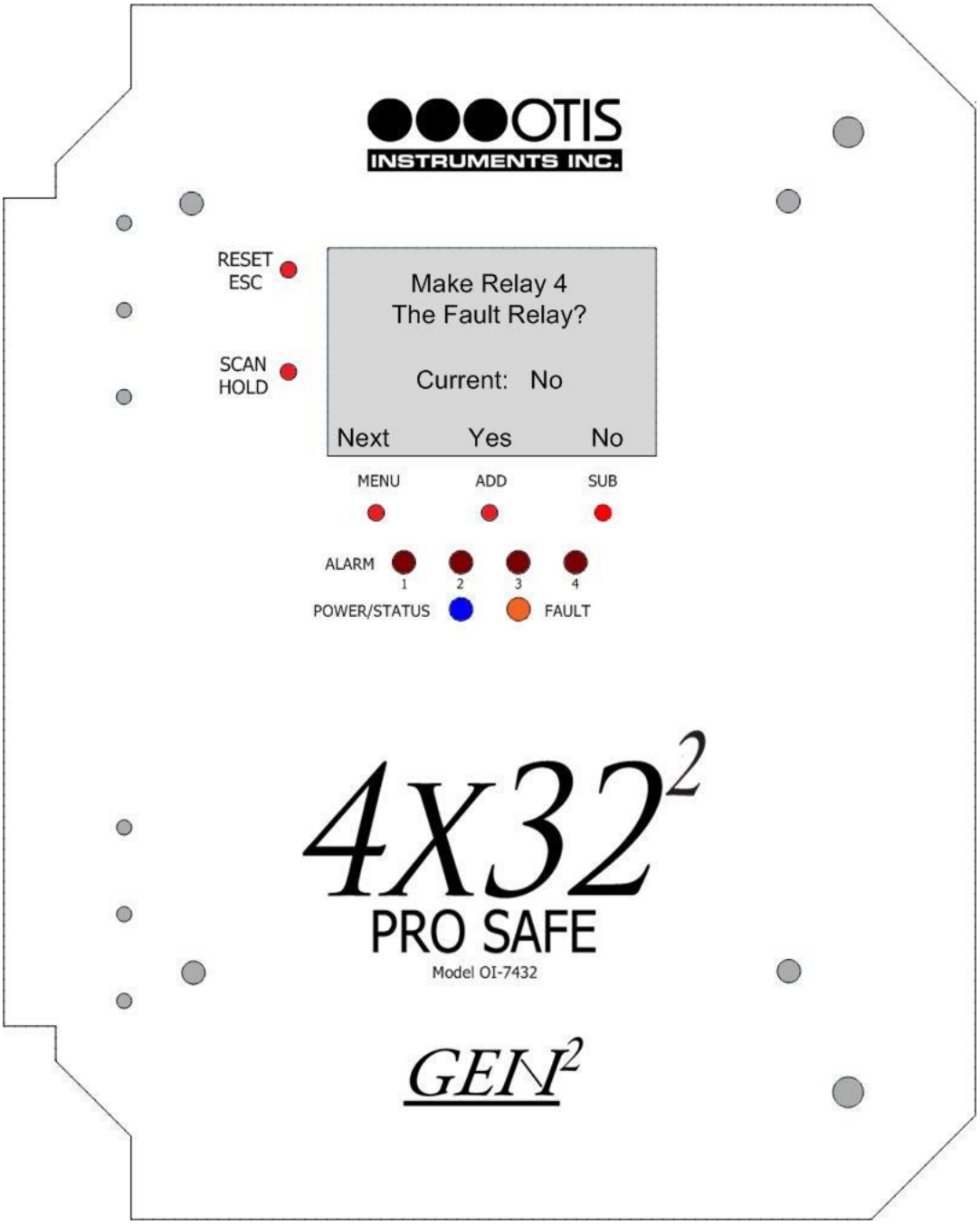
- Channels 1-32 “On”
- Relays set at “10, 15, 20 and 25”
- All relays set to “Unlatching” / “High”
- Modbus Output Baud set at 9600
- Modbus Output Address set at 1
- Channel Addresses set to 1-32
- Channels 1-32 baud rates set to 9600



Fault Relay Setup: Relay 4 Fault Relay

Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to setup Relay 4 as the Fault Relay. To leave the setting as it is, press *MENU* (Next).

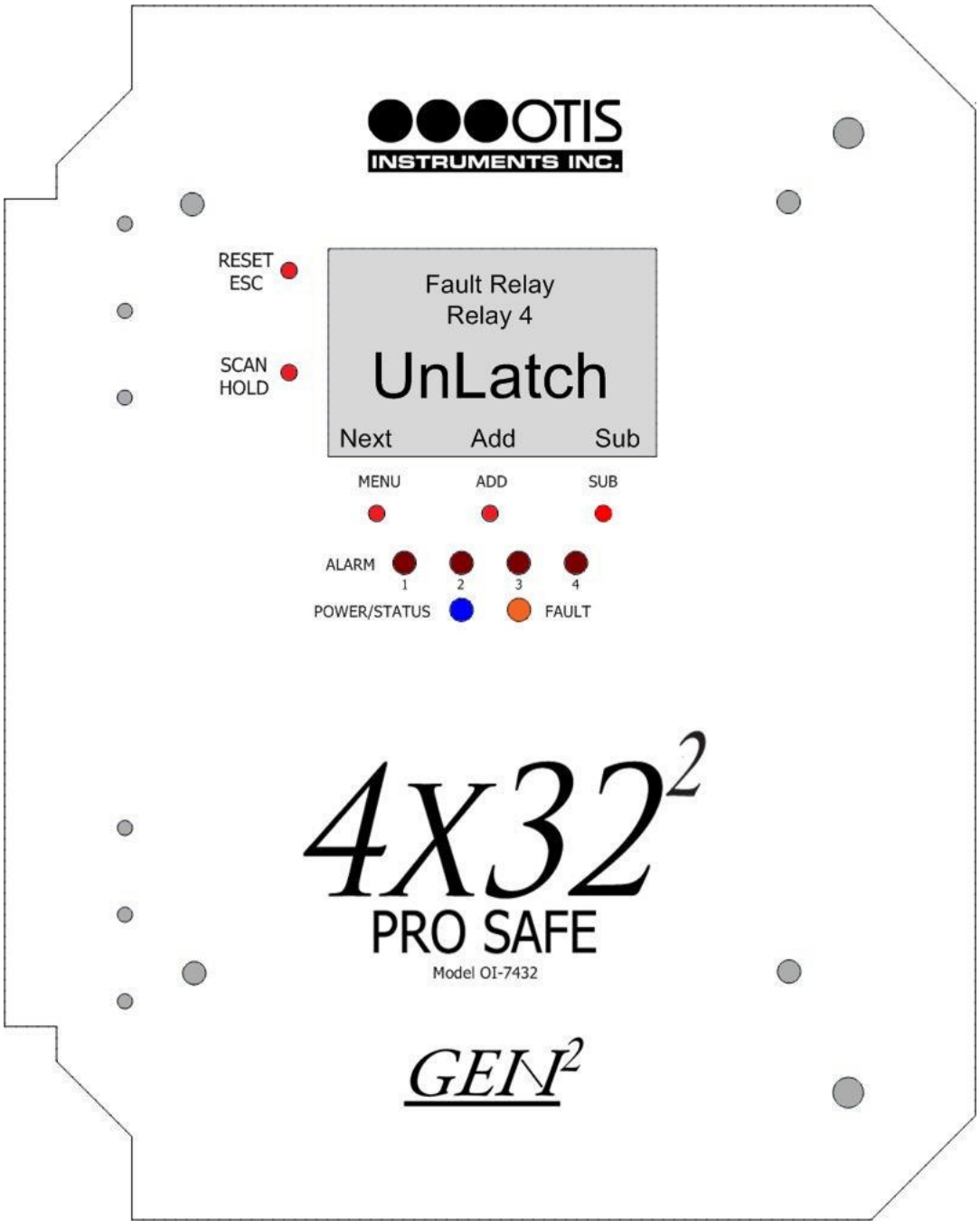
NOTE: With this feature enabled, if any Fault occurs (on any channel) the Fault Relay is engaged. In addition, Relay 4 is removed from all setup options.



