GEN^2

Model OI-6000 Sensor Assembly

Operation Manual

Revision 1.4w

OTIS INSTRUMENTS INC.

Product Overview

The Otis Instruments, Inc. Model OI-6000 GenII ambient air gas sensor assembly is the new wired/WireFree/Notis sensor assembly that uses a Catalytic Bead, Electro-Chemical, or Infrared sensor element to detect a variety of gases, and features a 2.4 GHz radio. The device comes standard with a 128 x 64 graphical LCD screen, Otis Instruments standard three-button interface, Otis-blue custom explosion-proof enclosure, and non-intrusive magnetic switches.

The OI-6000 Sensor Assembly is an innovative wired or wireless gas detection system designed to monitor gas in hostile environments without the use of wires or conduit from the controller to the sensor. The OI-6000 features 4-20mA (3-wire) or RS-485 Modbus output, and can be customized to offer relay and radio options.

The OI-6000 Sensor Assembly's key feature is non-intrusive calibration and configuration. With all adjustments made at the sensor assembly, one-man non-intrusive calibration is quick, easy, and allows the sensor housing and enclosure to remain Class I, Division 1, Group C and D certified while in the field. Non-intrusive calibration is made possible by using an Otis Instruments, Inc. distributed magnet to activate the *MENU*, *ADD*, and *SUB* buttons.

The device has been designed to reject EMI and other forms of interference in order to avoid false gas readings.

Features such as the auto-setting Null, relay/alarm tests, and system diagnostics make this device a truly remarkable gas detection system.

Table of Contents

Introduction

This document is an Operation Manual containing diagrams and step-by-step instruction for proper operation of the Otis Instruments, Inc. WireFree Model OI-6000 Sensor Assembly. 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

- CAUTION: FOR SAFETY REASONS THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING OR SERVICING.

- ATTENTION : POUR DES RAISONS DE SÉCURITÉ, CET ÉQUIPEMENT DOIT ÉTRE UTILISÉ ENTRETENU ET RÉPARÉ UNIQUEMENT PAR UN PERSONNEL QUALIFIÉ. ÉTUDIER LE MANUEL
D'INSTRUCTIONS EN ENTIER AVANT D'UTILISER, D'ENTERETENIR OU DE RÉPARER L'ÉQUIPEMENT.

- CAUTION: THIS AREA MUST BE FREE OF FLAMMABLE GASES DURING CALIBRATION.

  NOTE: This statement is required if calibration is performed by using the push-buttons while the explosion-proof container is open.

- ATTENTION : CETTE ZONE DOIT ÉTRE EXEMPTE DE GAZ INFLAMMABLES PENDANT L'ÉTALONAGE.

  NOTE: This statement is required if calibration is performed by using the push-buttons while the explosion-proof container is open.

- CAUTION: HIGH OFF-SCALE READINGS MAY INDICATE AN EXPLOSIVE CONCENTRATION.

- ONLY THE COMBUSTIBLE GAS DETECTION PORTION OF THIS INSTRUMENT HAS BEEN ASSESSED FOR PERFORMANCE.

