GEN²

Model OI-7032

32-Channel

Operation Manual

Revision 2.9.1w

OTIS INSTRUMENTS INC.

Product Overview

The Otis Instruments, Inc. Gen II OI-7032 (32-Channel) is a hybrid monitor and data logger that supports up to 32 WireFree sensor units, and up to four 4-20mA input sensors (when only 28 channels are setup as WireFree).

The OI-7032 is backward compatible with Gen I WireFree sensor units, and also supports Gen II Wirefree sensor units (configurable).

For additional information regarding the OI-7032, see the Appendices at the end of this operation manual.

Table of Contents

Product Overview 2
Introduction 5
Warnings 6
Complete System Diagrams 7
Front Panel 7
Internal Diagram 8
Terminal Board 9
Touchscreen (Front) 10
Touchscreen (Back) 10
AC (Delta) Power Supply 11
Internal Diagram – As Wired from the Factory 12
Internal Diagram – Completely Wired 13
Wiring Configurations 14
DC Power-in (24 Volts DC (nominal; 22-26 Volts DC)) 14
AC Power Supply Connection 17
Touchscreen Power Connection 19
Touchscreen Connection 22
Memory Installation 25
Connecting Sensors 27
Connecting Sensor 1 27
Connecting Sensor 2 29
Connecting Sensor 3 31
Connecting Sensor 4 33
Relay Configurations 35
Connecting Relay 1 35
Connecting Relay 2 37
Connecting Relay 3 39
Connecting Relay 4 41
Power On/Off 43
Basic Operation - Home Screen Navigation 44
Trend Chart 45
Real-Time Values 48
Time Since Last Calibration and Null 51
Autoscroll On/Off 53
Channel Configuration 54
Set as Wired or WireFree (Channels 29-32 ONLY) 57
Processing 57
Relay Configuration 58
Setting Radio Address (WireFree) 59
Setting Scale (Wired) 60
Setting Sensor Location 61
Duplicate Settings 62
Channel Off 64
Configuration Menu Navigation 65
Entering Configuration Menu 66
View Monitor Serial # 67
View Date Manufactured 67
Calibration Mode 68
Relay Tests 69
OI-7032 Restart 70
VIEW Modbus Output Settings: Address 71

VIEW Modbus Output Settings: Baud Rate 71
VIEW Radio Settings: Radio Timeout 72
VIEW Gen II Radio Settings: Network ID 72
VIEW Gen II Radio Settings: Primary or Secondary Monitor 73
VIEW OI-7032 Reset to Factory Default 73
VIEW Relay Settings: Relays 1-4 (Failsafe) 74
VIEW Relay Settings: Fault Terminal 74
VIEW Relay Settings: Fault Relay Assign 75
Configuration Menu Modifications (Second-Level Configuration Menu) 76
MODIFY Modbus Output Settings: Address 77
MODIFY Modbus Output Settings: Baud Rate 78
MODIFY Radio Settings: Radio Timeout 78
MODIFY Gen II Radio Settings: Network ID 79
MODIFY Gen II Radio Settings: Primary or Secondary Monitor 79
MODIFY OI-7032 Reset to Factory Default 80
MODIFY Relay Settings: Relays 1-4 (Failsafe) 80
MODIFY Relay Settings: Fault Terminal 81
MODIFY Relay Settings: Fault Relay Assign 81
Relay Indicator 82
Fault Indicator 83
Fault Status 83
Channel On Without Wired Sensor Connected (Fault) 84
F1: Check Sensor Cable 84
F4: Check Sensor Board 85
Error Messages 86
Double-Primary Error 86
Autoscroll Error 87
APPENDIX A: Software Installation 88
HMI Software 88
APPENDIX B: Reading USB Drive 92
Removing the USB Drive 92
Reading the USB Drive 92
Opening the Datalog Files 92
Opening the Easy Converter Software 93
Converting the Datalog File to an .xls (spreadsheet) File 95
Viewing the Datalog File 95
When Finished Reading the USB Drive 95
APPENDIX C: 4-20mA Loop Current Introduction 96
Overview 96
Calculations 96
Measuring Current 97
APPENDIX D: Modbus Information 98
APPENDIX E: Operation of Relays 99
"Dry" Contact and "Wet" Contact Relays 99
Normally Open and Normally Closed Relays 100
Failsafe Relays 100
APPENDIX F: Troubleshooting Guide 102
Specifications 104

Introduction

This document is an Operation Manual containing diagrams and step-by-step instruction for proper operation of the Otis Instruments, Inc. Gen II OI-7032. 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.

Warnings

- The OI-7032 should only be used in an environment that constantly remains between the range of -20 to 122 degrees Fahrenheit. If the OI-7032 is at risk of being exposed to temperatures that are outside the previously stated range, DO NOT install the device in that location. For applications in areas with the potential of reaching extreme temperatures, Otis Instruments recommends using the OI-7032 indoors only (in a temperature-controlled environment).

- Even when the Power switch is in the off position, the AC and DC terminals are still hot—regardless of if the device is wired as DC.

- Wiring Configuration Warnings:

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

  - Provide a clean and stable 24 Volts DC (nominal; 22-26 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 26 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 manufacturer for specific details. Otis Instruments, Inc. may also be contacted to provide guidance and recommendations.

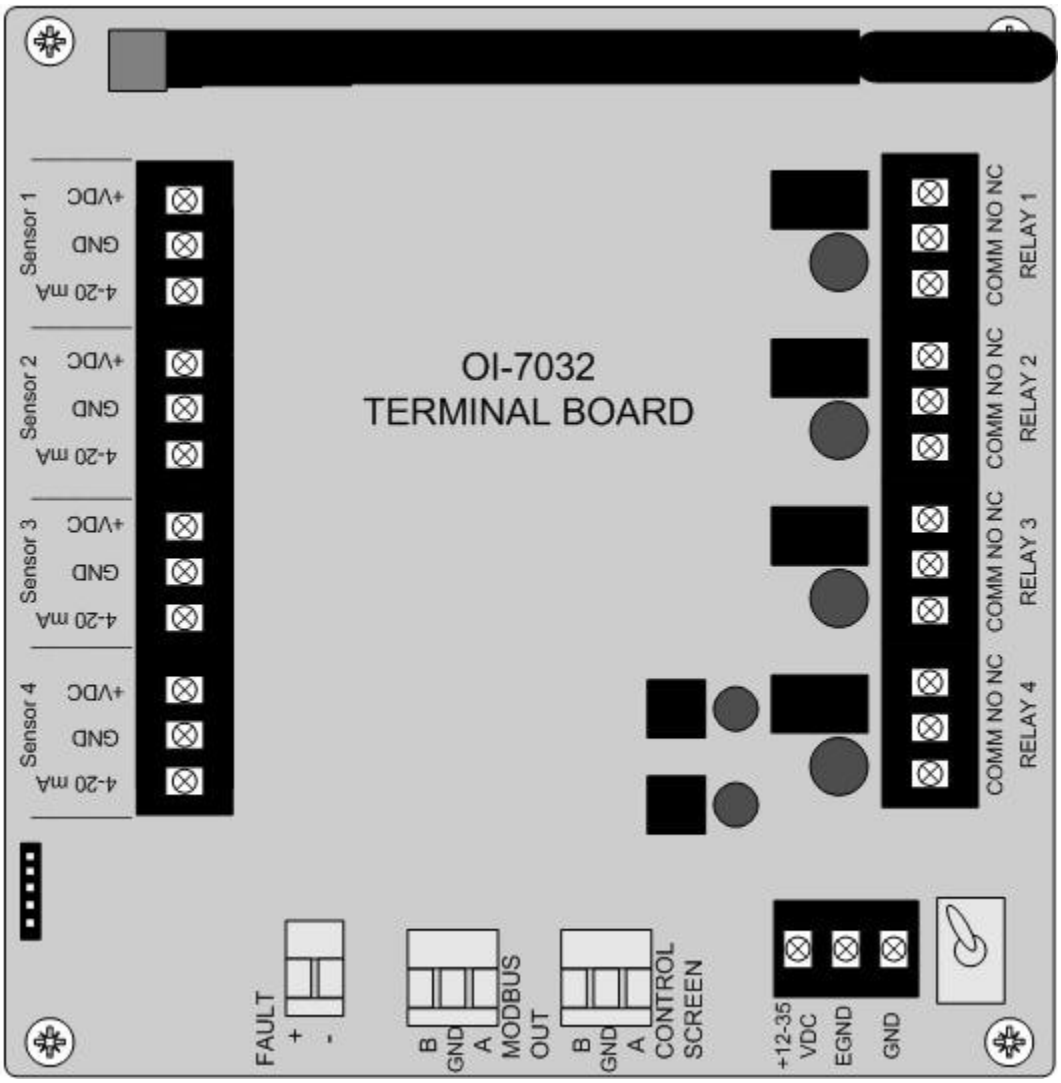
Complete System Diagrams

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

Front Panel

Internal Diagram

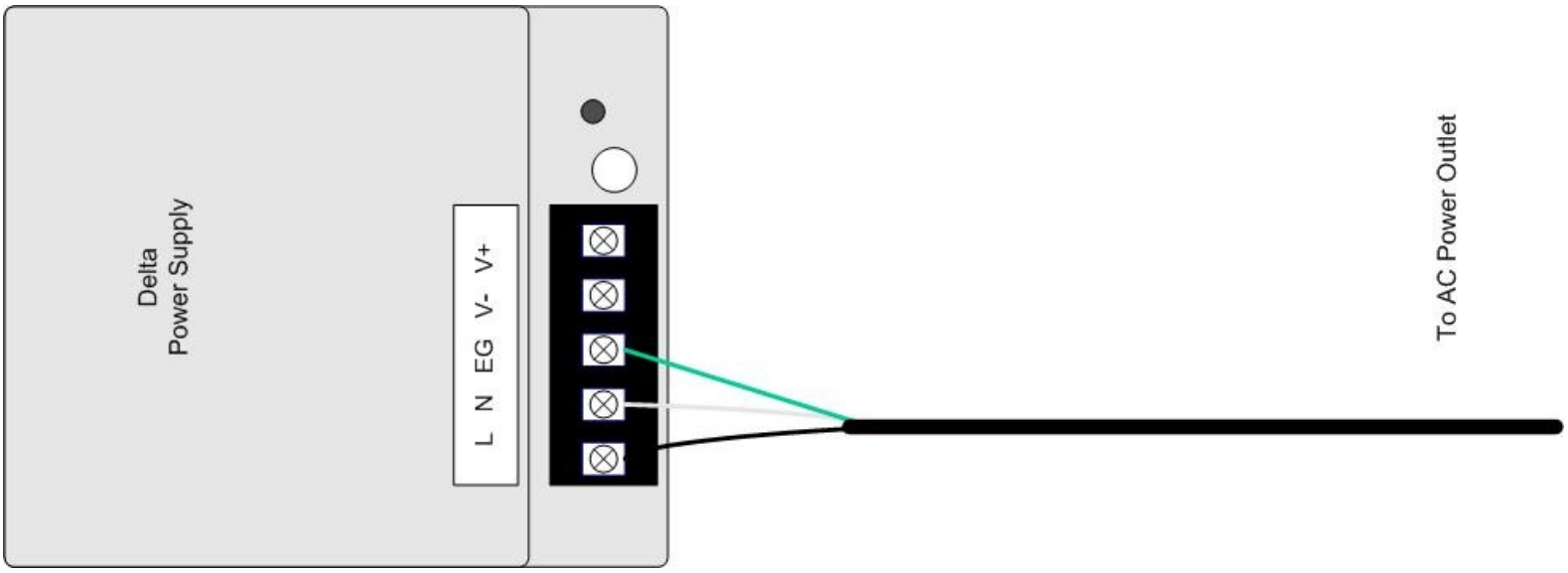
Terminal Board



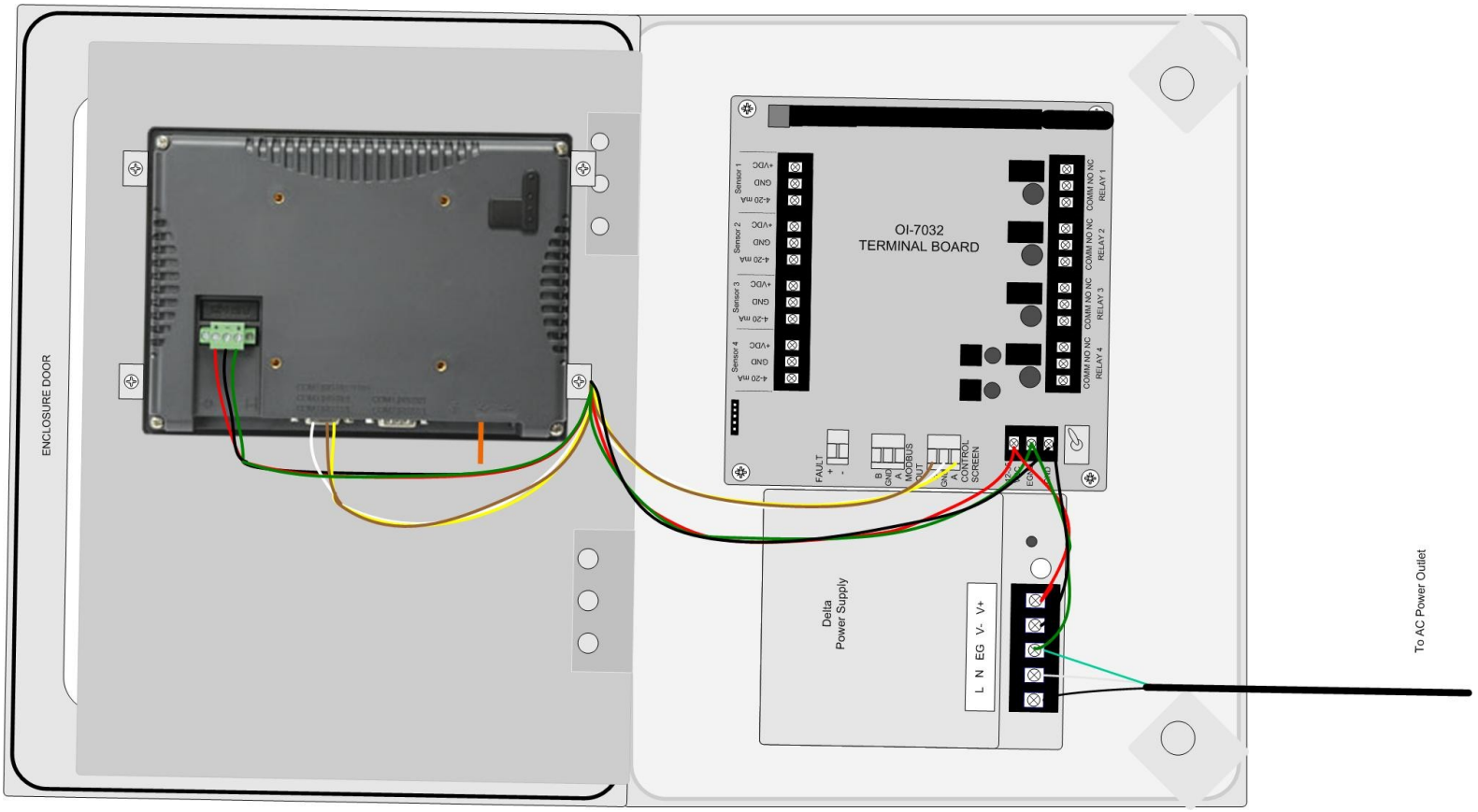
Touchscreen (Front)

Touchscreen (Back)

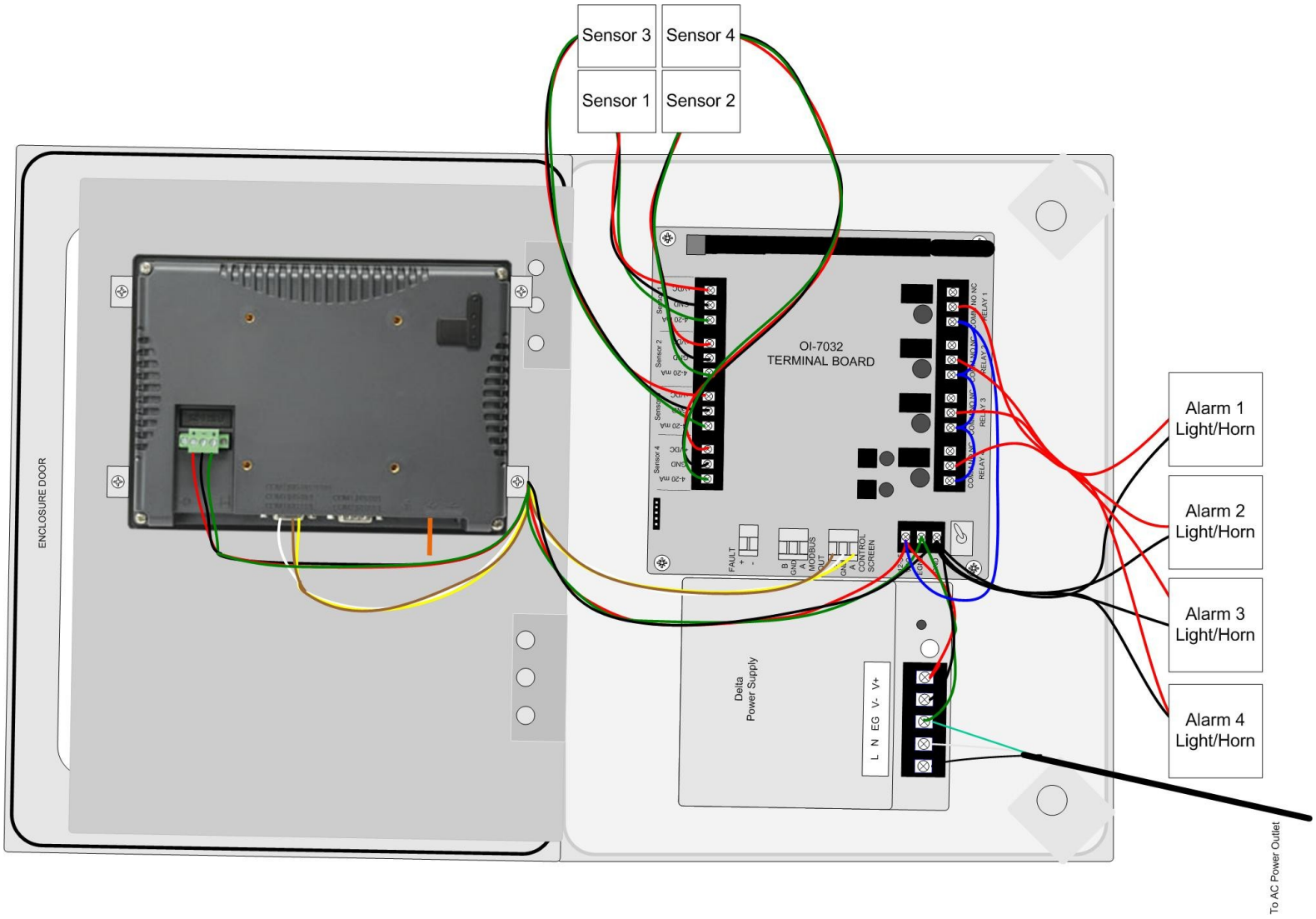
AC (Delta) Power Supply



Internal Diagram – As Wired from the Factory



Internal Diagram – Completely Wired



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 (24 Volts DC (nominal; 22-26 Volts DC))

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

When wiring the device, the following should be considered:

- Provide a clean and stable 24 Volts DC (nominal; 22-26 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 26 Volts may damage the unit.

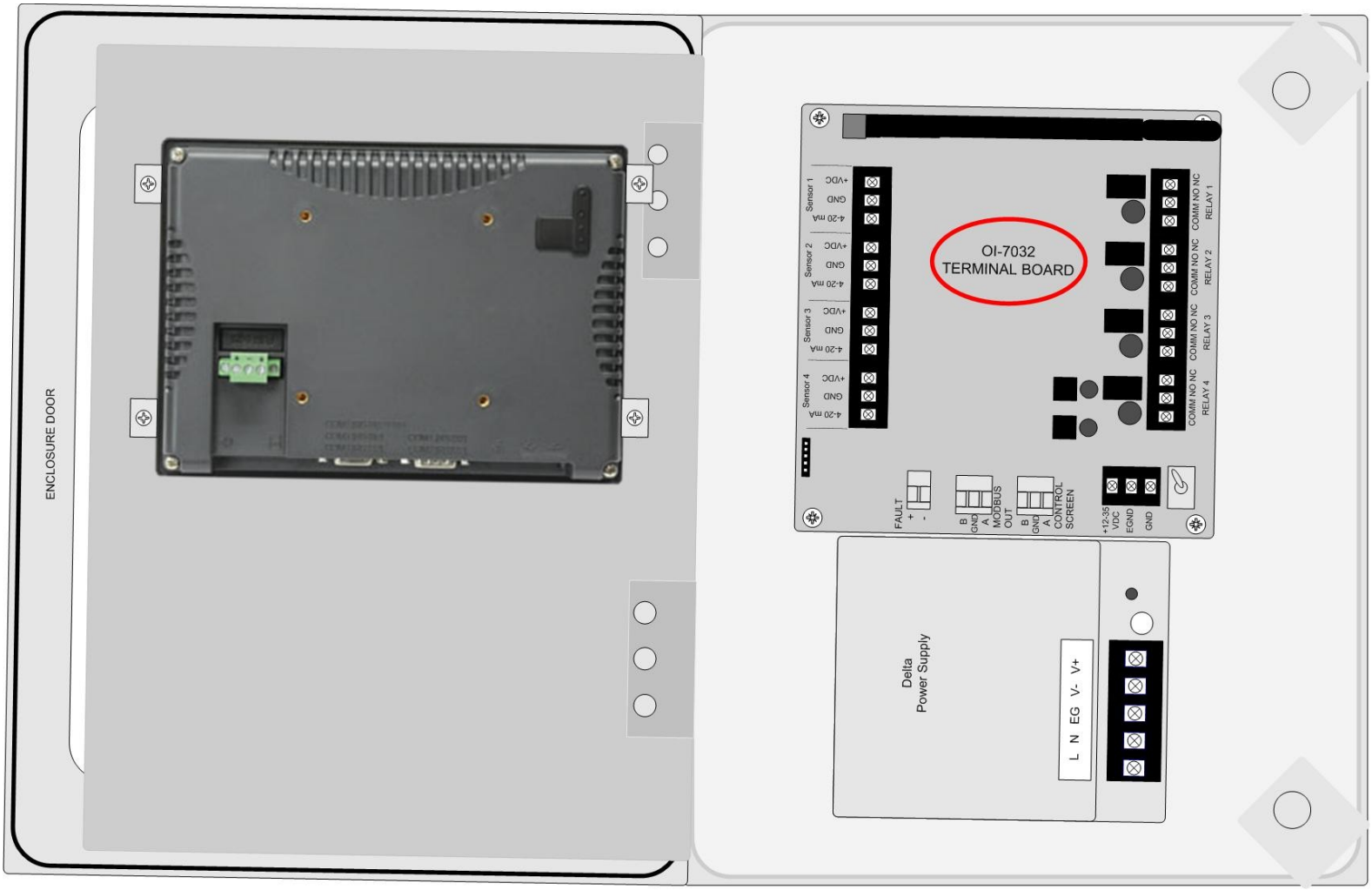
- Solar Panel power (with battery backup): This options may be used to power the unit, however, care must be taken to ensure the proper voltage and wattage is used.

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.

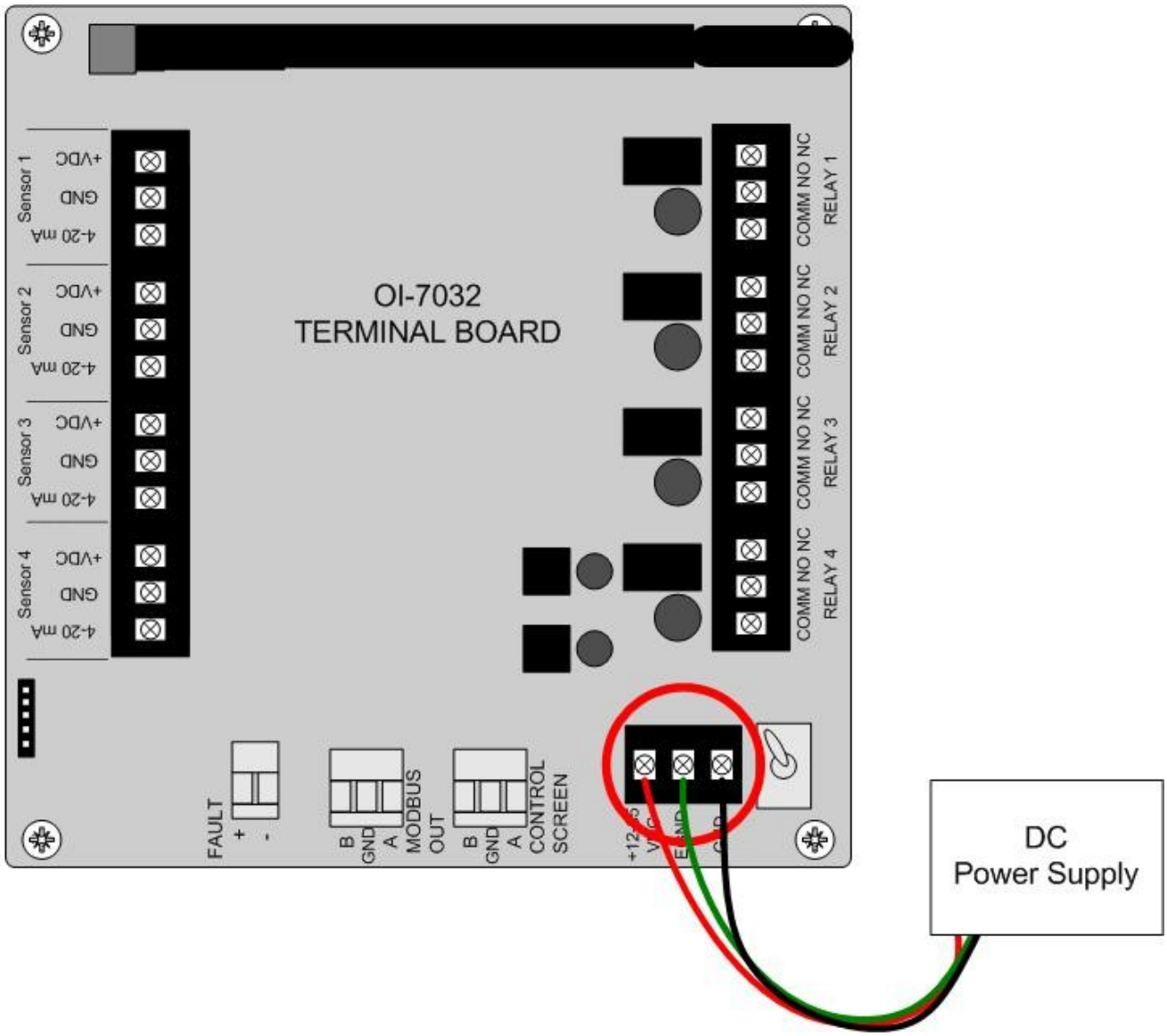
Please consult a solar panel manufacture for specific details. Otis Instruments, Inc. may also be contacted to provide guidance and recommendations.

DC Power-in (24 Volts DC (nominal; 22-26 Volts DC)) cont...

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.



4. Locate the Power Terminal (on the lower right side of the Terminal Board).
5. Connect the DC Power Supply live wire (red) to the terminal marked “+12-35 VDC”.



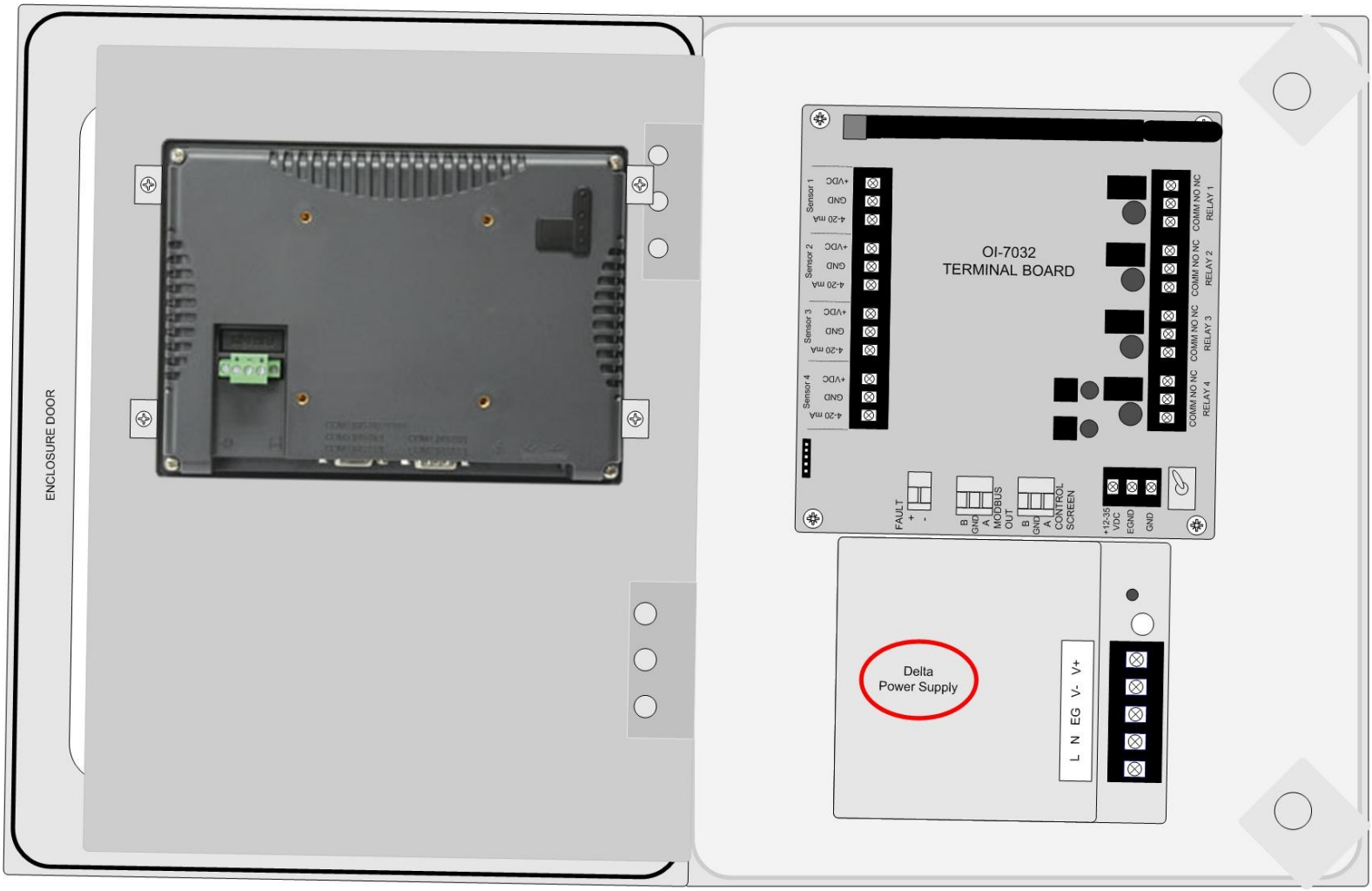
6. Connect the DC Power Supply Ground wire (black) to the terminal marked “GND”.
7. If desired, connect an Earth Ground wire (green) to the terminal marked “EGND” (required for surge suppression).
8. Close the Front Panel.
9. Screw in the thumb-screws.
10. Close the enclosure box.

AC Power Supply Connection

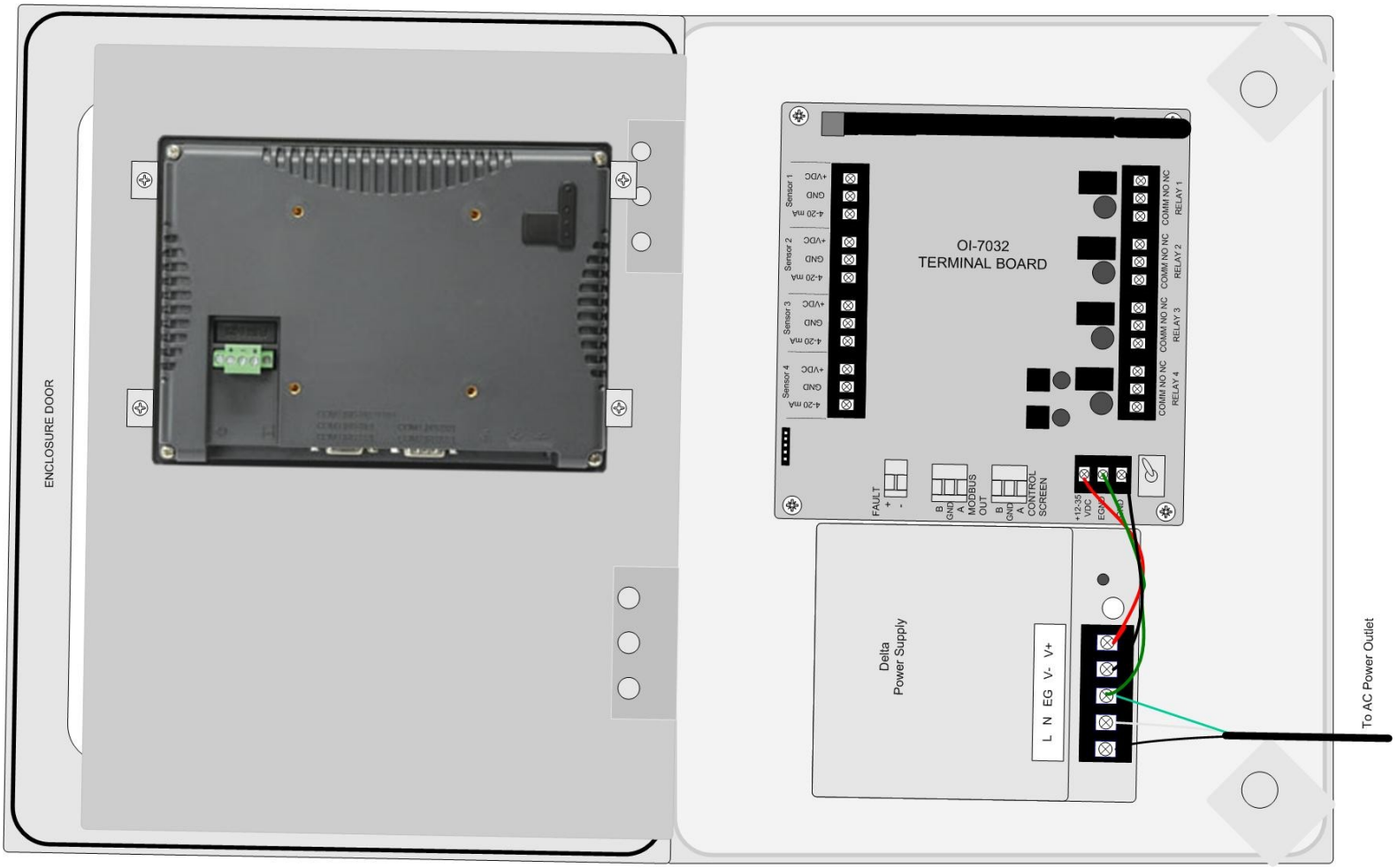
For AC Power applications, the Delta Power Supply located below the Terminal Board should be used.

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.

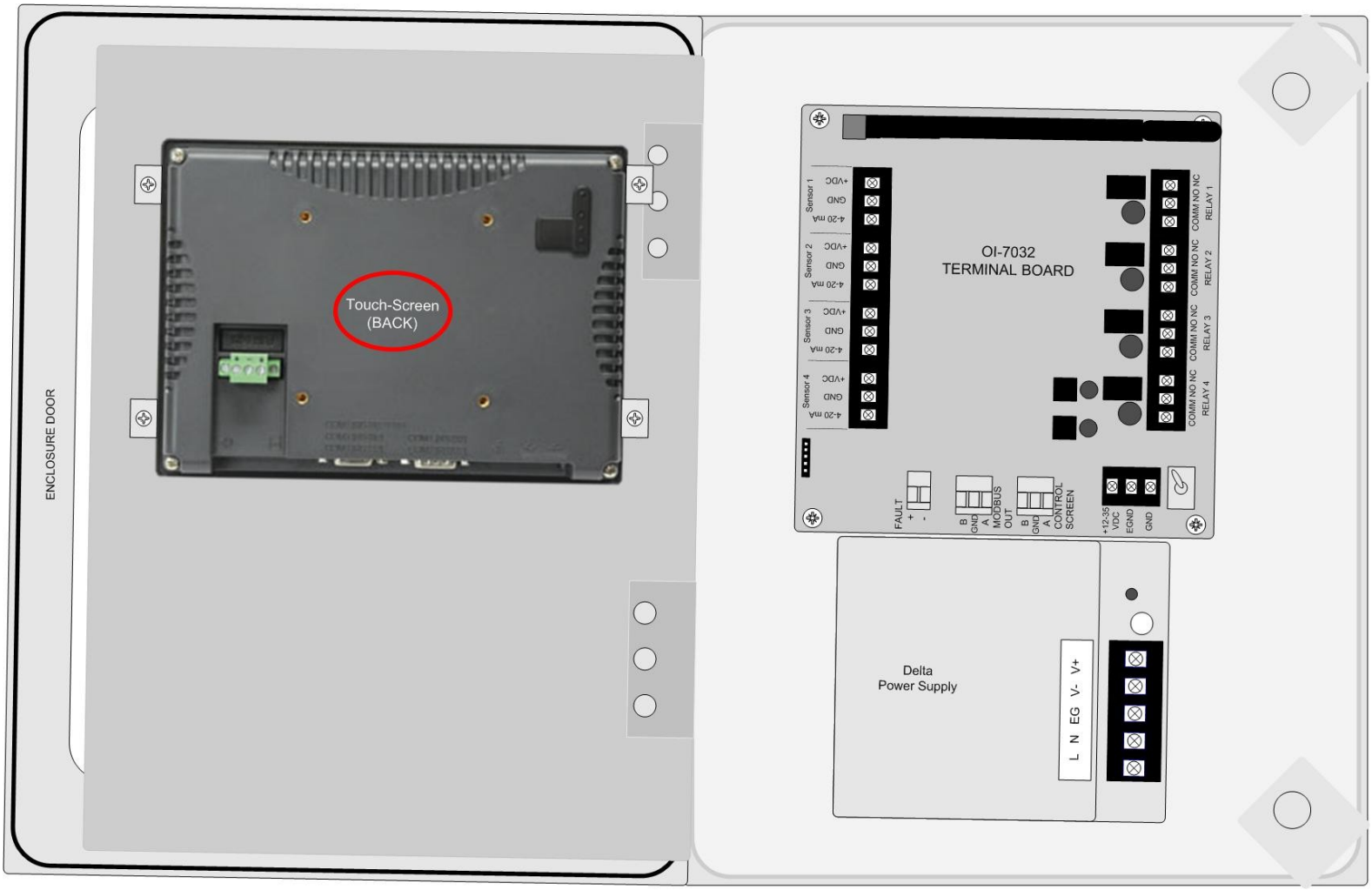


9. Close the Front Panel.
10. Screw in the thumb-screws.
11. Close the enclosure box.

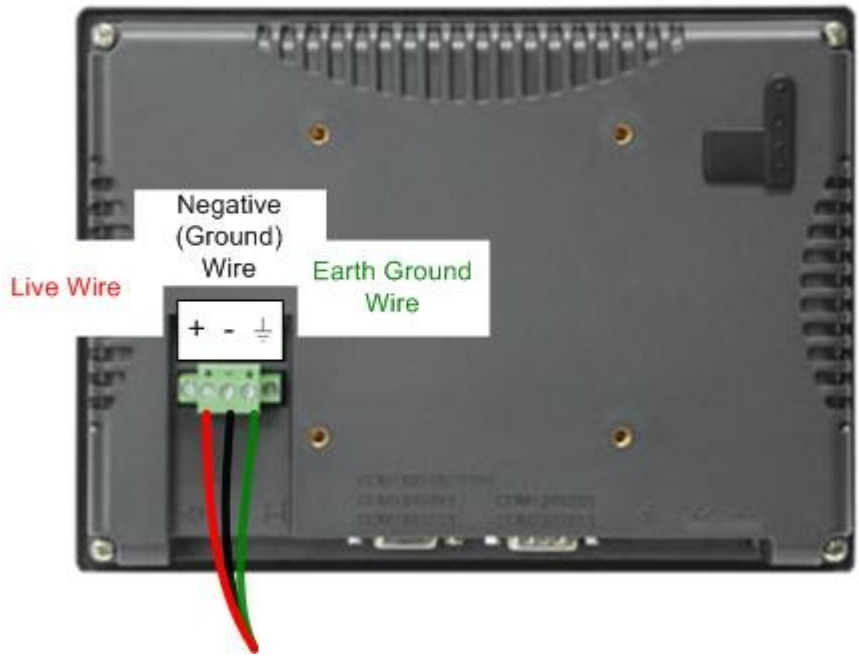
Touchscreen Power Connection

NOTE: The Touchscreen power connection will be pre-wired for use when the unit is shipped from Otis Instruments, Inc.

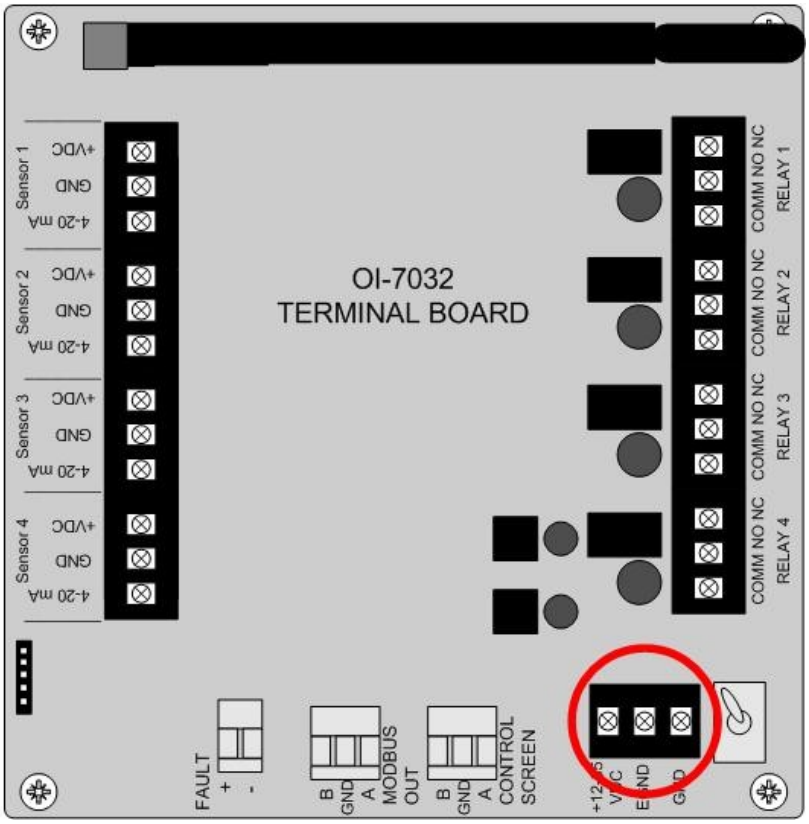
1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb-screws on the Front Panel.
3. Open the Front Panel so that the back of the Touchscreen is exposed.



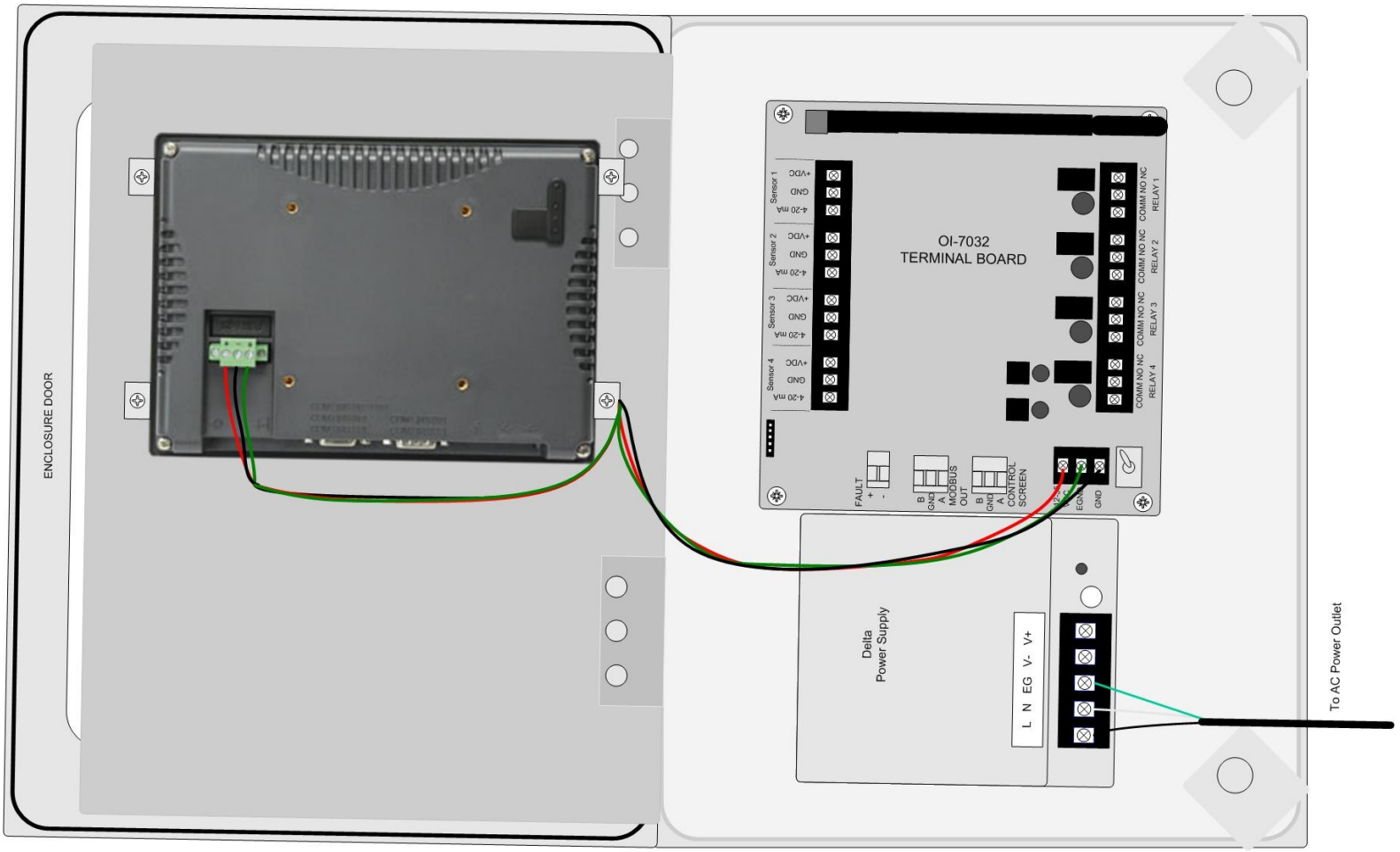
4. Locate the Touchscreen's Power Terminal.
5. Connect the positive DC Supply wire (red) to the terminal labeled “+”.
6. Connect the negative DC Supply wire (black) to the terminal labeled “-”
7. Connect an earth ground wire (green) to the ground terminal.