Fault Relay Setup: Latching or Unlatching

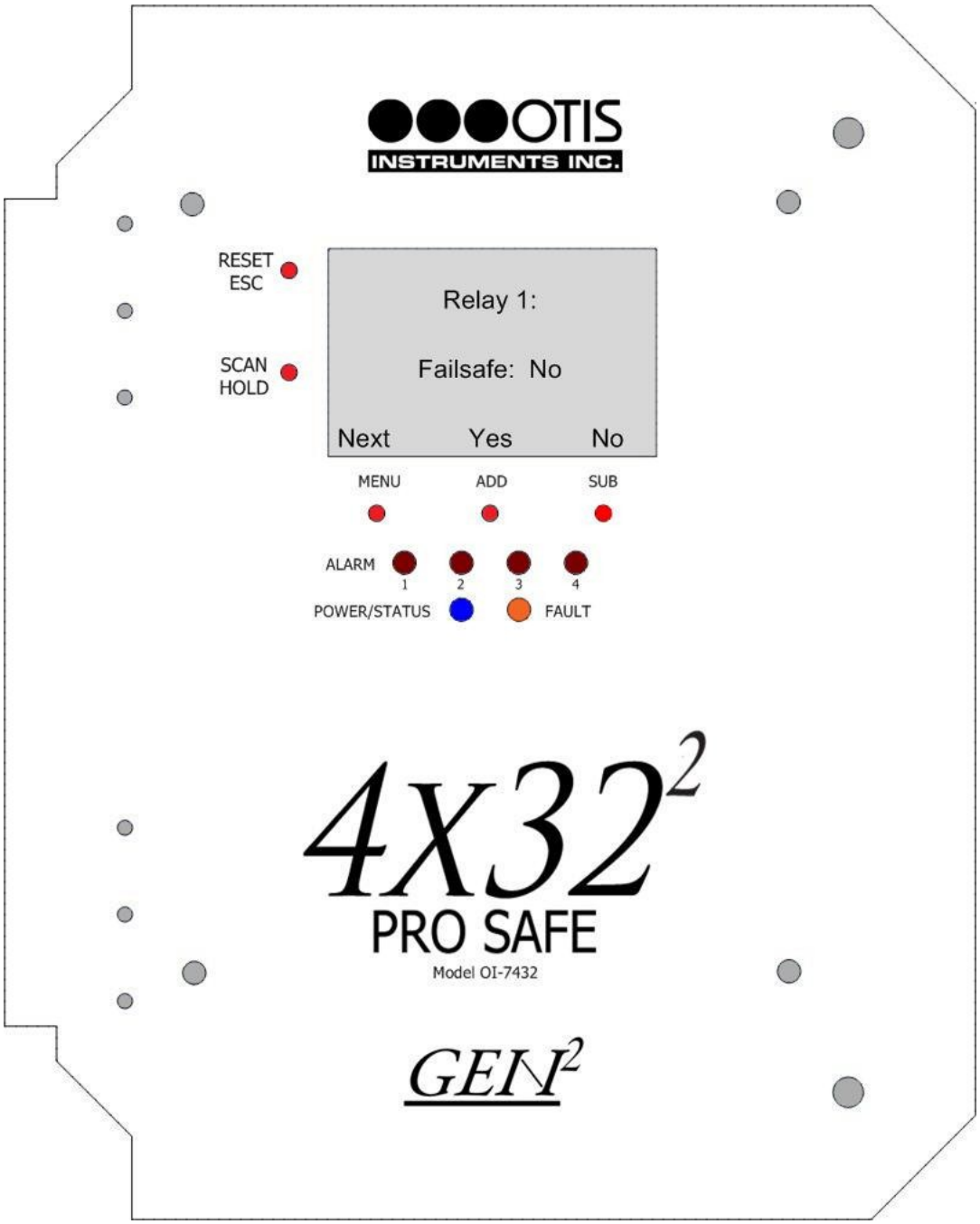
NOTE: This option will only appear if "Yes" is chosen on the previous option, setting Relay 4 as a Fault Relay.

Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to set Relay 4 as Latching or Unlatching. To leave the setting as it is, press *MENU* (Next).



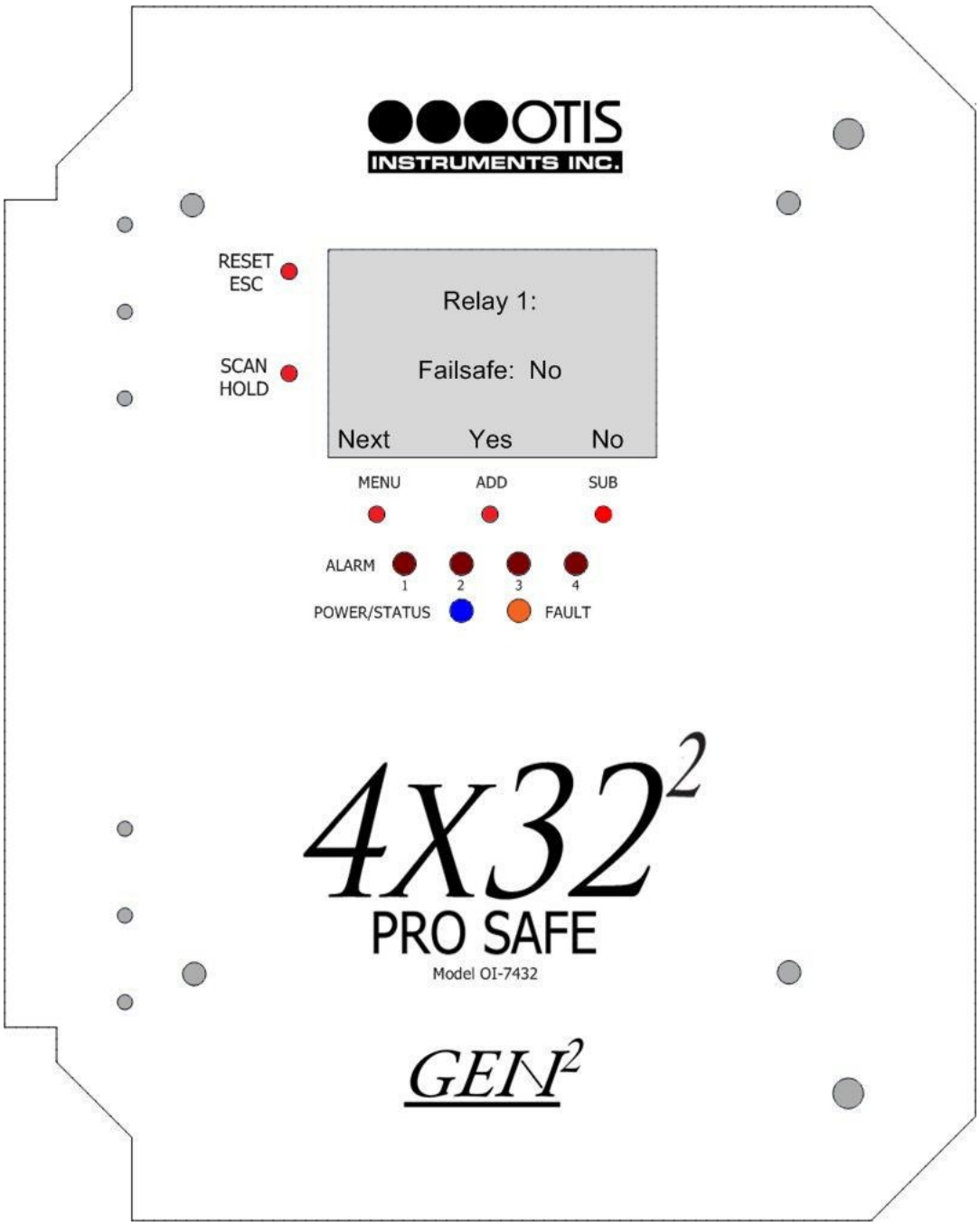
Fault Relay Setup: Relay Failsafe Setting

1. Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to setup Relay 1 as failsafe (or not failsafe). To leave the setting as it is, press *MENU* (Next).
2. Repeat the instructions in the previous step for Relays 2, 3, and 4.