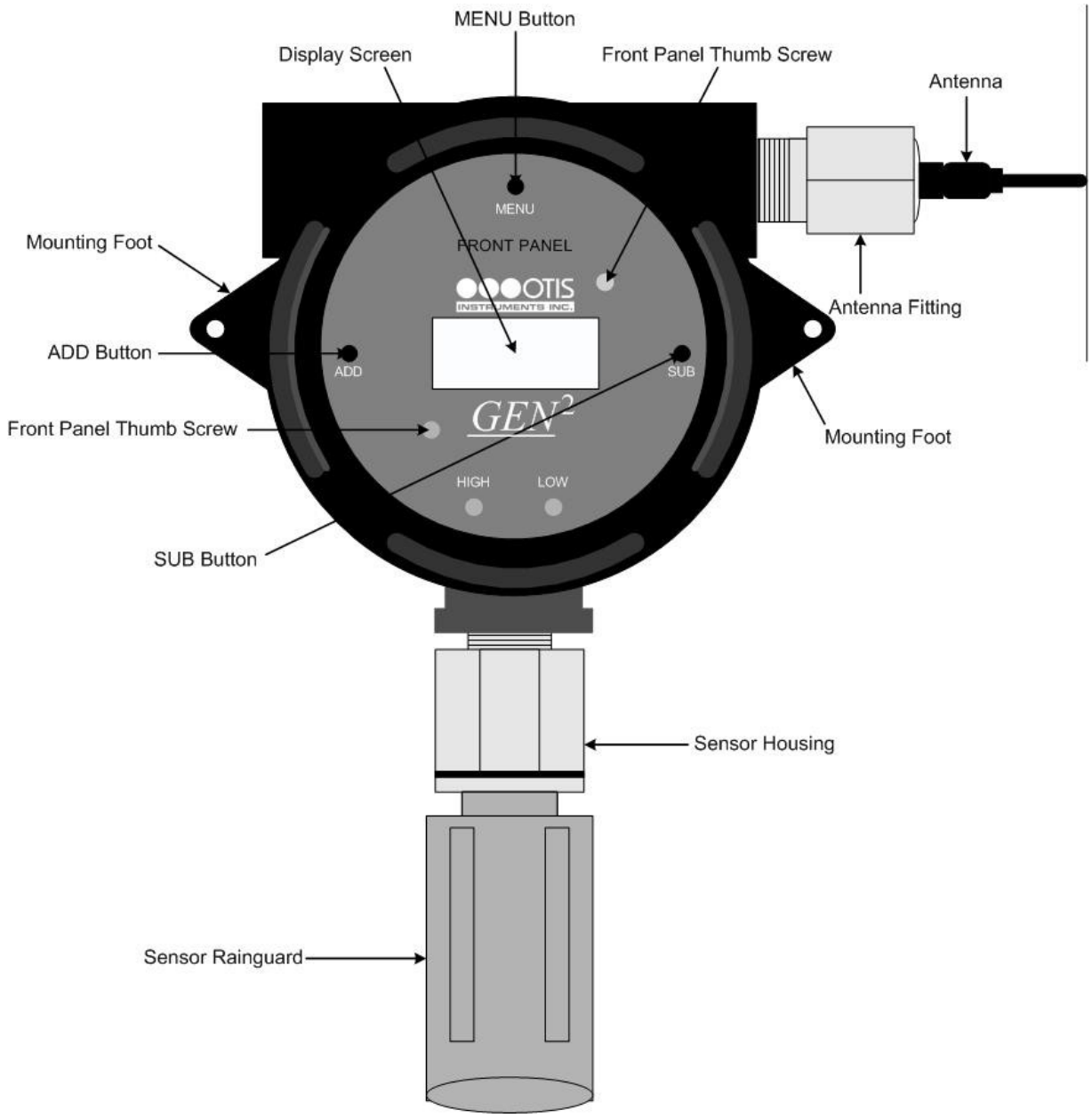
- CAUTION: RELAYS ARE USER-SETTABLE TO LACTCHING OR UNLATCHING.

Complete System Diagram

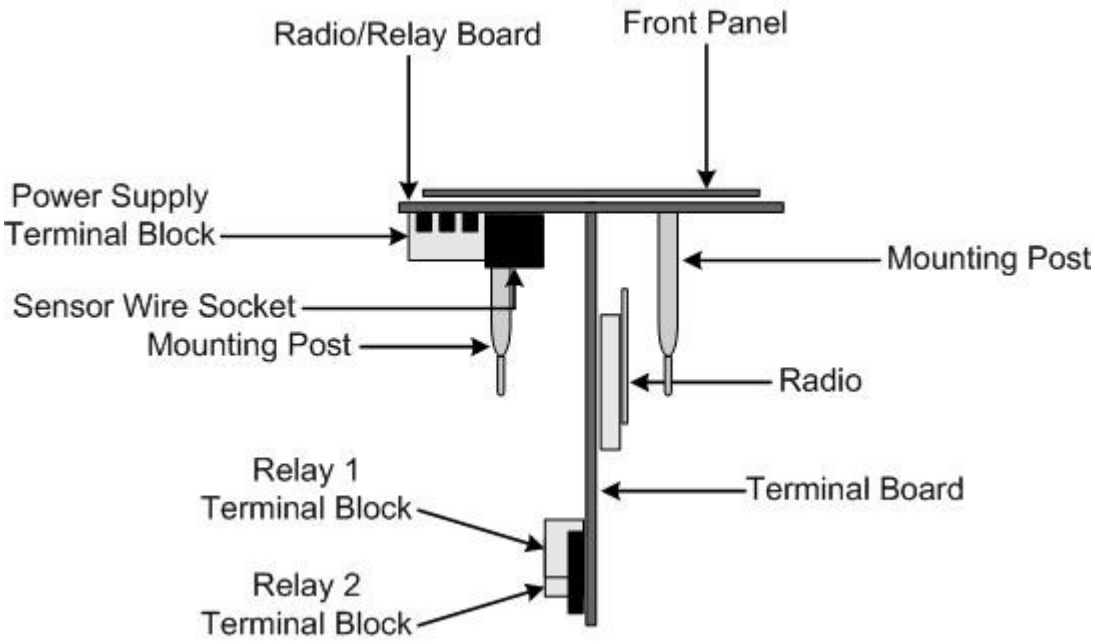
The following diagrams should be consulted for identification of the system and all parts that may be referred to in this Operation Manual.