8. Locate the Power Supply Terminal Block on the Terminal Board.



9. Connect the positive DC Supply wire (red) to the terminal labeled “12-32 VDC” on the Power Supply Terminal Block.
10. Connect the negative DC Supply wire (black) to the terminal labeled “GND” on the Power Supply Terminal Block.
11. Connect the earth ground wire (green) to the terminal labeled “EGND” on the Power Supply Terminal Block.

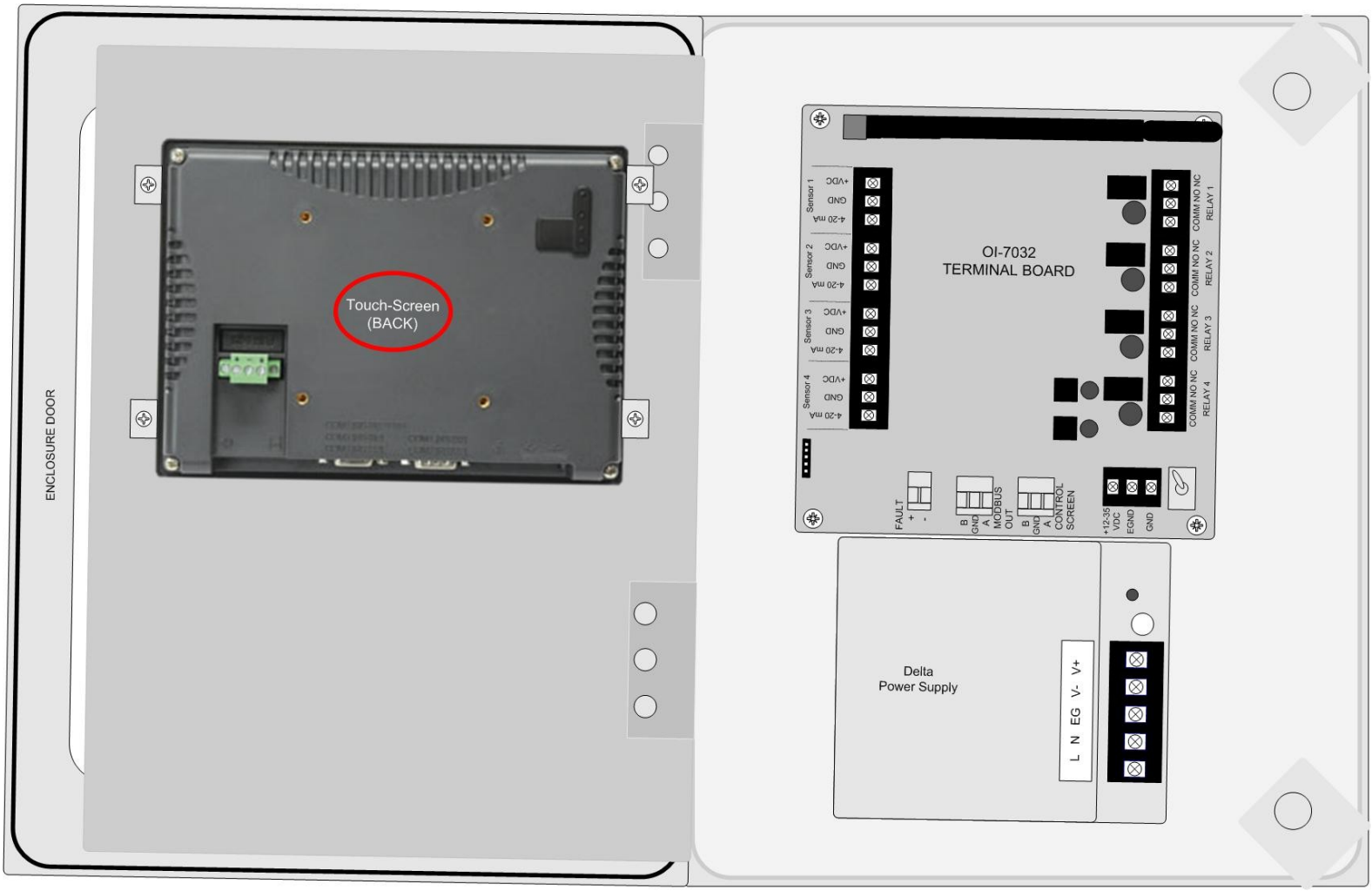


12. Close the Front Panel.
13. Screw in the thumb-screws.
14. Close the enclosure box.

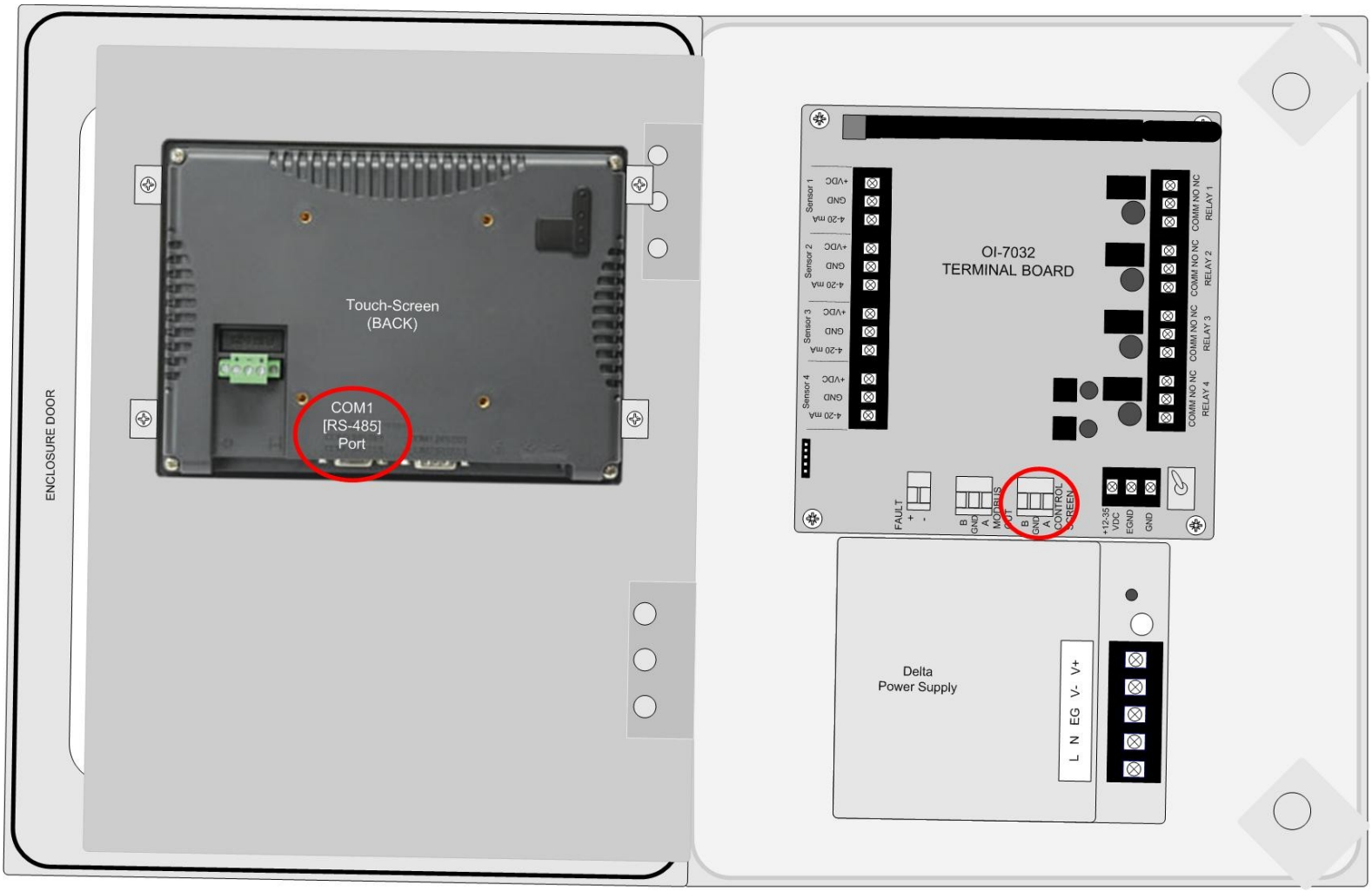
Touchscreen Connection

NOTE: The OI-7032 Touchscreen will be pre-wired when the unit is 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 back of the Touchscreen is exposed.

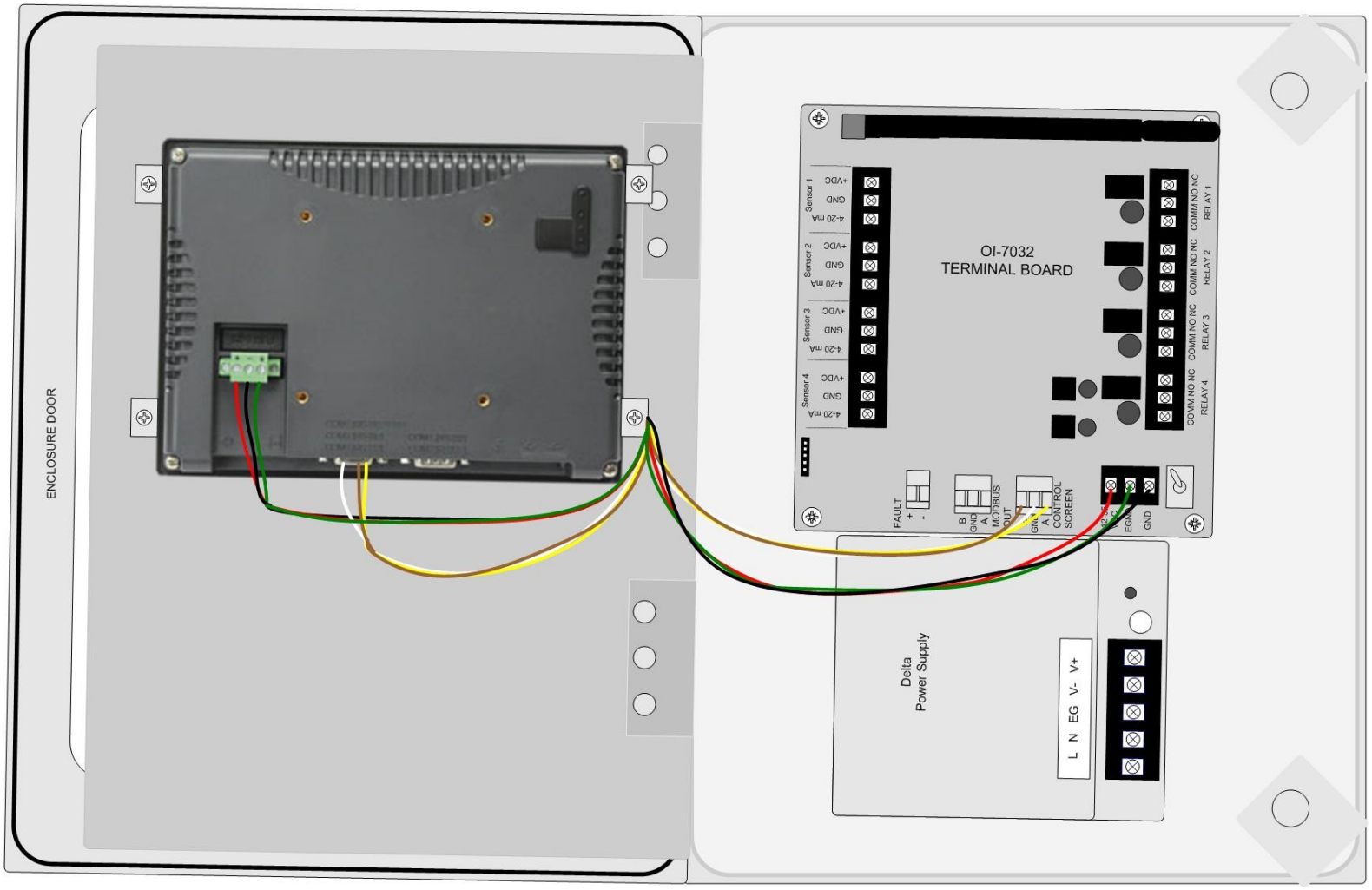


4. Locate the COM Port and the Control Screen Terminal Block.



5. Plug the DB-9 connector into the COM1 Port.

6. Connect the yellow wire from the DB-9 connector to the terminal labeled “A” on the Control Screen Terminal Block.
7. Connect the white wire from the DB-9 connector to the terminal labeled “GND” on the Control Screen Terminal Block.
8. Connect the brown wire from the DB-9 connector to the terminal labeled “B” on the Control Screen Terminal Block.



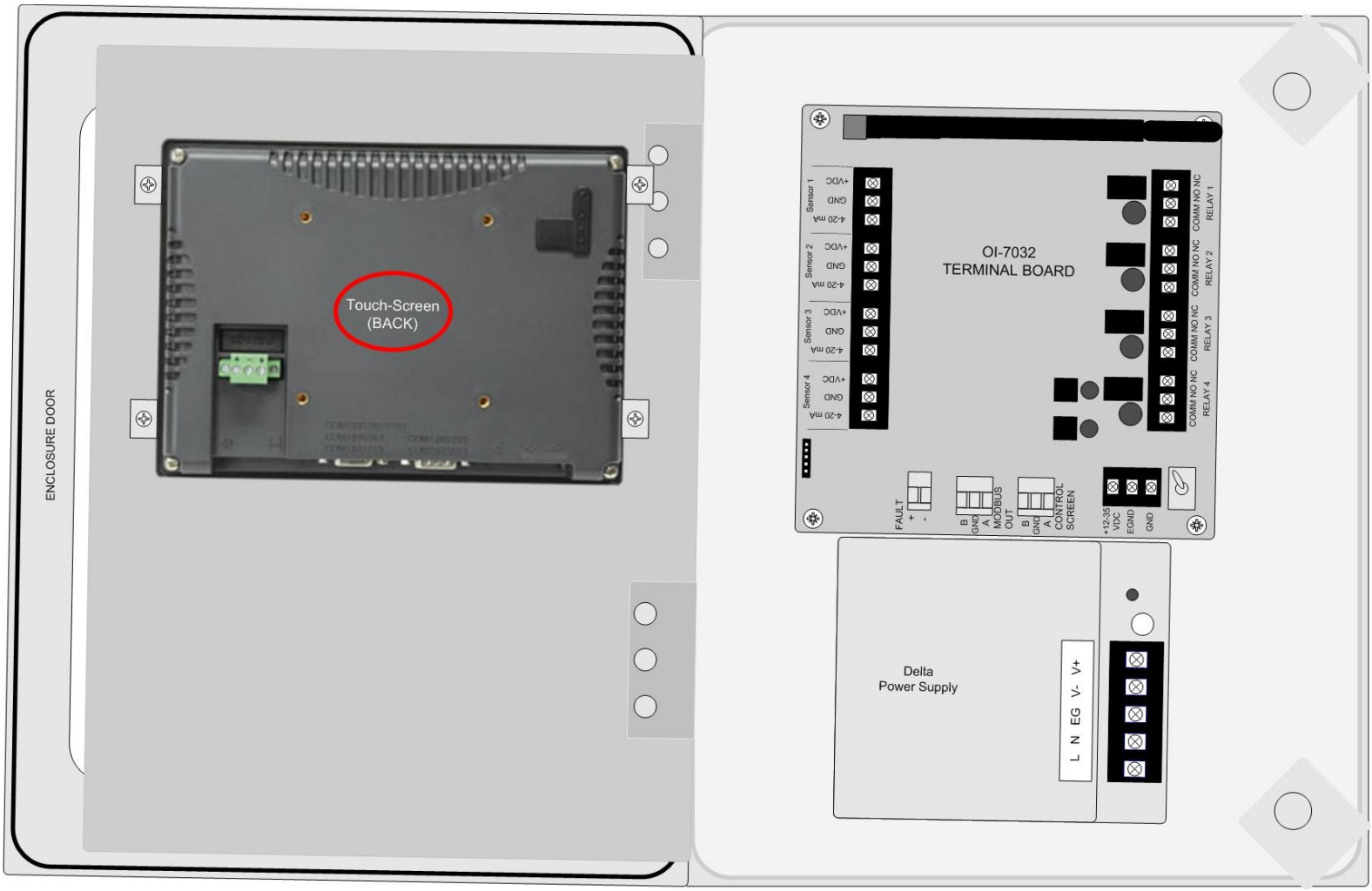
9. Close the Front Panel.
10. Screw in the thumb-screws.
11. Close the enclosure box.

Memory Installation

NOTE: The maximum USB capacity is 2GB.

NOTE: The OI-7032 USB will be pre-installed in the touch-screen when the unit is 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 back of the Touchscreen is exposed.



4. Locate the USB Port on the back of the Touchscreen.

5. Insert a USB into the USB Port.

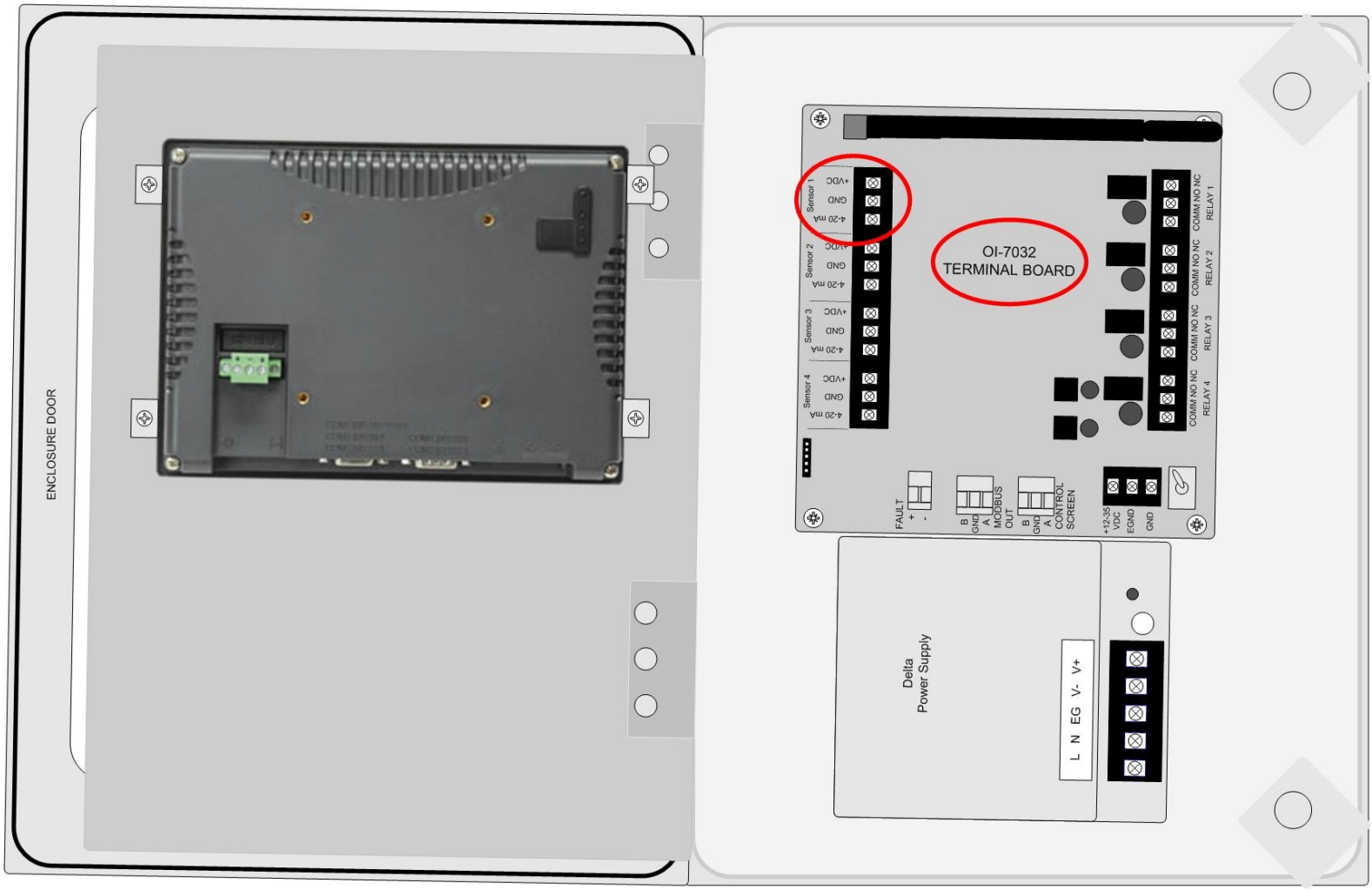
6. Close the Front Panel.
7. Screw in the thumb-screws.
8. Close the enclosure box.

Connecting Sensors

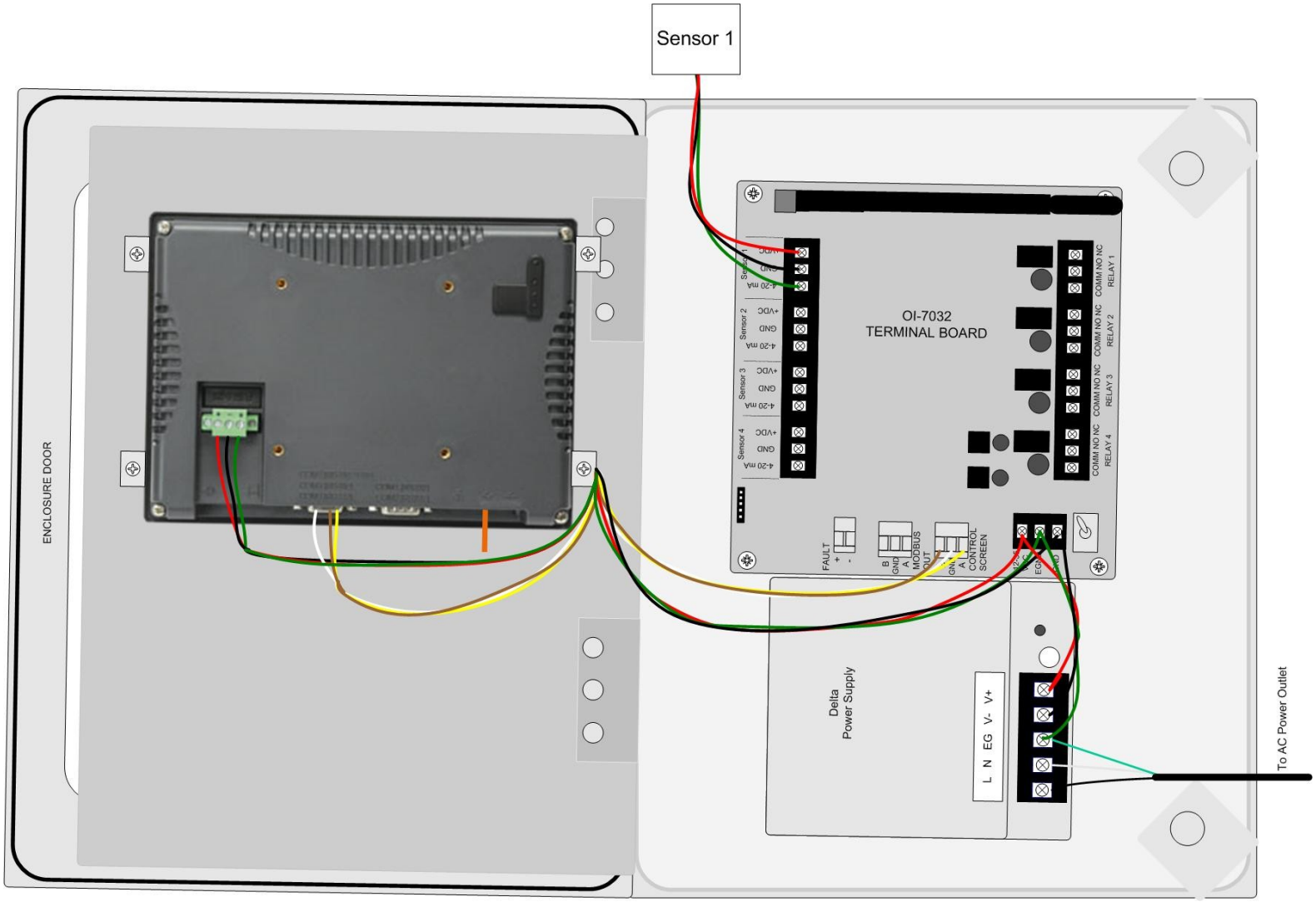
The OI-7032 is capable of monitoring up to four wired (4-20mA) sensors. Sensor connection should be completed according to the following instructions.

Connecting Sensor 1

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

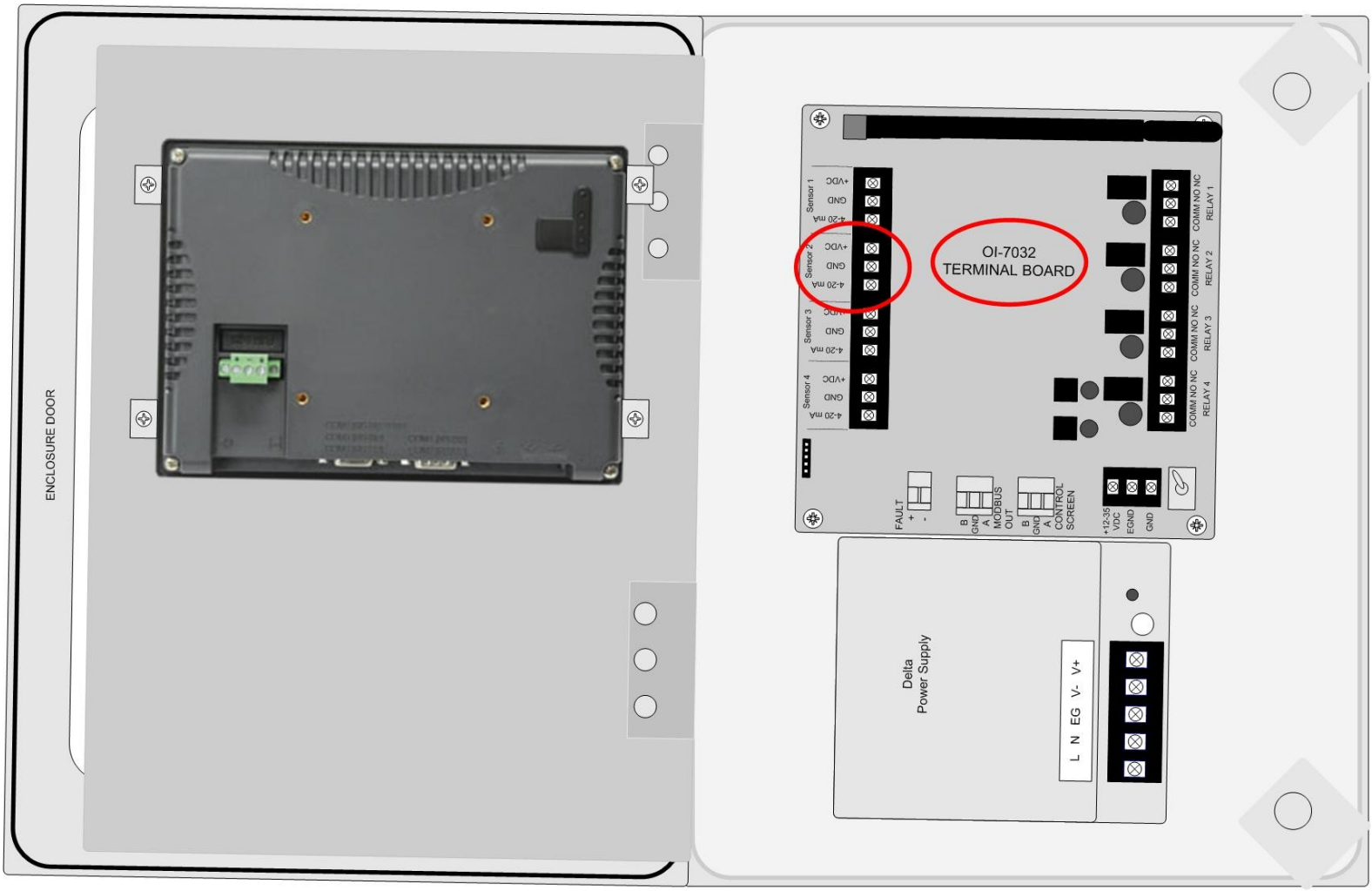


2. Connect the positive (red) wire to the terminal labeled “+VDC”.
3. Connect the signal (green) wire to the terminal labeled “4-20mA”.
4. Connect the neutral (black) wire to the terminal labeled “GND”.

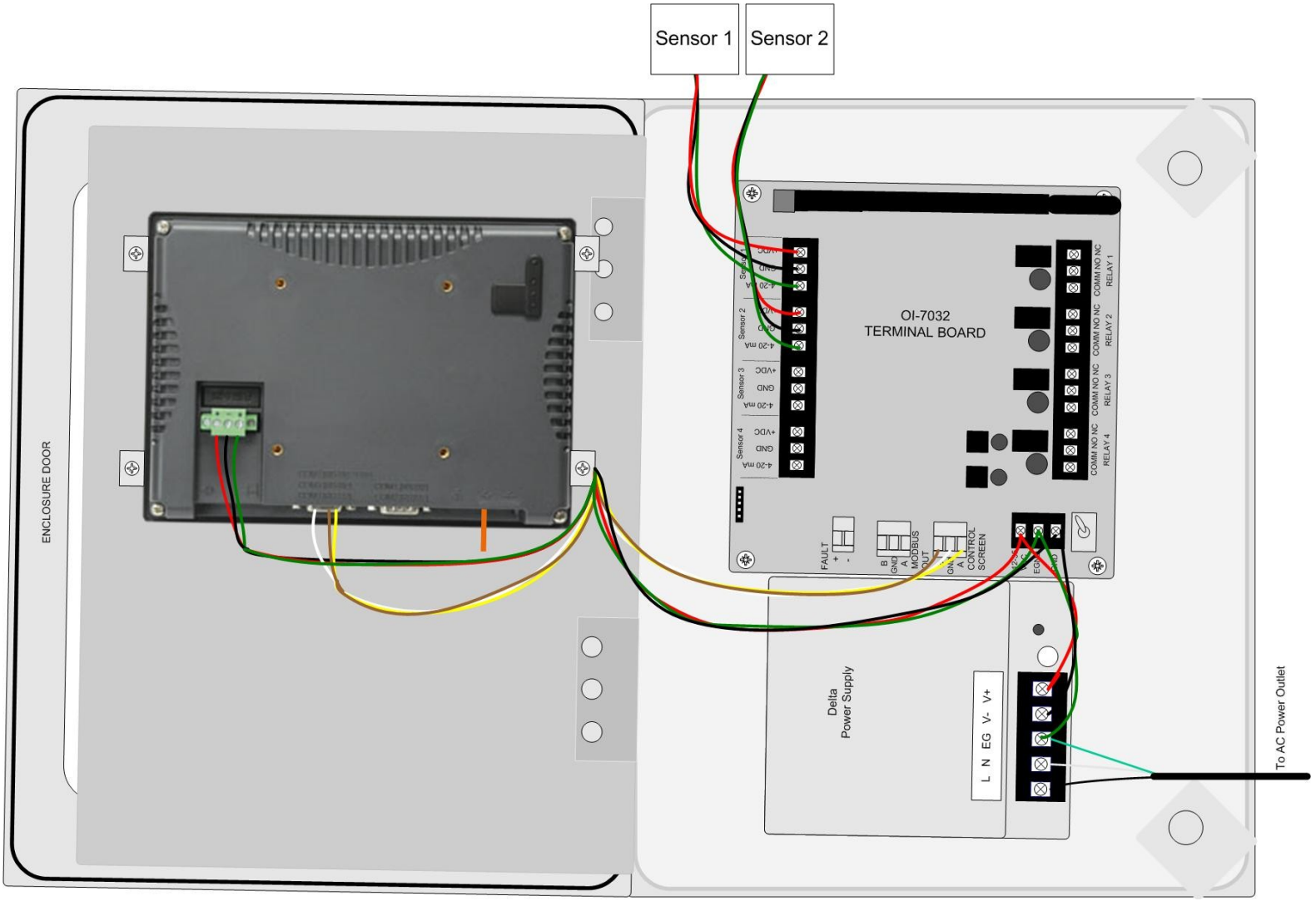


Connecting Sensor 2

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

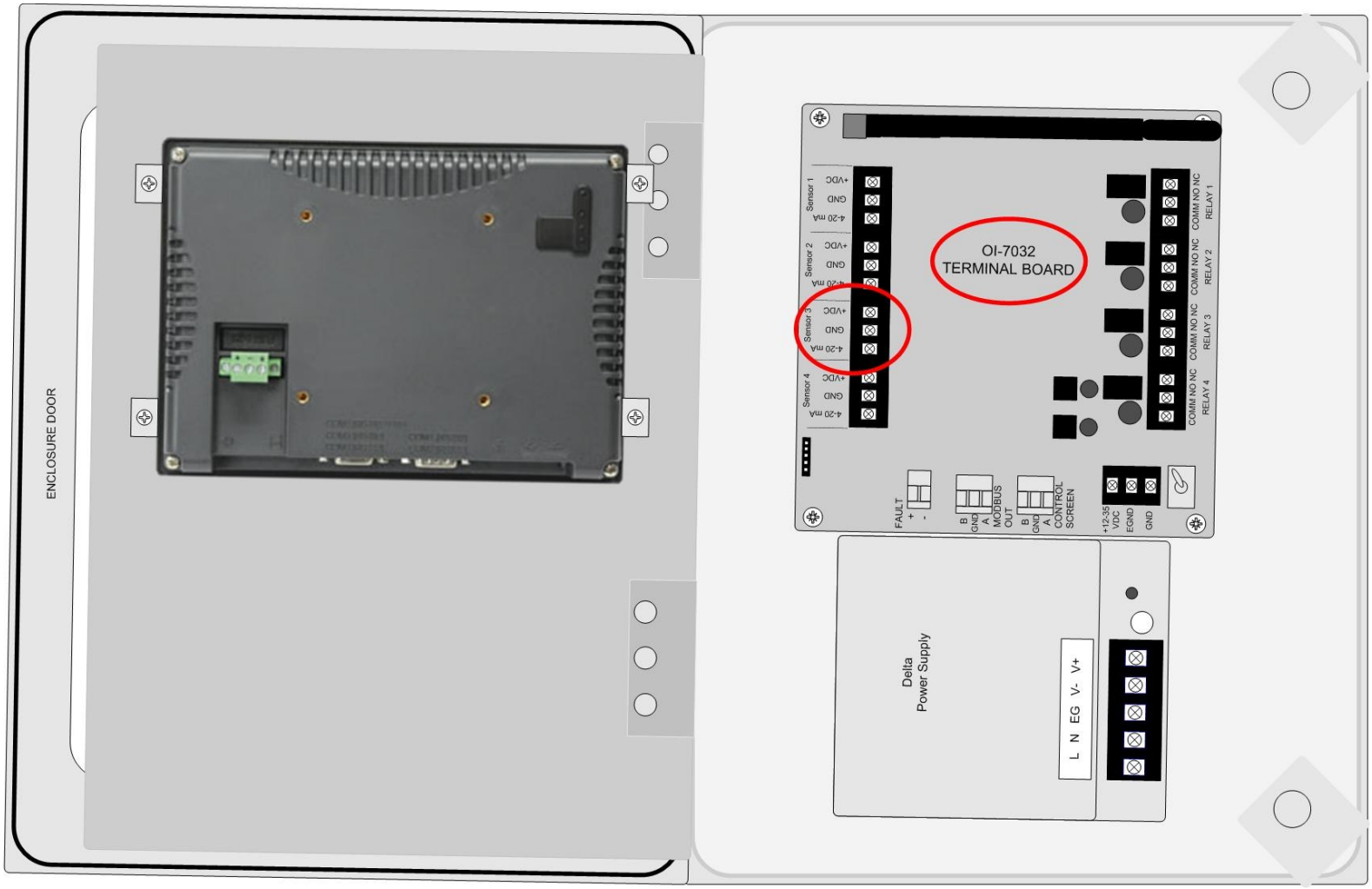


2. Connect the positive (red) wire to the terminal labeled “+VDC”.
3. Connect the signal (green) wire to the terminal labeled “4-20mA”.
4. Connect the neutral (black) wire to the terminal labeled “GND”.



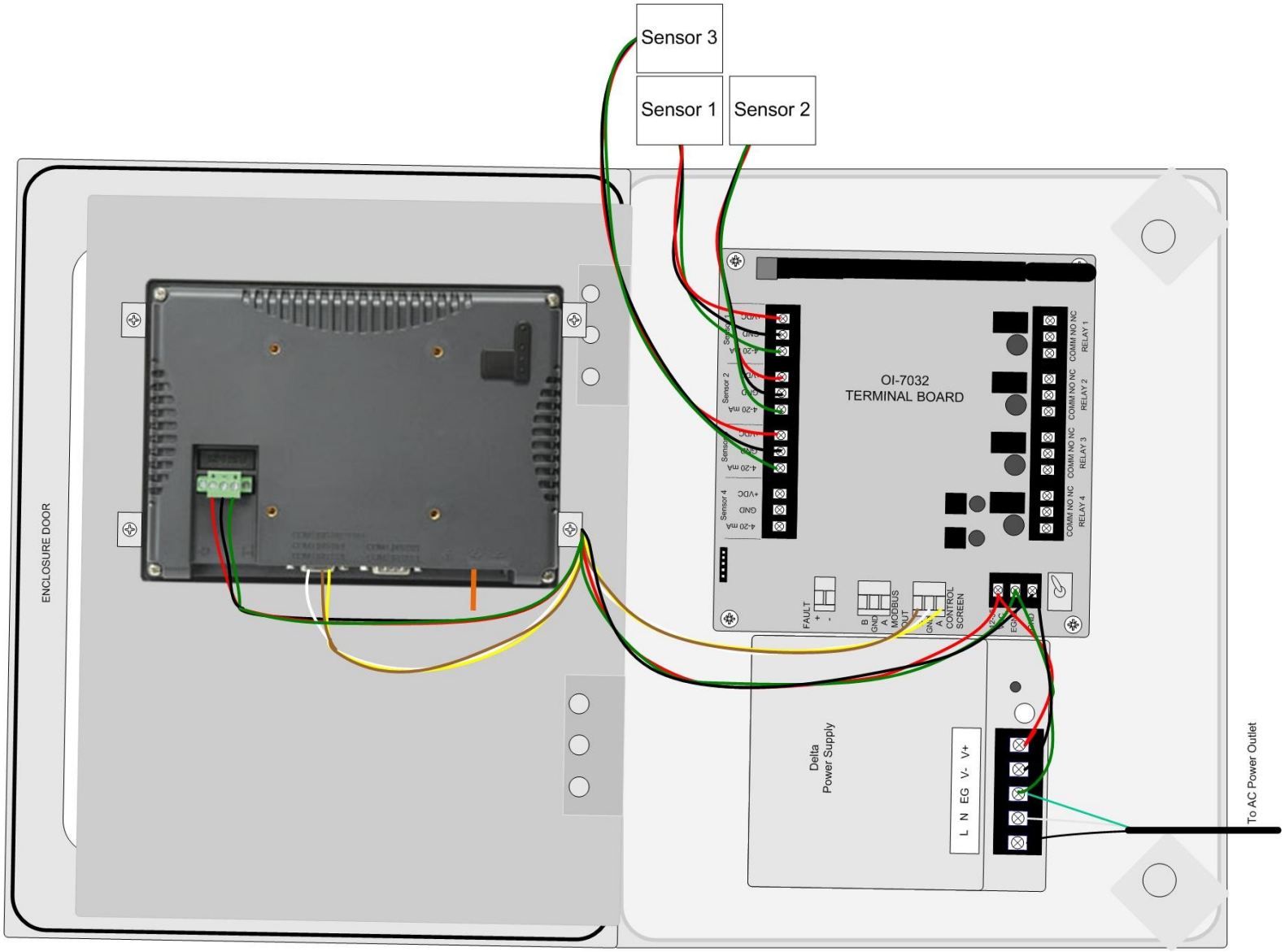
Connecting Sensor 3

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



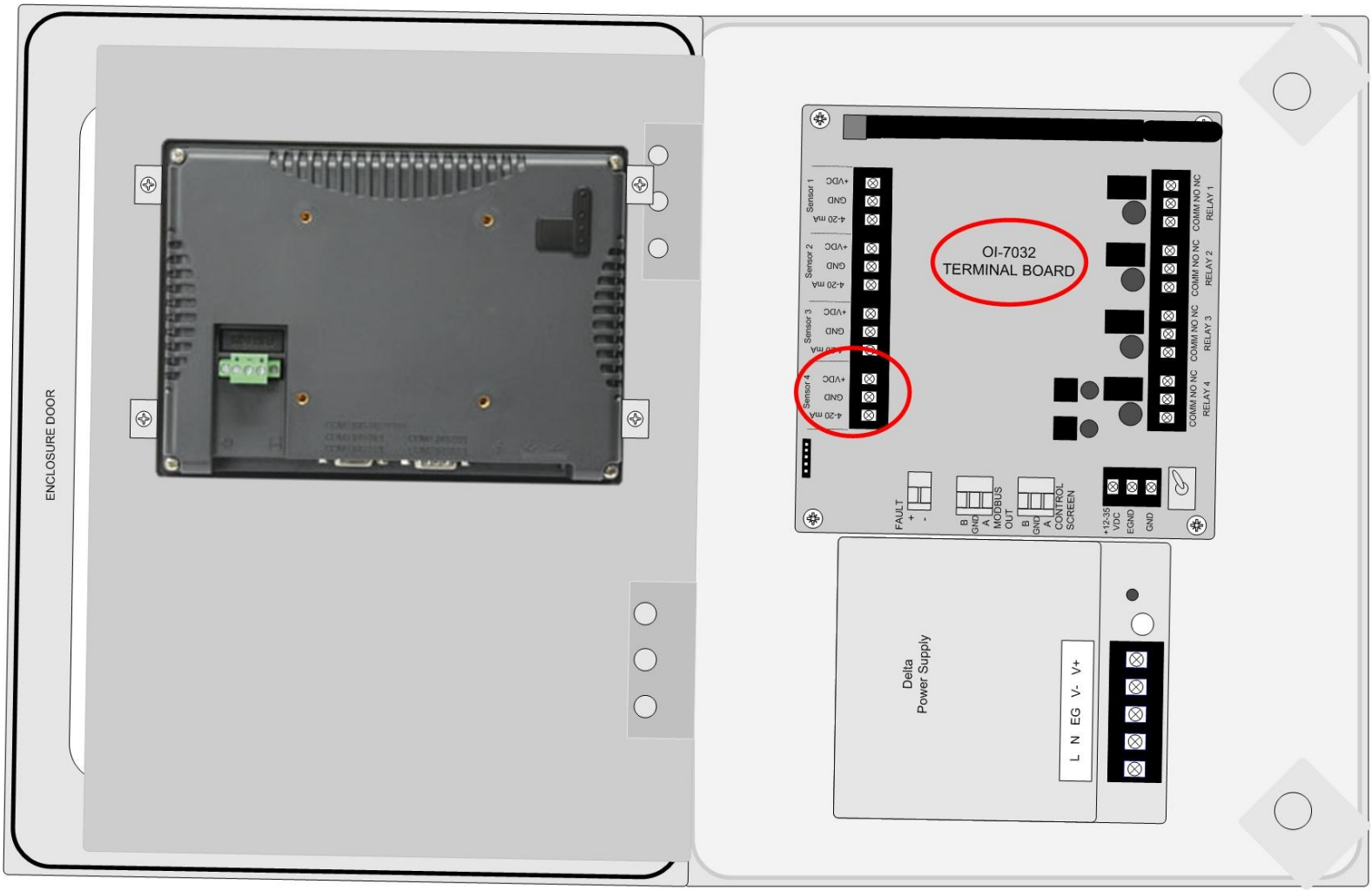
Connecting Sensor 3 cont...

2. Connect the positive (red) wire to the terminal labeled “+VDC”.
3. Connect the signal (green) wire to the terminal labeled “4-20mA”.
4. Connect the neutral (black) wire to the terminal labeled “GND”.