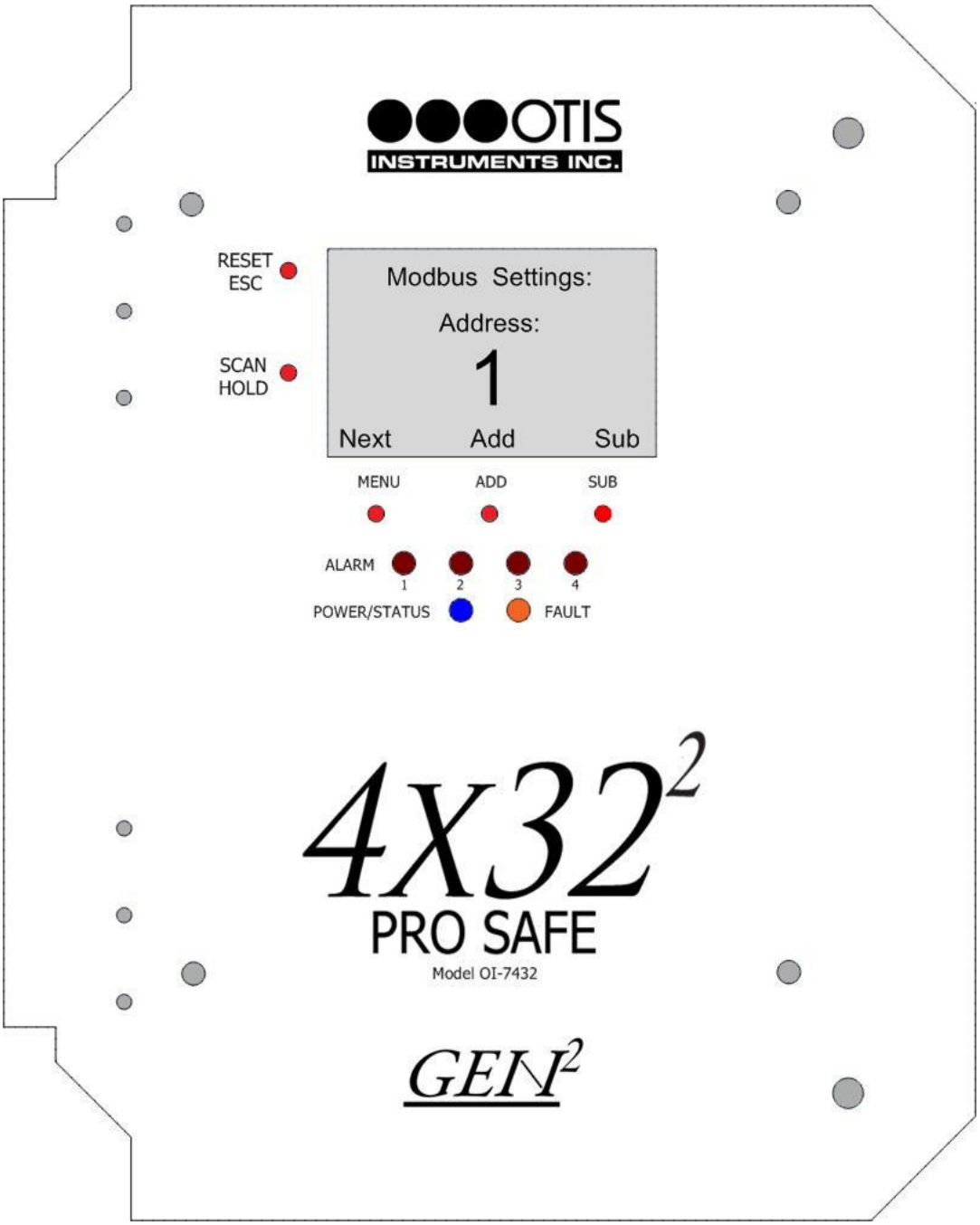
Fault Relay Setup: Fault Terminal Failsafe Setting

Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to setup the Fault terminal as failsafe (or not failsafe). To leave the setting as it is, press *MENU* (Next).



Modbus Setup: Modbus Output Address

2. Press *ADD* (increase) or *SUB* (decrease) to manipulate the global Modbus Address setting (between 1 and 247).

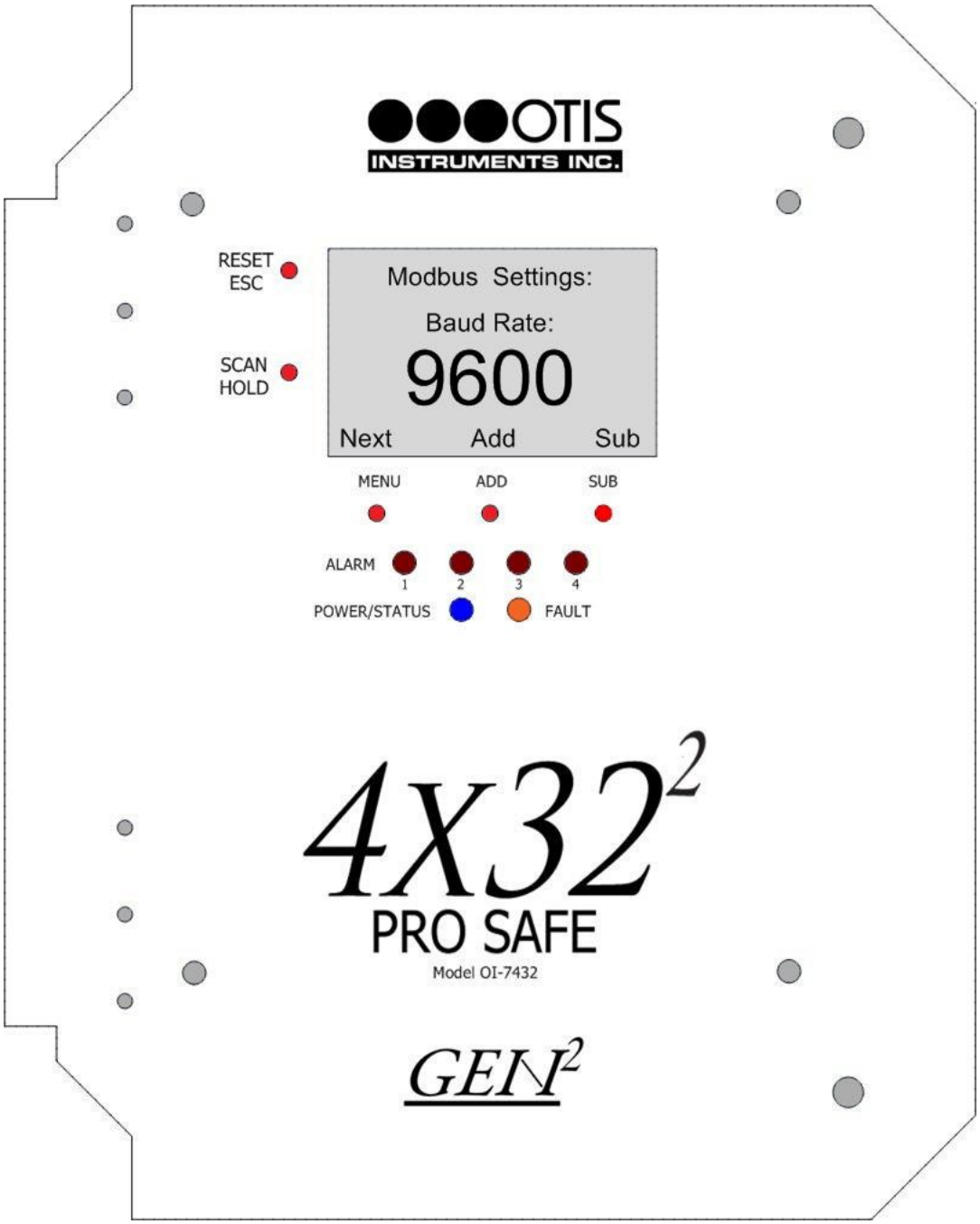


3. Press *MENU* (Next) to continue to the next Advanced Configuration Menu option.

Modbus Output Setup: Baud Setting

4. Press *ADD* (increase) or *SUB* (decrease) to manipulate the global Baud setting to: 4800, 9600, or 19200.

NOTE: Baud default is 9600.