NOTE: Not all applications include relays and/or a radio (antenna).

Complete System (External)



Complete System (Internal)



Wiring Configurations

To ensure full-functionality—and to maintain certification of the product—complete ALL of the following wiring configurations before installing the device in the field (a non-classified area).

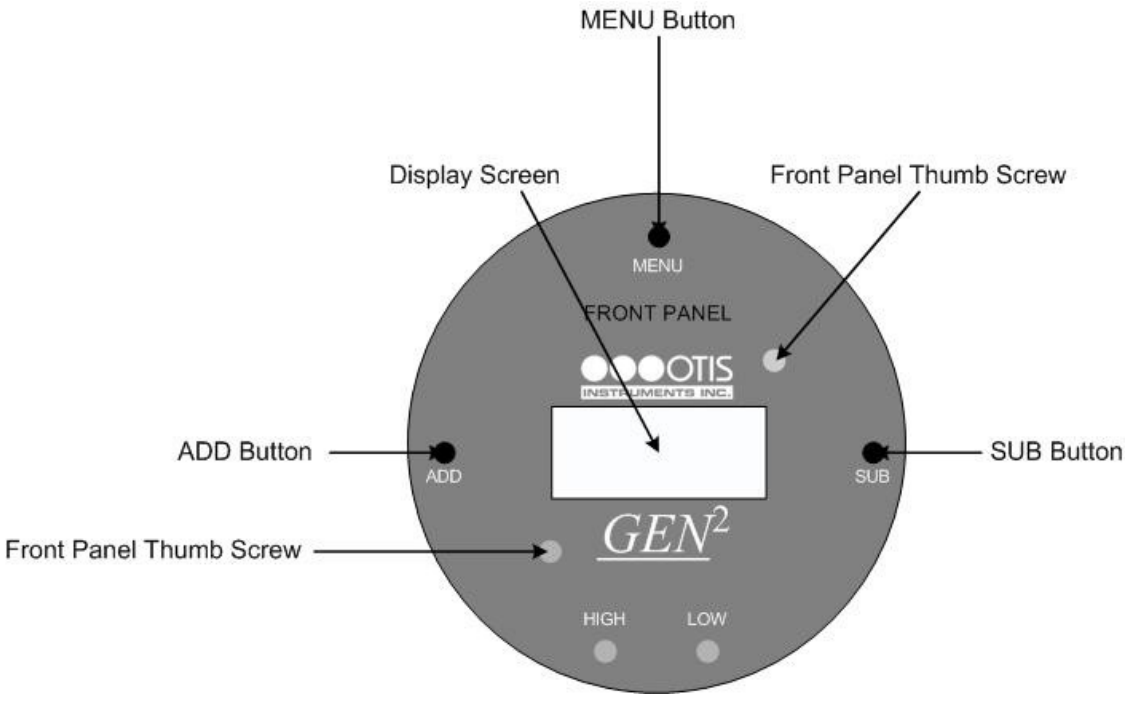
Power Supply Configuration

If it is necessary to attach a new power cord to the OI-6000, the following instructions should be consulted.