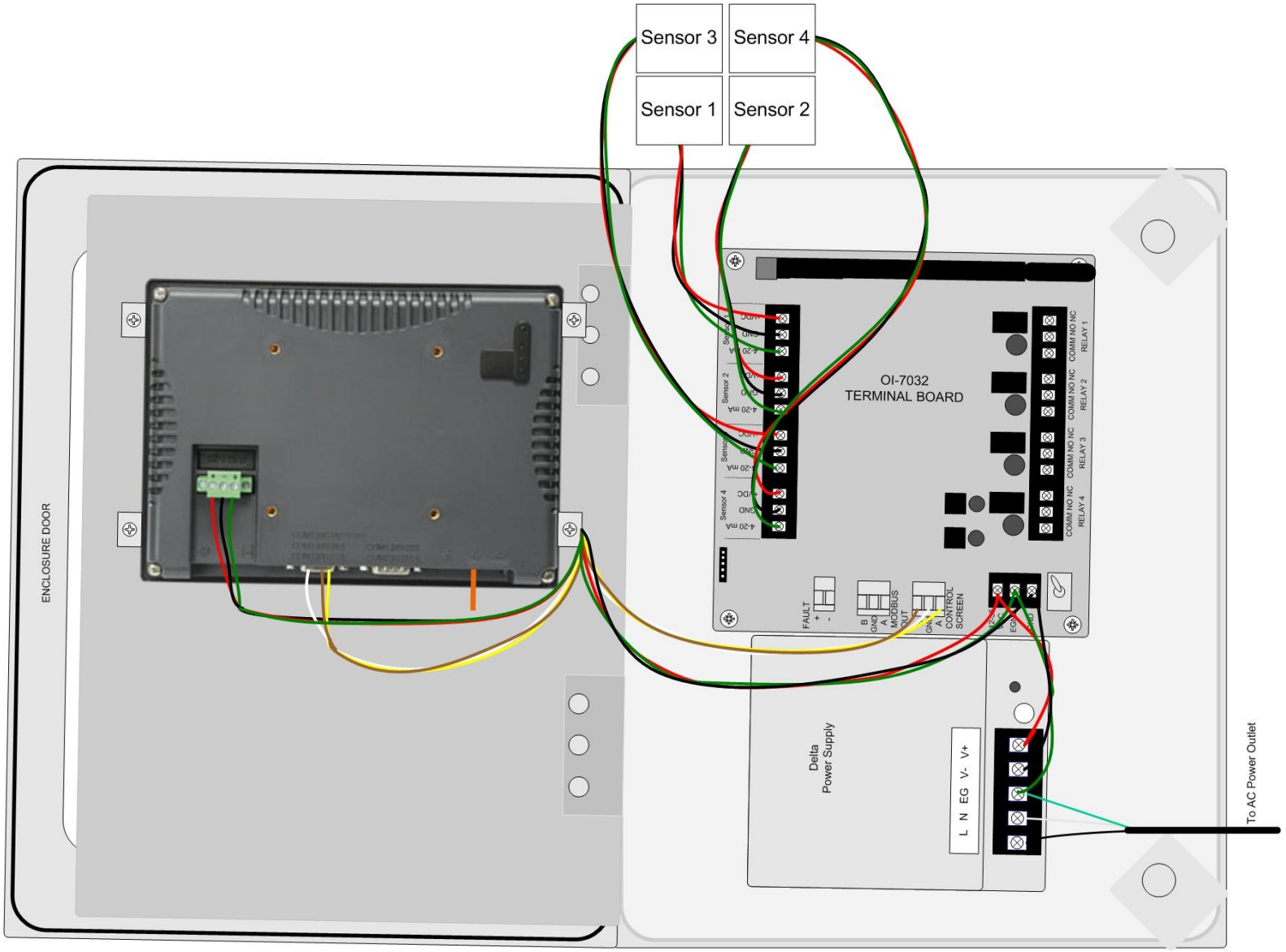


Connecting Sensor 4

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



2. Connect the positive (red) wire to the terminal labeled “+VDC”.
3. Connect the signal (green) wire to the terminal labeled “4-20mA”.
4. Connect the neutral (black) wire to the terminal labeled “GND”.

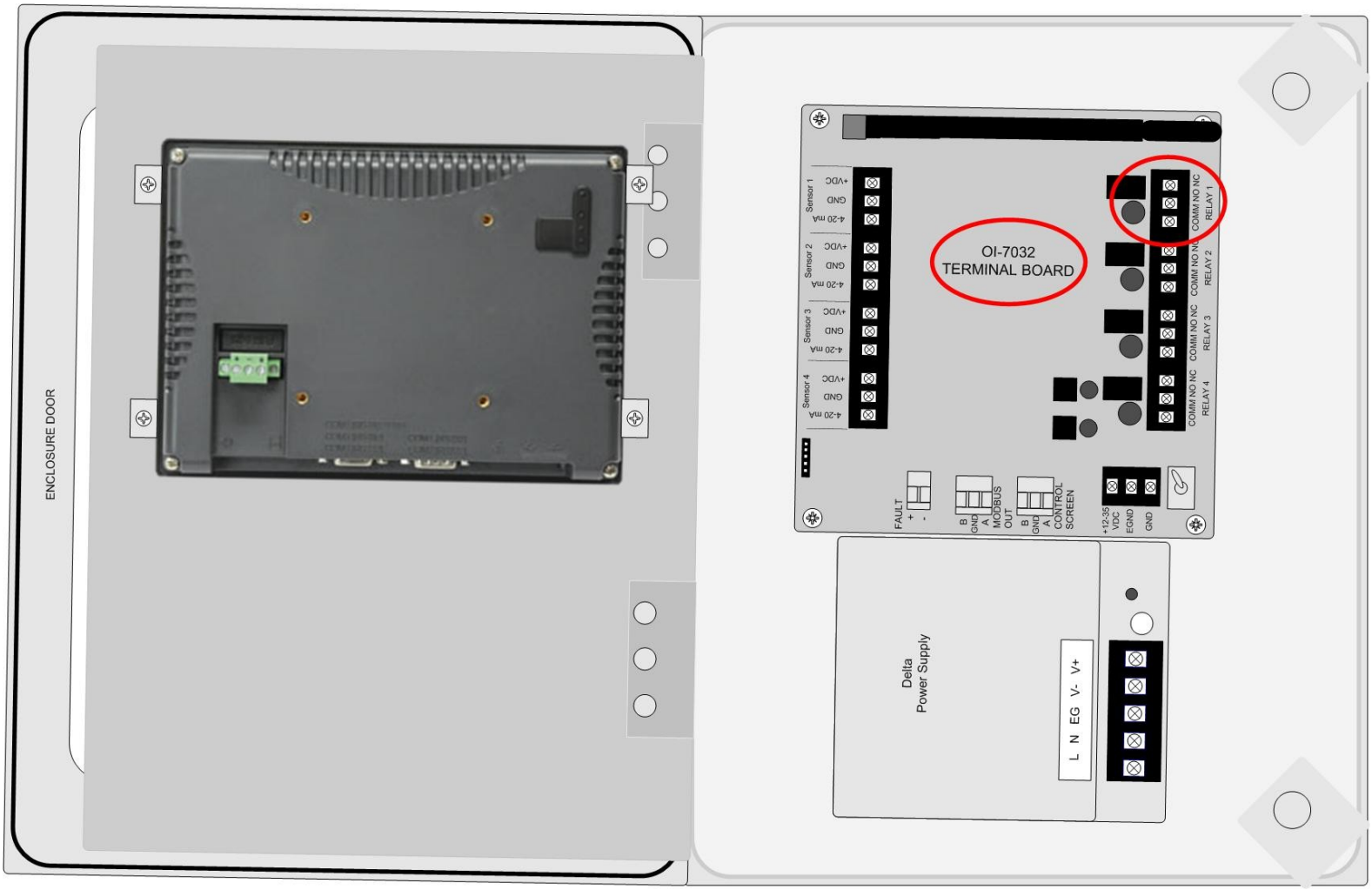


Relay Configurations

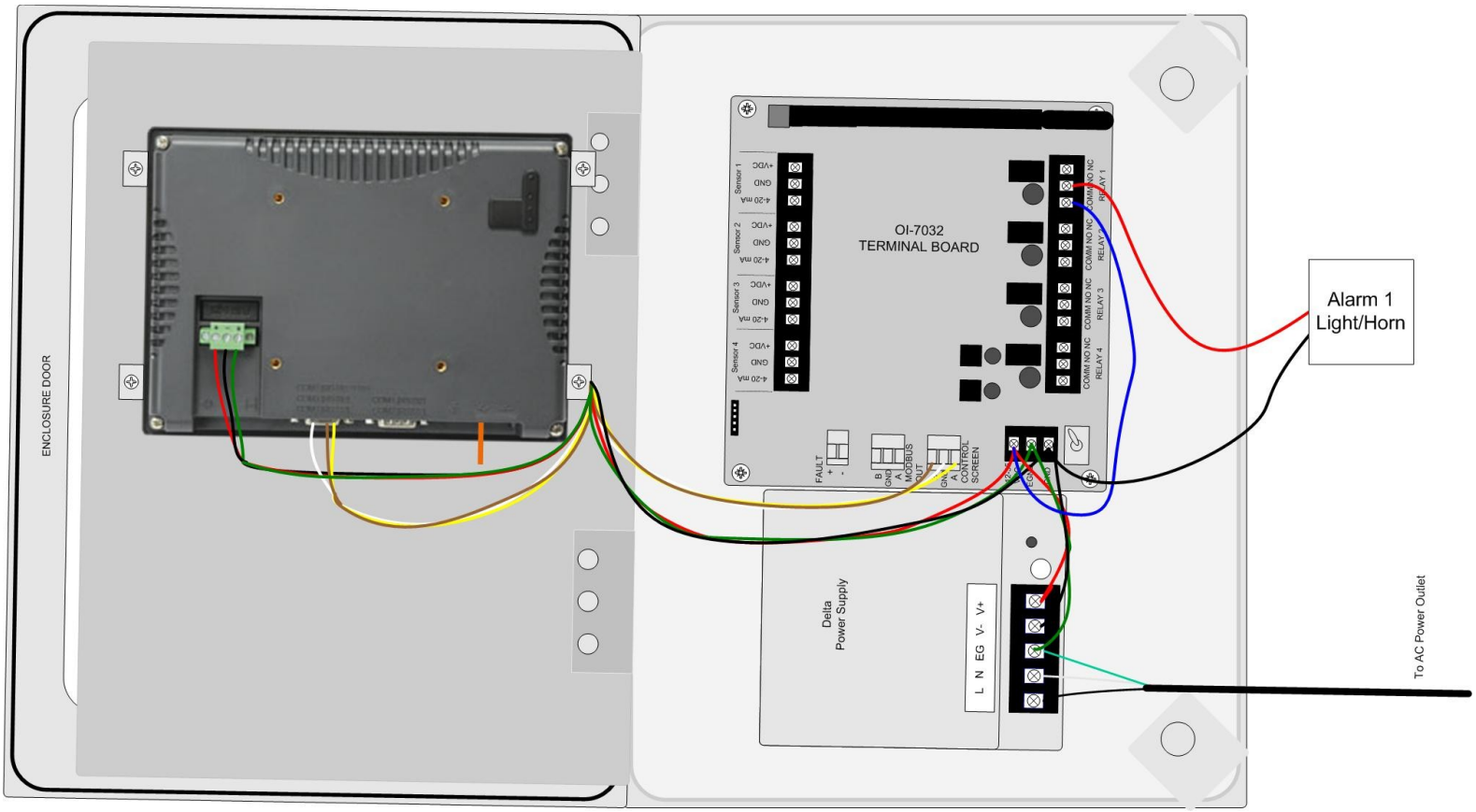
The OI-7032 offers four relays to be setup. Each of the four relays may be setup as Normal Open (NO) or Normally Closed (NC).

Connecting Relay 1

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

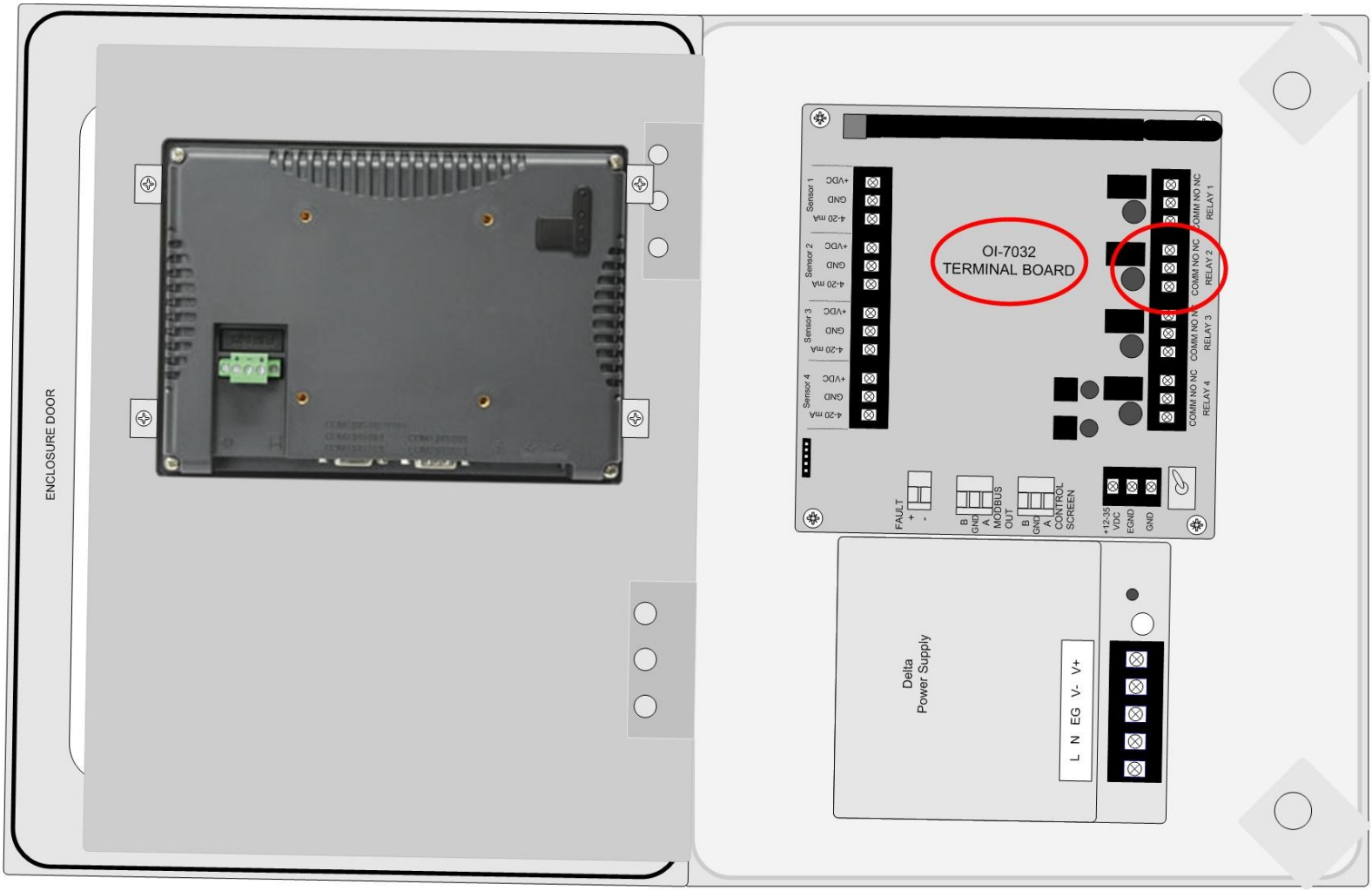


2. Connect the live wire (red) from the Relay 1 Alarm (light/horn) to the terminal labeled “NO” (or “NC”) on the Relay 1 Terminal Block.
3. Connect the neutral wire (black) from the Relay 1 Alarm (light/horn) to the terminal labeled “GND” on the DC Power Supply Terminal Block.
4. Connect the jumper wire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

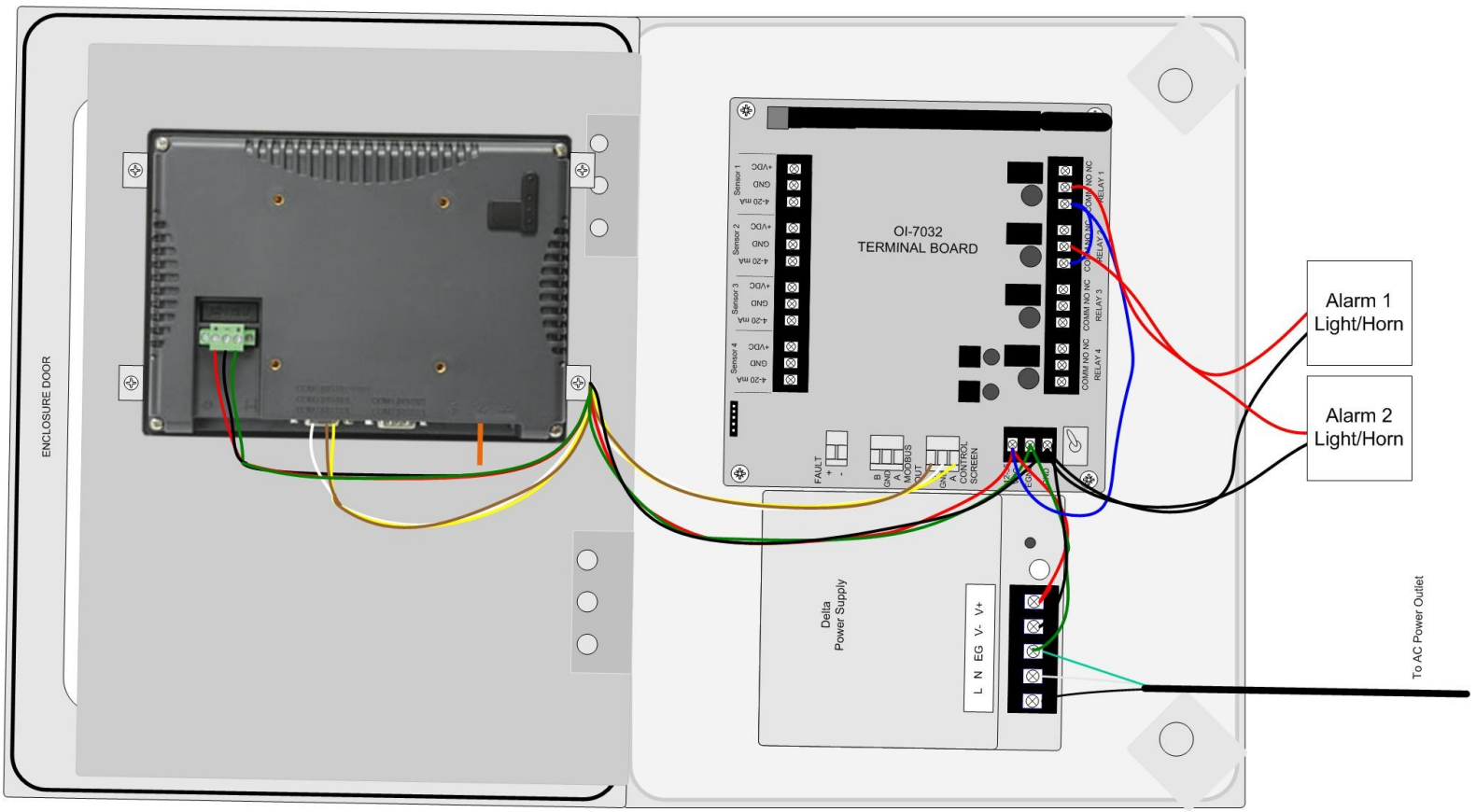


Connecting Relay 2

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

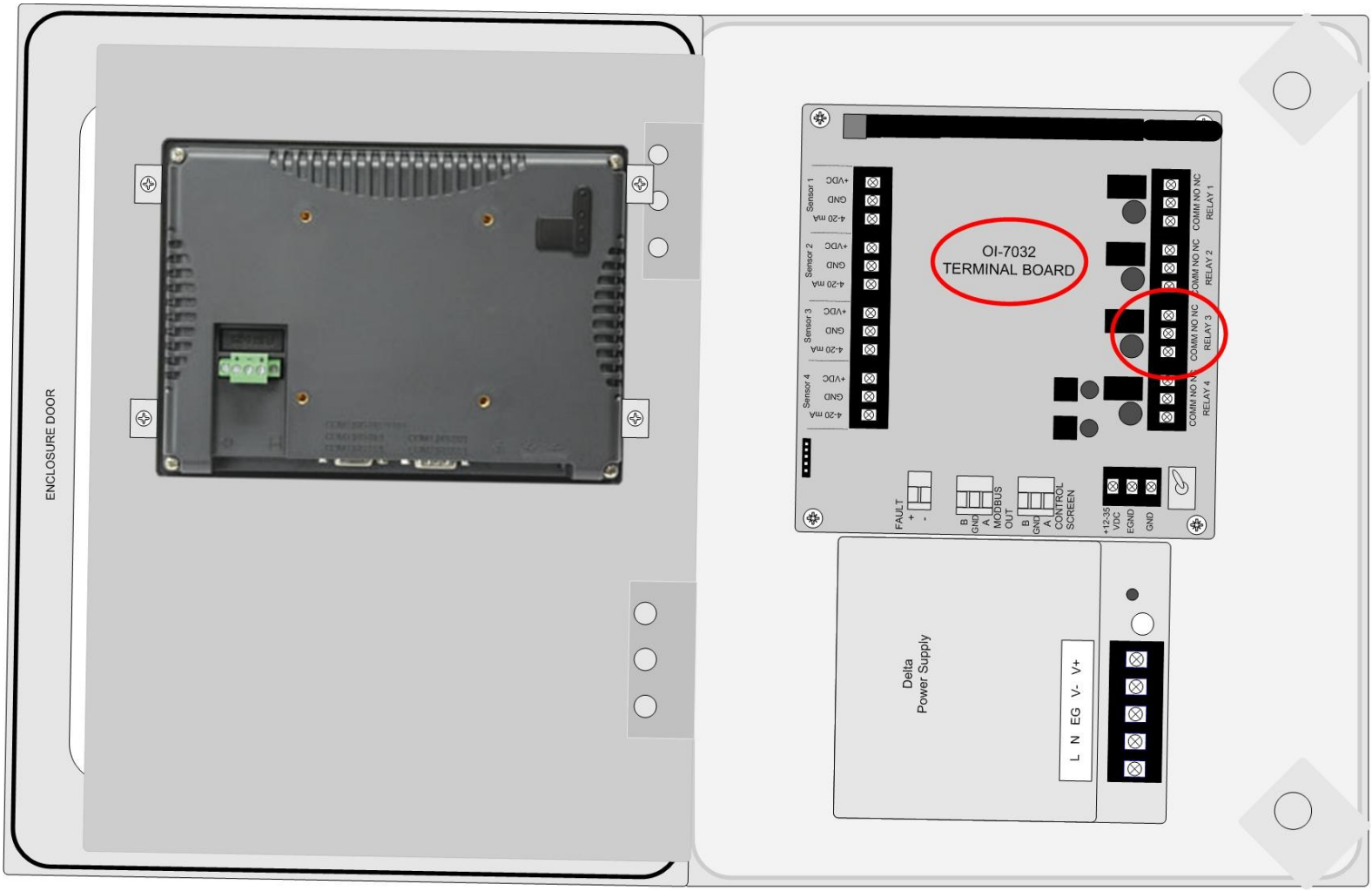


2. Connect the live wire (red) from the Relay 2 Alarm (light/horn) to the terminal labeled “NO” (or “NC”) on the Relay 2 Terminal Block.
3. Connect the neutral wire (black) from the Relay 2 Alarm (light/horn) to the terminal labeled “GND” on the DC Power Supply Terminal Block.
4. Connect a jumper wire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

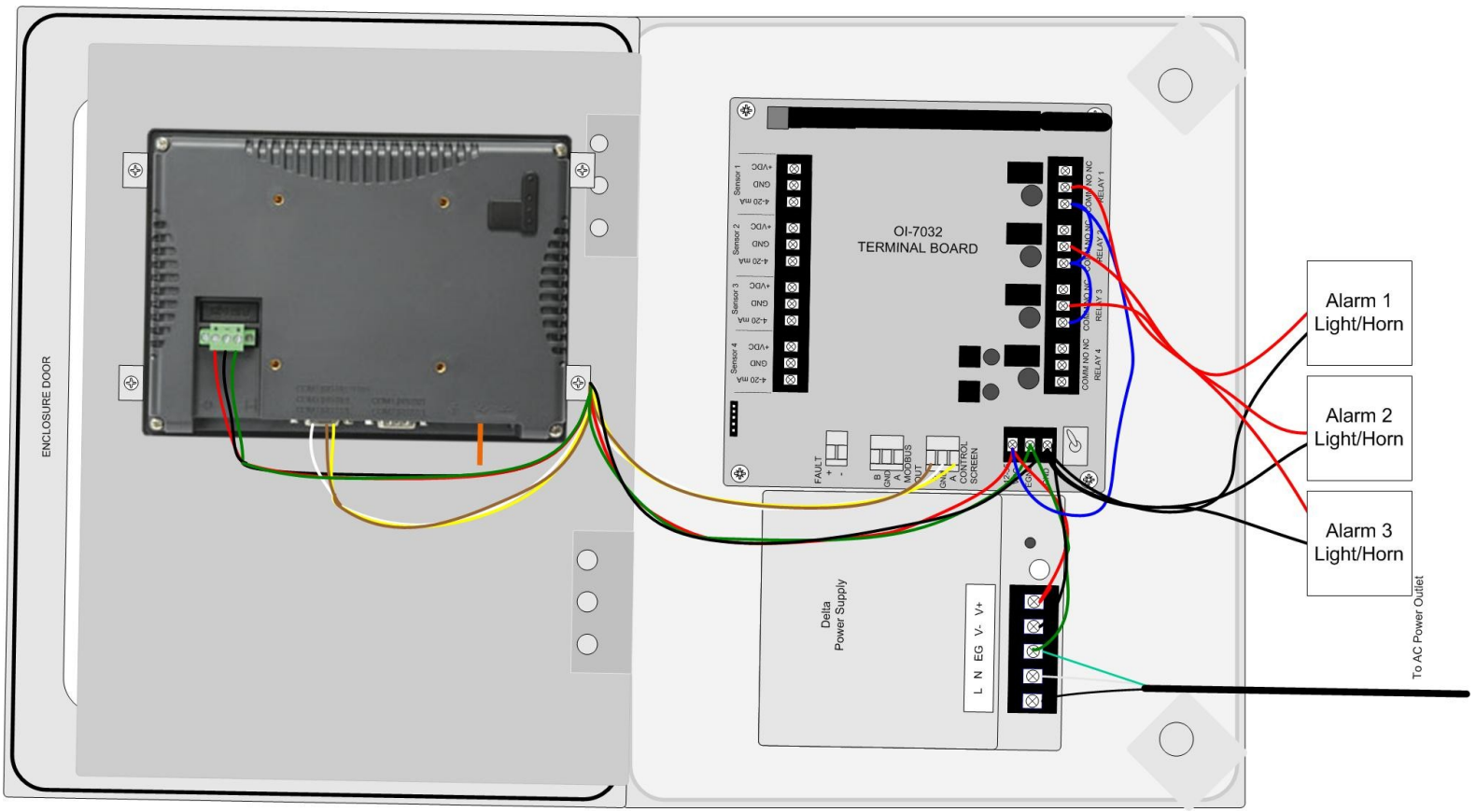


Connecting Relay 3

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

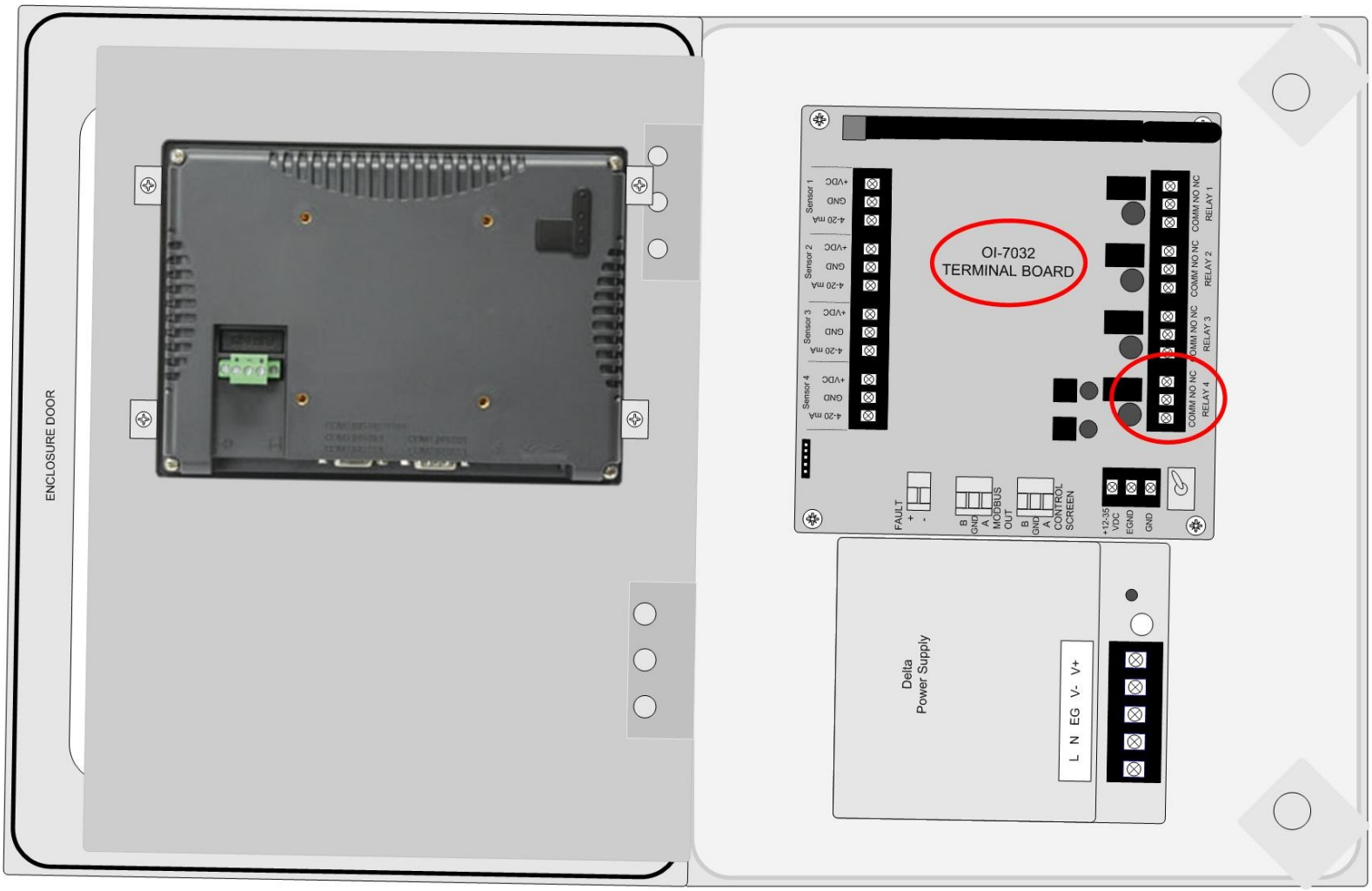


2. Connect the live wire (red) from the Relay 3 Alarm (light/horn) to the terminal labeled “NO” (or “NC”) on the Relay 3 Terminal Block.
3. Connect the neutral wire (black) from the Relay 3 Alarm (light/horn) to the terminal labeled “GND” on the DC Power Supply Terminal Block.
4. Connect a jumper wire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

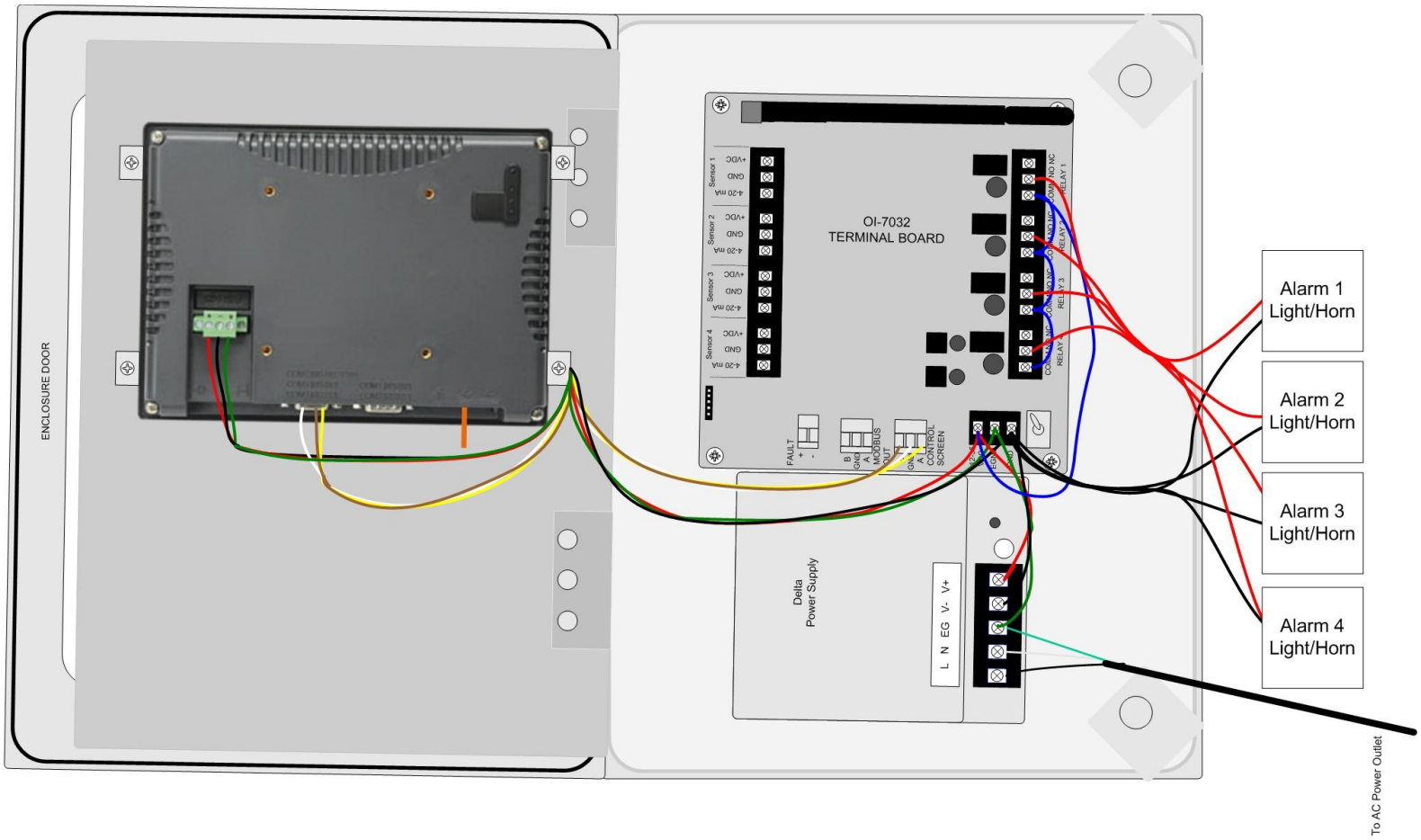


Connecting Relay 4

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 3 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.

Once power is supplied to the OI-7032—by being plugged into an AC outlet or by being wired to a DC power supply—the Touchscreen will illuminate.

Basic Operation - Home Screen Navigation

The Home Screen is the Main Menu of the OI-7032, and should be used view indicators, as well as to enter the sub-menus.

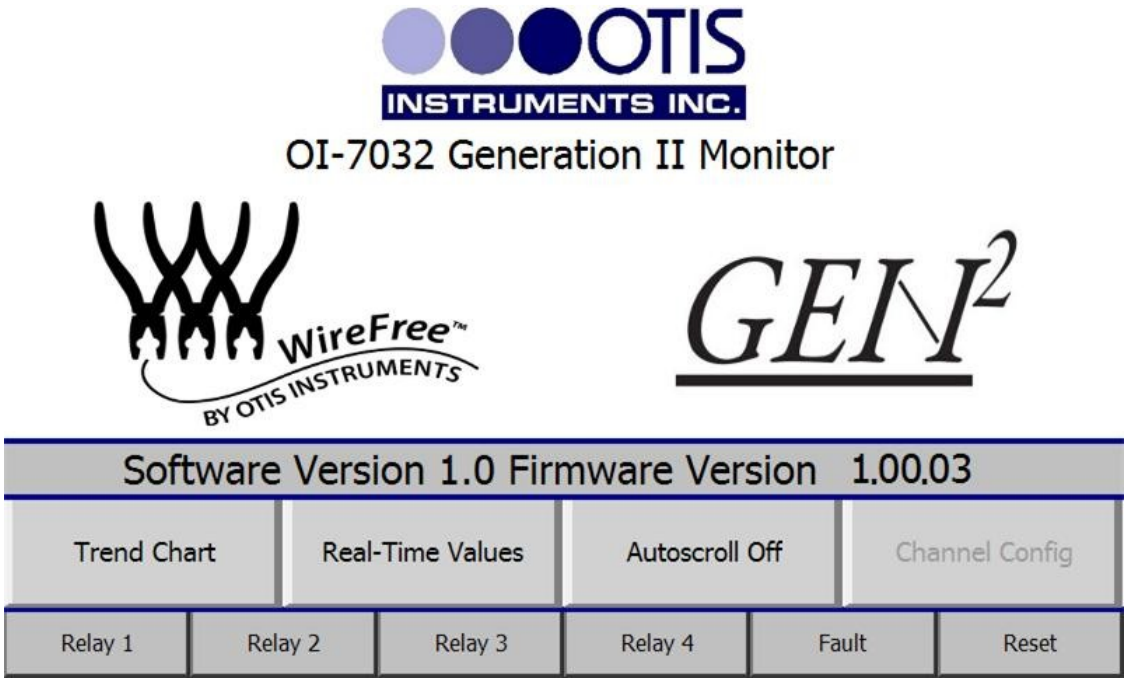
NOTE: To return to the Home Screen at any time, press "HOME" on the upper right corner of the Touch Screen.

The options that are included on the Home Screen for direct navigation include:

- Trend Chart
- Real-Time Values
- Time Since Last Calibration and Null
- Autoscroll Off/On
- Channel Configurations
- Fault
- Reset

Indicators that are included on the Home Screen for constant status-monitoring are:

- Relay 1
- Relay 2
- Relay 3
- Relay 4



Trend Chart

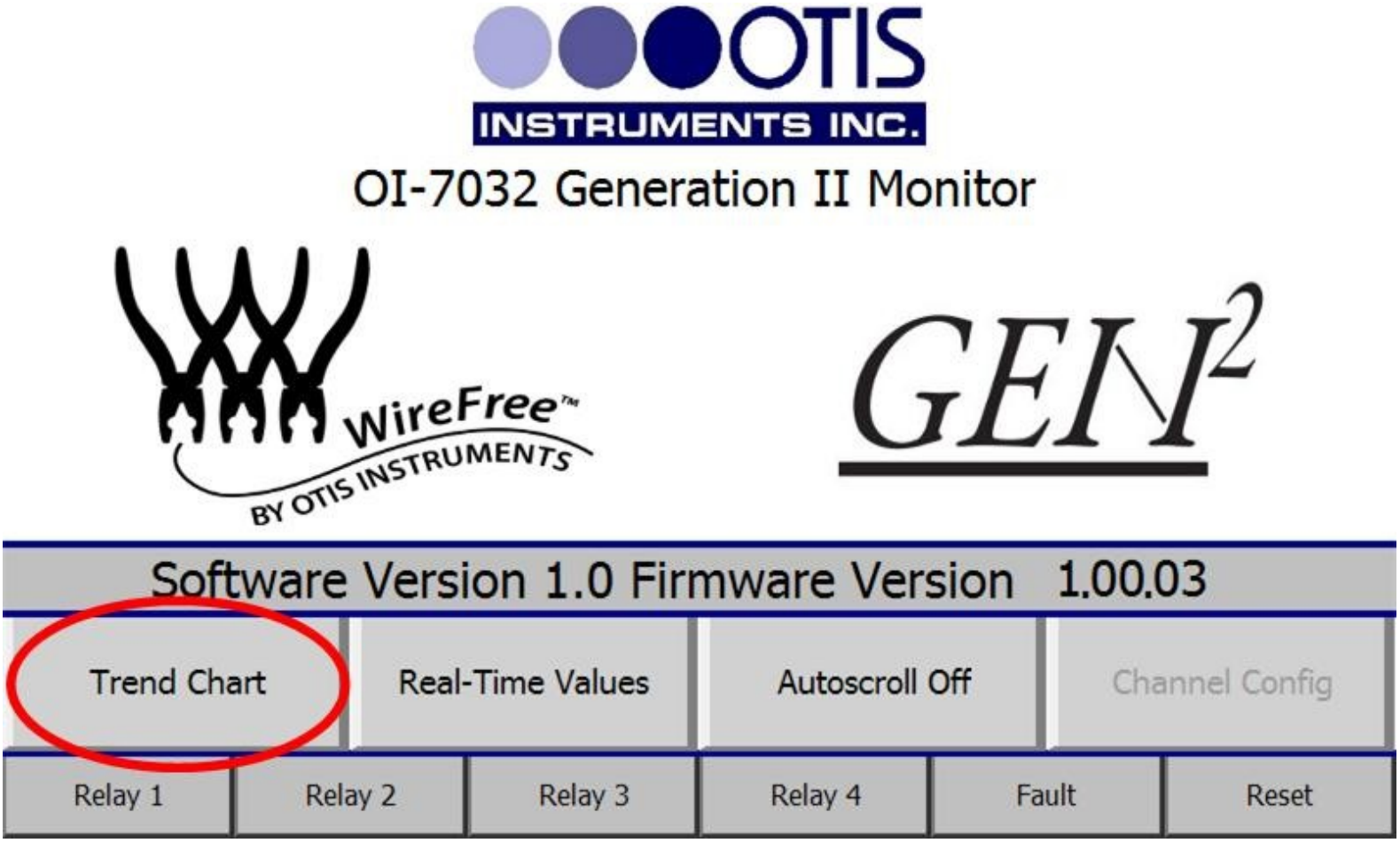
The Trend Chart allows the user to view logged data for each channel. The Trend Chart menu allows the user to select a group of eight channels, and then view the trends for the selected set.

The trend chart will show data that was recorded over the past week. To view additional data (up to 2 months prior), use the USB that's connected to the back of the Touchscreen.

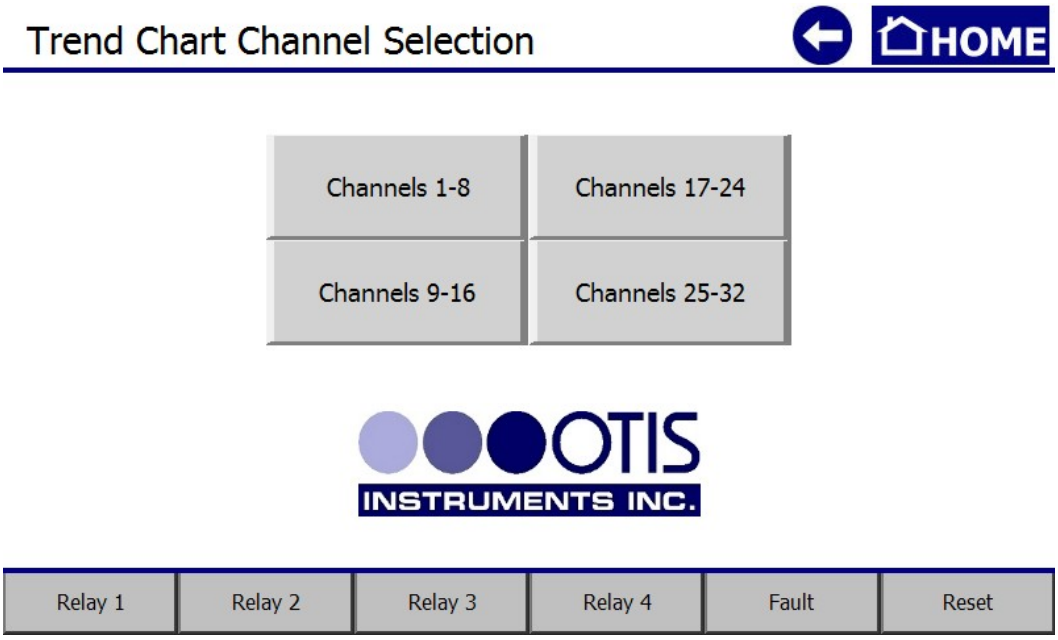
The Trend Chart screen should be entered from the Home Screen.

1. If the Touch Screen is not already displaying the Home Screen, press “Home”.

2. Press “Trend Chart”.

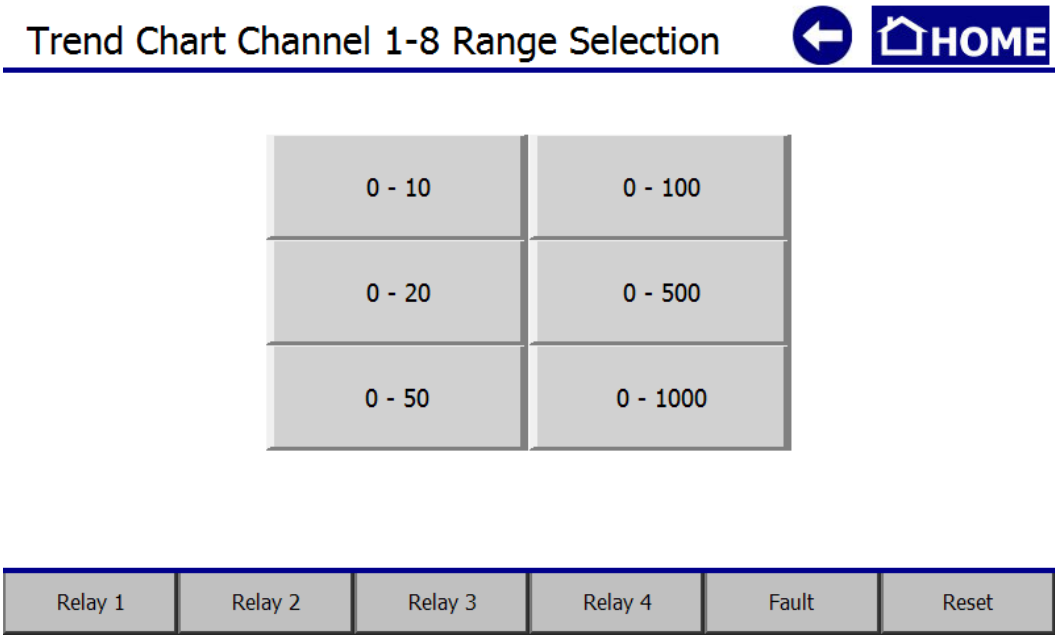


The Touchscreen will show the following:



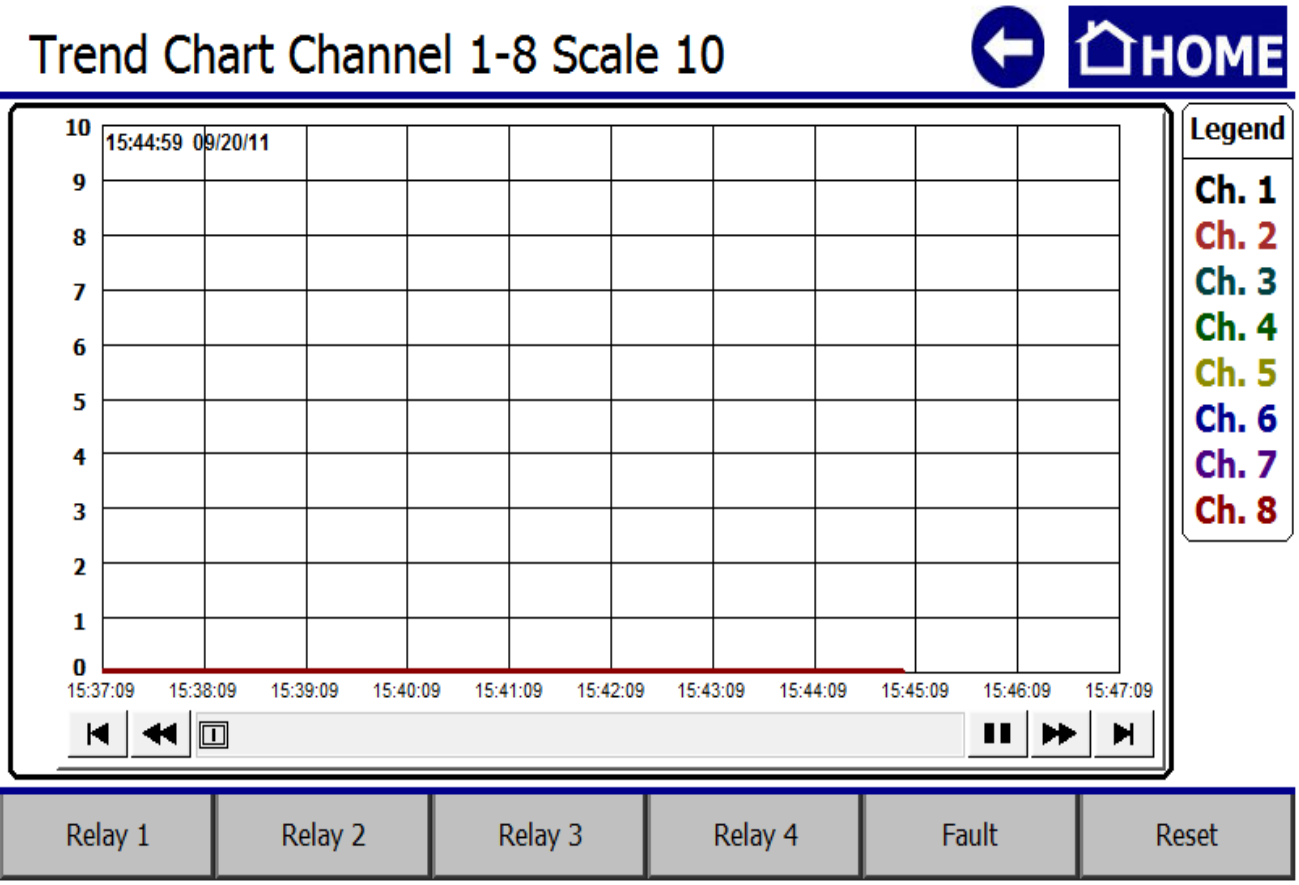
3. Select a channel group to view.