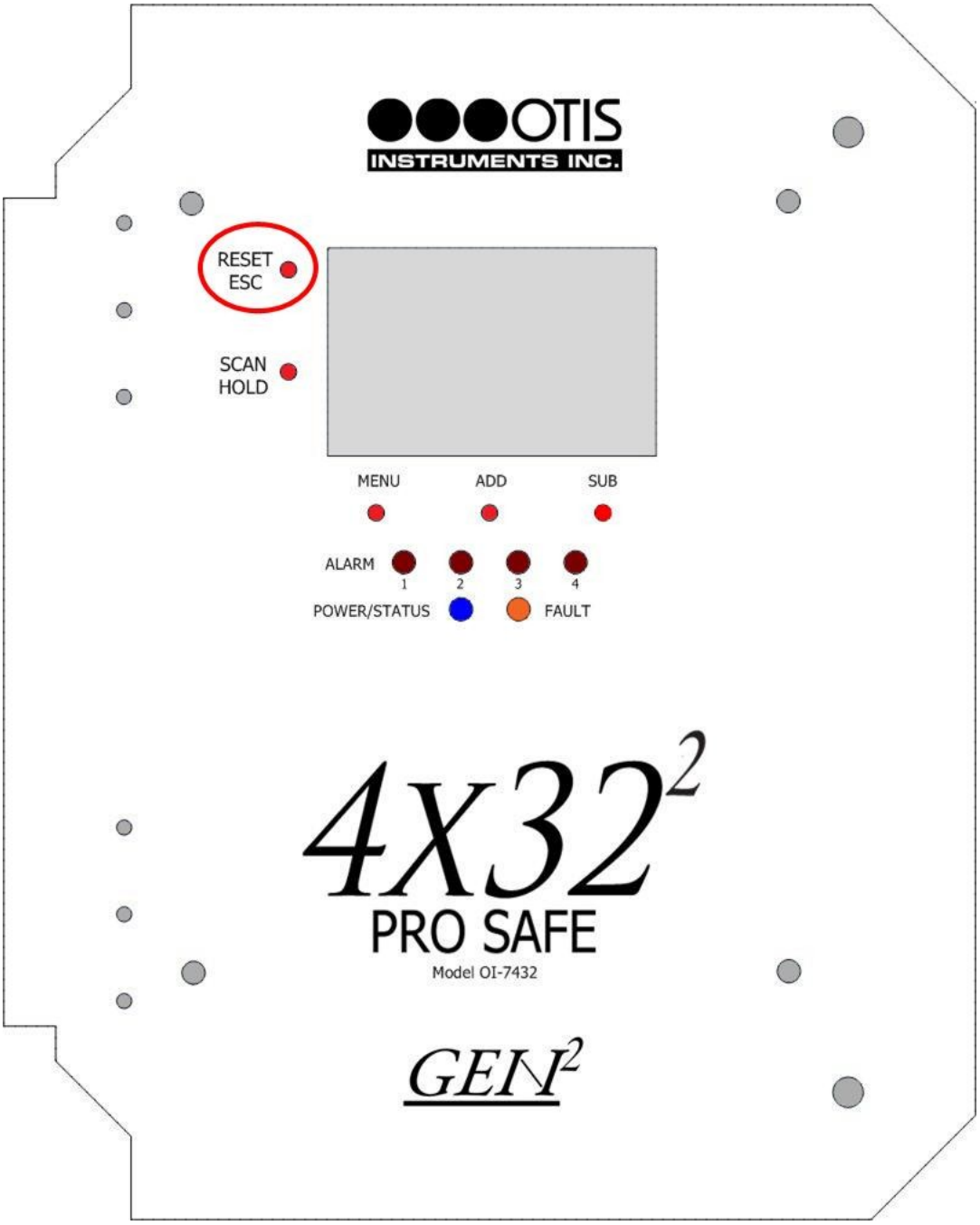


5. Press *MENU* (Next) to exit the Advanced Configuration Menu and return to Normal Operating Mode.

Exiting the Advanced Configuration Menu

Complete the following steps to exit the Advanced Configuration Menu at any time.