NOTE: Verify that there is no power being sent from the power supply while wiring the power supply.

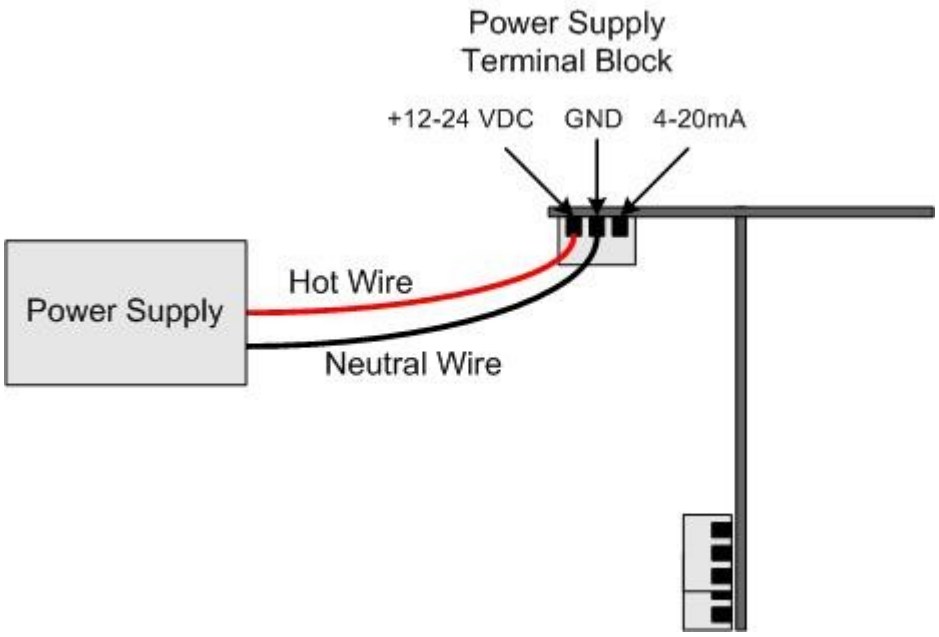
1. Unscrew, remove and set aside the explosion proof Moore lid.
2. Using your thumb and forefinger, firmly grip the Front Panel Thumb Screws and lift it out of the Moore enclosure.

NOTE: Do not use any metal object to remove the Radio/Relay Board.