The Touchscreen will show the following (in this example, the group of "Channels 1-8" was chosen):



4. Select a range to view.

The Touchscreen will show the following (in this example, the range selection of 0-10 was chosen):



NOTE: Load-time will depend on the amount of recorded data. Please wait until all data has loaded before using the navigation arrows.

5. Use the control arrows along the bottom of the chart to view the available data.
6. Press "Home" to return to the Home Screen when finished viewing the data.

Real-Time Values

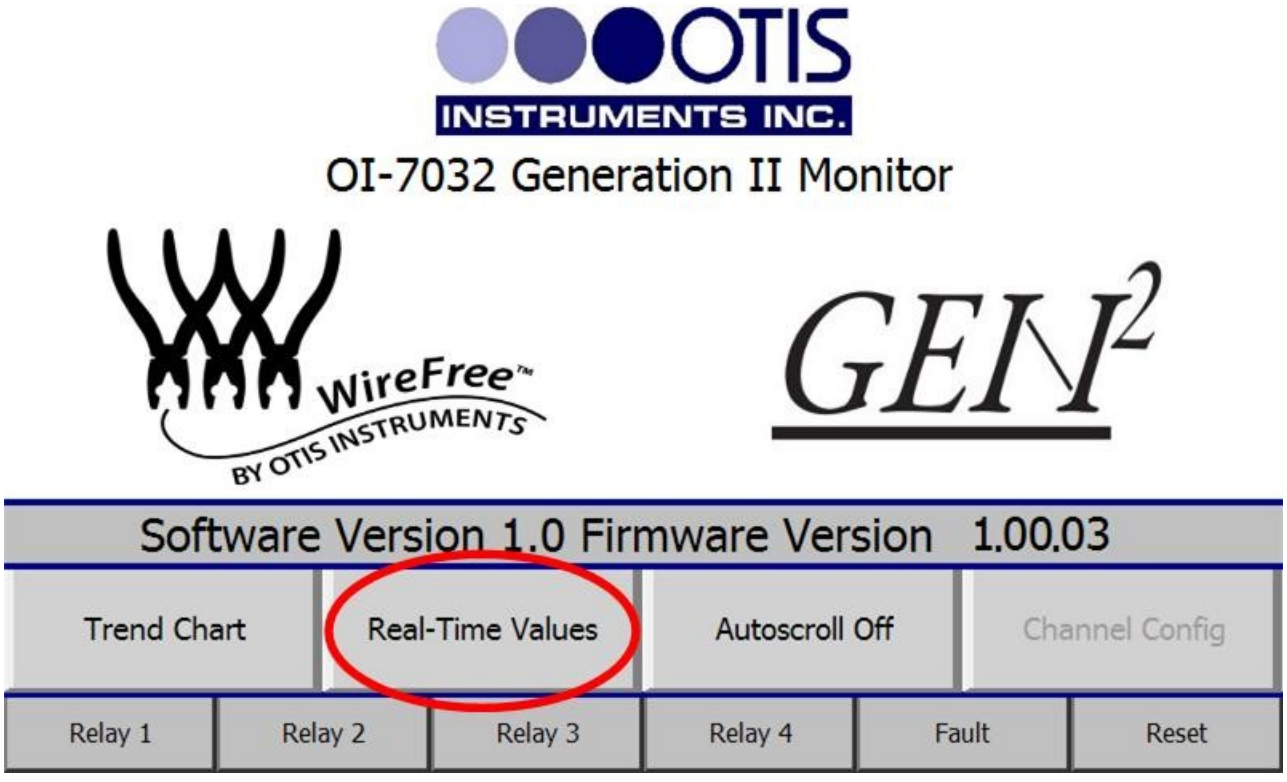
The Real-Time Values Screen allows the user to view the current status of each sensor. Status readings include:

- Sensor Location
- Reading
- Address
- Mode
- Battery
- TSLM
- Relays

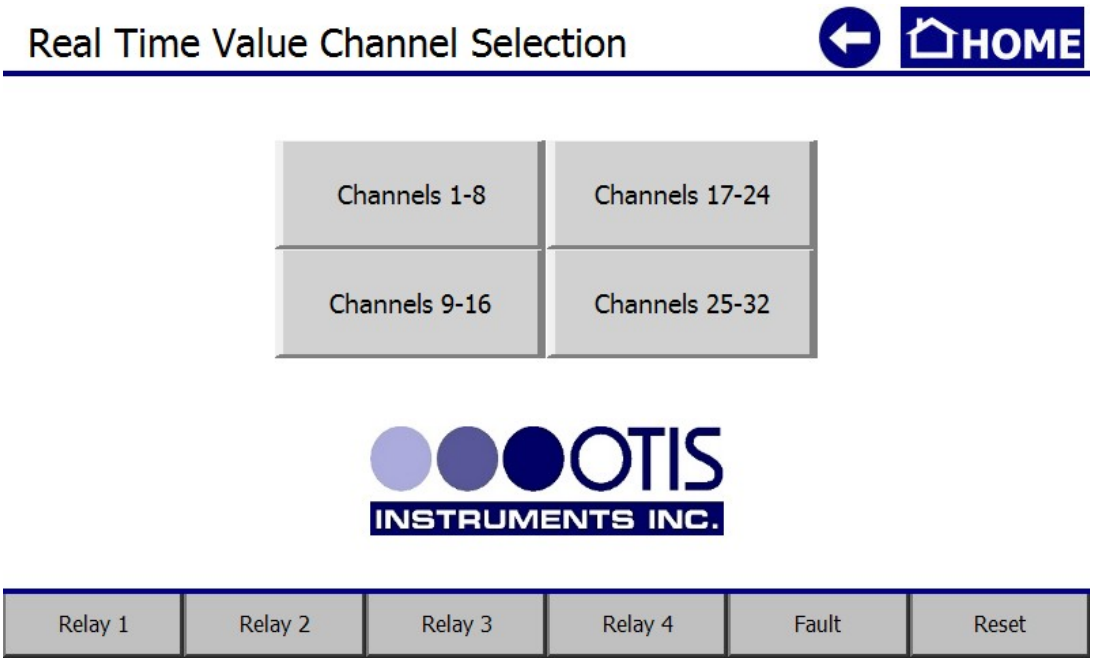
The Real-Time Values Screen should be entered from the Home Screen.

1. If the Touch Screen is not already displaying the Home Screen, press “Home”.

2. Press “Real-Time Values”.

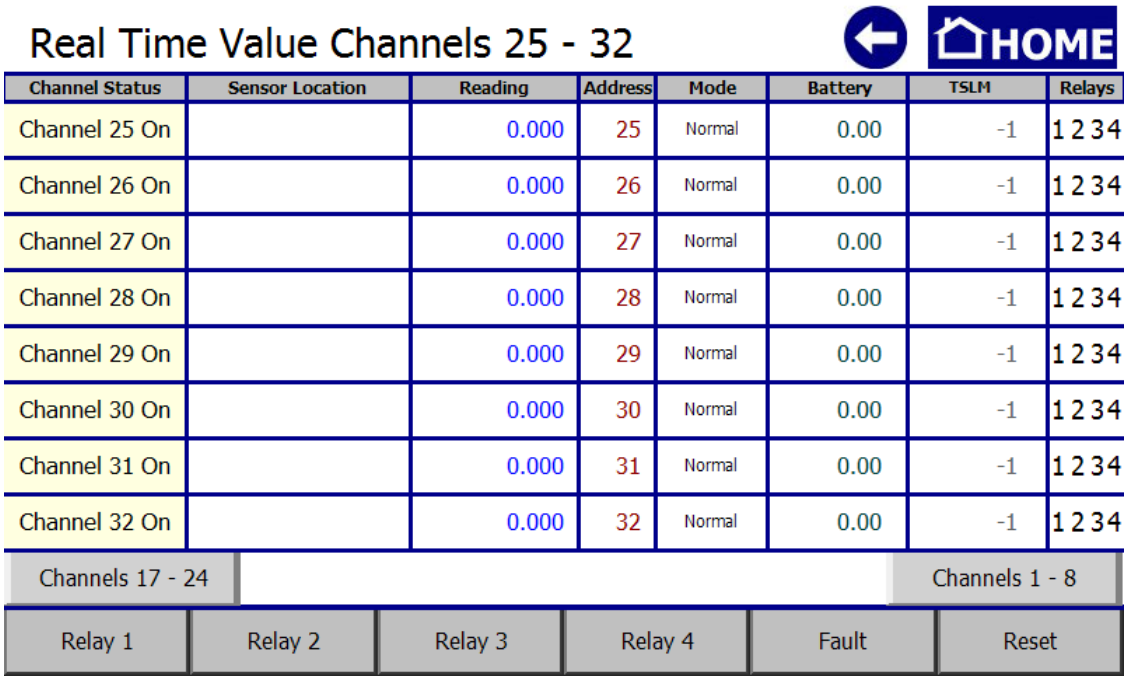


The Touchscreen will show the following:

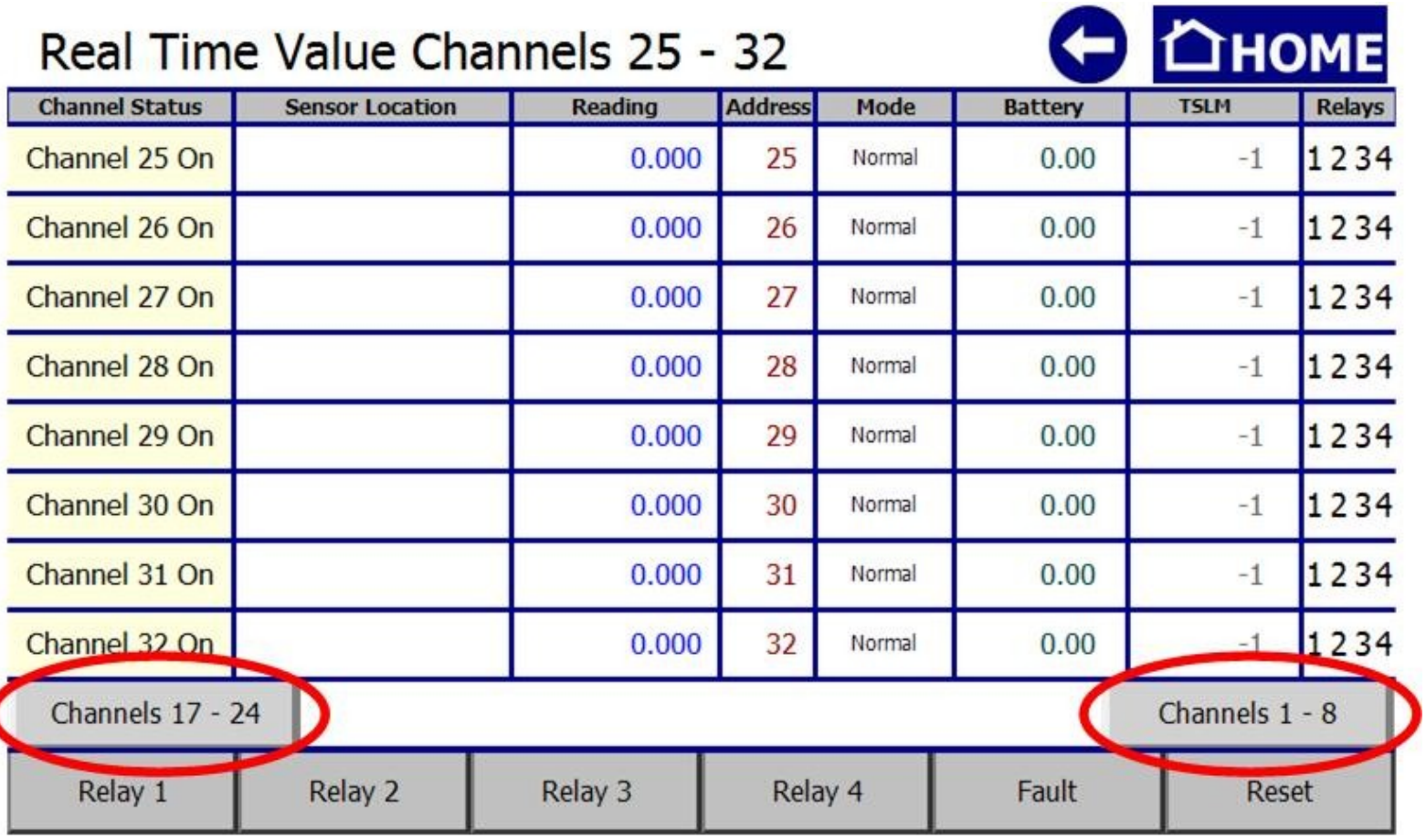


3. Select a channel group to view.

The Touchscreen will show the following (in this example, the group of "Channels 25-32" was selected):



4. Real-Time Value Data may be viewed from this screen. To view data for additional channels, press either of the "Channels xx – xx" buttons on the lower left/right side of the Touch Screen.



5. Press "Home" to return to the Home Screen when finished viewing the data.

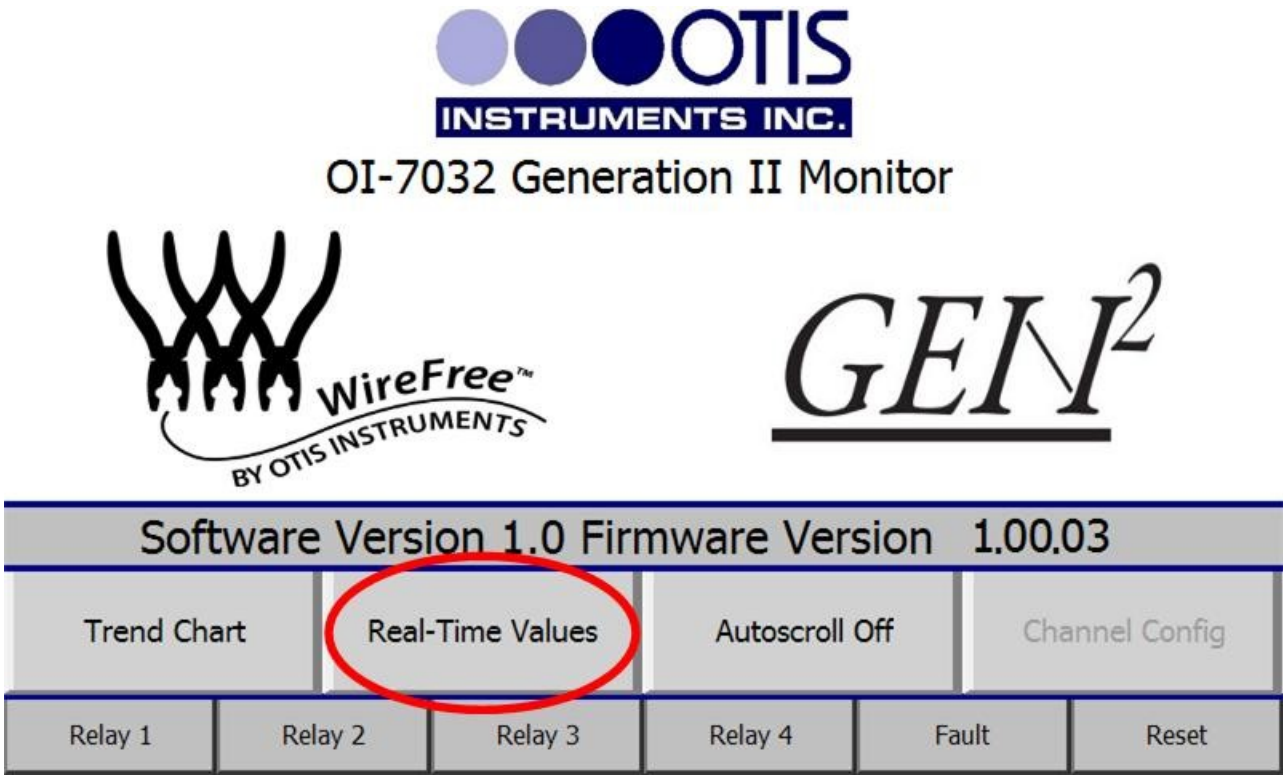
Time Since Last Calibration and Null

The Time Since Last Calibration and Null Screen allows the user to view the last time each sensor assembly was calibrated or nulled. The Time Since Last Calibration and Null Screen should be entered from the Real-Time Values Screen via the Home Screen.

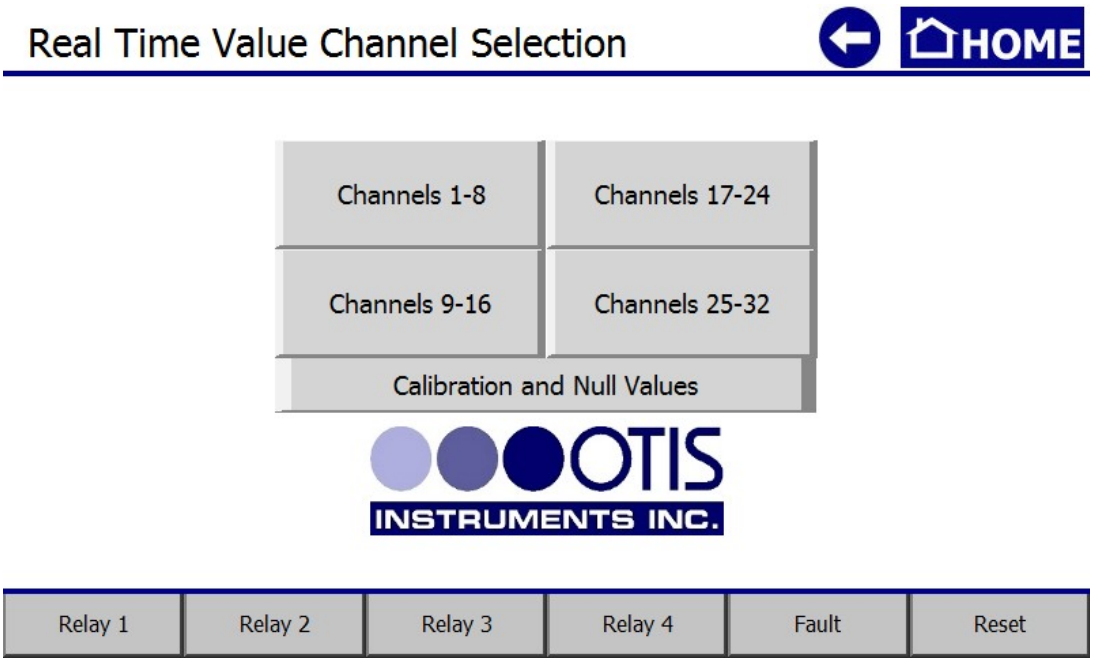
The Time Since Last Calibration and Null is recorded every minute. A reading of "0" means the sensor assembly has never been calibrated before, or it has not been a complete day since the previous calibration.

1. If the Touch Screen is not already displaying the Home Screen, press "Home".

2. Press "Real-Time Values".

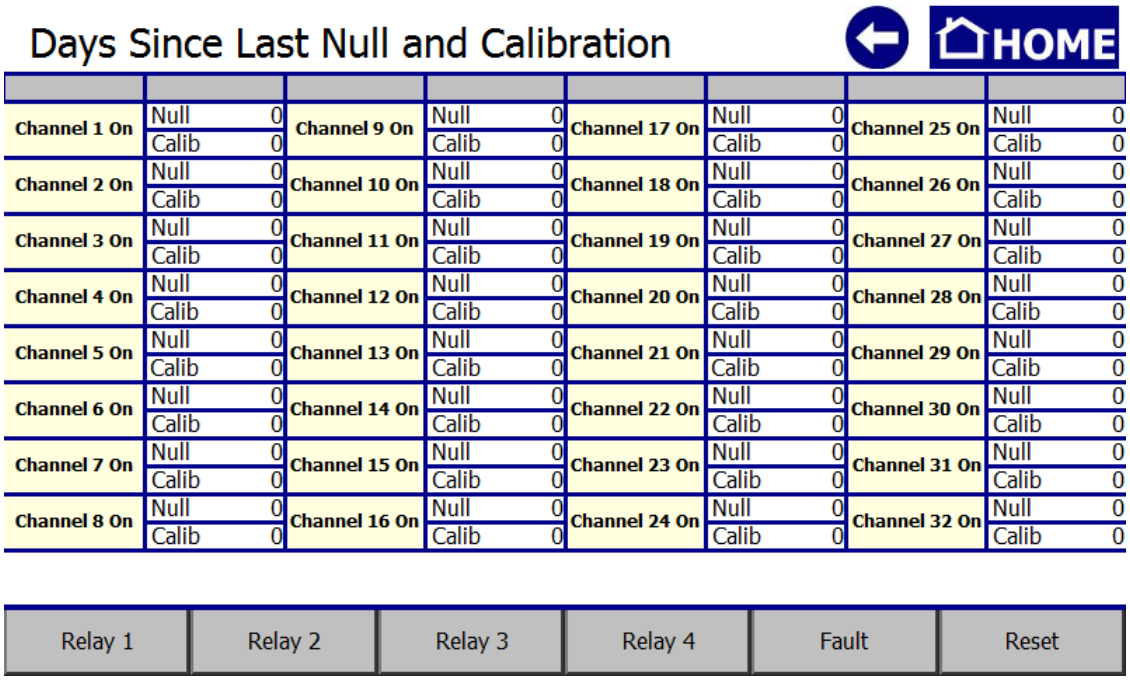


The Touchscreen will show the following:



3. Press “Calibration and Null Values”.

The Touchscreen will show the following:



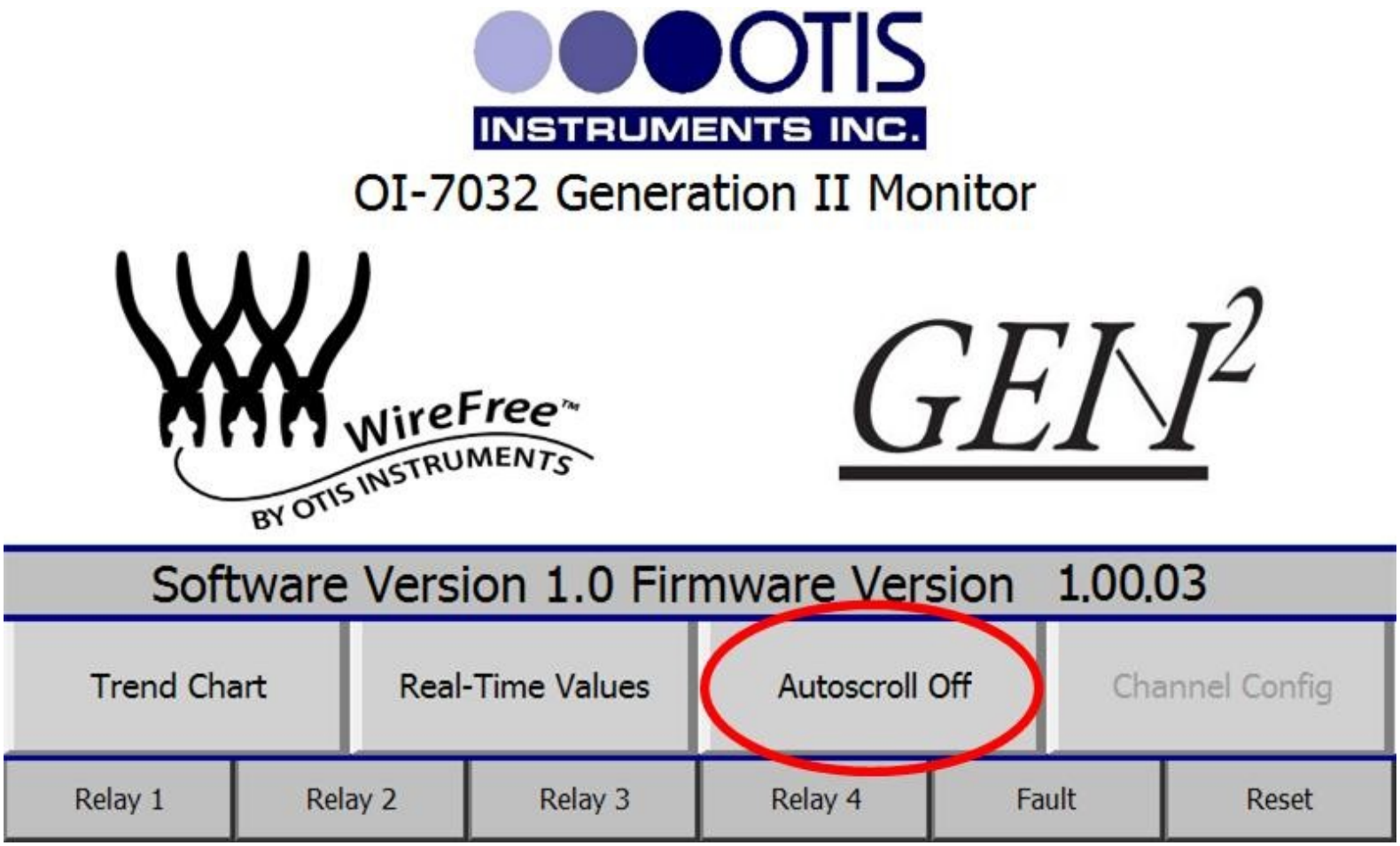
4. Press “Home” to return to the Home Screen when finished viewing the data.

Autoscroll On/Off

Autoscroll may be used to continuously scroll through the current state of each channel. To turn this feature On/Off, simply press "Autoscroll On/Off".

NOTE: The unit will automatically Autoscroll after 20 seconds of Home Screen inactivity.

In this example, Autoscroll is Off.



Channel Configuration

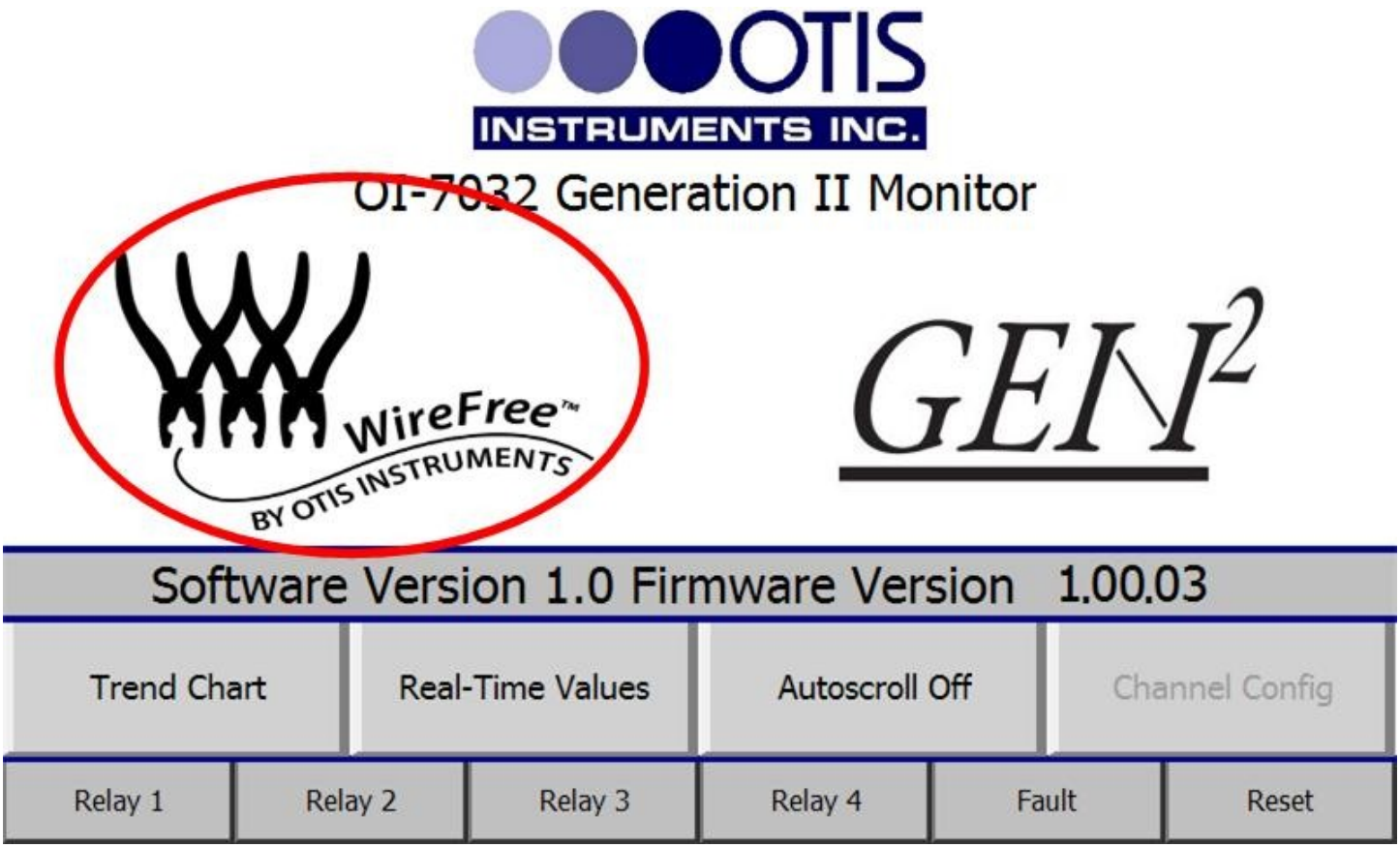
The following instructions should be consulted when configuring the channels for their corresponding sensor assemblies.

Once one channel is setup, these settings may be duplicated for all channels by pressing “Duplicate Setting” on the lower right side of the Touchscreen. Remember, though, that the duplicate settings feature will duplicate the settings for ALL successive channels.

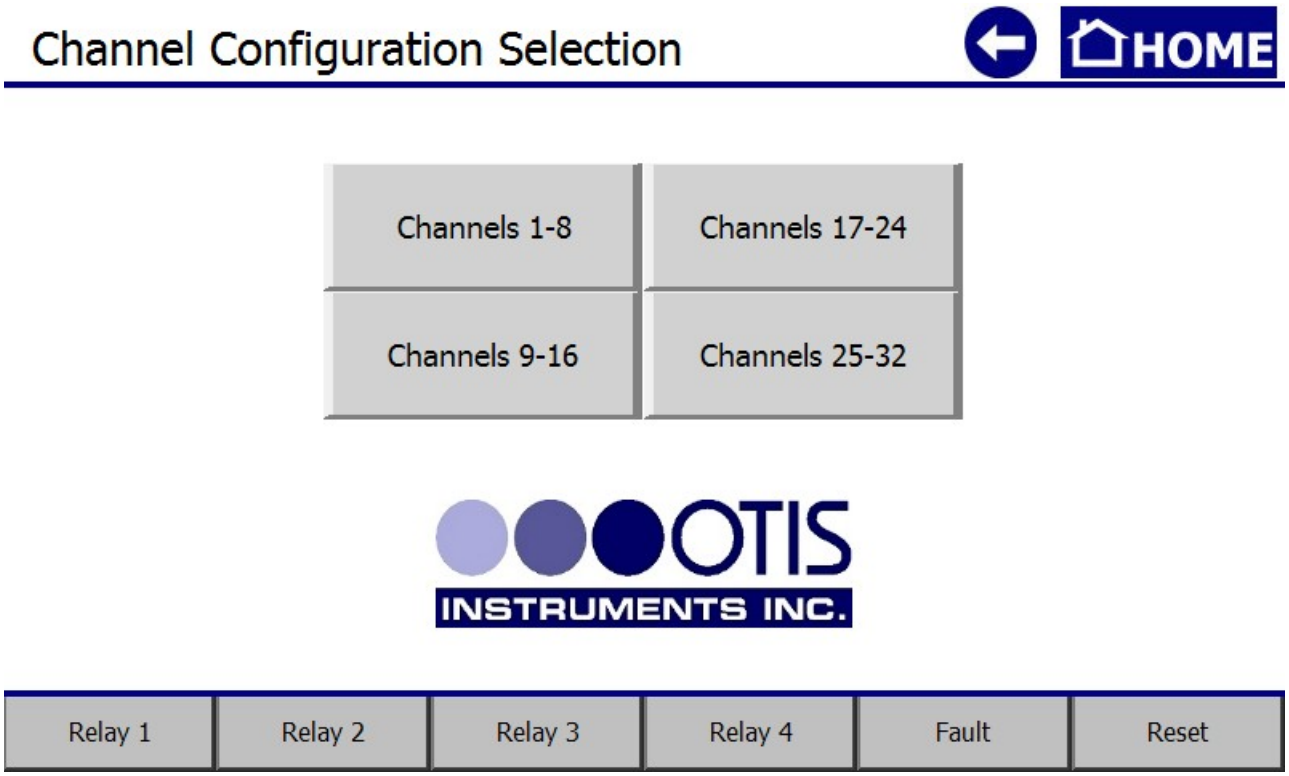
If the settings of channels need to vary, the differing channels should be setup individually. For instances in which a minimal number of channel must vary, setup a channel to reflect the majority, then duplicate that channel's settings. Next, manually setup the few varying channels.

NOTE: The OI-7032 supports a maximum of 32 sensor assemblies. The OI-7032 supports up to 32 WireFree sensor assemblies; up to 4 wired (4-20mA) sensor assemblies may be setup in place of 4 of the 32 WireFree sensor assemblies (for a total of 28 WireFree and 4 Wired).

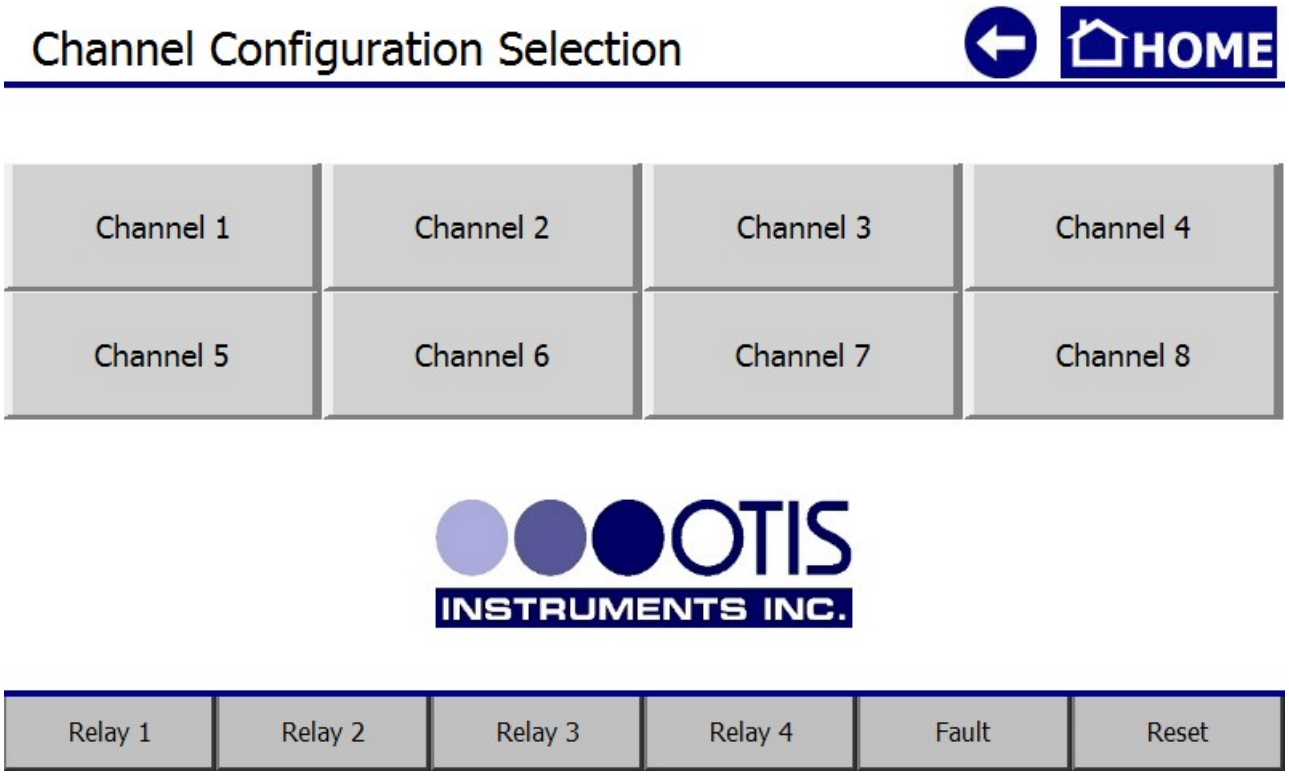
1. Press the WireFree logo to enable the “Channel Config” button on the Home Screen.



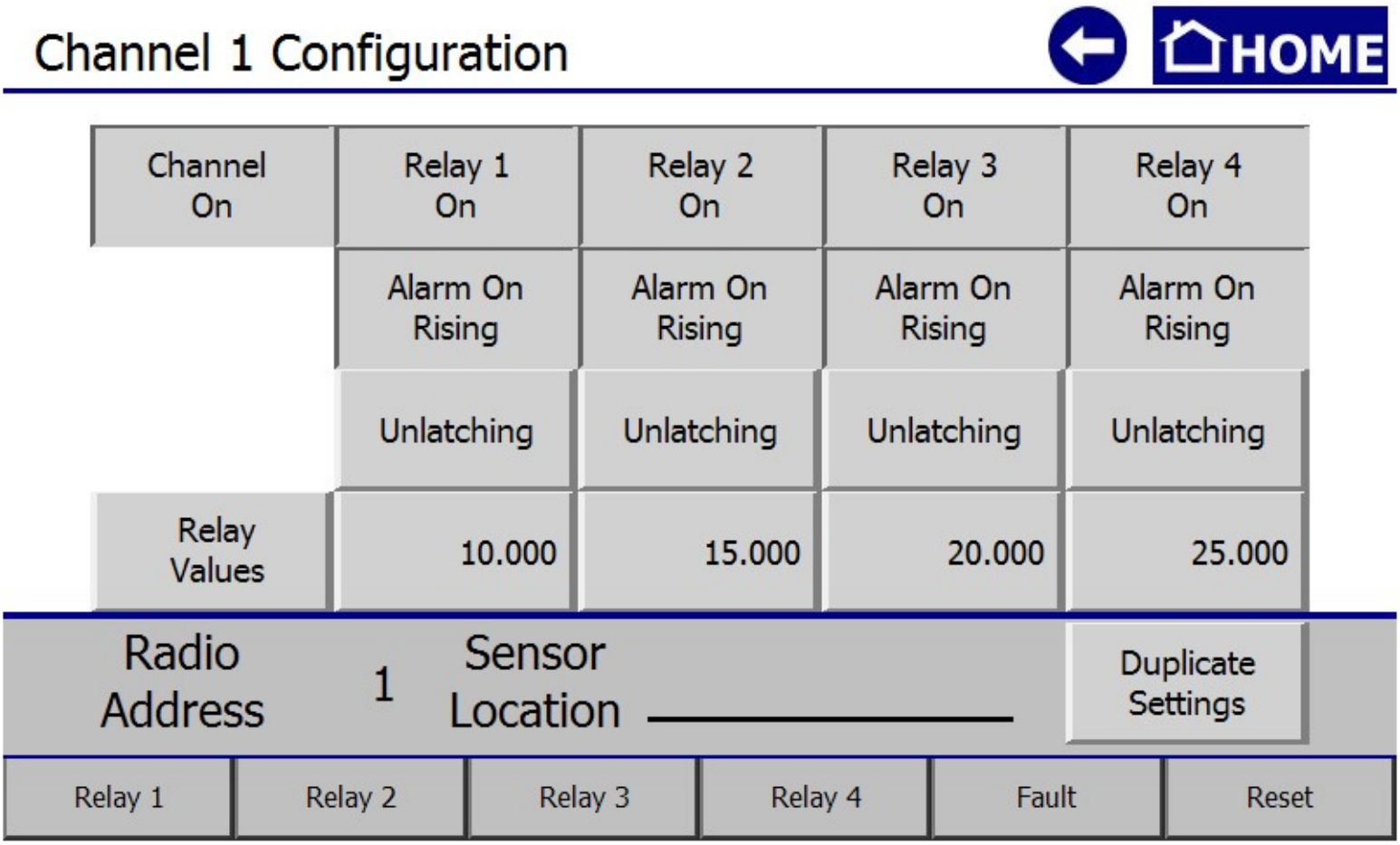
2. Press “Channel Config” to enter Channel Configuration Mode. The Touchscreen will show the following:



3. Choose a group of channels to configure. The Touchscreen will show the following (in this example, “Channel 1-8” was selected):



4. Choose a channel to configure. The Touchscreen will show the following (in this example, "Channel 1" was selected):



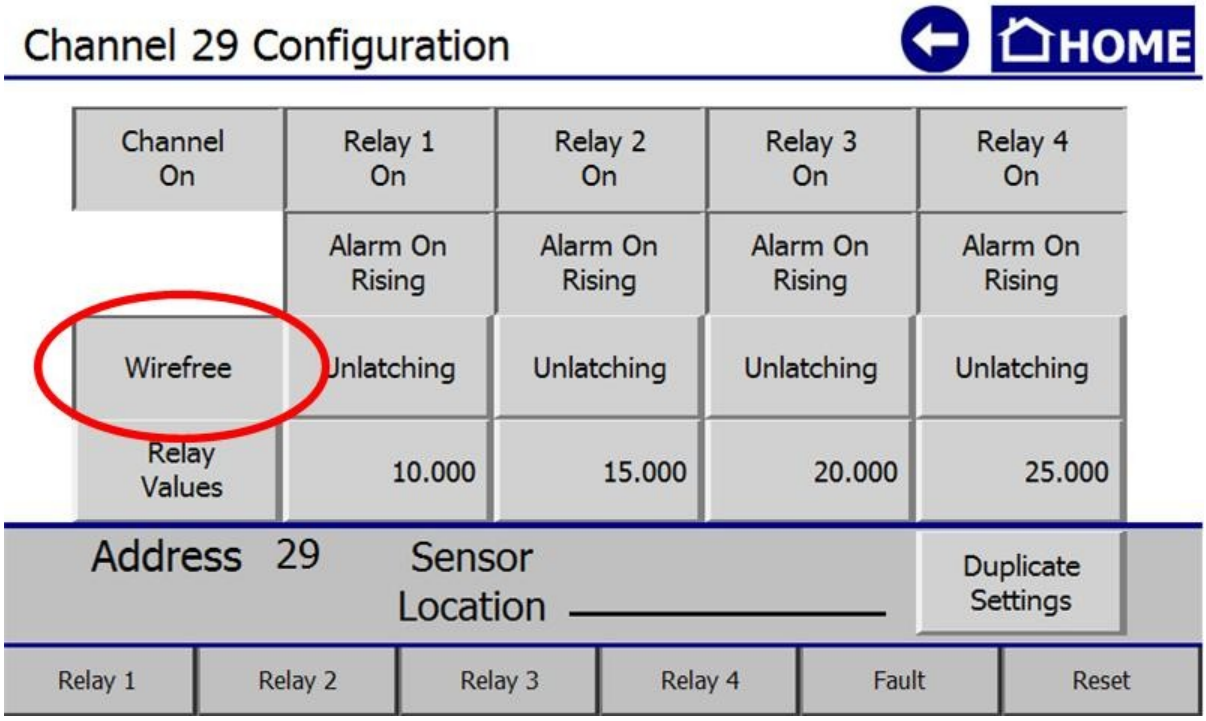
5. Touch the desired button on the Touchscreen to setup that specific aspect of the sensor assembly.

   - For options that require numbers be typed, a numeric keypad will appear when that option is selected.
   - For options that require letters be typed, an on-screen keyboard will appear when that option is selected.

   The following sub-sections provide information and illustrations of options that may be setup in Channel Configuration Mode.