1. Press *ESC* to exit the Advanced Configuration Menu.

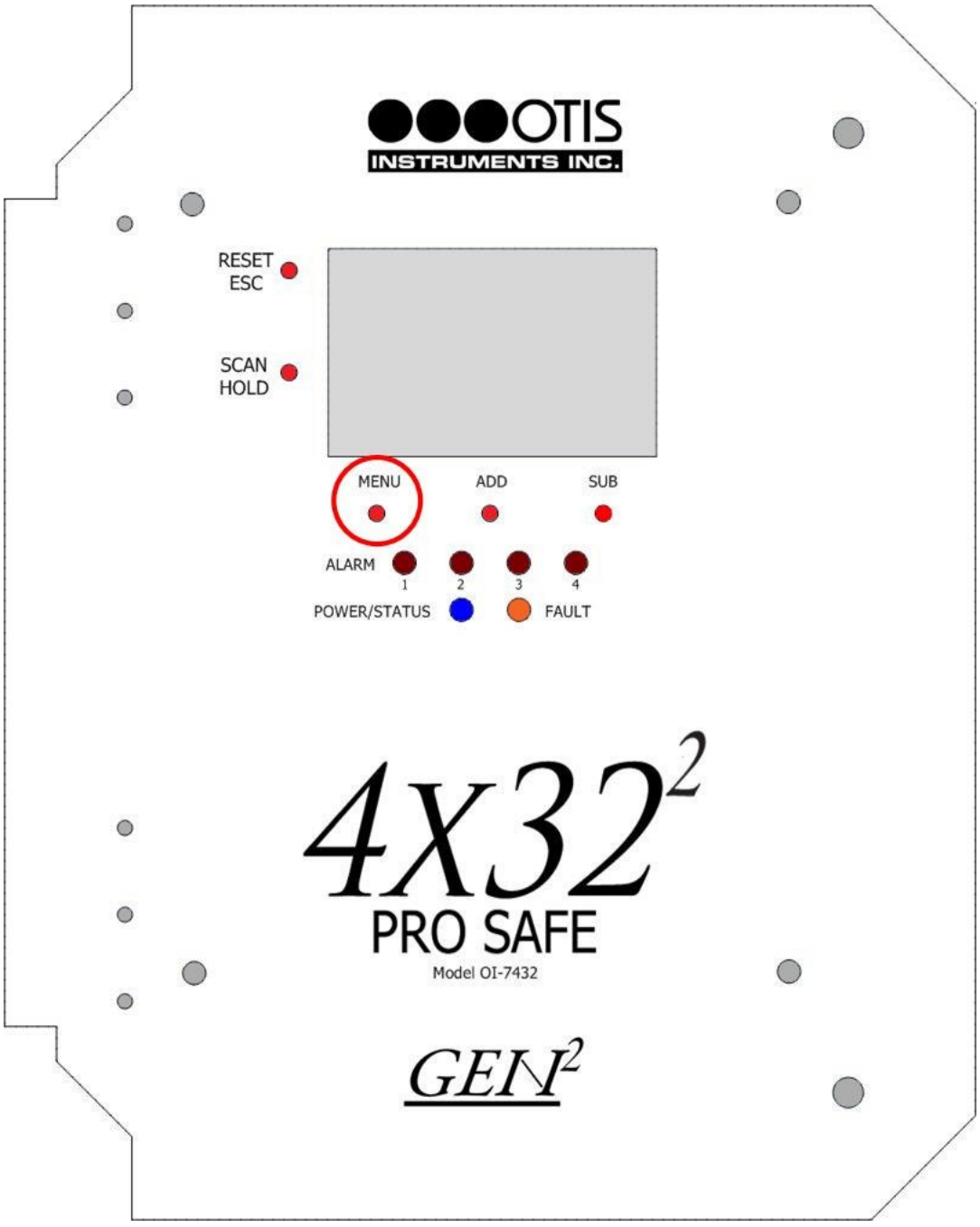


2. Close the enclosure box.
3. Clamp down the enclosure latches.

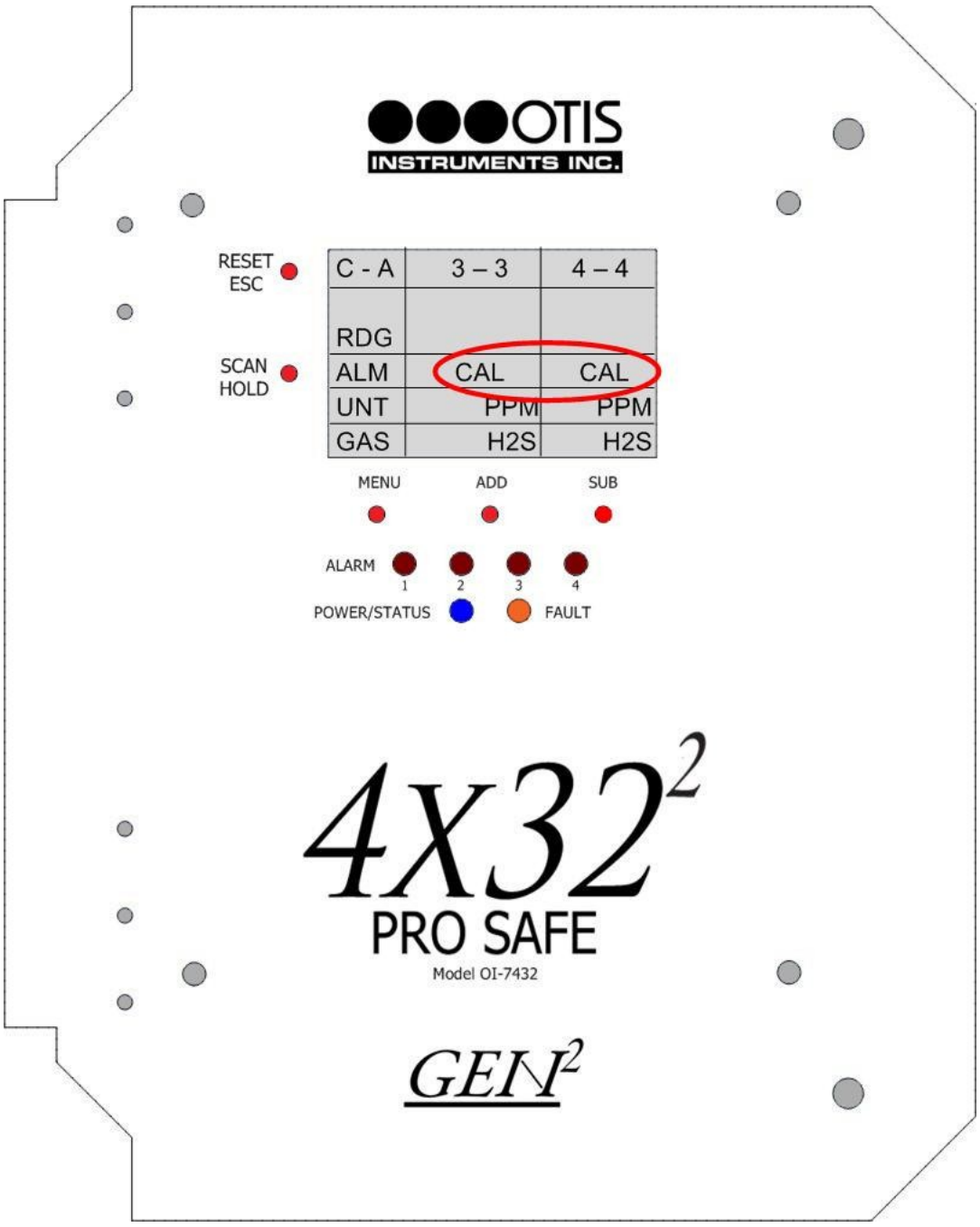
Calibration Mode

Entering Calibration Mode disables the relays and allows the sensors to be calibrated without triggering alarms. Once in Calibration Mode, the unit will remain in this state for two hours—unless *RESET/ESC* is pressed.

1. Open the enclosure box to expose the Front Panel.
2. To enter Calibration Mode, press and hold *MENU* for five seconds.

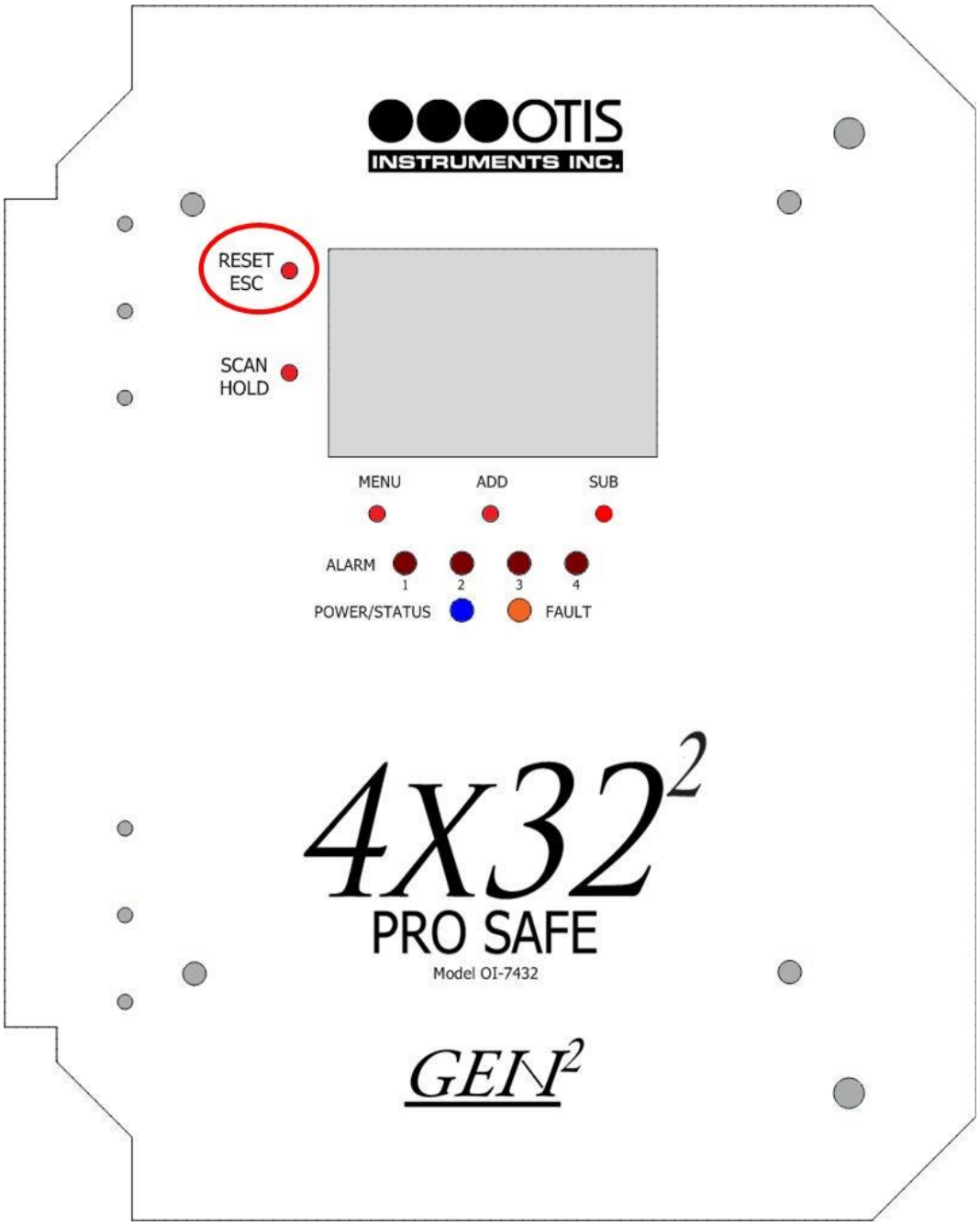


3. Once in Calibration Mode, the display screen will show “CAL” beside the “ALM” identifier.



4. To return to Normal Operating Mode, press *RESET/ESC*.

NOTE: If RESET/ESC is not pressed, the unit will remain in Calibration Mode for two hours.