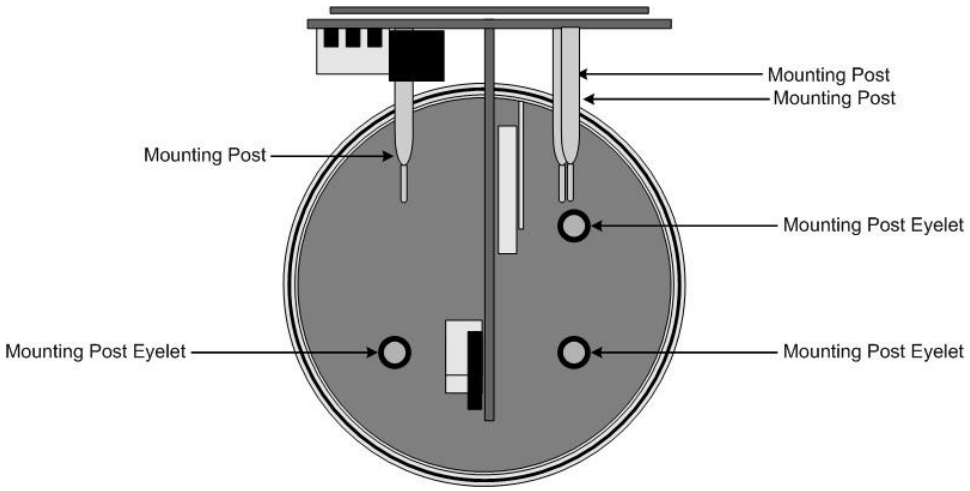


3. Turn the Radio/Relay Board over so that the Back Panel is showing.

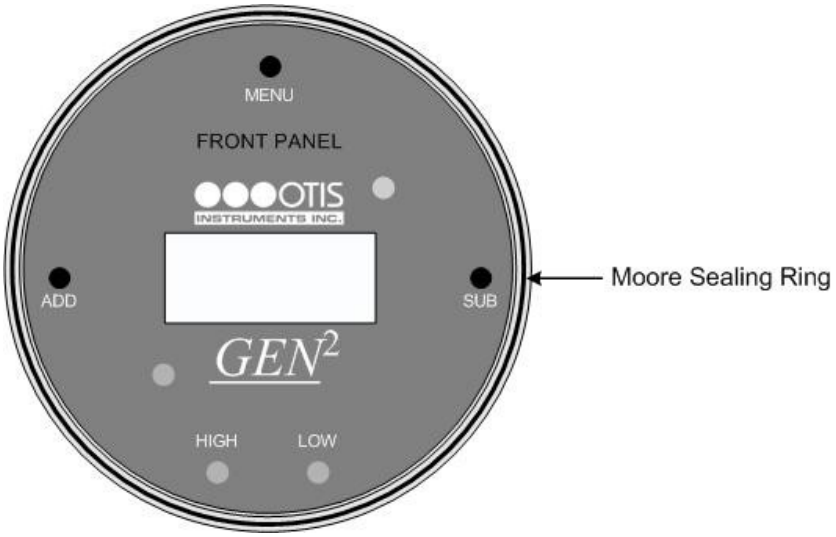
4. Run the power supply cord through the hole on the upper left side (hub) of the OI-6000 Enclosure.
5. Connect the two conductor cables to the power supply terminal block (+12 to +24VDC and GND)



6. Replace the unit back in the Moore enclosure by matching each Back Panel mounting post to its corresponding eyelet inside the enclosure.



7. Verify that each mounting post is properly fitted in its corresponding eyelet inside the Moore enclosure.
8. Verify that the sealing ring on the Moore base is still in place.



9. Place the Moore enclosure lid on top of the Moore enclosure base.
10. Rotate the lid until it is tightly screwed in place (approximately 20 rotations).
11. Apply +12-24 Volts DC power from the controller/monitor to the unit.
12. The device will then count down from 60 to 0.

- From 60 to 30, the Display Screen will show the Otis Instruments, Inc. logo.
- From 30 to 0, the Display Screen will show:

OI-6000

Version 0.x Build x

13. When “0” is displayed, the device is in Normal Operating Mode and ready to operate.

NOTE: If the device is in Fault, the Display Screen will alternately show “0” and then:

Normal Mode

FXX *EXAMPLE: F14*

(Reason for fault) *EXAMPLE: NO PRIMARY MONITOR*

Relays/Alarms Configurations

The following instructions should be consulted for proper relay-wiring procedures. When wiring relays, the following items are important to consider:

- Verify that there is no power being sent from the power supply while wiring the relays.

- The OI-6000 is DC Powered only. If AC powered alarms are desired, the user must provide their own outside AC power source to power the relays.

- Otis Instruments, Inc. recommends wiring the relays as "NO" for most applications. With a "NO" relay, the relay will only be triggered if gas is seen.

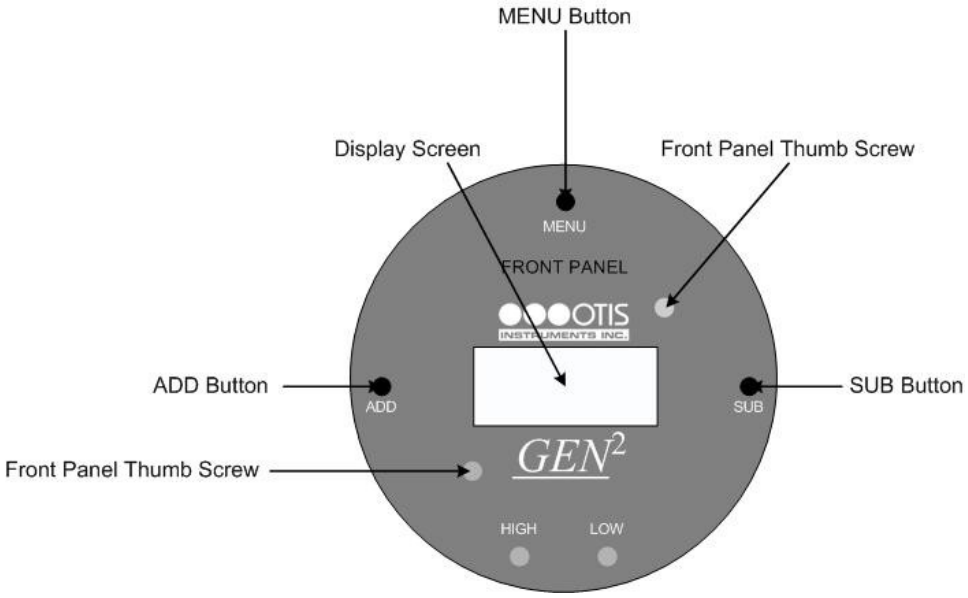
- The user may choose to wire the relays as "NC" if desired. To do so, connect the neutral wire from the power source to the terminal labeled "NC" (Normally Closed) instead of the terminal labeled "NO" (Normally Open).