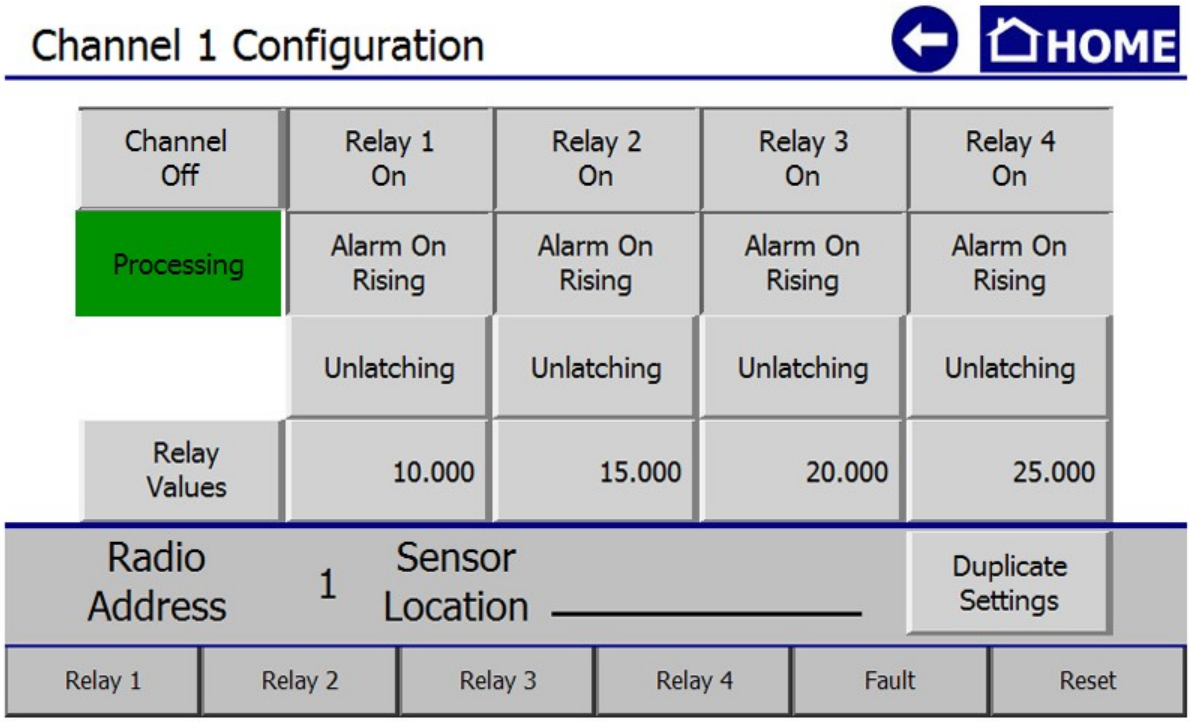
Set as Wired or WireFree (Channels 29-32 ONLY)

To begin configuring the channel, set the channel-type to Wired or WireFree.



Processing

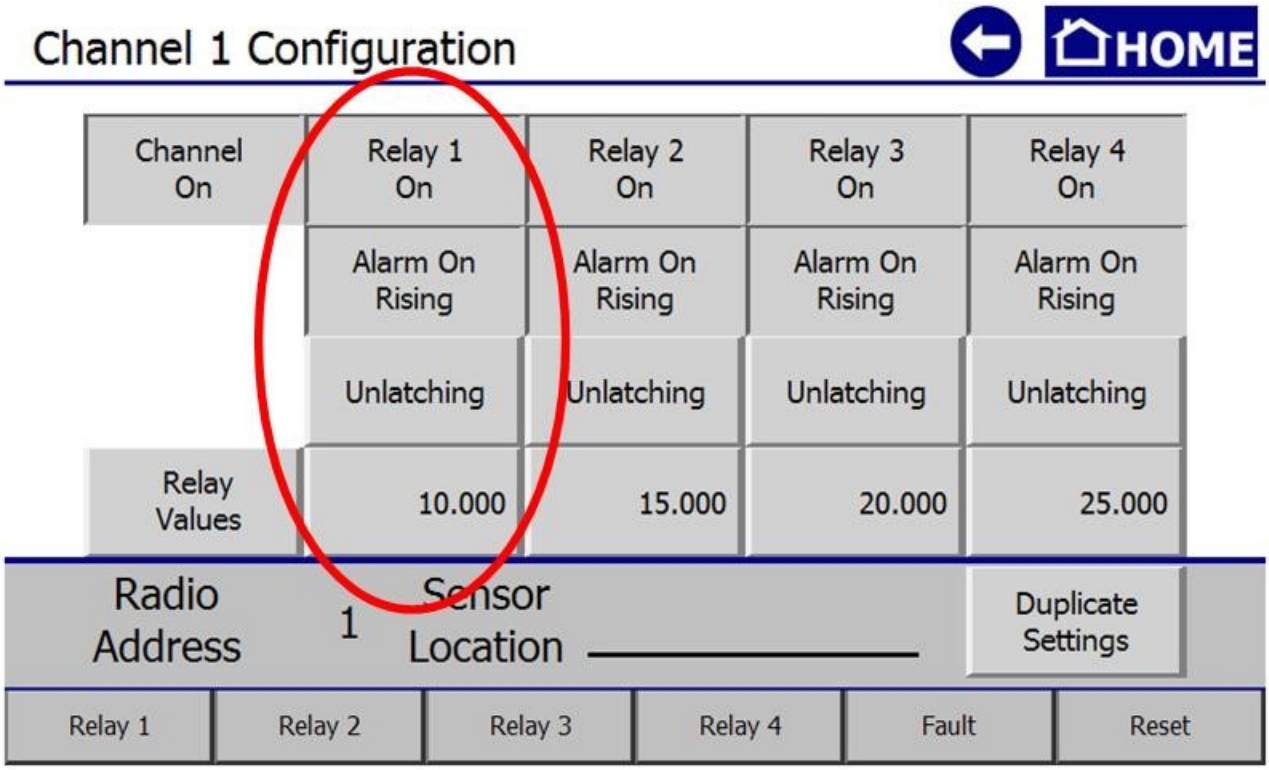
When operations are confirmed, the Touchscreen may display that the operation is being processed. When the following is displayed, please wait until processing is complete (and the green box disappears) before pressing another button.



Relay Configuration

To setup the relays for Channel 1, complete the following steps.

1. Press “Relay 1” to turn Relay 1 On/Off. In this example, Relay 1 is On.



2. Press “Alarm On Rising” (or “Alarm On Falling”) to set Relay 1 as Rising or Falling. In the image above, Relay 1 is set as “Alarm On Rising”.
3. Press “Unlatching” (or “Latching”) in the Relay 1 column to set Relay 1 as Latching or Unlatching. In the image above, Relay 1 is set as Unlatching.
4. Press the value of Relay 1 to set Relay 1's value. In the image above, Relay 1's value is set as “10.000”.

NOTE: The range of values allowed for all relays is 0.001 to 65000. If a value that is outside this range is entered, the previously set value will be used.

5. To set the remaining three relays, simply repeat these steps for each relay. The image above illustrates how each of the relays might be setup in a four-relay application.

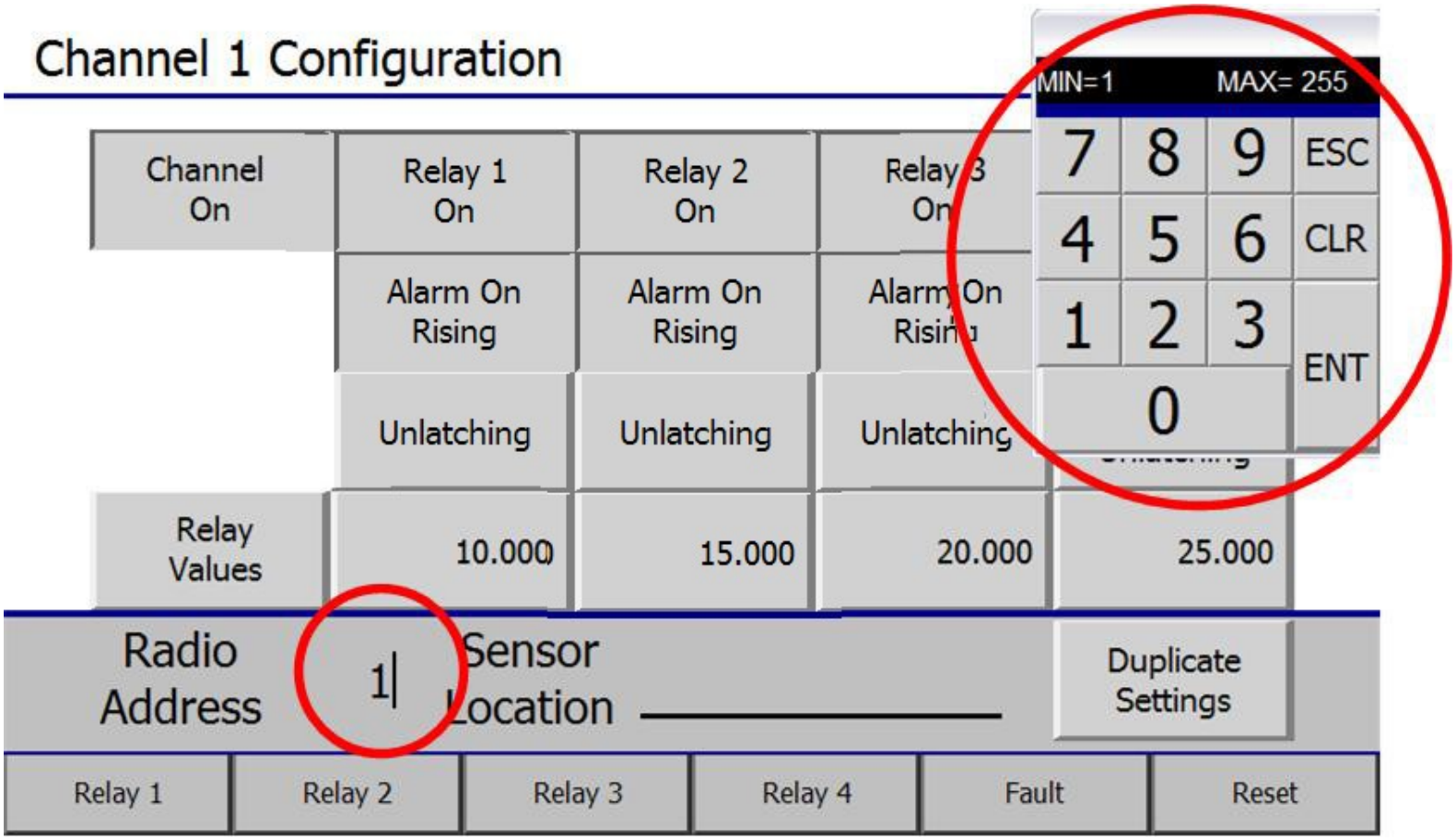
NOTE: If the fourth relay is being used as the FAULT relay, it will not be shown on the channel configuration screens.

Setting Radio Address (WireFree)

1. To set the radio address, touch the value next to "Radio Address" and wait for the numeric keypad to appear.
2. Type the desired address on the keypad, then press "ENT".

NOTE: The range of available addresses is 1-255.

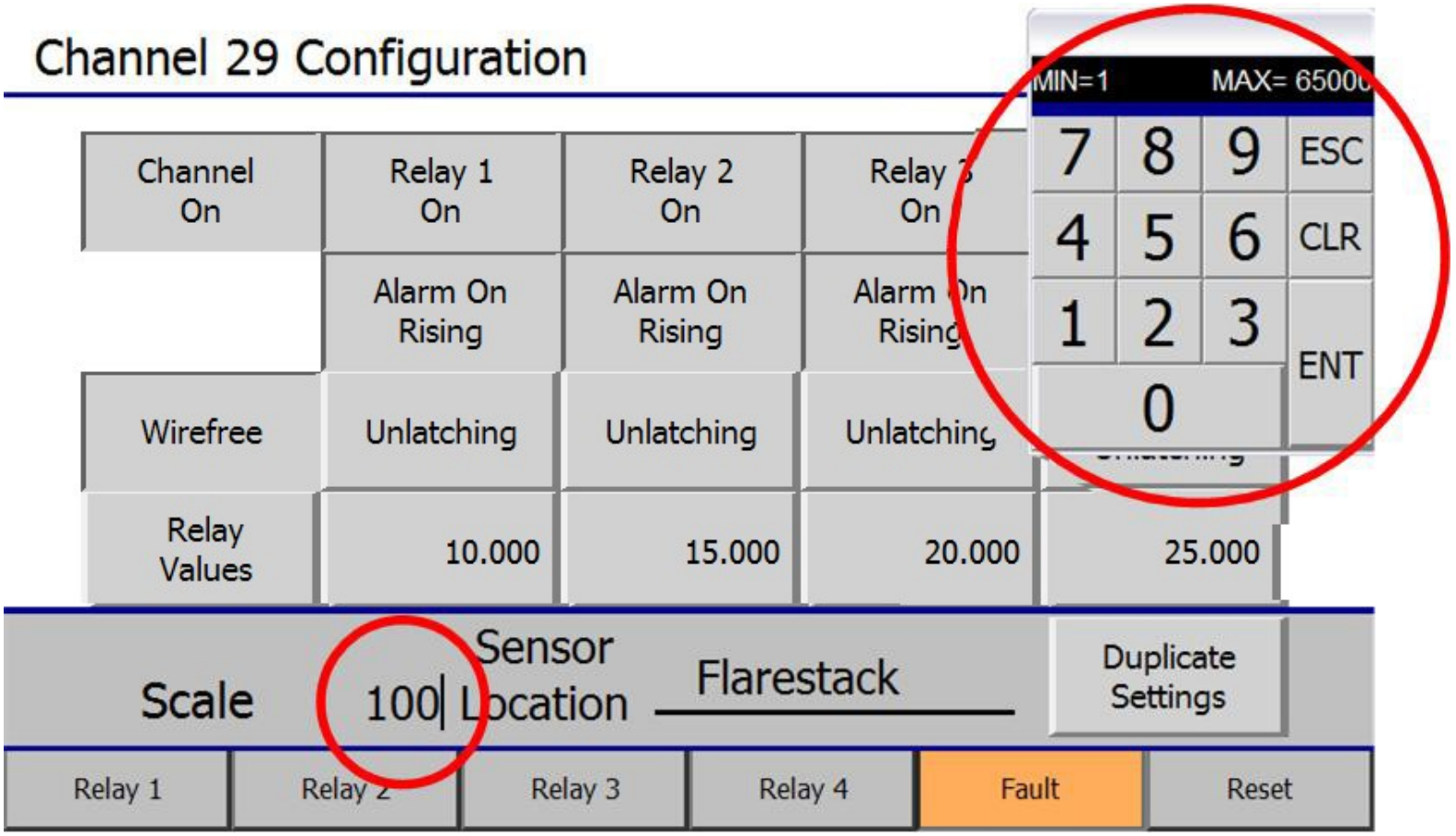
- *If a value that falls outside this range is entered, the previously set value will be used.*
- *If the user attempts to enter the same address for multiple channels, the next available value will be used.*



Setting Scale (Wired)

1. To set the scale, touch the value next to “Scale” and wait for the numeric keypad to appear.
2. Type the desired scale on the keypad, then press “ENT”.

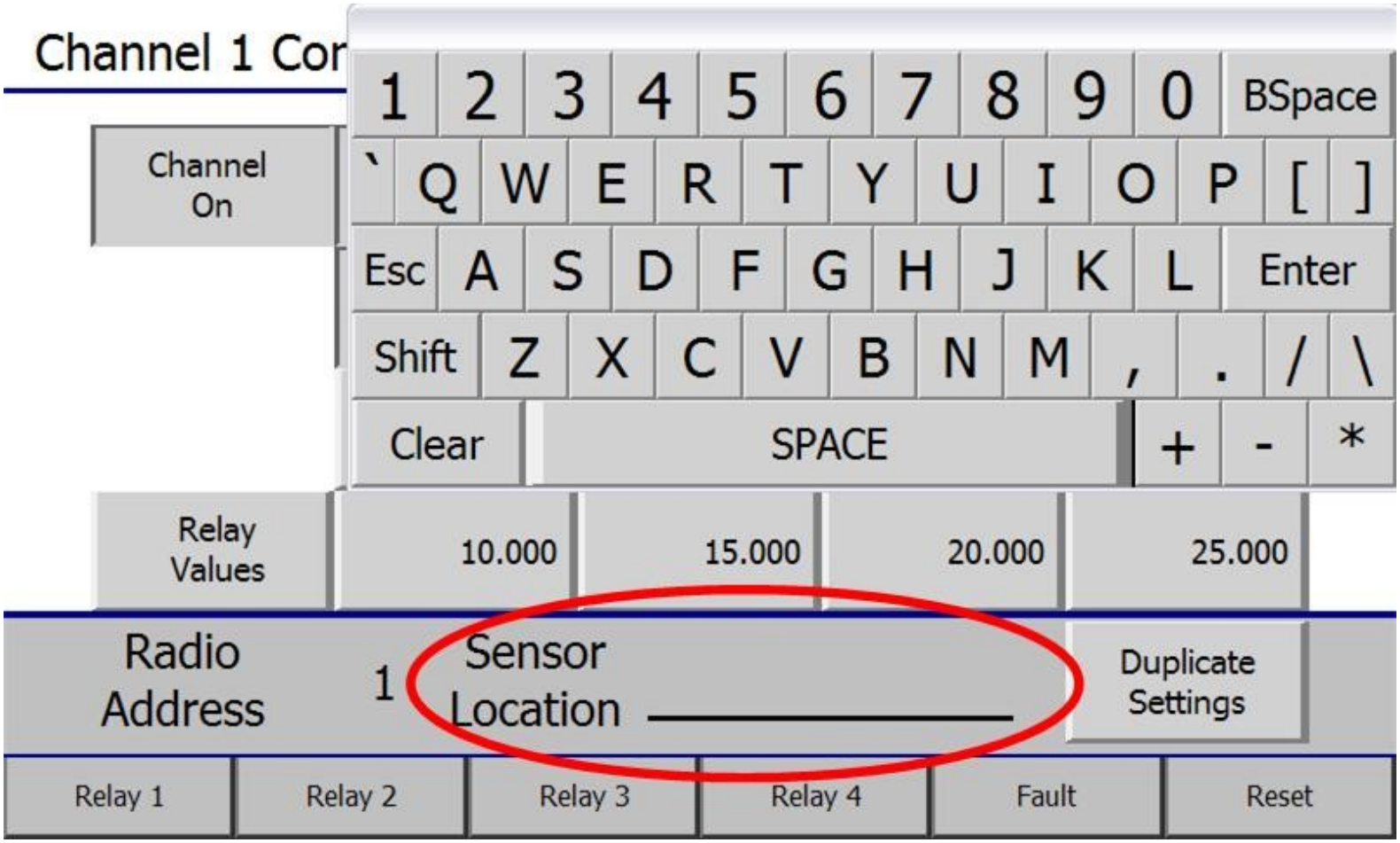
NOTE: The range of available scales is 1 – 65000. If a value that falls outside this range is entered, the previously set value will be used.



Setting Sensor Location

1. To specify the sensor location, touch the space to the right of "Sensor Location" and wait for the on-screen keyboard to appear.
2. Type the desired sensor location name—up to ten characters—on the keypad, then press "ENT".

NOTE: To enter lower-case letters, press "Shift".



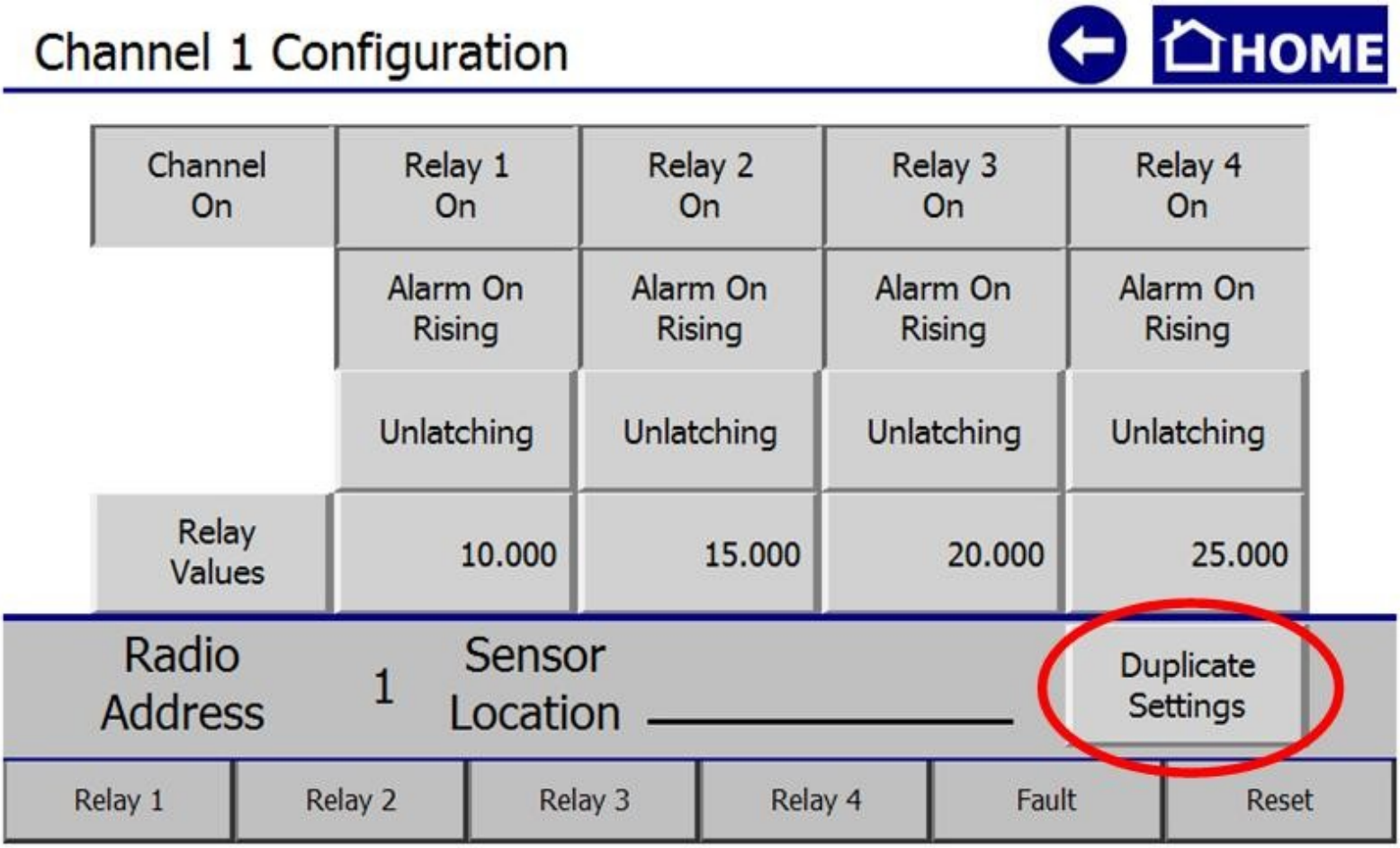
Duplicate Settings

Each channel may be setup individually, or one channel may be setup and then duplicated to all other channels. The "duplicate" feature will set all channels the same way as the one channel that was manually setup.

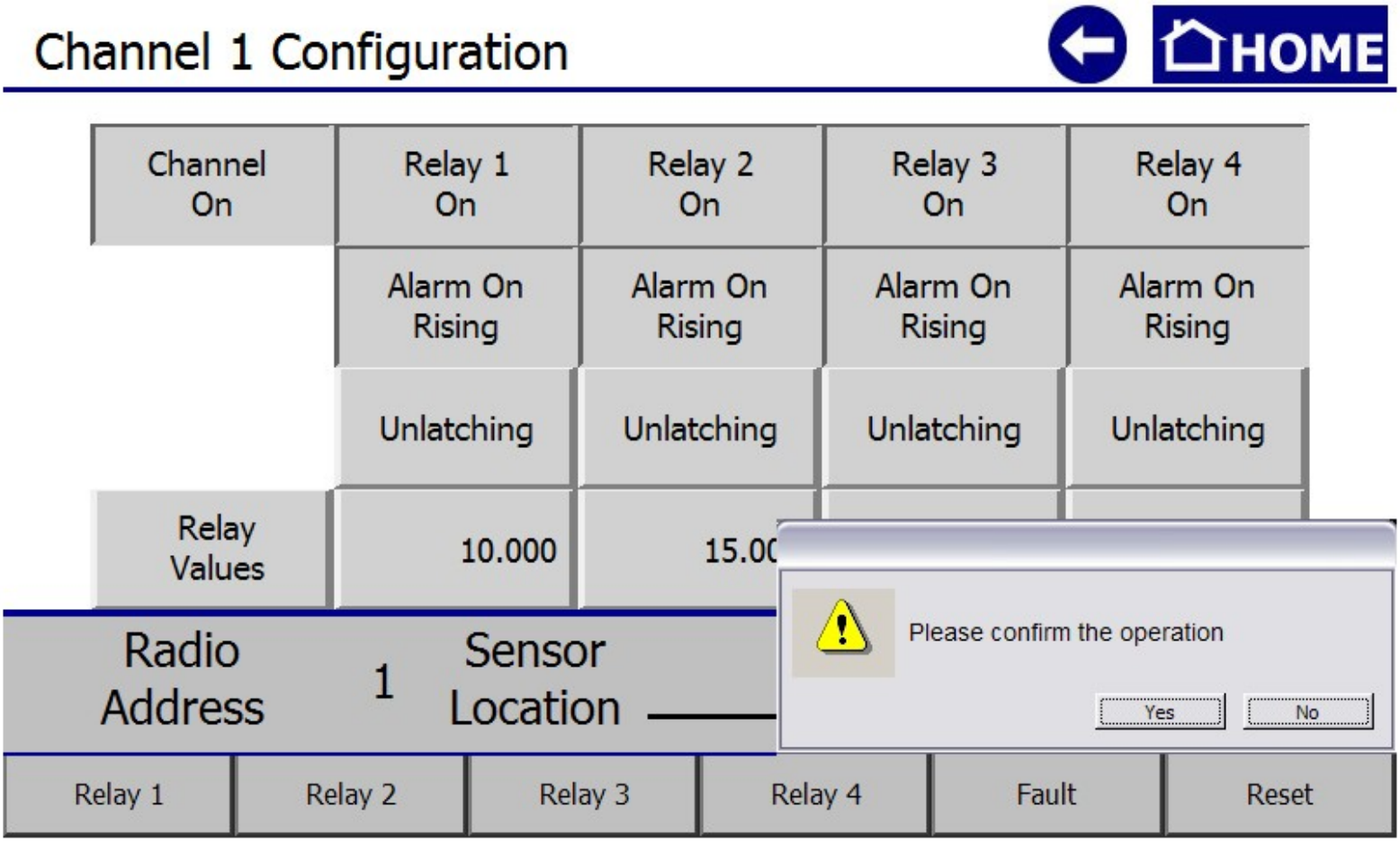
When the duplicate feature is used:

- The address value is incremented
- All relay settings are copied
- The "Location" is not copied—it must be individually set for each channel.

1. To duplicate the settings of a channel, press "Duplicate Settings".



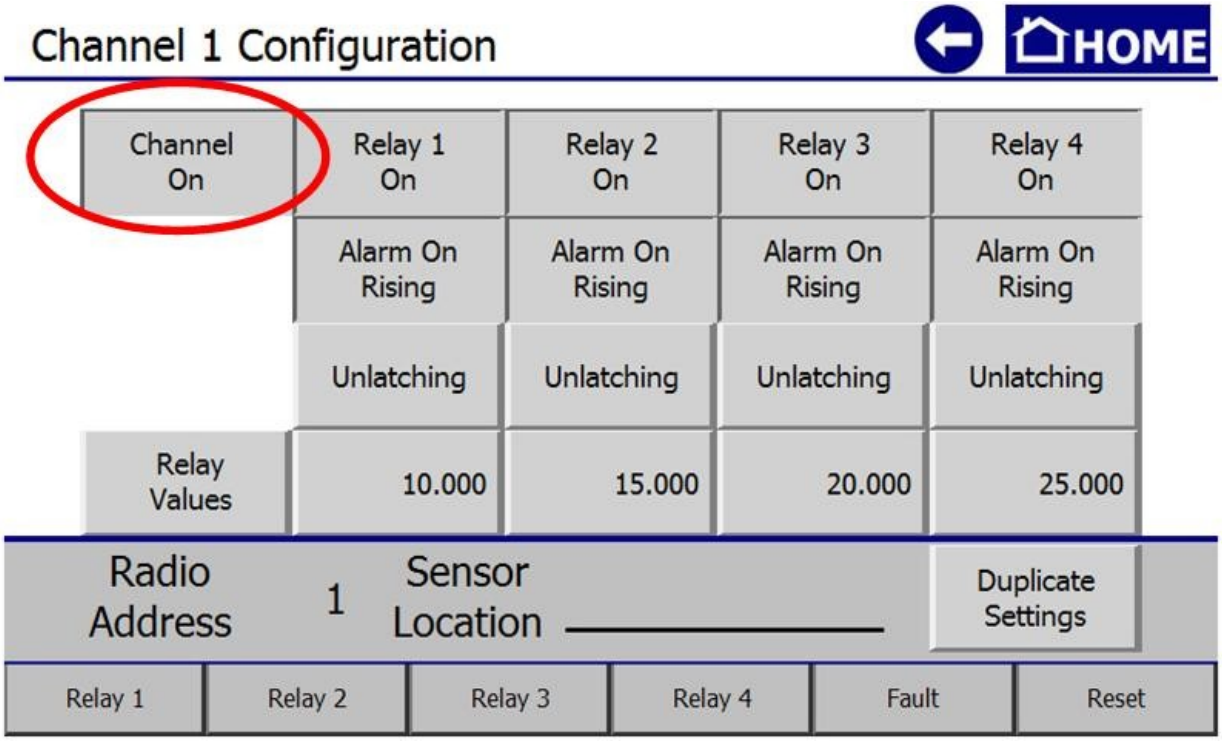
2. Once the "Duplicate Settings" button has been pressed, the Touchscreen will show the following:



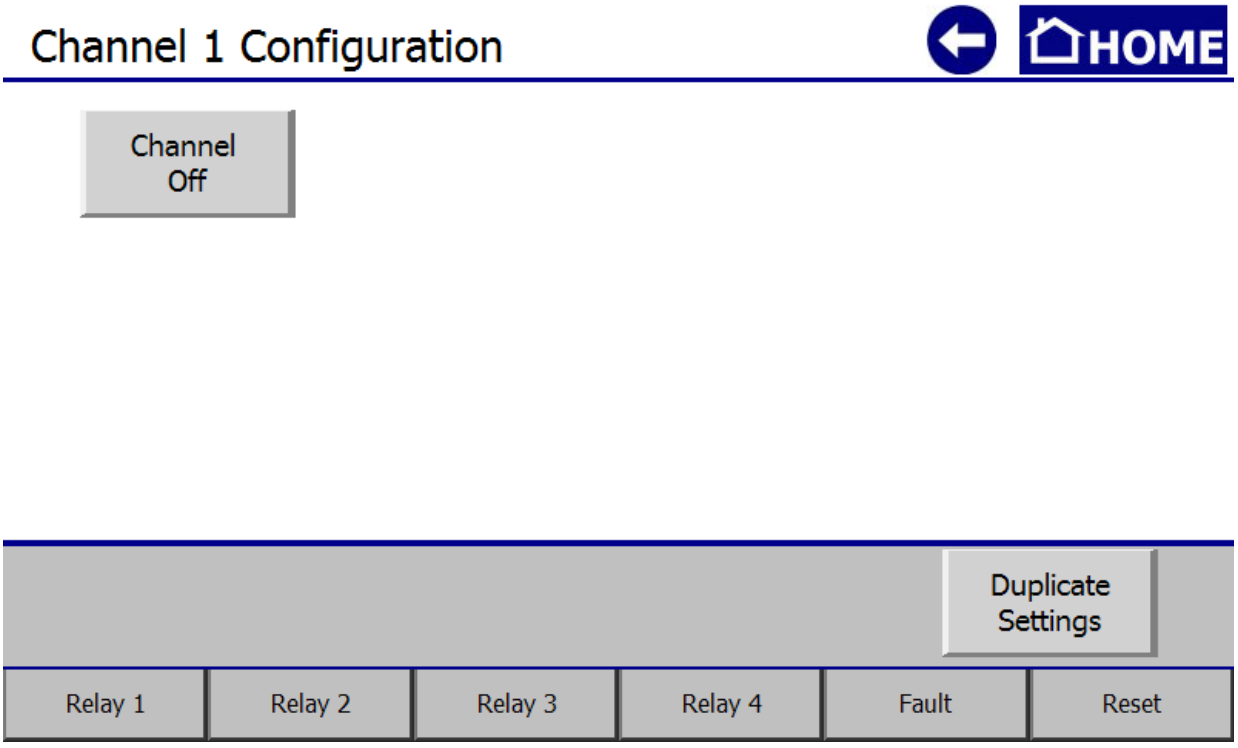
3. Press “Yes” to confirm, or “No” to decline, the Duplicate Settings operation.

Channel Off

1. To turn the channel off, press “Channel On”.



2. The button will then say “Channel Off”, as illustrated here:



NOTE: The Channel On/Off state can be duplicated to all successive channels by pressing the “Duplicate Settings” button.

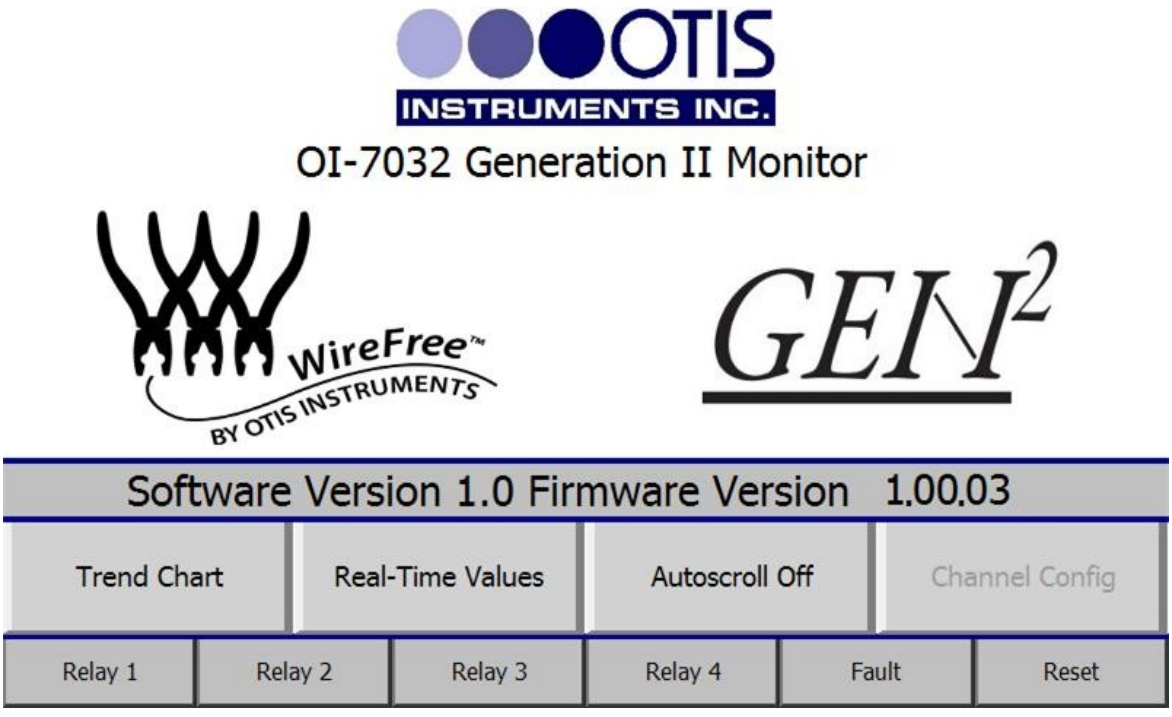
Configuration Menu Navigation

The Configuration Menu should be used to view/modify any of the following:

- Monitor Serial #
- Date Manufactured
- Calibration Mode
- Relay Tests
- OI-7032 Restart
- Modbus Output Settings (Address; Baud Rate)
- Radio Settings (Radio Timeout)
- Gen II Radio Settings (Network ID; Primary or Secondary Monitor)
- OI-7032 Reset to Factory Default
- Relay Settings (Relays 1-4 (failsafe); Fault Terminal (failsafe); Fault Relay Assign)

NOTE: A Second-Level Configuration Menu must be activated to modify some options. For instructions on how to enter and navigate the Second-Level Configuration Menu, see the next section of this Operation Manual.

NOTE: To return to the Home Screen at any time, press "HOME" on the upper right corner of the Touch Screen.

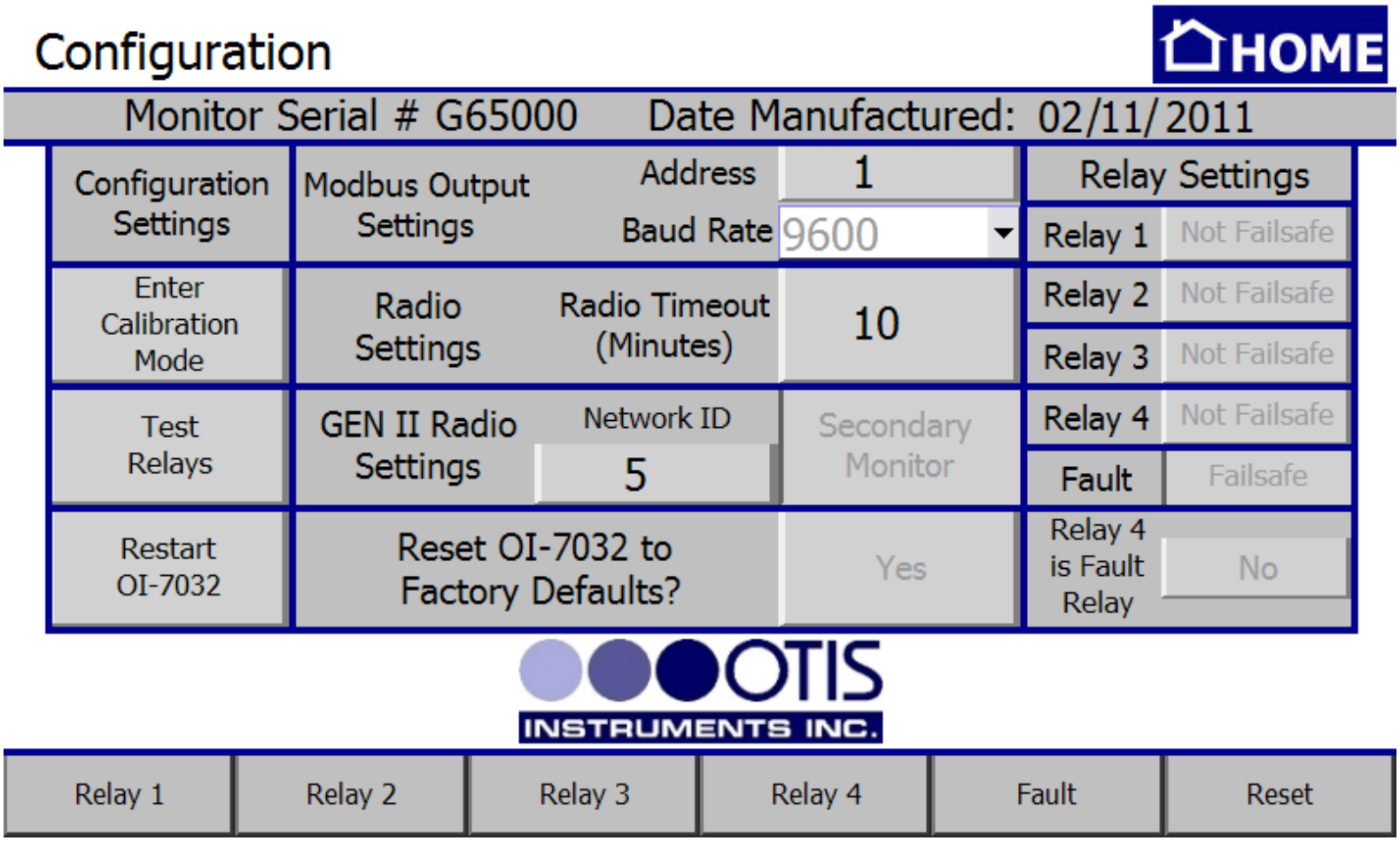


Entering Configuration Menu

To enter the Configuration Menu:

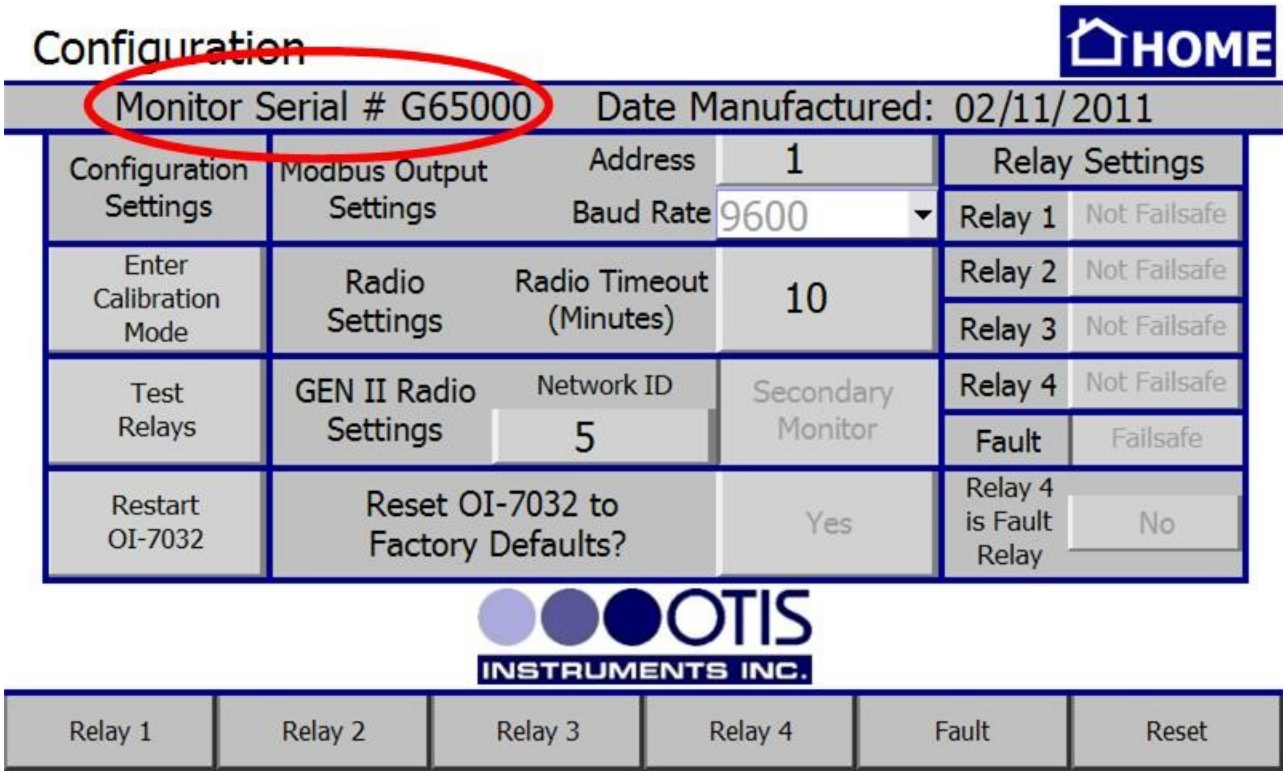
- Touch the WireFree logo, then
- Press and hold the GEN II logo until the Touchscreen shows the Configuration Menu.

The Touchscreen will show the following:



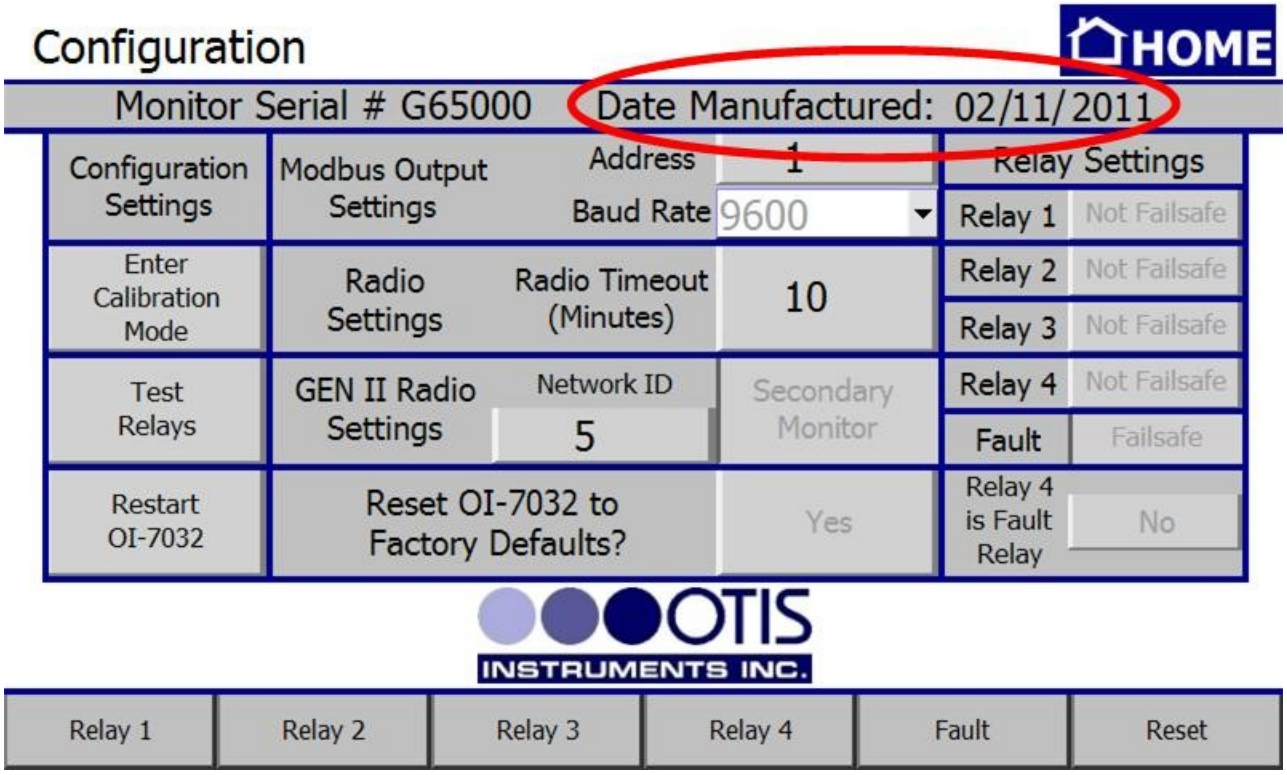
View Monitor Serial #

The Monitor Serial # can be viewed on the upper left side of the Touchscreen while in the Configuration Menu.