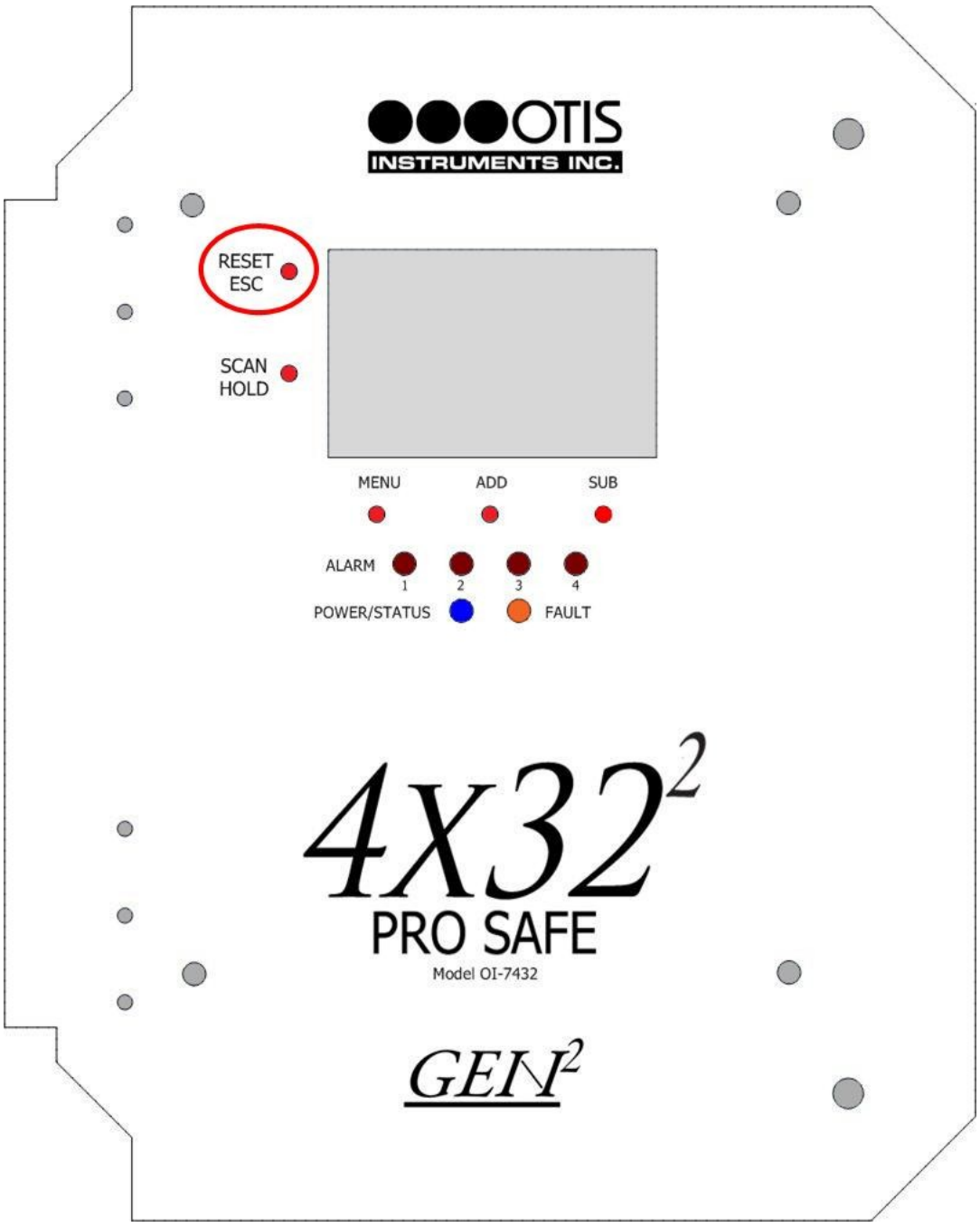


5. Close the enclosure box.
6. Clamp down the enclosure latches.

Relay Test Mode

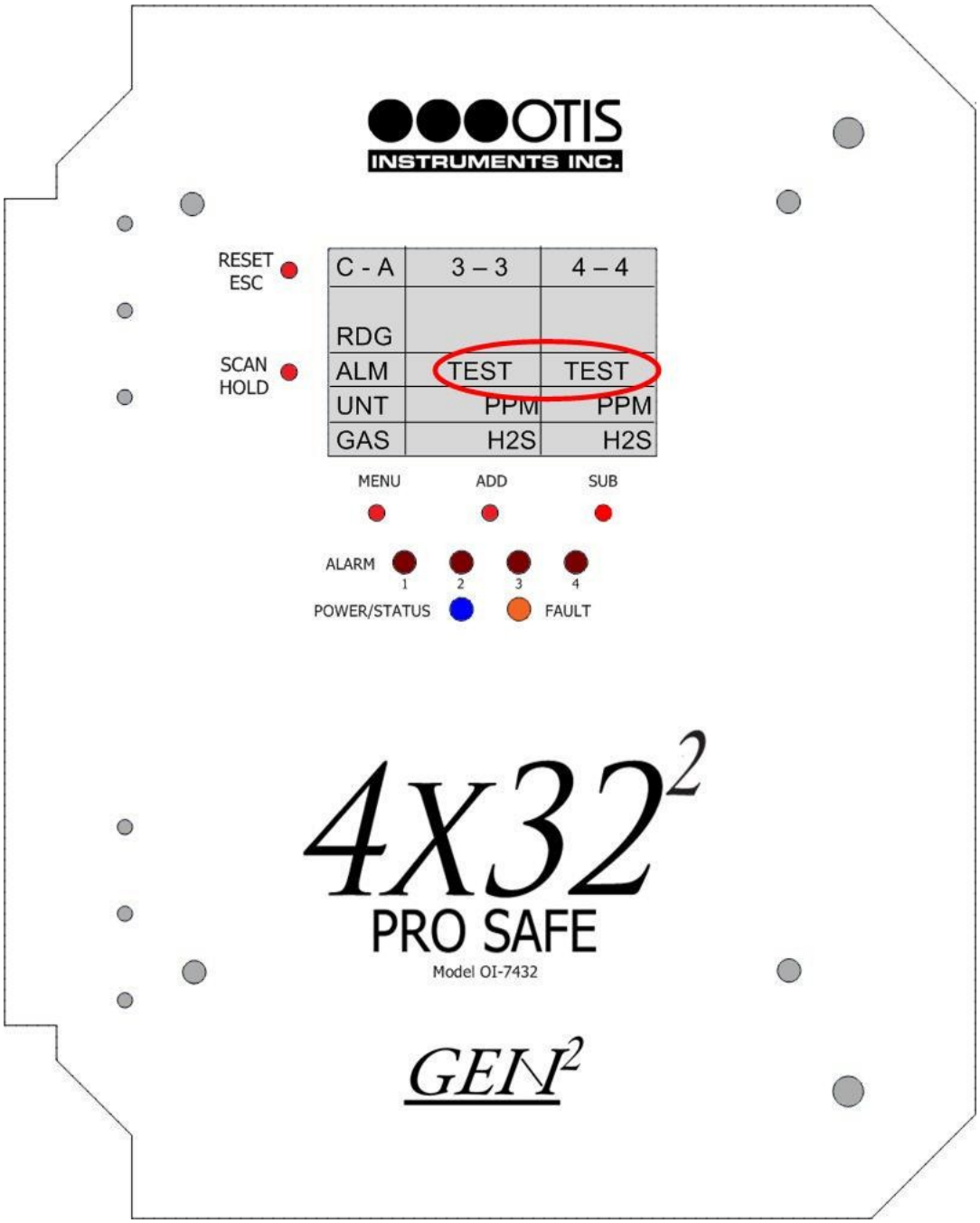
Relay Test Mode activates each , and can be used to determine whether or not the relays and attached alarms are functioning properly.

1. Open the enclosure box to expose the Front Panel.



2. To enter Relay Test Mode, press and hold *RESET*.

3. Relay 1 will activate after five seconds, Relay 2 will activate after five additional seconds, etc.

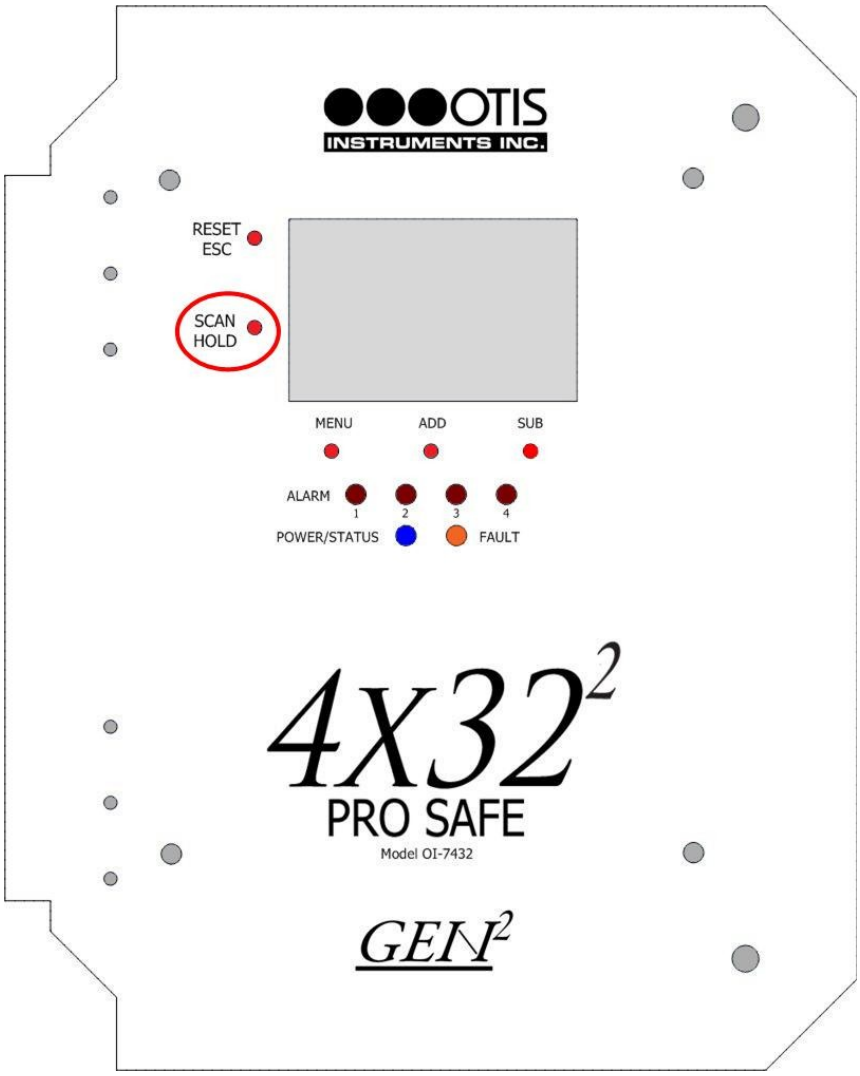


4. To return to Normal Operating Mode, release and press *RESET/ESC*.
5. Close the enclosure box.
6. Clamp down the enclosure latches.