- The wire colors used in the following drawings are used for ease of displaying which wires go where. Although the wire colors used in these drawings are standard colors, the wire colors used in the application that you are installing may not correlate with the ones shown here.

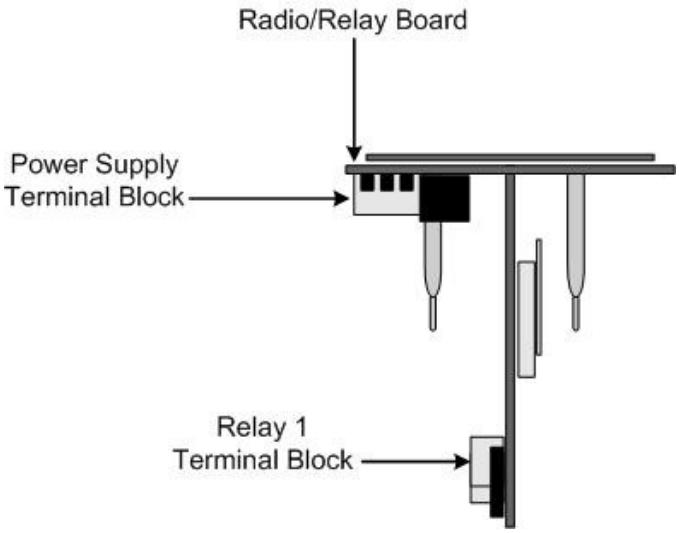
DC Relays/Alarms Configuration – Preparation Steps

1. Unscrew, remove and set aside the explosion proof Moore lid.
2. Using your thumb and forefinger, firmly grip the Front Panel Thumb Screws and lift it out of the Moore enclosure.

NOTE: Do not use any metal object to remove the Radio/Relay Board.