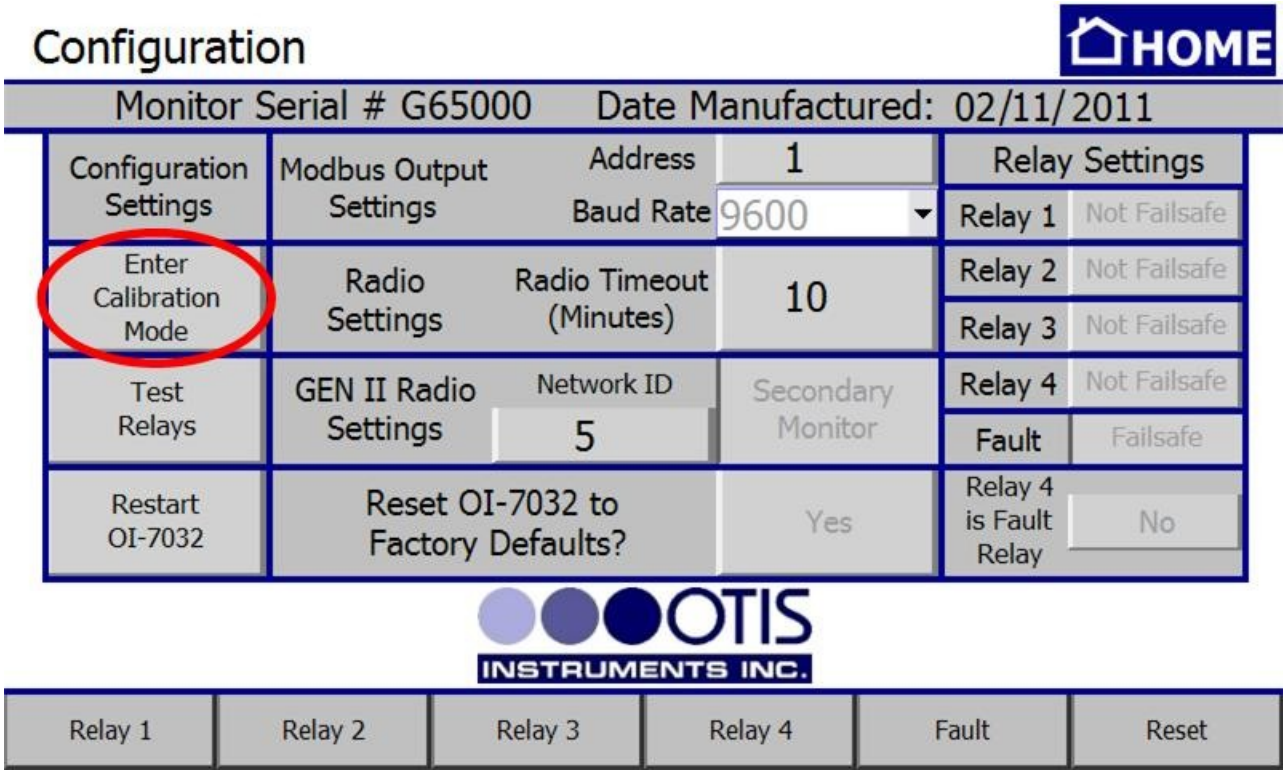
View Date Manufactured

The Date Manufactured can be viewed on the upper right side of the Touchscreen while in the Configuration Menu.

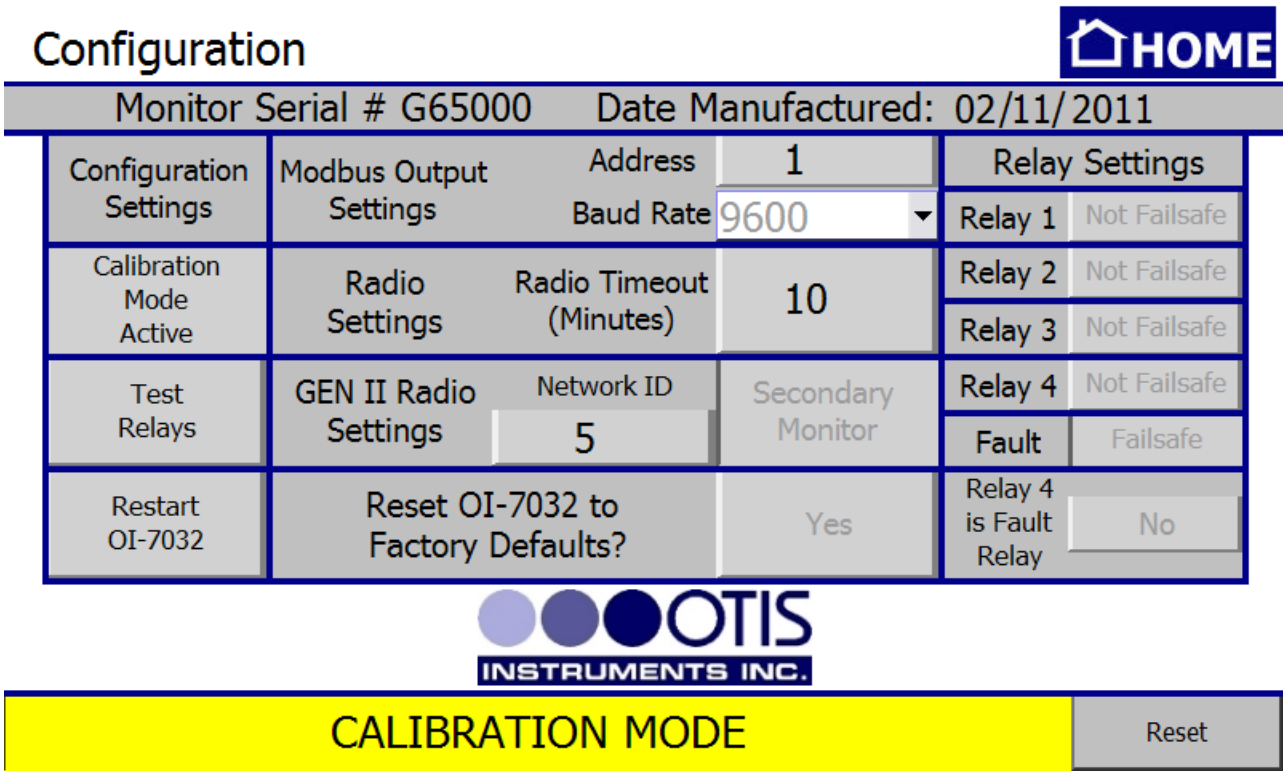


Calibration Mode

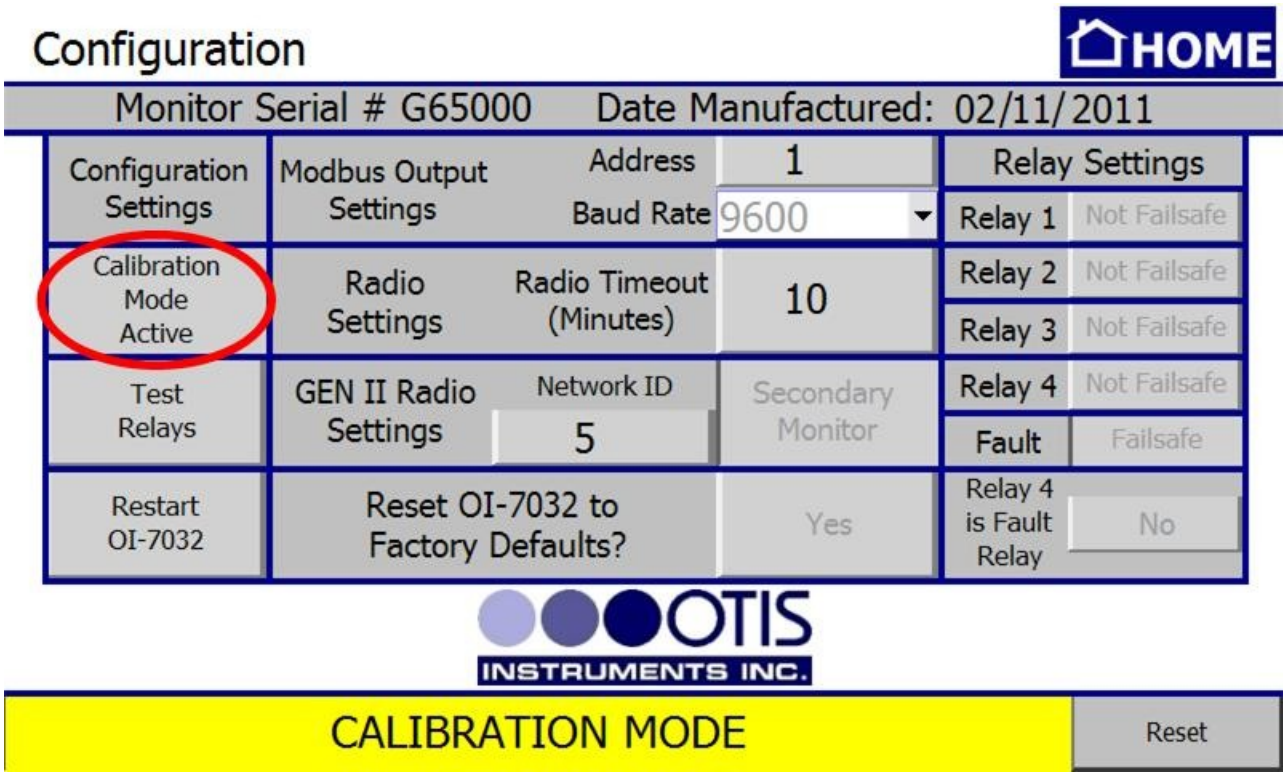
While in the Configuration Menu, press “Enter Calibration Mode” to put the OI-7032 in Calibration Mode.



While in Calibration Mode, the Touchscreen will show the following:

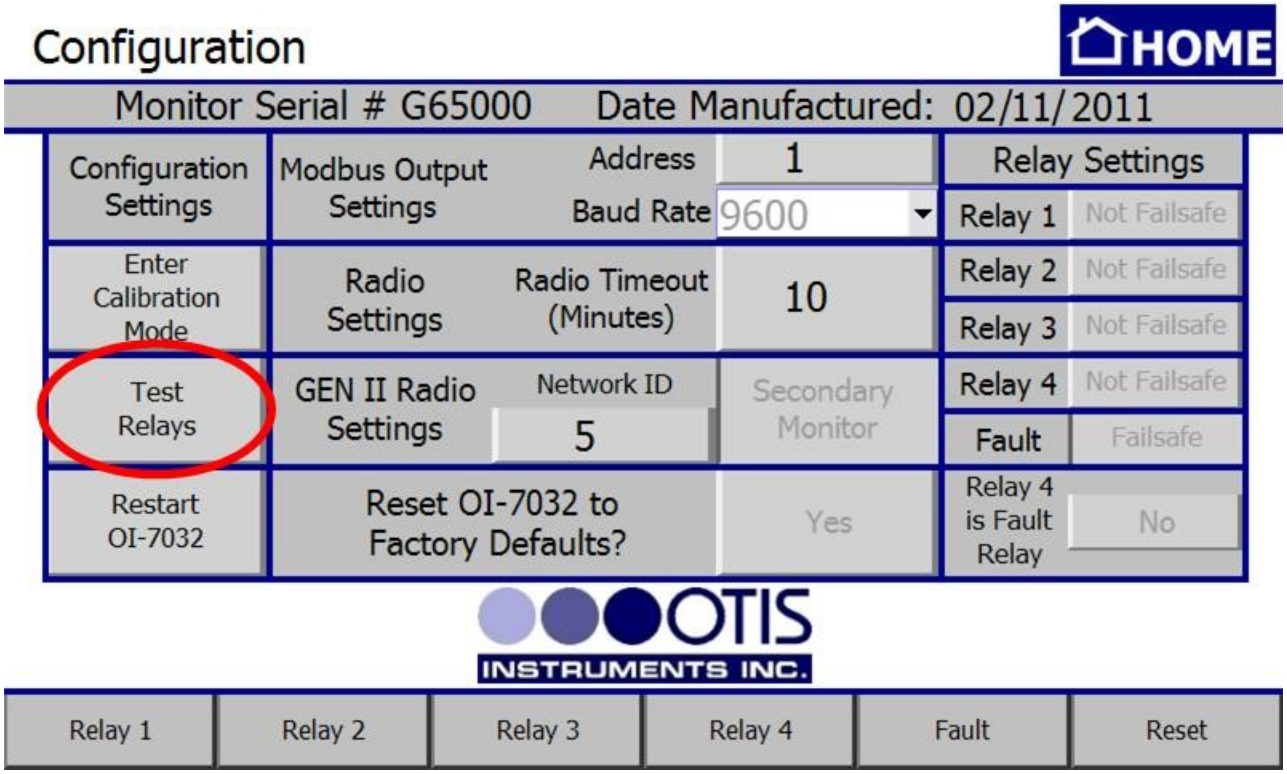


To exit Calibration Mode, touch “Calibration Mode Active” or “Reset”.

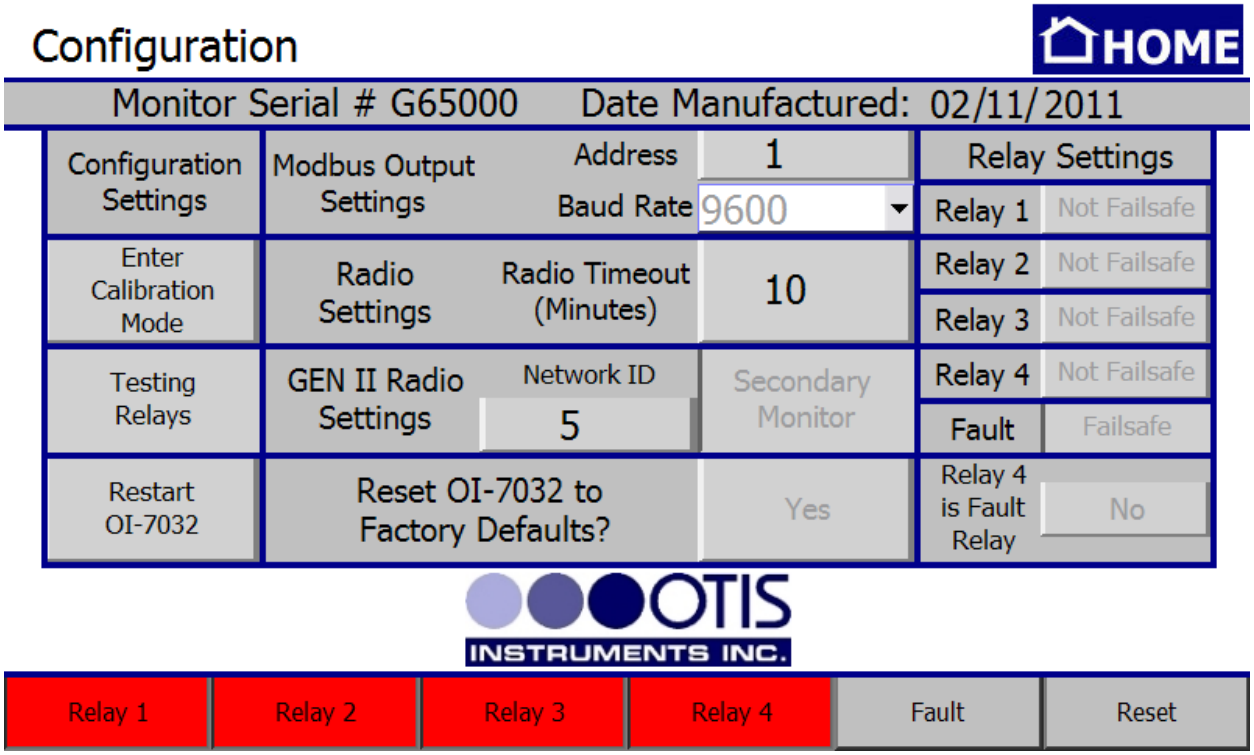


Relay Tests

While in the Configuration Menu, press “Test Relays”.

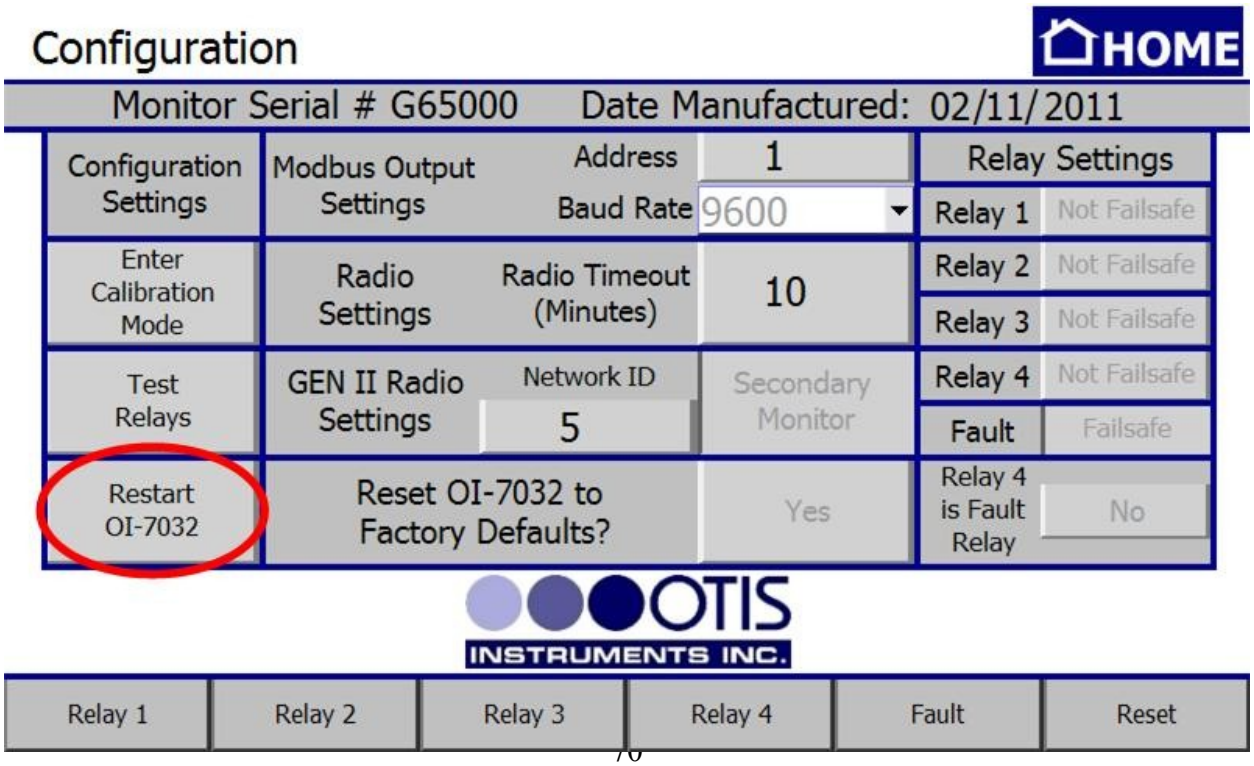


When in Relay Test Mode, the Touchscreen will consecutively light each Relay (in red) every 5 seconds. To cancel the Relay Test, press "Testing Relays" or "Reset". When all 4 relays have been tested (and passed), the Touchscreen will look like the following illustration (before automatically returning to the regular Configuration Menu view):



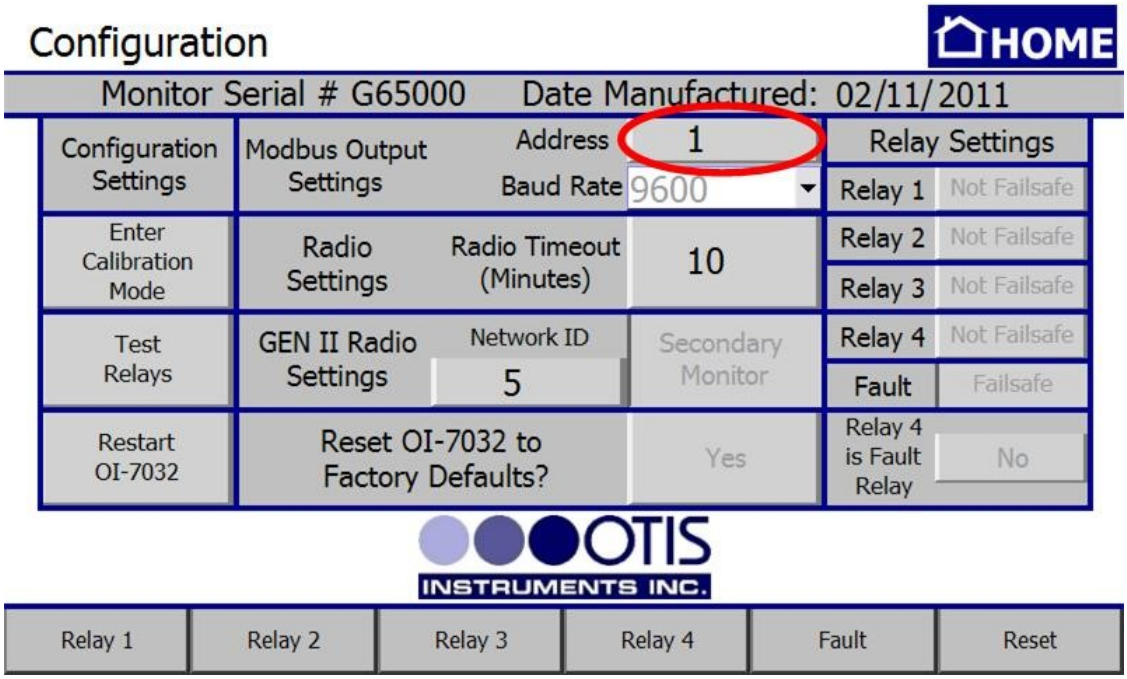
OI-7032 Restart

While in the Configuration Menu, press "Restart OI-7032" to restart the Terminal Board. A pop-up will appear for action-confirmation. Press "Yes" to confirm, or "No" to decline.



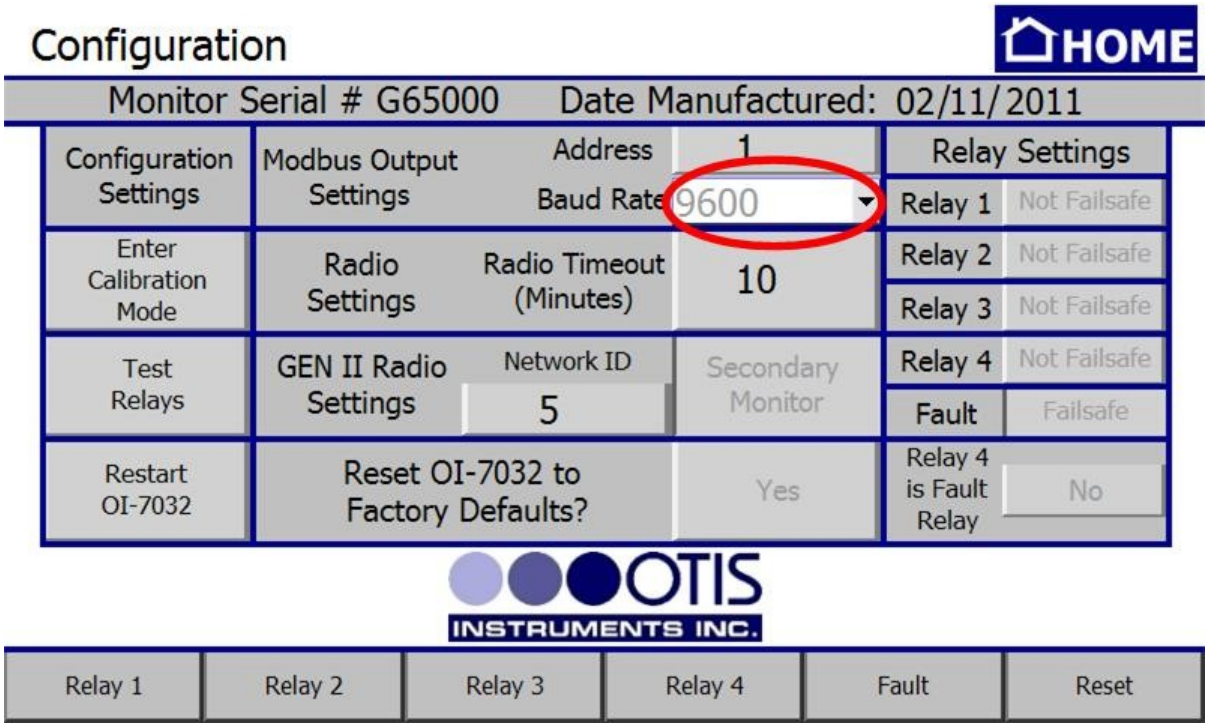
VIEW Modbus Output Settings: Address

While in the Configuration Menu, the address can be viewed in the Modbus Output Settings box. To modify the Address, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



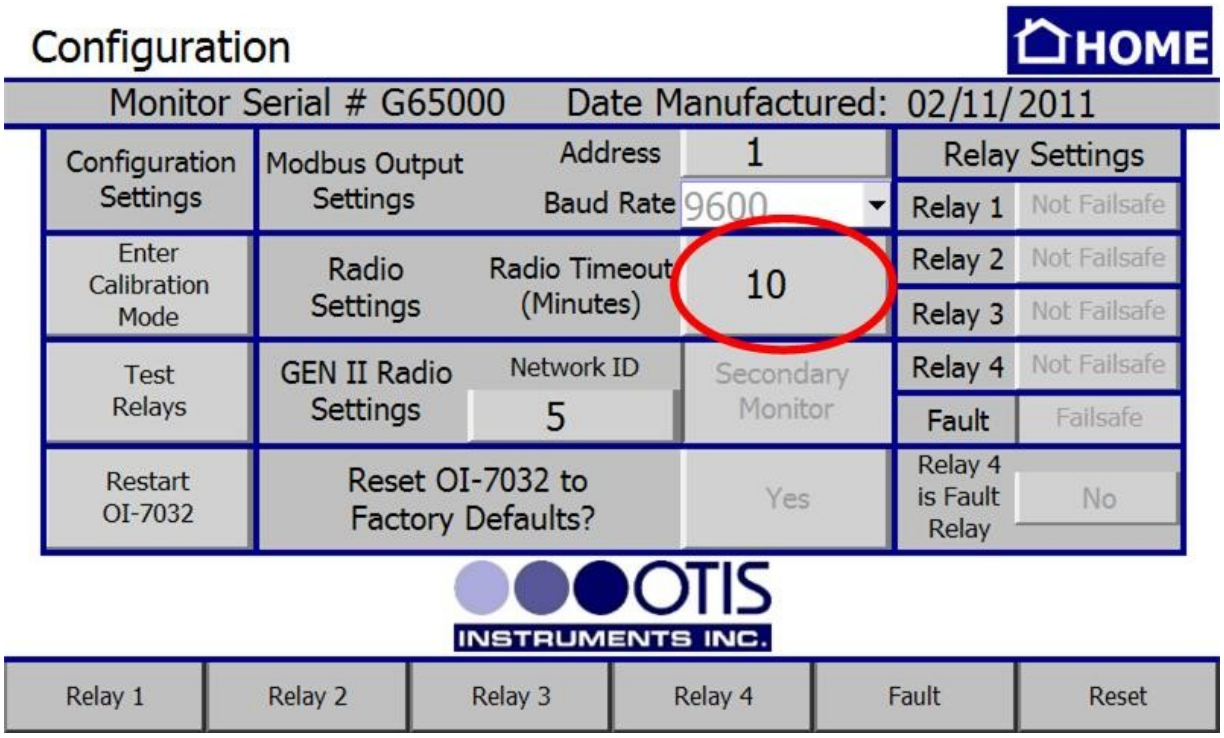
VIEW Modbus Output Settings: Baud Rate

While in the Configuration Menu, the Baud Rate can be viewed in the Modbus Output Settings box. To modify the Baud Rate, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



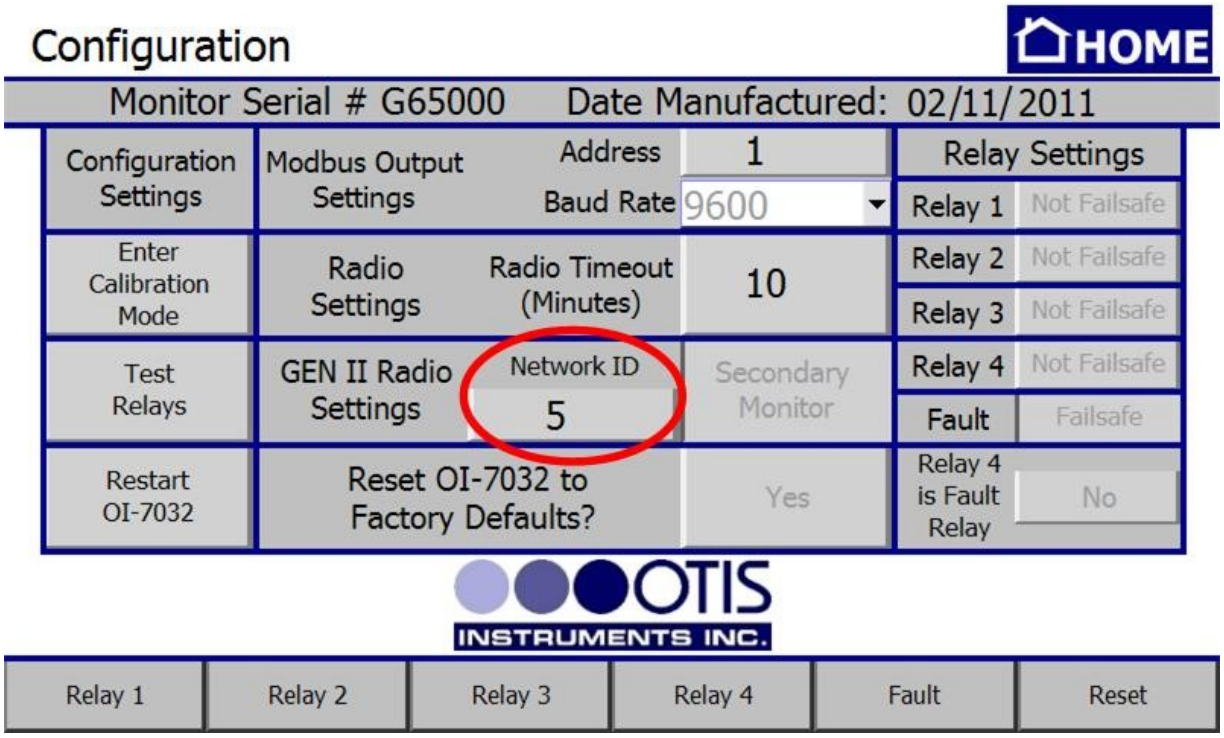
VIEW Radio Settings: Radio Timeout

While in the Configuration Menu, the Radio Timeout can be viewed in the Radio Settings box. To modify the Radio Settings, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



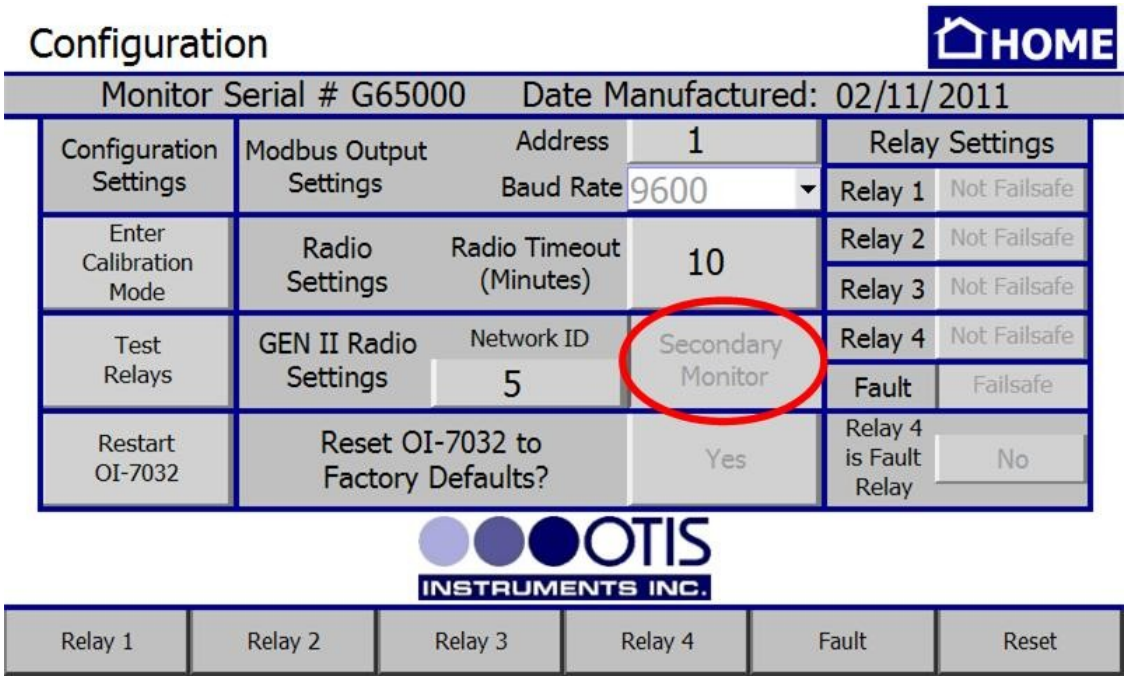
VIEW Gen II Radio Settings: Network ID

While in the Configuration Menu, the Network ID can be viewed in the Gen II Radio Settings box. To modify the Gen II Radio Settings, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



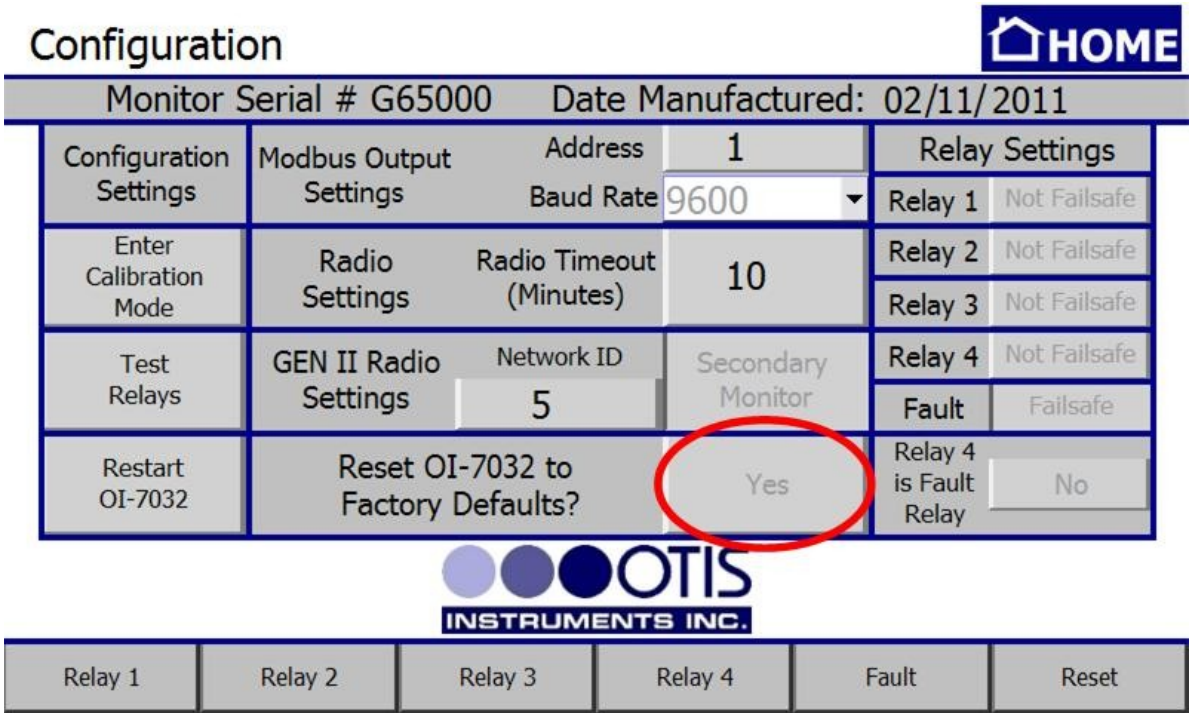
VIEW Gen II Radio Settings: Primary or Secondary Monitor

While in the Configuration Menu, the monitor can view the "Primary/Secondary Monitor" setting in the Gen II Radio Settings box. To modify the Gen II Radio Settings, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



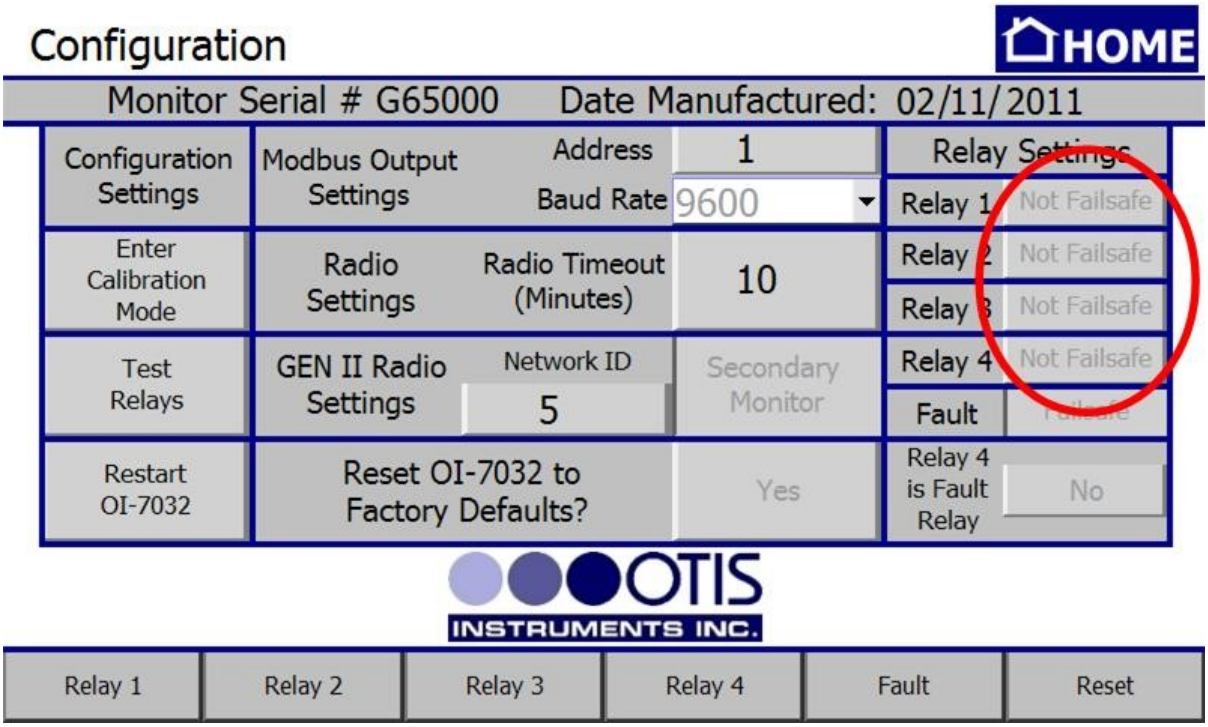
VIEW OI-7032 Reset to Factory Default

While in the Configuration Menu, the user can view the OI-7032 to the factory default settings in the Reset OI-7032 to Factory Defaults? box. To enable the Factory Default Yes/No button, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



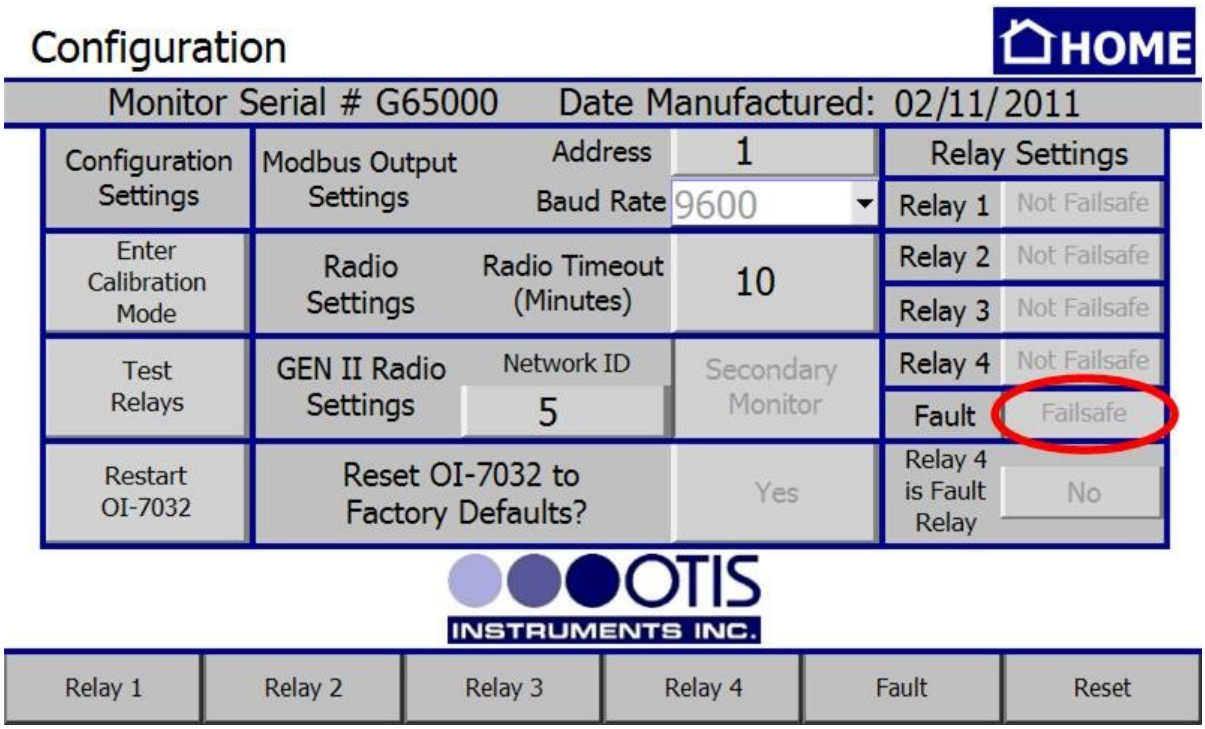
VIEW Relay Settings: Relays 1-4 (Failsafe)

While in the Configuration Menu, the user can view the Relay Failsafe (1-4) setting next to the corresponding relay number in the Relay 1, 2, 3 or 4 box. To modify the Relay Failsafe settings, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



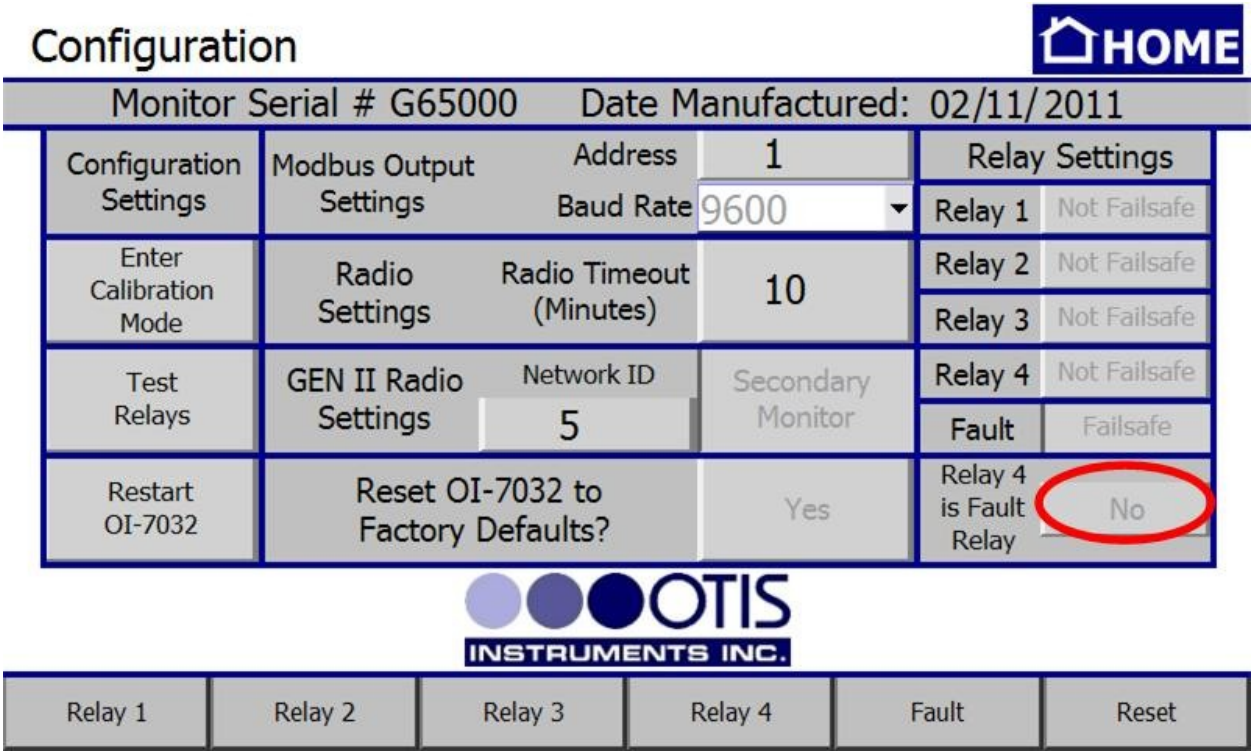
VIEW Relay Settings: Fault Terminal

While in the Configuration Menu, the user can view the Fault Terminal Failsafe setting in the Fault box. To modify the Fault Terminal Failsafe setting, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



VIEW Relay Settings: Fault Relay Assign

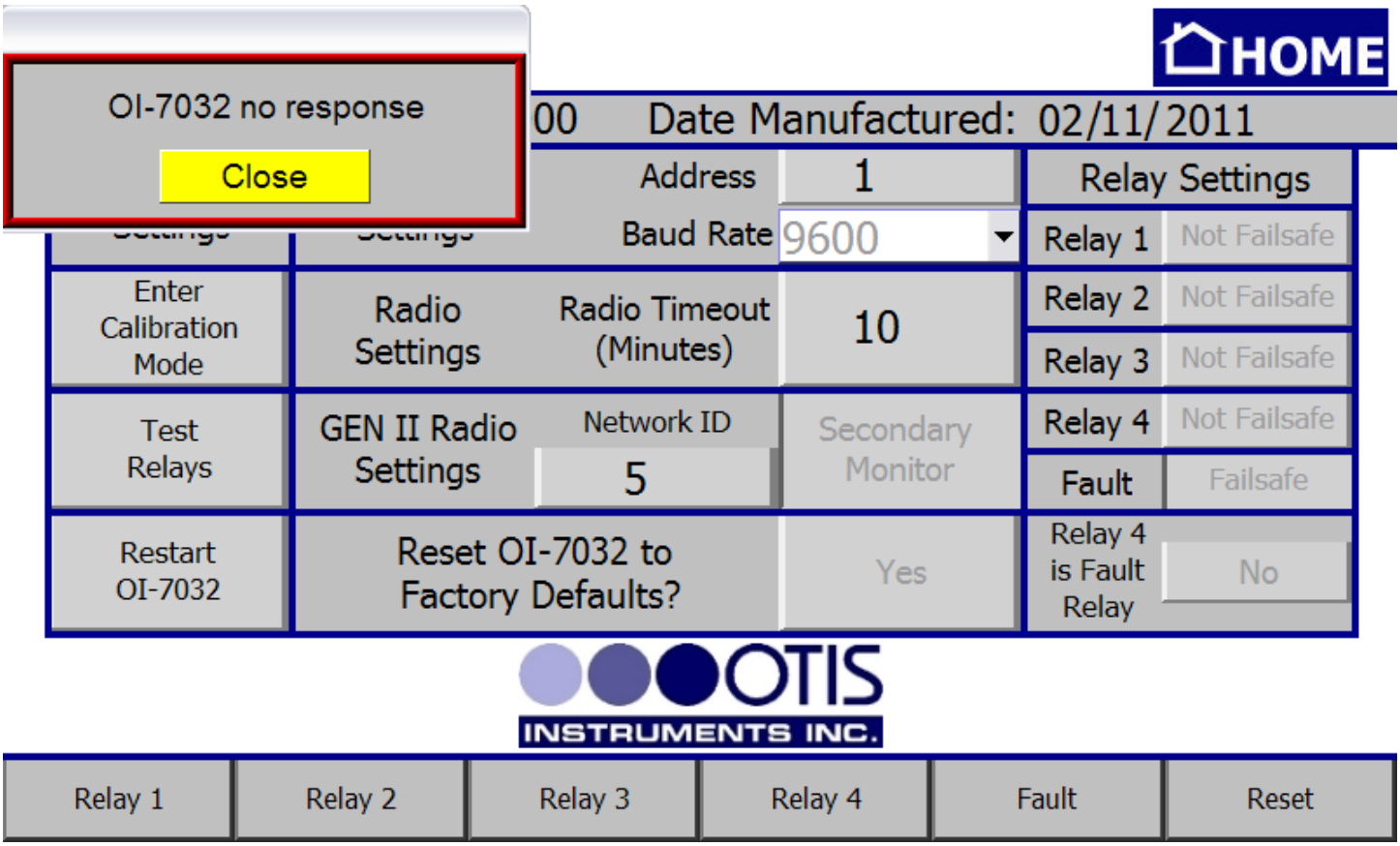
While in the Configuration Menu, the user can view the Relay 4 Fault Relay setting in the "Relay 4 is Fault Relay" box. To modify the Relay 4 fault relay assignment, consult the next section of this Operation Manual "Second-Level Modifications – Configuration Menu".