Holding Channels

This feature can be used to monitor a select channel, rather than the continuous scanning of channels while in Normal Operating Mode.

1. Open the enclosure box.
2. Locate *HOLD* on the Front Panel.



3. Press *HOLD* once to "freeze" the channel scan sequence.
4. Press *ESC* to return to Normal Operating Mode.

NOTE: The device will automatically return to Normal Operating Mode after five minutes of inactivity.

5. Close the enclosure box.
6. Clamp down the enclosure latches.

APPENDIX A: Additional Product Information

LED Indication Key (Alarms, Faults, and Power/Status)

There are four red LEDs, one orange LED, and one tricolored LED (only blue and red will be used).

LED	Color / Status	Description
ALARM 1	off	no alarm condition has occurred on 1 since the last reset or power up
	solid red	an alarm condition is currently happening on 1
	blinking red	an alarm condition has occurred on 1, but condition has now gone
ALARM 2	off	no alarm condition has occurred on 2 since the last reset or power up
	solid red	an alarm condition is currently happening on 2
	blinking red	an alarm condition has occurred on 2, but condition has now gone
ALARM 3	off	no alarm condition has occurred on 3 since the last reset or power up
	solid red	an alarm condition is currently happening on 3
	blinking red	an alarm condition has occurred on 3, but condition has now gone
ALARM 4	off	no alarm condition has occurred on 4 since the last reset or power up
	solid red	an alarm condition is currently happening on 4
	blinking red	an alarm condition has occurred on 4, but condition has now gone
Fault	off	no Fault condition has occurred on any sensor unit sense the last reset or power up
	solid orange	a Fault condition is currently happening on at least one sensor unit
POWER/STATUS	red	a Fault condition is occurring on the monitor
	blue	Normal Operating Mode

OI-7432 Troubleshooting Guide

Fault 1 (F1)

Reason: The top card has lost communication with the digital sensor board (the board potted into the sensor housing).

Solution: Check the connections and/or try new digital sensor board

Applies to: OI-6000-X sensor assemblies

Fault 4 (F4)

Reason: The top card is losing communication to the analog sensor board

Indication: On OI-6000-X units, F4 means that the Analog to Digital Conversion (ADC) on the analog sensor board is not communicating to the digital sensor board.

Solution: Check the orientation of the analog sensor board and/or try a new analog sensor board.

Indication: On the OI-6900-X and OI-6975-X units F4 means the top card is not communicating with the analog sensor board.

Solution: Check the connections from the top card all the way to the analog sensor board. If that does not fix the fault, try replacing the analog sensor board and/or the sensor housing.

Indication: When the sensor element is a Low Power IR sensor the sensor element itself could be the issue. Also, there might not be an issue because sometimes sensor assemblies will show F4 for a few seconds after boot up. This is normal and is due to the boot up of the sensor element itself.

Fault 10 (F10)

Reason: When using a monitor with wired sensor assemblies attached, the sensor is not communicating with the monitor. The problem could be that the sensor assembly is not connected properly, or there may be board issues with the sensor or monitor.

Solution: Check all connections. If there is a 4-20mA connection, use a current meter inline to see if the current is correct.

Fault 13 (F13)

Reason: When using a monitor with a 4-20mA wired connection, F13 may appear when the sensor assembly is in a fault condition.

Solution: Since it is 4-20mA, the monitor does not know the exact fault condition. Therefore, check the sensor assembly to see what the fault is and then consult other items in this chart for a solution.

Fault 15 (F15)

This fault is no longer assigned. If “F15” is displayed on a sensor assembly, the firmware should be updated.

APPENDIX B: Modbus Information

The complete OI-7432 Modbus Register Map may be downloaded from the “Service” section of our website (www.otisinstruments.com).

Modbus Terms

Modbus: RTU
Setting: Baud Rate = 9600
Data Bits: 8
Parity: None
Stop Bits: 1
Time Out: 1000 ms
Device Address: 1-247
Data Type: Holding Registers
Start Address: The first register the user would like to view (must be between 1-255)
Length: Depends on the number of addresses the user would like to view
Scan Rate:1000 ms
Data Format: Hex, Decimal, Float

APPENDIX C: Operation of Relays

Relays are offered in certain Otis Instruments devices for the purpose of activating alarms, horns, and other equipment upon the detection of gas.

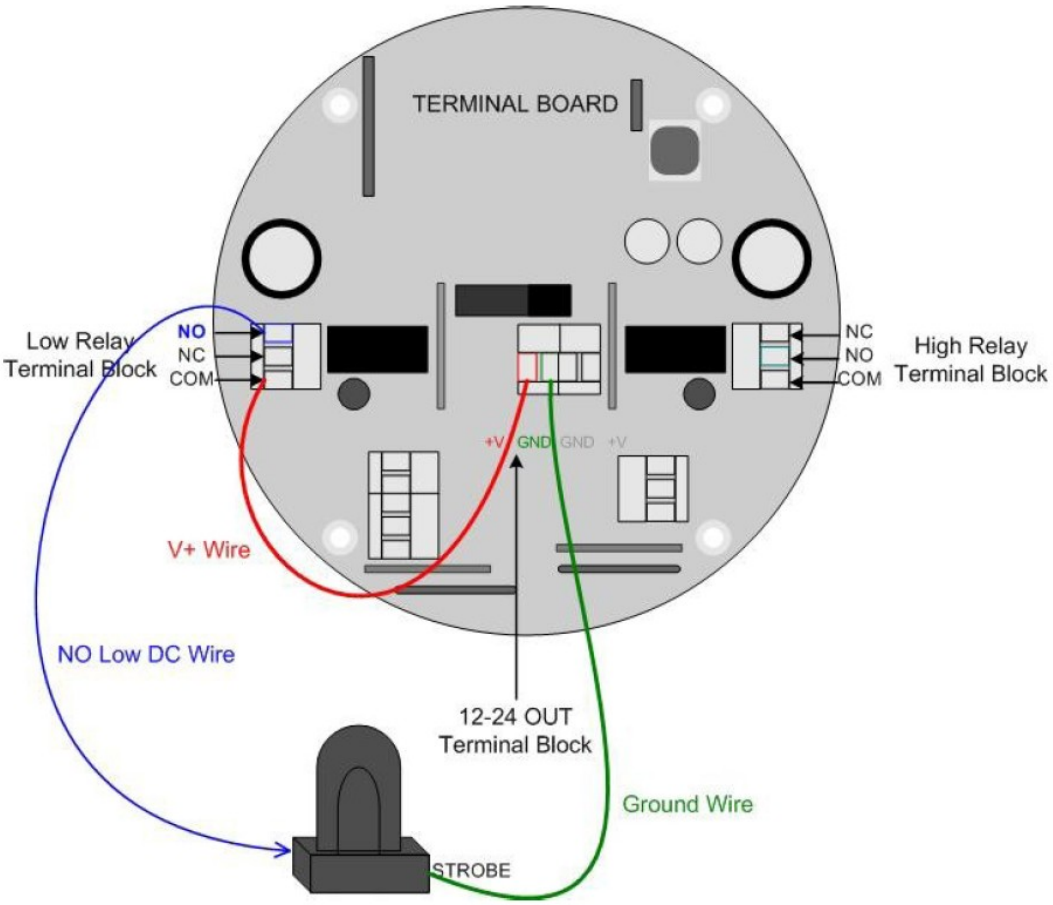
There are two key terms to remember when using relays.

- Deactivated: refers to a is in its normal state
- Activated: refers to a in the event of an alarm

"Dry" Contact and "Wet" Contact Relays

In regard to power, there are two types of relays.

1. Dry Contact Relays: This type of does not provide power to the equipment attached to it (i.e. if there is a light hooked up to this type of , it must be powered by another source).
2. Wet Contact Relays: This type of does provide power to the equipment attached to it (i.e. if a light was hooked up to this type of , it would be powered by the). When using a Wet Contact Relay, power should run through the "COMM" terminal to the end equipment.



Drawing 1: "Dry" Contact Relay Configured as a "Wet" Contact

Both the Wet Contact and Dry Contact Relays can be further broken into their connection type.

Normally Open and Normally Closed Relays

There are two different connection types used in Otis Instruments products:

1. Normally Open (NO): when the is deactivated, it is “open”. When a signal is received to activate the , the connection will “close”—providing a closed circuit. This will allow whatever device that is connected (strobe, horn, etc) to be activated (turned on) when a signal is sent to the to activate it. This is the most common configuration. It can be used to set off an alarm or strobe light to indicate that there is an issue.
2. Normally Closed (NC): when the is deactivated, it is “closed”. When a signal is received to activate the , the connection will “open”—providing an open circuit. This will allow whatever device that is connected to the to be deactivated (turned off) when a signal is sent to the to activate it. Ex: If there was a powered light connected to this to indicate that the system was up and running, when the signal to activate the is sent the light will turn off. Therefore, the user is made aware that there is an issue.

If a light was connected in the NO configuration with the default setting (not failsafe), then the light would not turn on in the event of a power loss. If the light was used in the NC configuration, the light would stay lit (provided the light is powered by a different source).

Failsafe Relays

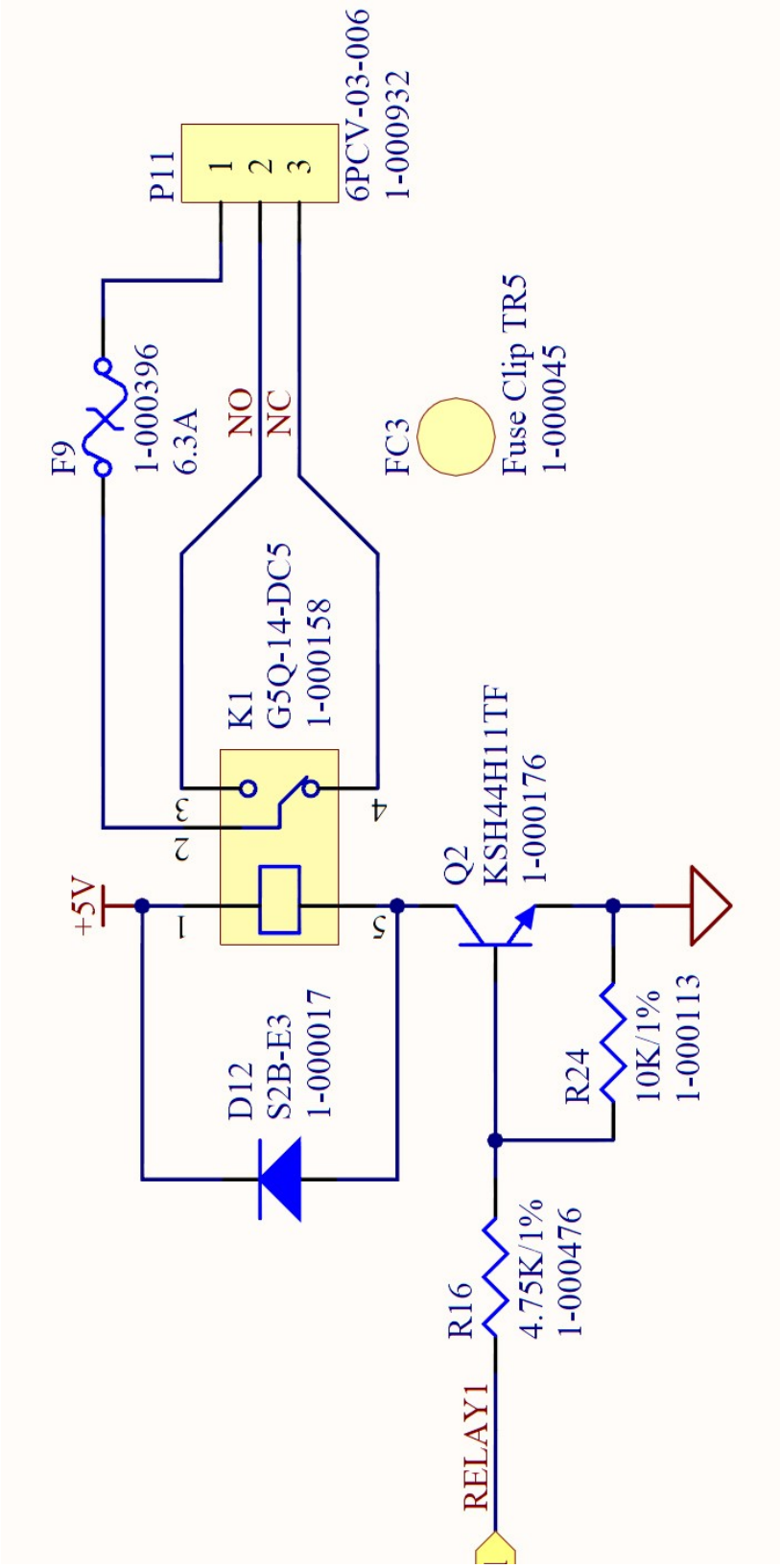
There is an option in Otis Instruments devices to set the relays as “failsafe” or “not failsafe”. This refers to what type of signal is being sent through the , which can be a “high” or a “low” (on or off). The default setting is “not failsafe”, which means that the devices will operate as described above.

Failsafe mode was introduced to be able to show a change in state (or alarm) in the event of a power loss. If the NO configuration was used in failsafe mode, it could indicate that there was a power loss by turning off of a light.

If the “failsafe” setting is used, the relays will behave as follows:

1. Normally Open (NO): when the is deactivated, it is “closed”. When a signal is received to activate the , the connection will “open”—leaving the circuit open. This means that if a light was configured to this connection in failsafe mode, it would be powered on until the activated—then the light would go out. This can be used to alert the user of an issue.
2. Normally Closed (NC): when the is deactivated, it is “open”. When a signal is received to activate the , the connection will “close”—providing an closed circuit. For instance, this configuration can be used to set off an alarm or strobe light to indicate that there is an issue.

If a light was connected in the NO configuration with the failsafe setting, then the light would not stay lit in the event of a power loss (provided the light has a separate power source). If the light was used in the NC configuration, then the light would turn on (provided the light has a separate power source).



Drawing 2: Schematic of Relay Circuit

Specifications

Operating Voltage:	12-35 VDC, 110/240 VAC
Input Signal:	RS-485 Modbus
Output (Internal Alarm Power):	+12-35 VDC (Fault Indicator) RS-485 Modbus
Current Draw:	250mA at 12 VDC
Channels:	32
Gases:	All that are supported by the sensor assemblies
Display:	Graphical LCD (160x104), transflective, sunlight readable, LED backlight
Relays:	Four Dry Contact (5 Amp) w/ 4 Amp Fuses
Protection:	Power EMI filter, surge suppression, RS-485 surge suppression
Enclosure:	Stahlin fiberglass, clear window
Enclosure Dimensions:	10” x 8” x 6”
Enclosure Mounting:	Wall Mount
Certifications:	NEMA 4 (enclosure only)
Warranty:	Hardware: One year (limited)

Hardware

Otis Instruments, Inc. (Manufacturer) warrants its products to be free of defects in workmanship and materials—under normal use and service—for one year from the date of purchase from the manufacturer or from the product's authorized reseller.*

The manufacturer is not liable (under this warranty) if its testing and examination disclose that the alleged defect in the product does not exist or was caused by the purchaser's (or any third party's) misuse, neglect, or improper installation, testing or calibrations. Any unauthorized attempt to repair or modify the product, or any other cause of damage beyond the range of the intended use, including damage by fire, lightening, water damage or other hazard, voids liability of the manufacturer.

In the event that a product should fail to perform up to manufacturer specifications during the applicable warranty period, please contact the product's authorized reseller—or visit the “Service” page at www.otisinstruments.com for repair/return information.

Any repaired or replaced product or part has either a 90-day warranty or the remainder of the initial warranty period (whichever is longer).

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