Configuration Menu Modifications (Second-Level Configuration Menu)

To modify certain items in the Configuration Menu, the OI-7032 Terminal Board must be reset (while in the Configuration Menu). To reset the board, complete the following steps.

1. Press "Restart OI-7032". The Touchscreen will show the following:



2. Wait for the pop-up window to disappear and the grayed-out buttons to become black, then modify the options that are now available for changes (see the following sub-sections for specific instructions on how to modify items while in the Second-Level Configuration Menu.

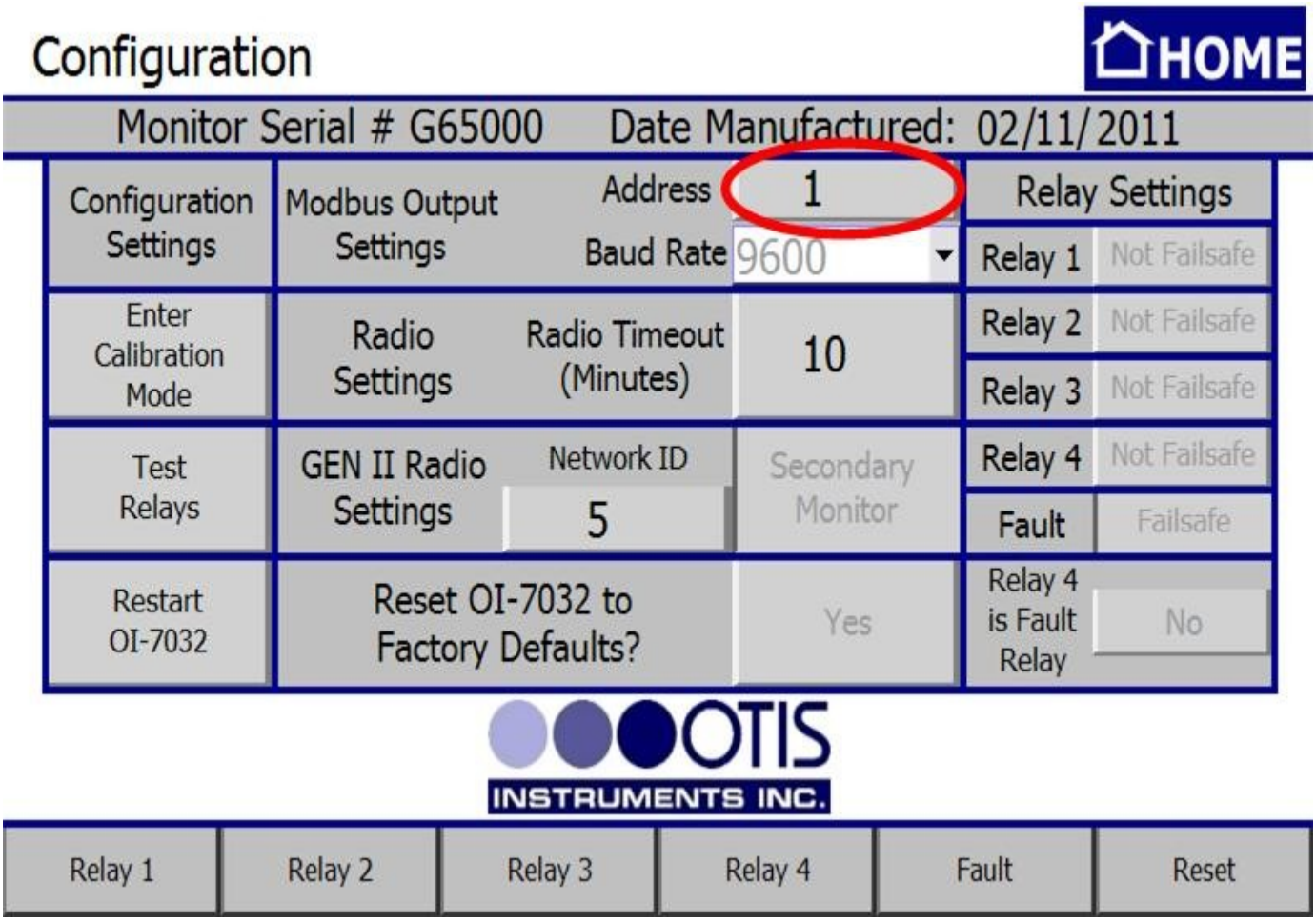
NOTE: The OI-7032 will allow 30 seconds—starting from when the pop-up window disappears—to make any changes to the temporarily-enabled items.

NOTE: If additional time (beyond the 30 seconds) is needed, repeat the steps to reset the Terminal Board.

MODIFY Modbus Output Settings: Address

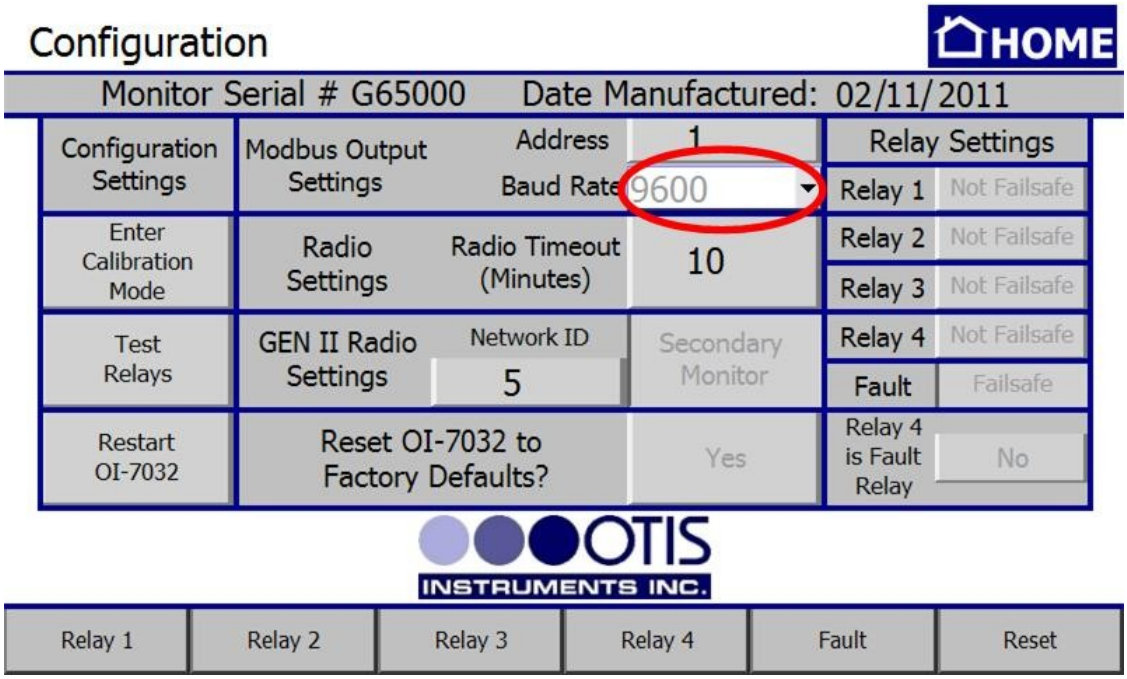
While in the Second-Level Configuration Menu, modify the address by touching the number next to the word "Address". When the numeric keypad appears, type the desired address number and then press "ENT".

NOTE: The acceptable values for this setting are 1-247. If a value that falls outside this range is entered, the previously entered value will be used.



MODIFY Modbus Output Settings: Baud Rate

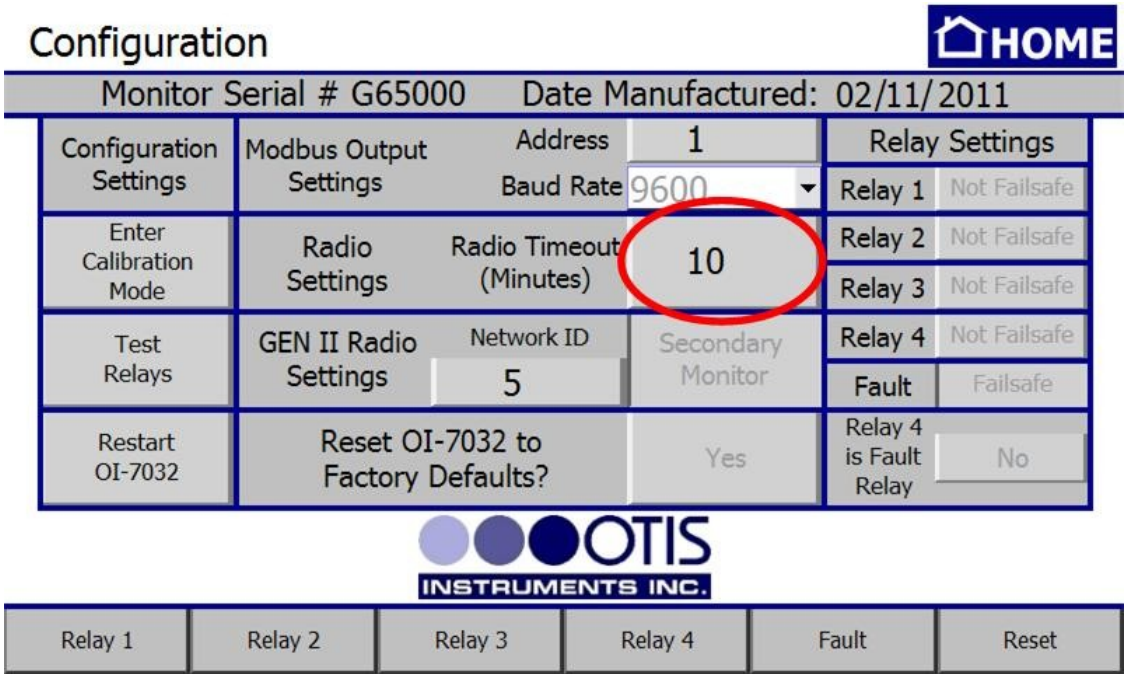
While in the Second-Level Configuration Menu, modify the Baud Rate by pressing the arrow next to the current Baud Rate setting, and then choosing the desired option from the drop-down list.



MODIFY Radio Settings: Radio Timeout

While in the Second-Level Configuration Menu, adjust the Radio Timeout by touching the number next to "Radio Timeout (Minutes)". When the numeric keypad appears, type the desired timeout time (in minutes) and then press "ENT".

NOTE: The acceptable values for timeout is 6-255 minutes. If a value that falls outside of the range is entered, the previously entered value will be used.

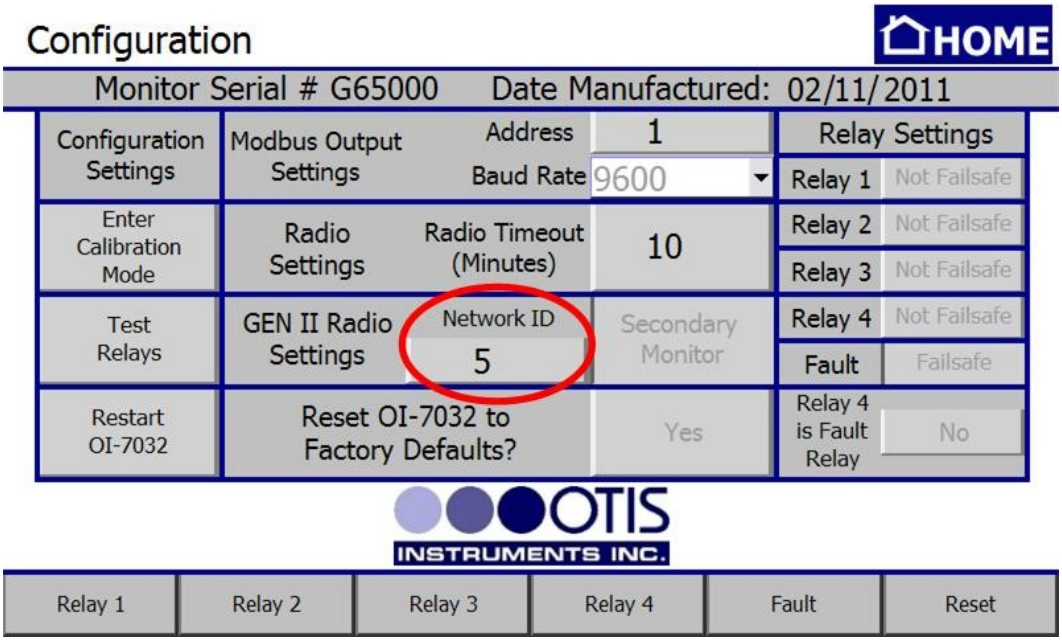


MODIFY Gen II Radio Settings: Network ID

While in the Second-Level Configuration Menu, adjust the Network ID by touching the number under "Network ID". When the numeric keypad appears, type the desired ID number and then press "ENT".

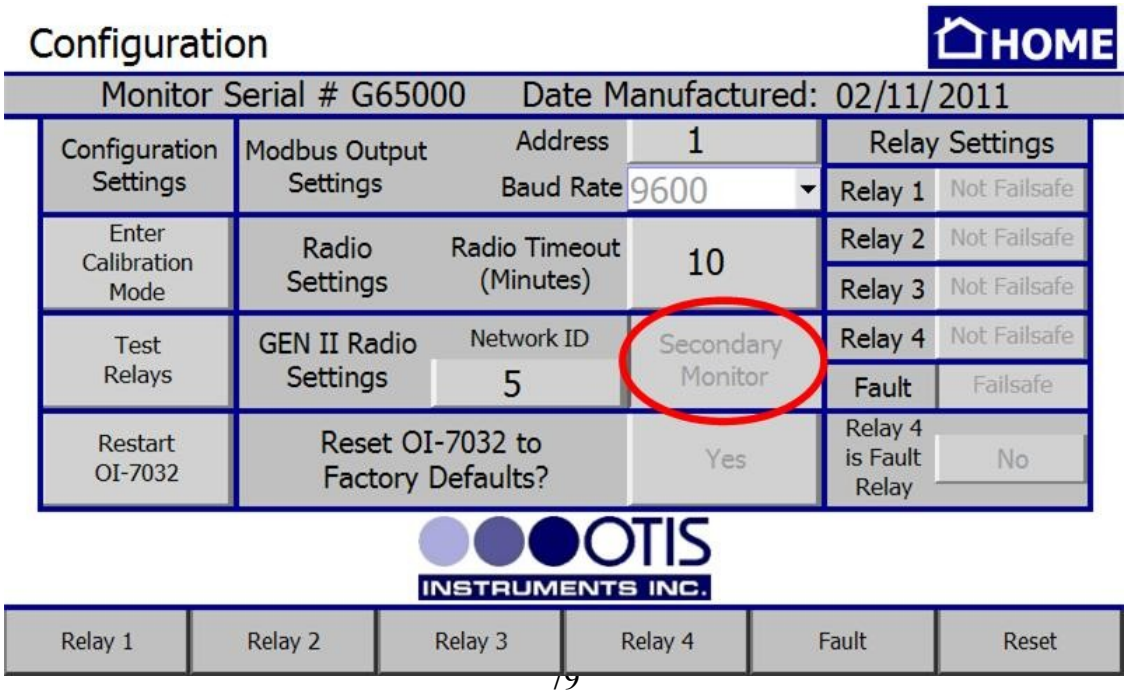
NOTE: The values allowed for "Network ID" are 1-78. If a value that falls outside this range is entered, the previously entered value will be used.

NOTE: Setting the Network ID is only necessary when using a Gen II radio.



MODIFY Gen II Radio Settings: Primary or Secondary Monitor

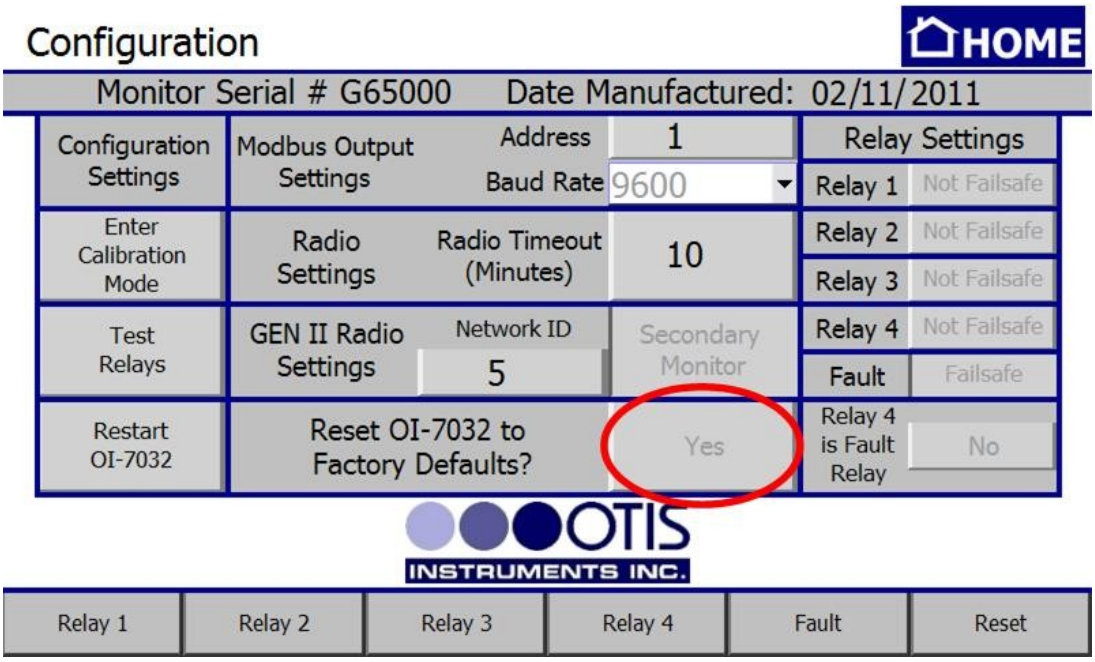
While in the Second-Level Configuration Menu, the monitor can be set as either a Primary or Secondary monitor by touching the "Primary/Secondary Monitor" button in the Gen II Radio Settings box.



MODIFY OI-7032 Reset to Factory Default

While in the Second-Level Configuration Menu, the user can reset the OI-7032 to the factory default settings by completing the following steps.

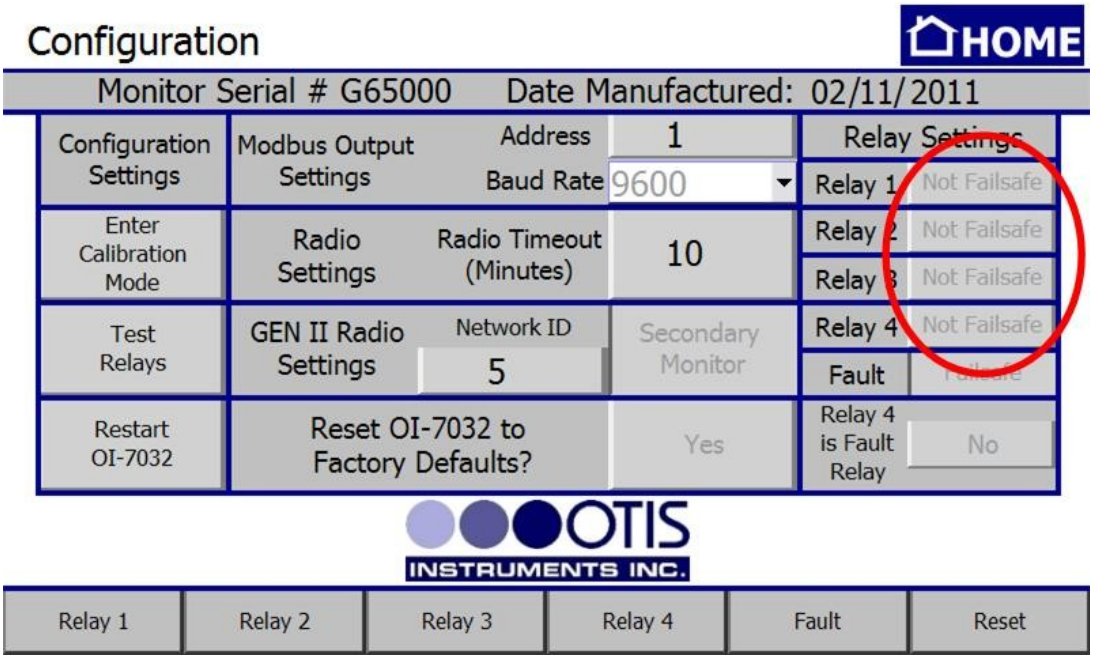
1. Press the "Yes" button in the "Reset OI-7032 to Factory Defaults?" box.



2. A pop-up will appear for action-confirmation. Press "Yes" to confirm, or "No" to decline.

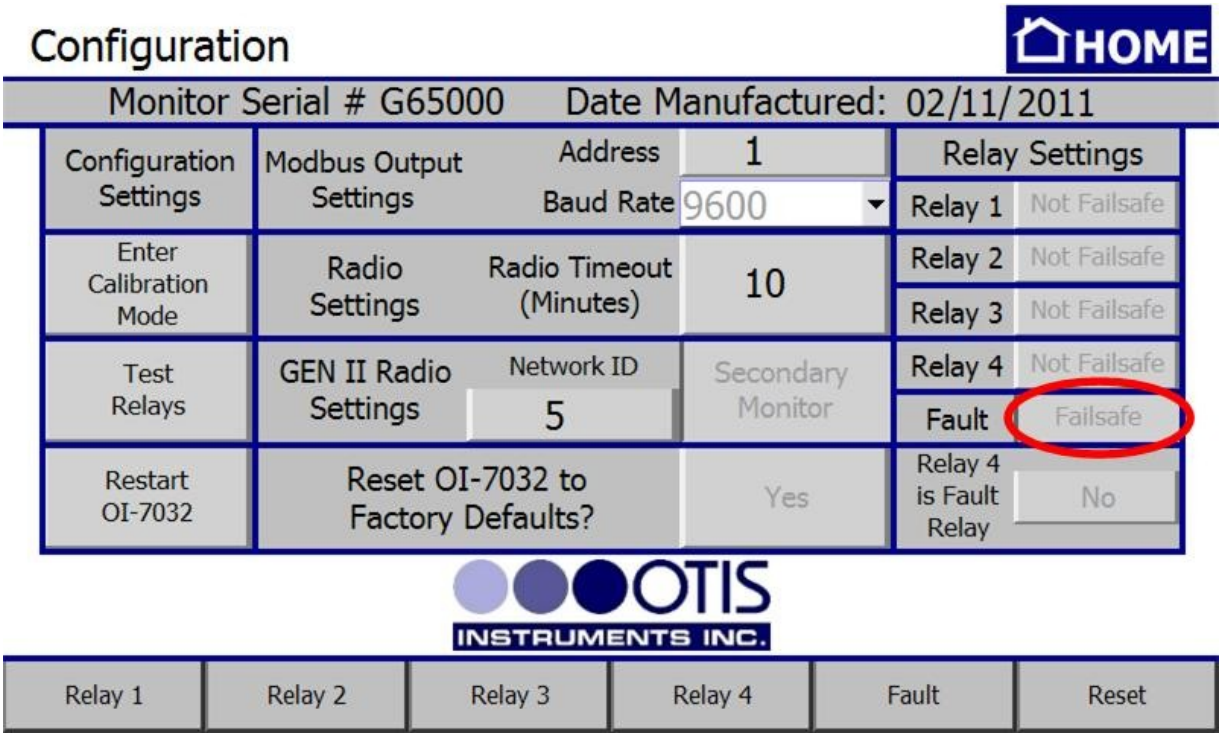
MODIFY Relay Settings: Relays 1-4 (Failsafe)

While in the Second-Level Configuration Menu, set relays 1-4 to be failsafe (or not failsafe) by pressing the "Not Failsafe" (or "Failsafe") button next to the desired relay in the Relay 1, 2, 3 or 4 box.



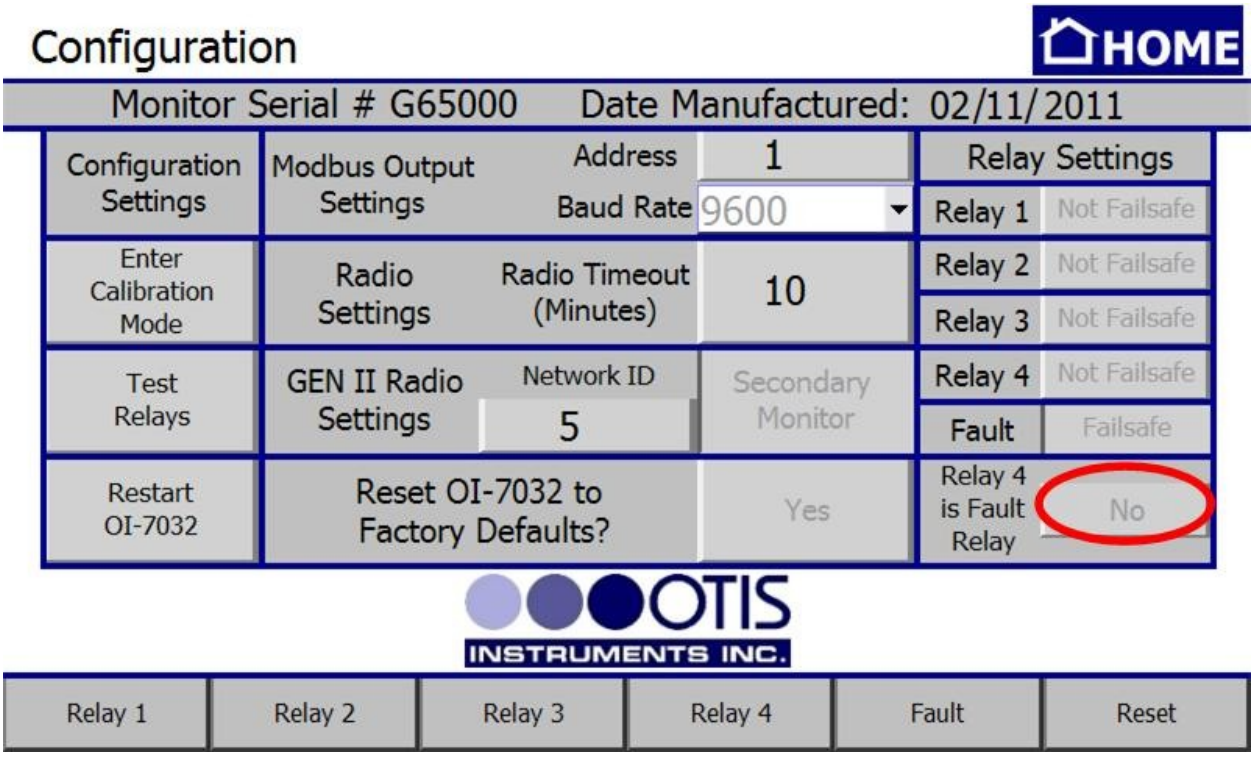
MODIFY Relay Settings: Fault Terminal

While in the Second-Level Configuration Menu, set the relays and fault terminal to be failsafe (or not failsafe) by pressing the "Failsafe" (or "Not Failsafe") button in the Relay Settings box.



MODIFY Relay Settings: Fault Relay Assign

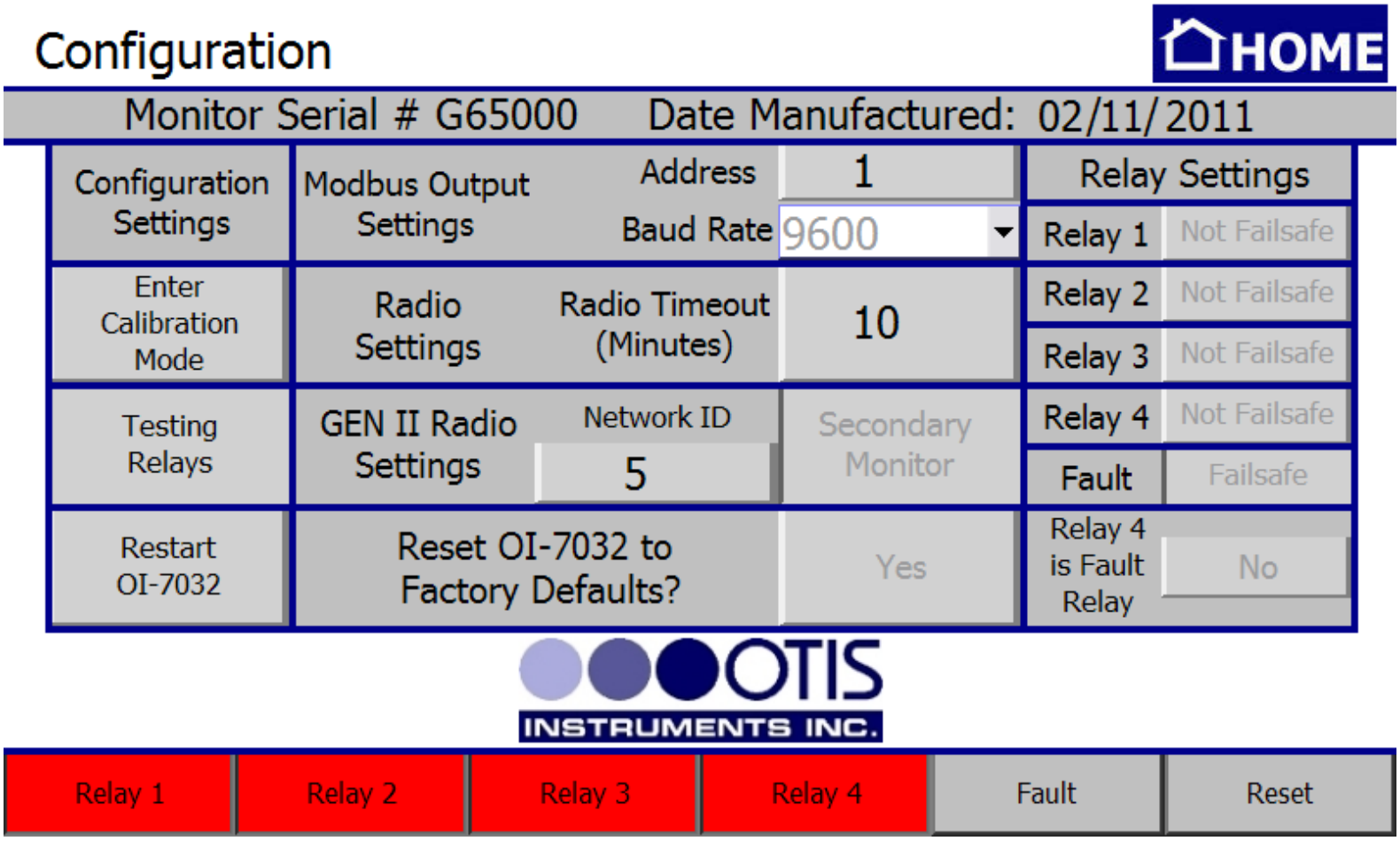
While in the Second-Level Configuration Menu, set relay 4 as the fault relay (or not the fault relay) by pressing the "Yes/No" button in the "Relay 4 is Fault Relay" box.



Relay Indicator

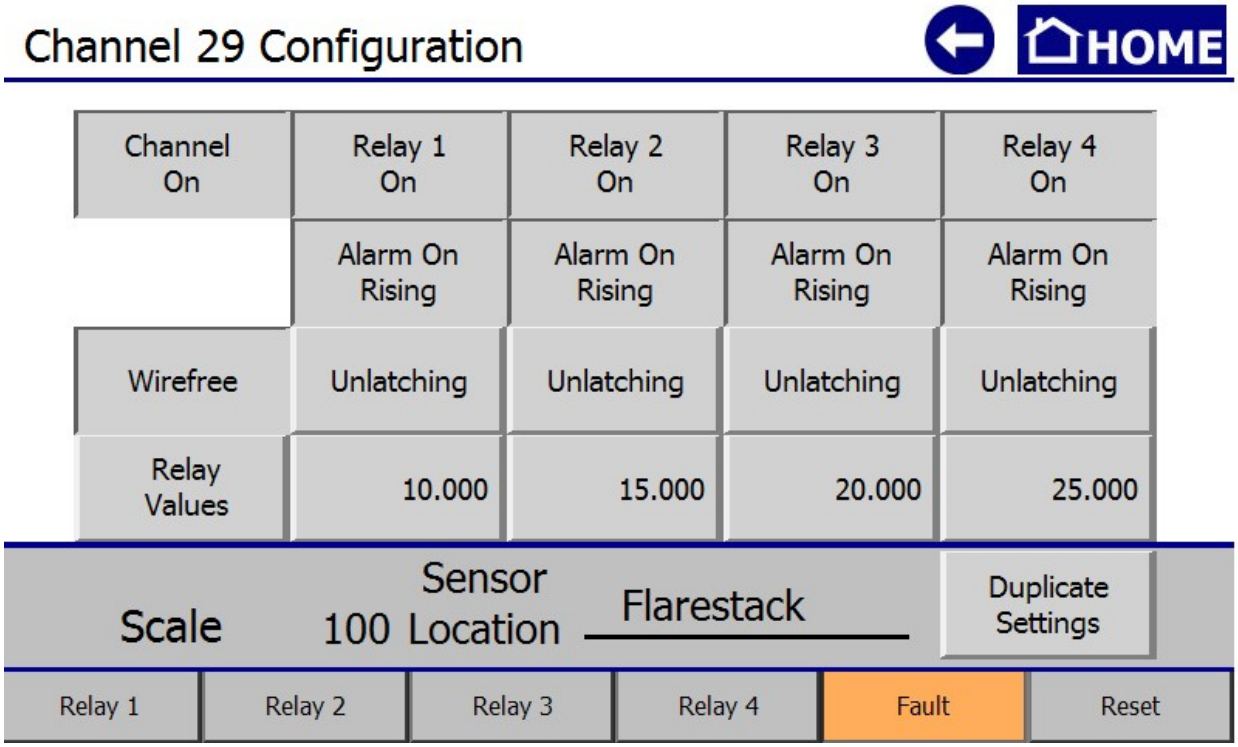
Indicators for all four relays remain along the bottom of the Touchscreen at all times. When a relay has been triggered, that relay indicator will turn red.

In the illustration below, all four relays are in alarm (in Relay Test Mode):



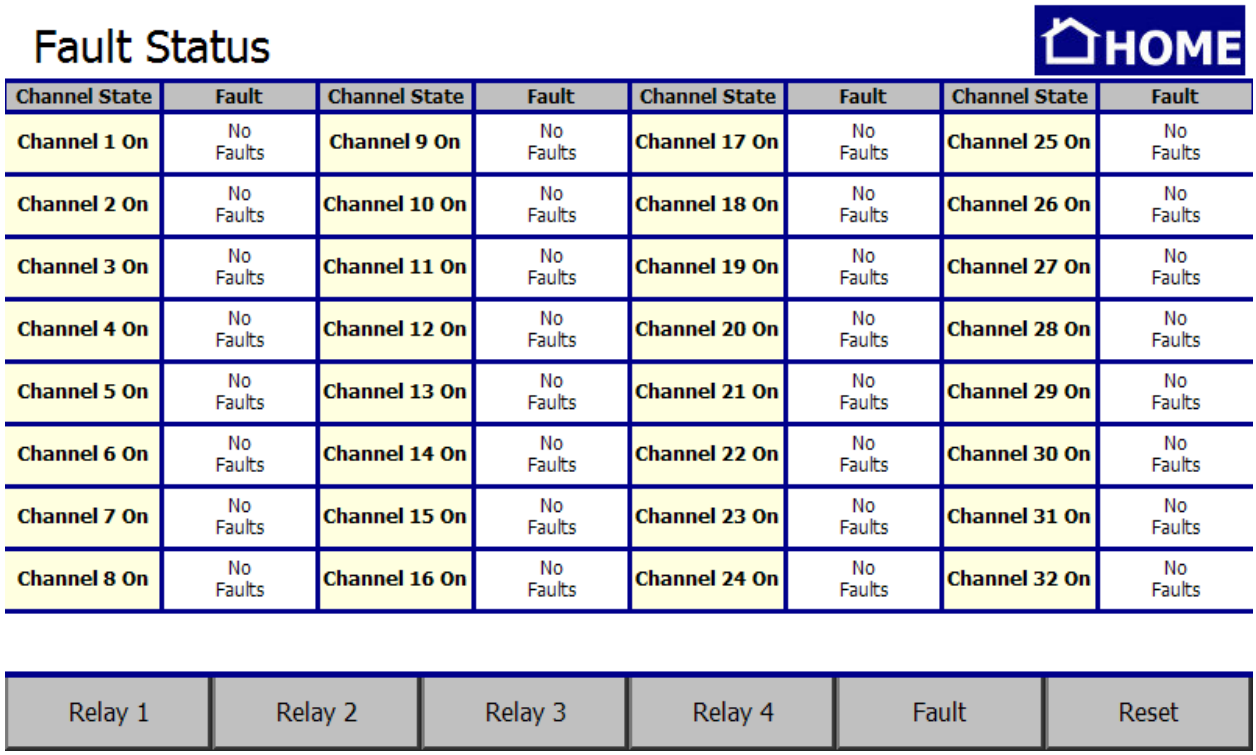
Fault Indicator

A button for fault indication remains along the bottom of the Touchscreen at all times. When a fault occurs, the fault button will turn orange.

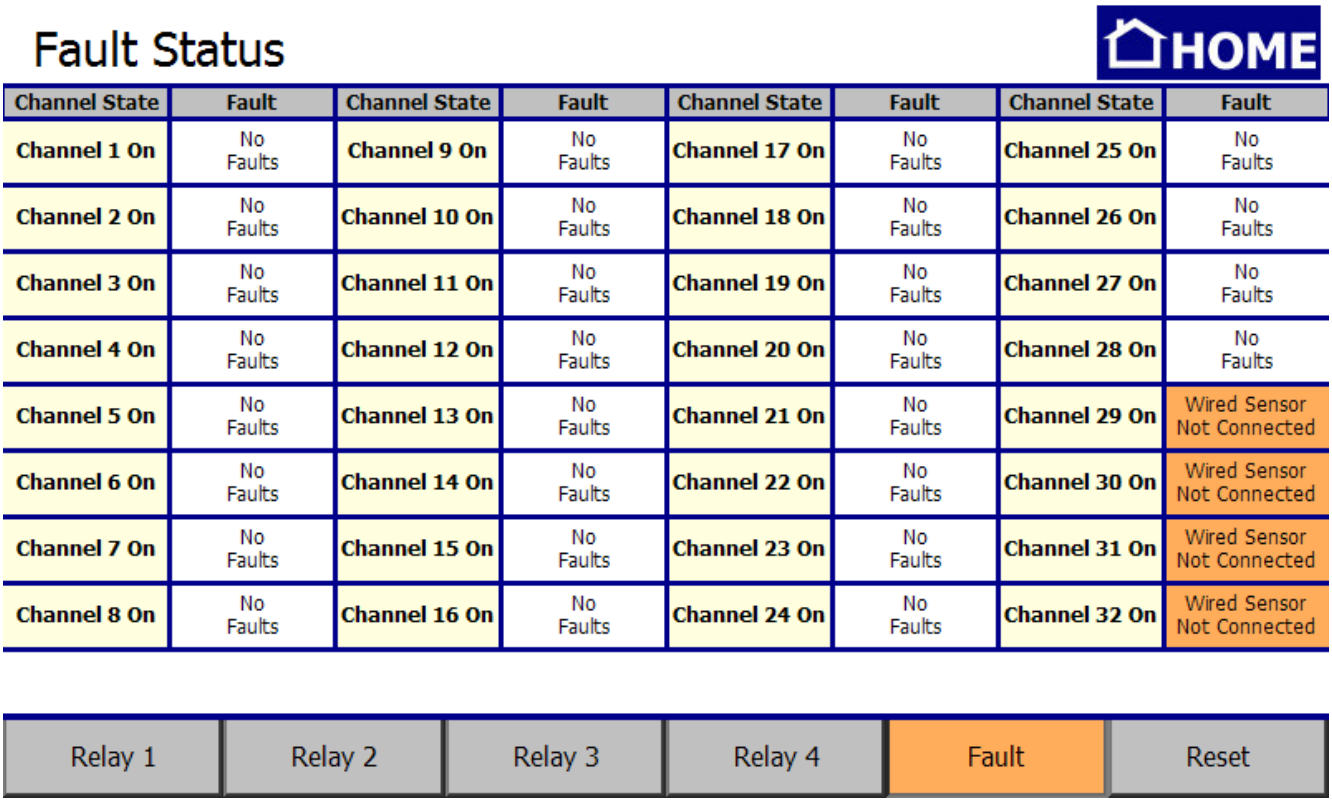


Fault Status

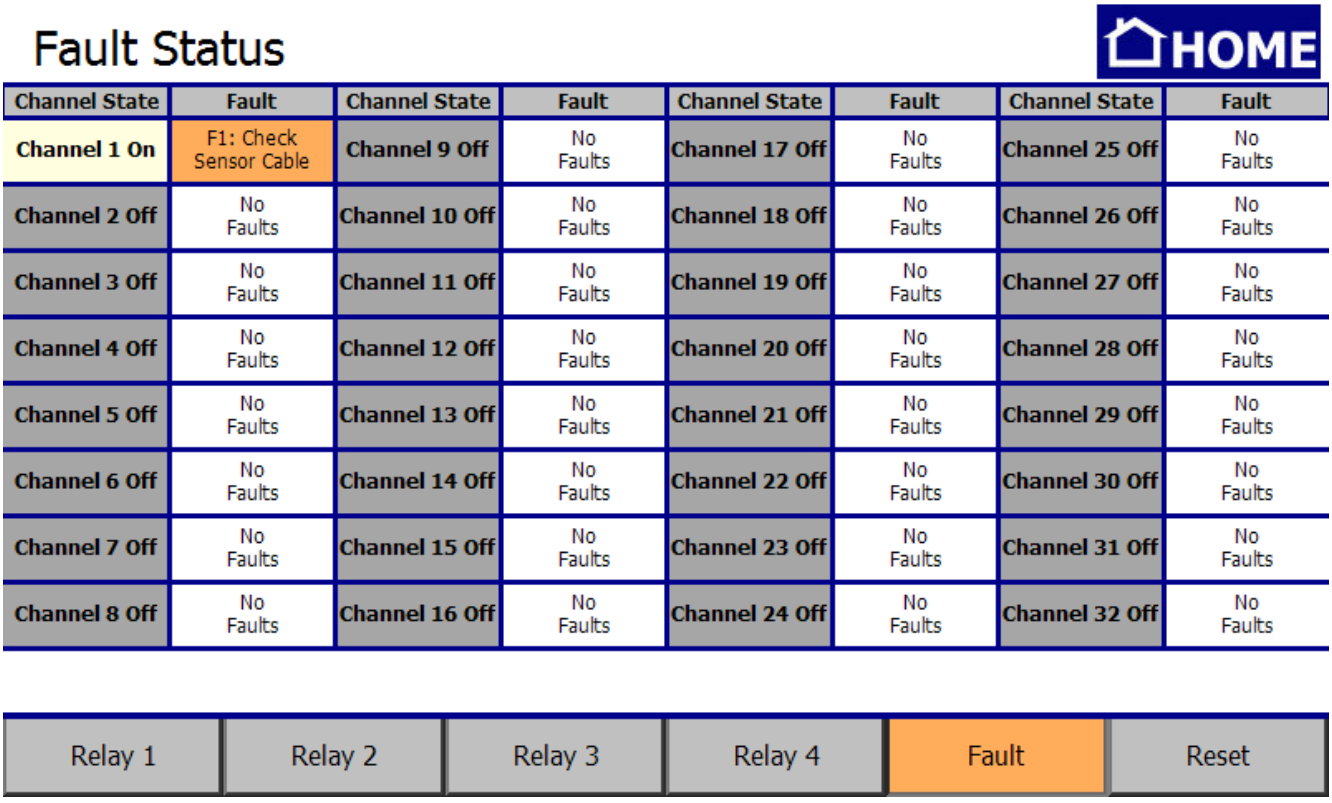
To view the Fault Status, press the "Fault" button. The screen will show orange buttons for the channels that are in fault, as well as a description of the fault. The following illustration shows the Fault Status screen (without any faults):



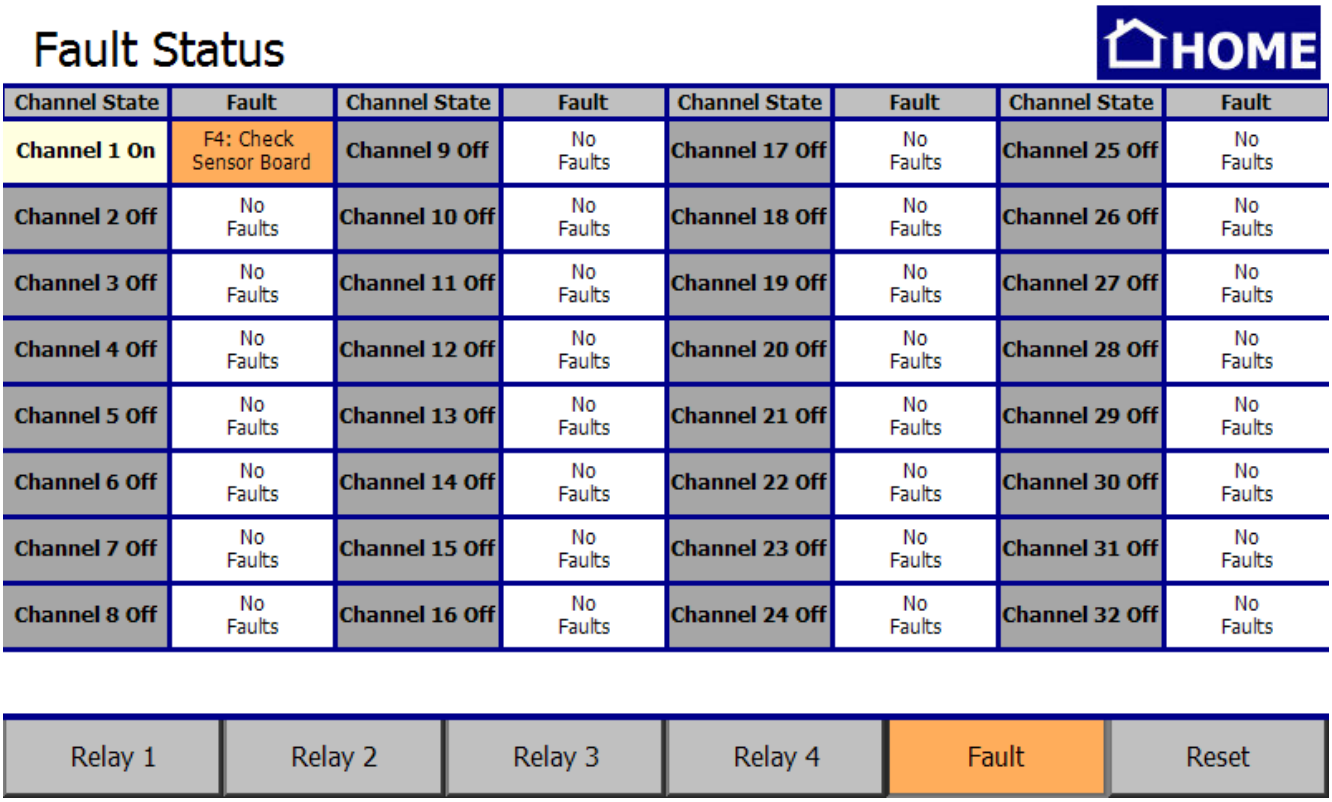
Channel On Without Wired Sensor Connected (Fault)



F1: Check Sensor Cable



F4: Check Sensor Board



Error Messages

The following section contains explanations, and corresponding illustrations, for error messages that may appear while using the OI-7032.

Double-Primary Error

Problem: There are two primary monitors in the network, which is not allowed.

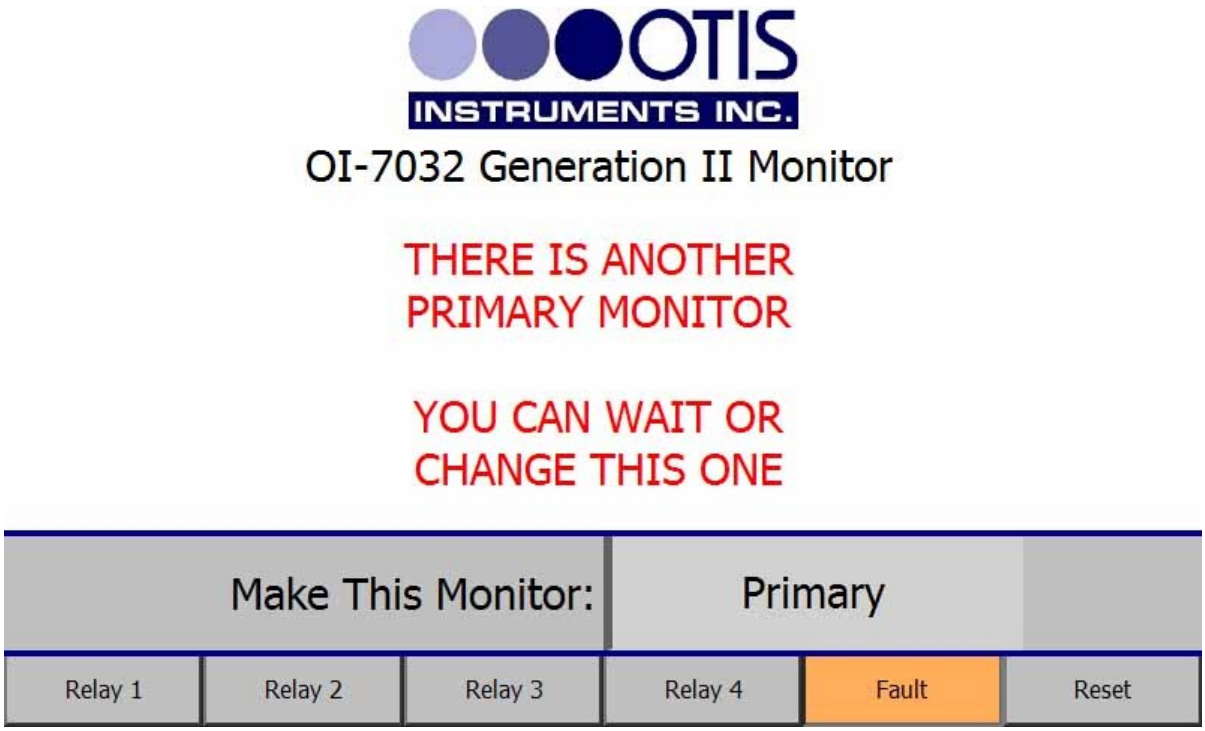
NOTE: The Primary/Secondary setting ONLY applies to a GEN II network.

Reason 1: The OI-7032 was setup to be the primary monitor and it was turned off or reset, the secondary monitor became the primary monitor.

Reason 2: There was already a primary monitor setup when the OI-7032 was turned on, which conflicts with the OI-7032's default primary setting.

Solution: Set one of the monitors to be a primary and the other to be a secondary, or turn off the other monitor. To change the setting of the OI-7032, simply press the button beside "Make This Monitor:" (as illustrated below) to either "Primary" or "Secondary". Once the condition is resolved, the Home Screen will appear.

NOTE: It may take a few seconds for the change to be recognized before the Home Screen appears.



Autoscroll Error

Problem: Autoscroll is turned on, but all channels are turned off.

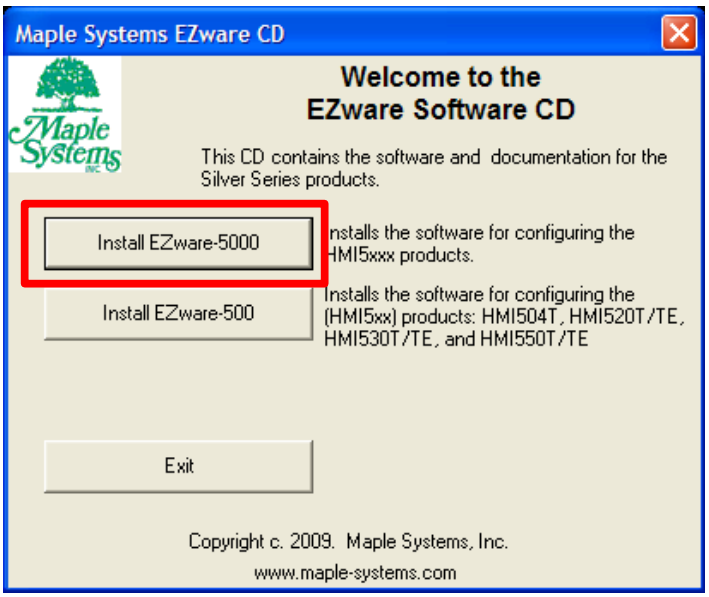
Solution: Return to the Home Screen and activate all channels that are needed.

APPENDIX A: Software Installation

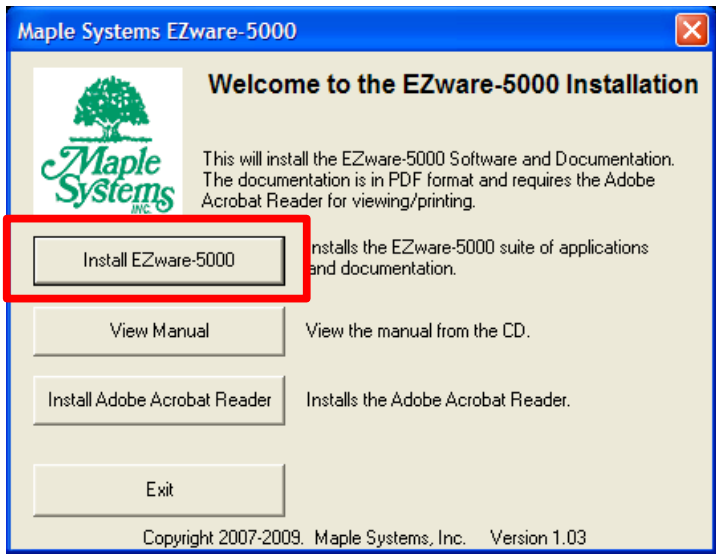
This section will detail how to set up the OI-7032 software.

HMI Software

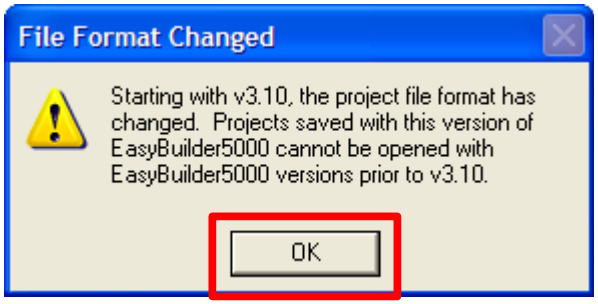
1. Insert the provided CD into the CDROM drive of a computer. The following screen should automatically appear:



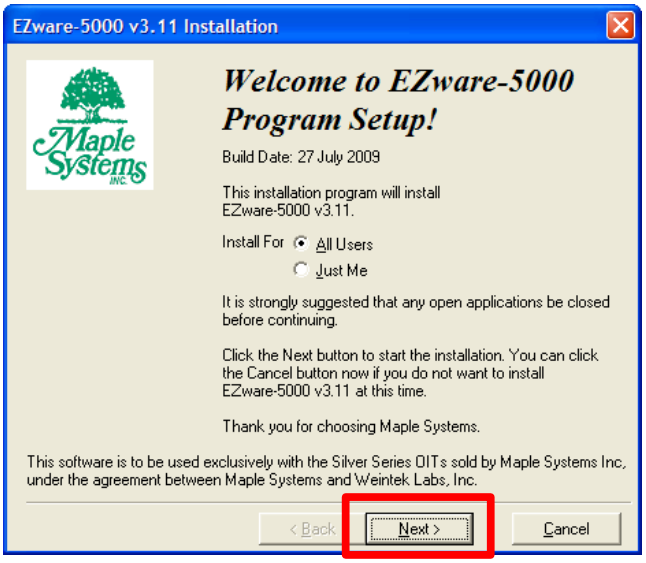
2. Select the top button “Install Ezware-5000”. The following window will appear:



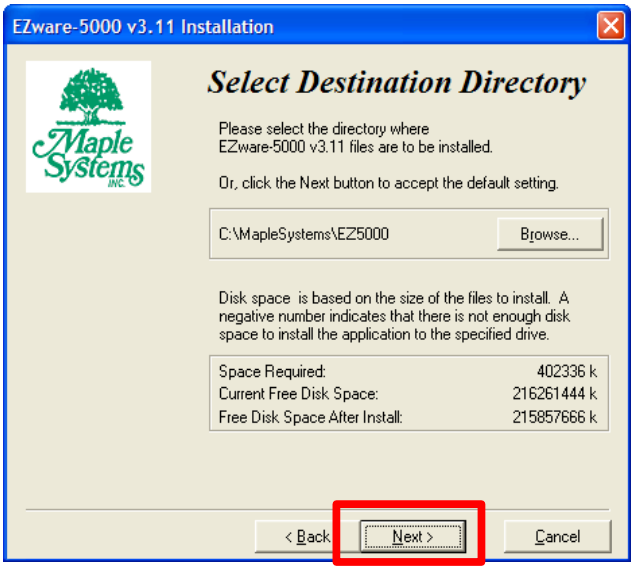
3. Select the top option again. The following notification will appear:



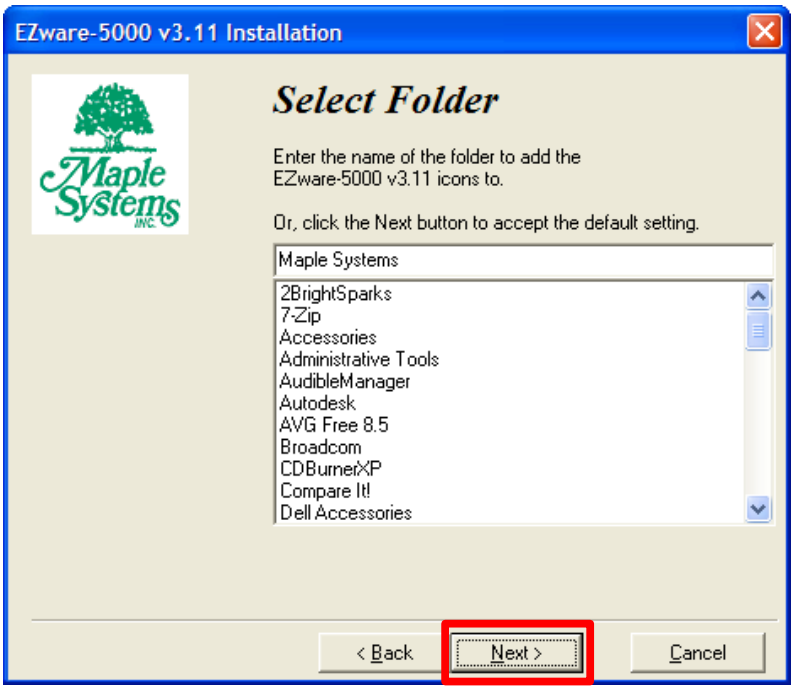
4. Press OK.
5. On the following screen, press "Next".



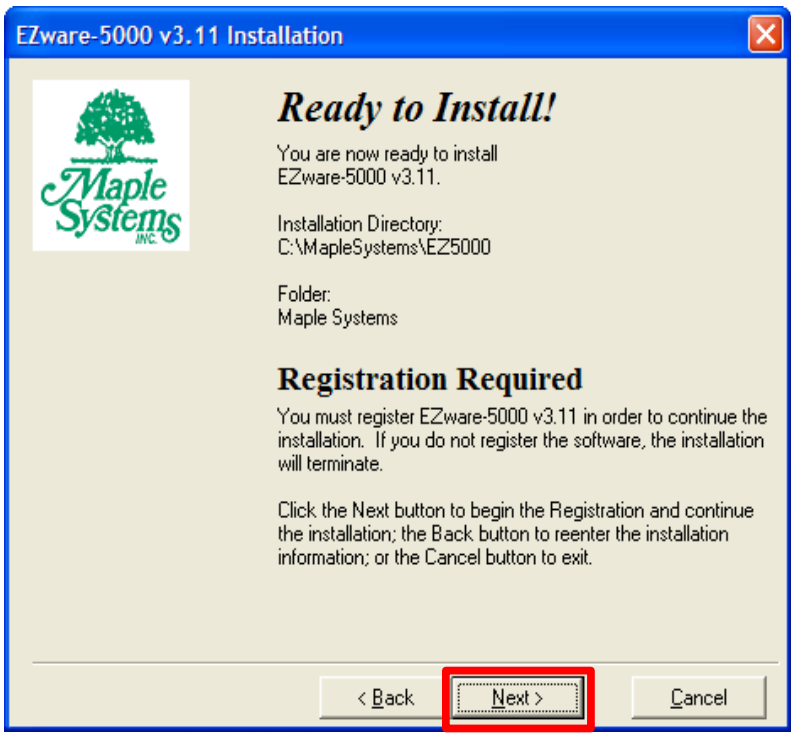
6. Press "Next" again.



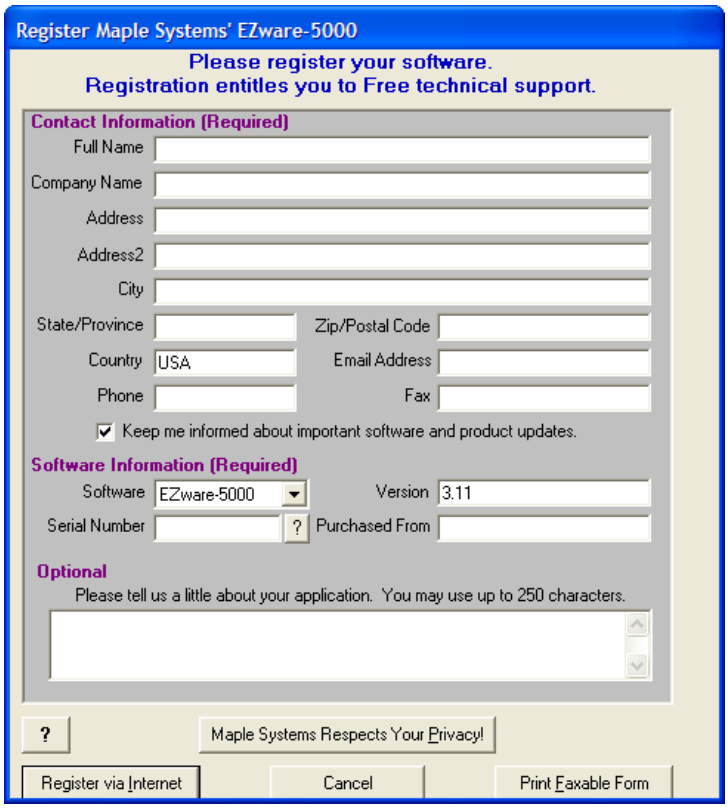
7. Press “Next” again.



8. Press “Next” again to begin installation.



9. After the installation is complete, the following window will appear:



10. Fill in the appropriate fields. The serial number can be found on the back of the plastic case that contained the CD. If a viable Internet connection is available, press the "Register via Internet" button now. If a viable Internet connection is not available, press "Print Faxable Form" and follow the subsequent instructions.

APPENDIX B: Reading USB Drive

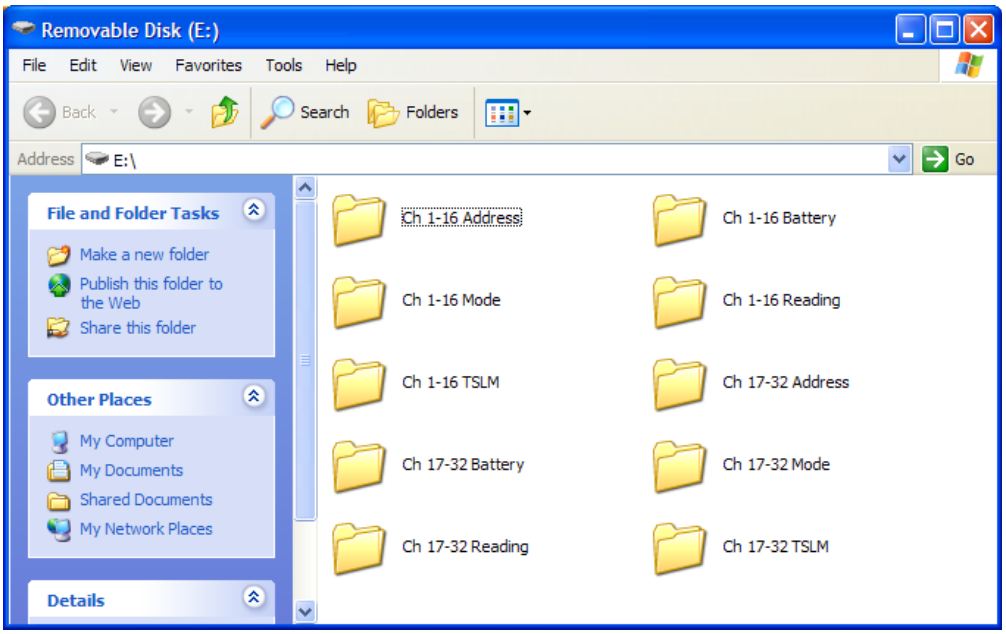
The following instructions will advise the user on how to remove and read the USB Drive information.

Removing the USB Drive

1. Remove the USB drive from the OI-7032.
2. Plug the USB drive into your computer.

Reading the USB Drive

When looking at the contents of the USB drive, you will see the following:



Opening the Datalog Files

Each folder is labeled. Inside each folder, there is a datalog file for each day. In order to open the datalog files, the files must converted with the "Easy Converter" software that was installed with the CD provided.

<u>If the Easy Convertor software is installed on your computer, simply double-click one of the files on the USB and the software will automatically create an excel file for that information.</u>

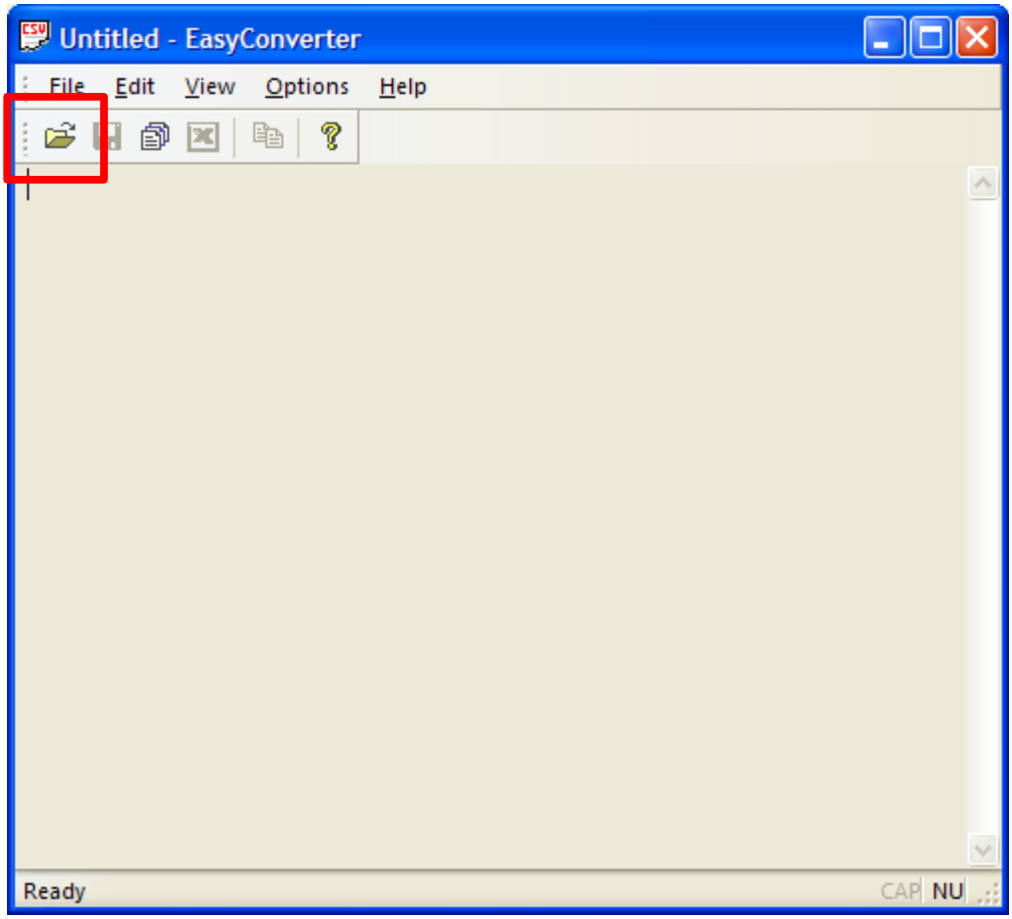
NOTE: If the "Easy Converter" software is already installed, opening the software should not be necessary. If double-clicking the file does not work, though, complete the following steps in this Operation Manual.

NOTE: The datalog folder labeled "Alarm" will only have entries that include readings from when at least one alarm was on. The file will have all 32 channels; each file will be one day. Whenever there is an alarm condition, the OI-7032 will log what each channel is reading at that time and file it in the "Alarm" folder.

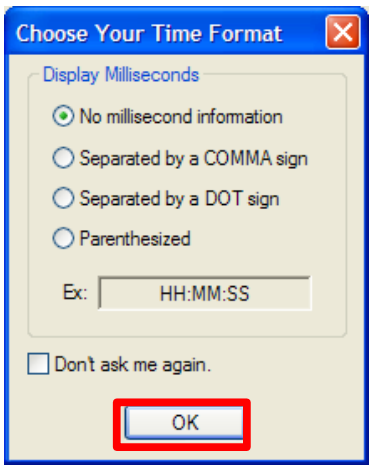
Opening the Easy Converter Software

In order to open this software, complete the following.

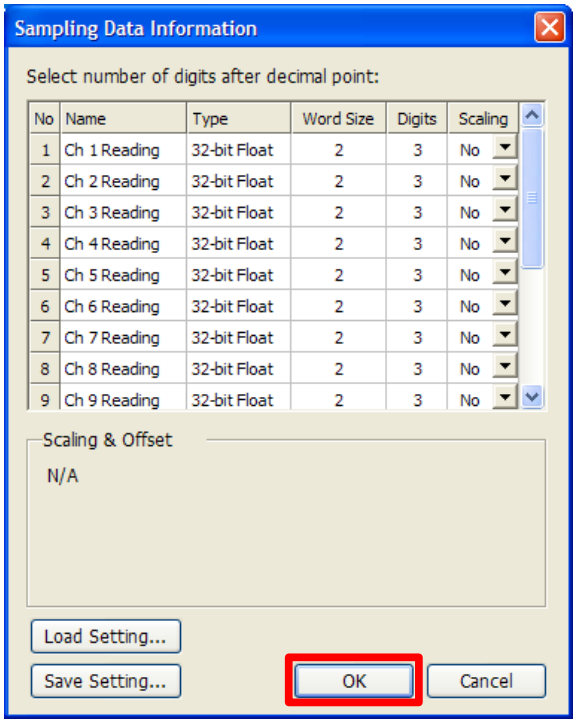
1. Click on your Start Menu.
2. Click on “All Programs”.
3. Locate the folder labeled “Maple Systems”.
4. Open the folder within labeled “Ezware-5000”.
5. Open the shortcut called “Easy Converter”.
6. Once Easy Converter is opened, click the “open” button to locate the datalog file desired to convert.



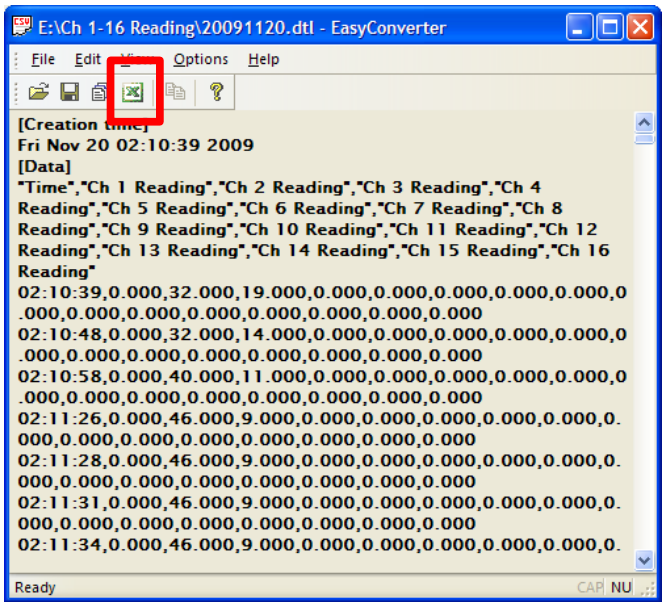
7. Once the file has been selected and “OK” is pressed, the following window will appear:



8. Press “OK” to proceed to the next window.
9. Press “OK” again.



10. The following window will appear. The data may then be converted into an .xls (spreadsheet file).



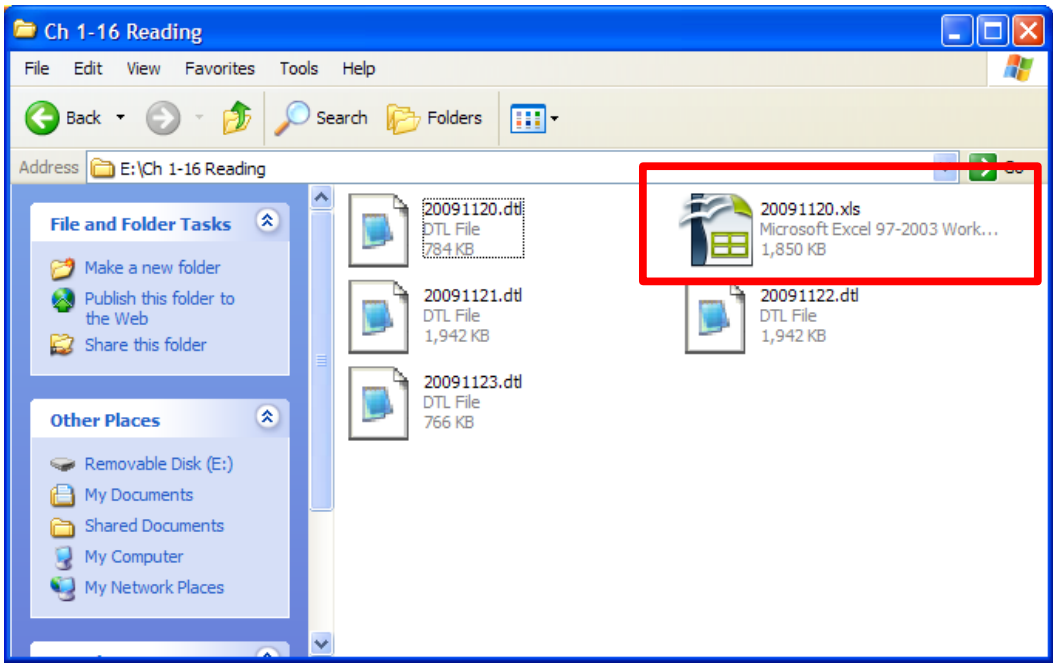
Converting the Datalog File to an .xls (spreadsheet) File

In order to convert the file to an .xls or spreadsheet file, complete the following instructions.

1. Press the “spreadsheet” button as seen in the diagram above.
2. The software will convert the file and save it in the same location as the datalog file. To view the file, complete the instructions in the following section.

Viewing the Datalog File

To view the file, open the folder on the USB drive that contains the datalog file.



The data can be viewed in Microsoft Excel or any other compatible spreadsheet software.

When Finished Reading the USB Drive

When finished viewing the USB drive, complete the following instructions.

1. Insert the USB drive back into the OI-7032 Touchscreen. This should be done in the same manner as the removal was done.
2. On the screen that appears on the OI-7032, press “cancel”.
3. The OI-7032 will now resume saving the datalog files to the USB drive.

APPENDIX C: 4-20mA Loop Current Introduction

This appendix in only an introduction. The information should serve as a brief overview of 4-20mA, and should not be considered a complete reference for proper implementation or use.

Prior knowledge of industry standards pertaining to 4-20mA specifically, and other aspects of electronics, are assumed to be known by the technician. For proper connection to a monitor or PLC, refer to the manufacturer's specific manual or instructions for that particular piece of hardware.

Overview

4-20mA ("four to twenty"), is an analog electrical transmission standard used by Otis Instruments for some of its ambient gas sensors and monitors. The signal is a current loop where 4mA represents zero percent signal, and 20mA represents 100 percent signal (full scale of the sensor assembly). The relationship between the current loop and the gas value is linear.

The 4mA allows the receiving monitor/PLC to distinguish between a zero signal, a broken wire, or a dead instrument. Benefits of 4-20mA convention are that it is: an industry standard, low-cost to implement, can reject some forms of electrical noise, and the signal does not change value around the "loop" (as apposed to a voltage). Only one current level can be present at any time; each device which operates via 4-20mA must to wired directly to the monitoring device.

Calculations

$$I_{(4-20)} = \left(\frac{(16 \cdot value)}{scale} \right) + 4$$

$I_{(4-20)}$: current of loop, measured in mA
value : PPM or %, of gas concentration
scale : full scale of sensor (see below for usual ranges)

Target Gas			Range	Temp.
H2S	=	Hydrogen Sulphide	0-100 ppm	-20 to 50C
O2	=	Oxygen	0-25 %	-30 to 55C
SO2	=	Sulfur Dioxide	0-20 ppm	-20 to 50C
CL2	=	Chlorine	0-10 ppm	-20 to 50C
H2	=	Hydrogen	0-4 %	-20 to 40C
NH3	=	Ammonia	0-100 ppm	-40 to 40C
CO	=	Carbon Monoxide	0-999 ppm	-20 to 50C
F2	=	Florine	0-1 ppm	-10 to 40C
HF	=	Hydrogen Fluoride	0-10 ppm	-10 to 40C
H2S-2	=	Hydrogen Sulphide (extended temp)	0-100 ppm	-40 to 50C

Table – Gas Sensor Details

Actual ranges may vary with our product. If unsure, confirm with the actual gas sensor assembly distributor, Otis Instruments sales representative, or call the main Otis Instruments office for more details.

Measuring Current

If the value measured is 0mA, then: the loop wires are broken, the sensor assembly is not powered up, the sensor assembly is malfunctioning, or the monitor is malfunctioning. A DMM (digital multi meter) or Current Meter may be used to test a 4-20mA signal. Place the DMM or Current Meter in line with the loop and measure current. The DMM/Current Meter may be used in conjunction with the normal monitoring device.

APPENDIX D: Modbus Information

The complete OI-7032 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 E: 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.

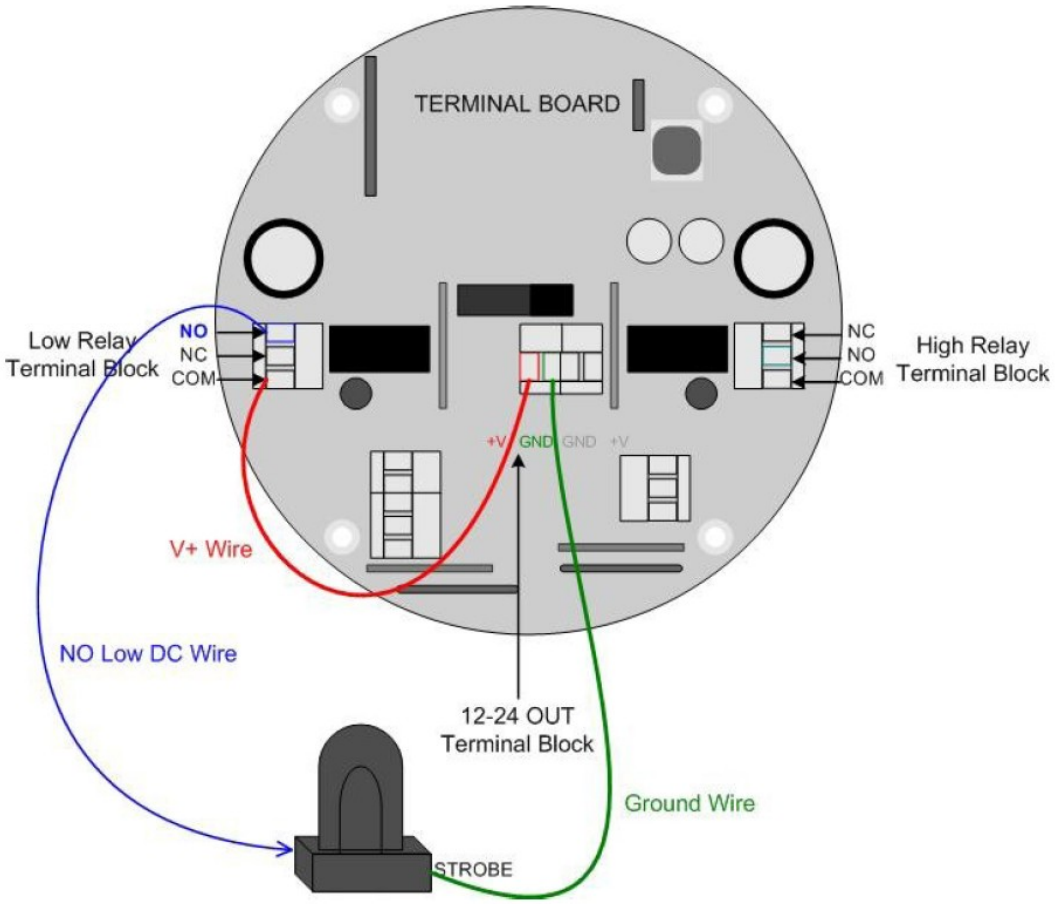
There are two key terms to remember when using relays.

- Deactivated: refers to a relay is in its normal state
- Activated: refers to a relay 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 relay does not provide power to the equipment attached to it (i.e. if there is a light hooked up to this type of relay, it must be powered by another source).
2. Wet Contact Relays: This type of relay does provide power to the equipment attached to it (i.e. if a light was hooked up to this type of relay, it would be powered by the relay). 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 relay is deactivated, it is "open". When a signal is received to activate the relay, 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 relay 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 relay is deactivated, it is "closed". When a signal is received to activate the relay, the connection will "open"—providing an open circuit. This will allow whatever device that is connected to the relay to be deactivated (turned off) when a signal is sent to the relay to activate it. Ex: If there was a powered light connected to this relay to indicate that the system was up and running, when the signal to activate the relay 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

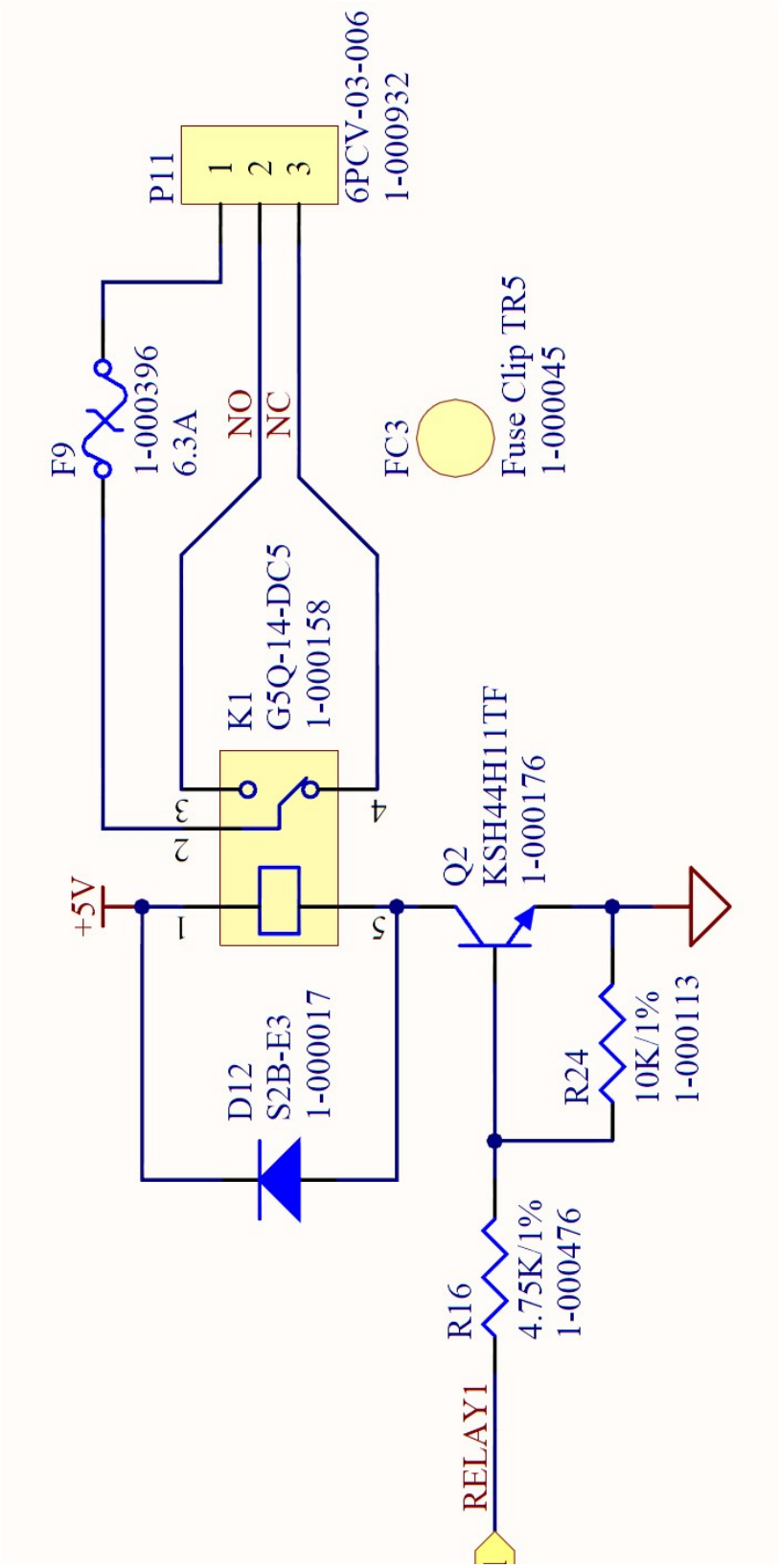
There is an option in Otis Instruments devices to set the relays as "failsafe" or "not failsafe". This refers to what type of signal is being sent through the relay, which can be a "high" or a "low" (on or off). The default setting is "not failsafe", which means that the devices will operate as described 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 relay is deactivated, it is "closed". When a signal is received to activate the relay, 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 relay activated—then the light would go out. This can be used to alert the user of an issue.
2. Normally Closed (NC): when the relay is deactivated, it is "open". When a signal is received to activate the relay, 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

APPENDIX F: 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 8 (F8)

Reason: There are two sensors with the same address communicating to the monitor. This could be two different Gen II sensor assemblies, or a Gen I and Gen II sensor assembly. The monitor cannot tell if there are two different Gen I units communicating to the same device with the same address.

Solution: Check all units and make sure they are all using a different addresses.

Fault 9 (F9)

Reason: Radio timeout. This means the monitor has not gotten a communication from the faulting address for over X minutes. X is equal to the radio timeout that is set in the start up menu options. It defaults to 10 minutes.

Solution: Find the sensor assembly and see why it is not communicating. This could be due to a dead battery, broken antenna, bad antenna cable, no antenna, obstacle, weather, etc.

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.

Specifications

Operating Voltage:	24 Volts DC (nominal; 22-26 Volts DC), 120/240 Volts AC
Compatibility:	Otis WireFree and wired (4-20mA input) sensor units
Memory:	2 GB USB
Channels:	32
Gases:	all that are supported by the sensor assemblies
Wired Output:	RS-485 Modbus
Relays:	four Dry-Contact (5 Amp) w/ 4 Amp Fuses
Protection:	power EMI filter, surge suppression, 4-20mA and RS-485 surge suppression
Current Draw:	300mA (typical, no wired sensor assemblies) 3A max (with 4-20mA input sensor assemblies)
Radio Options:	· 900 MHz (Legacy Option), 100mW · 2.4 GHz ISM, 100mW · 900 MHz, 200mW
Display:	7.0 Inch 800x480 pixels resistive touchscreen
Temperature Range:	-20 to 122 degrees F
Enclosure:	Stahlin 12x10x6 fiberglass, clear window
Certifications:	NEMA 4 (enclosure only)
Warranty:	Hardware: 1 year (limited)

Warranty Statement for **WireFree Touchscreen Monitor OI-7032**

Hardware

Otis Instruments, Inc. (Manufacturer) warrants its products to be free of defects in workmanship and materials—under normal use and service—from the date of purchase from the manufacturer or from the product's authorized reseller. The hardware for this device is under a one-year limited warranty.

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, contact the product's authorized reseller or return the product directly to the manufacturer with a Return Material Authorization (RMA). This number will be assigned upon contacting our service department at 903.566.1300 or service@otisinstruments.com. The manufacturer will--at its option and expense--repair or replace the product, or deliver an equivalent product or part to the purchaser at no additional charge.

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

Otis Instruments, Inc.

301 S Texas Ave.

Bryan, TX 77803

Service Department: 903.566.1300

Corporate Office: 979.776.7700

service@otisinstruments.com

www.otisinstruments.com