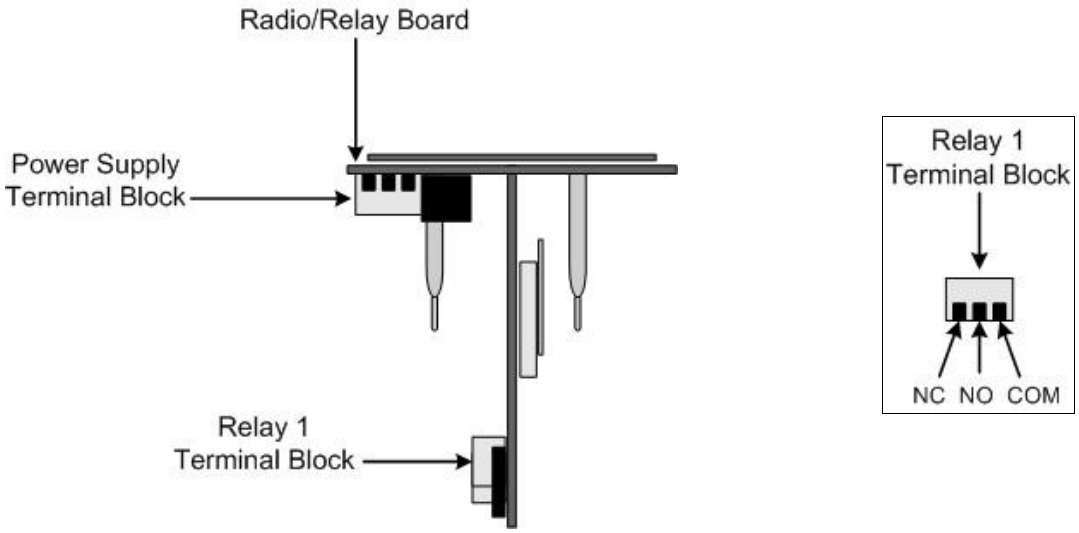


3. Turn the unit over so that the Radio/Relay Board is showing.

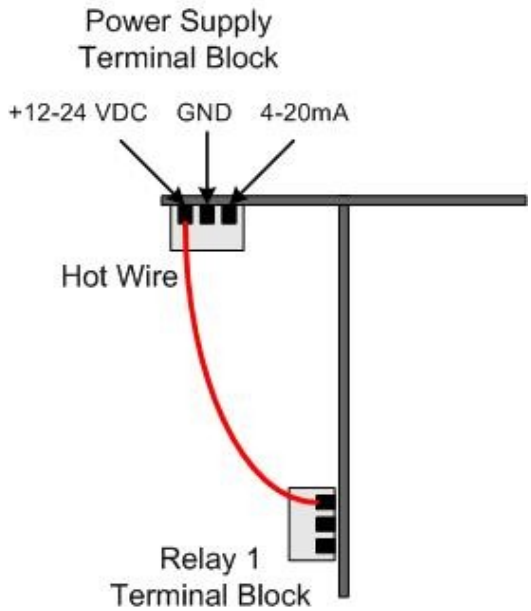


DC Relay Configurations – Relay 1 Power

1. Bring the two conductor cables from the Relay 1 Alarm (light/horn) to the Front Panel of the Radio/Relay Board using the proper certified 3/4" NPT cable gland or conduit fitting.
2. Run the two conductor cables for Relay 1 from the Relay 1 Alarm (light/horn) through the hole (hub) on the upper left side of the OI-6000 Enclosure.

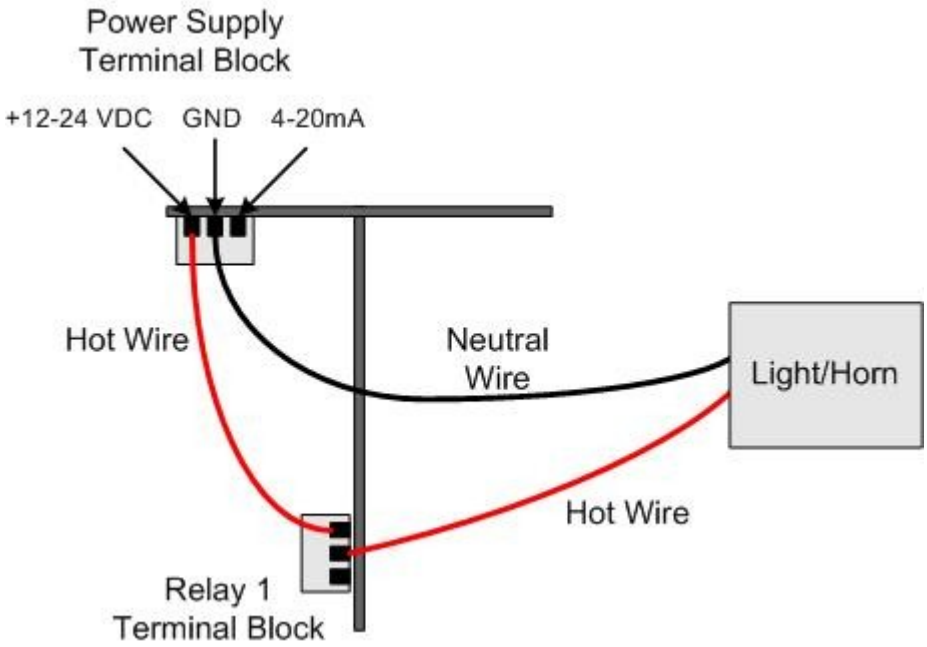


3. Connect the "Hot" (positive) wire from the terminal labeled "+12-24 VDC" on the Power Supply Terminal Block to the terminal labeled "COM" on the Relay 1 Terminal Block.



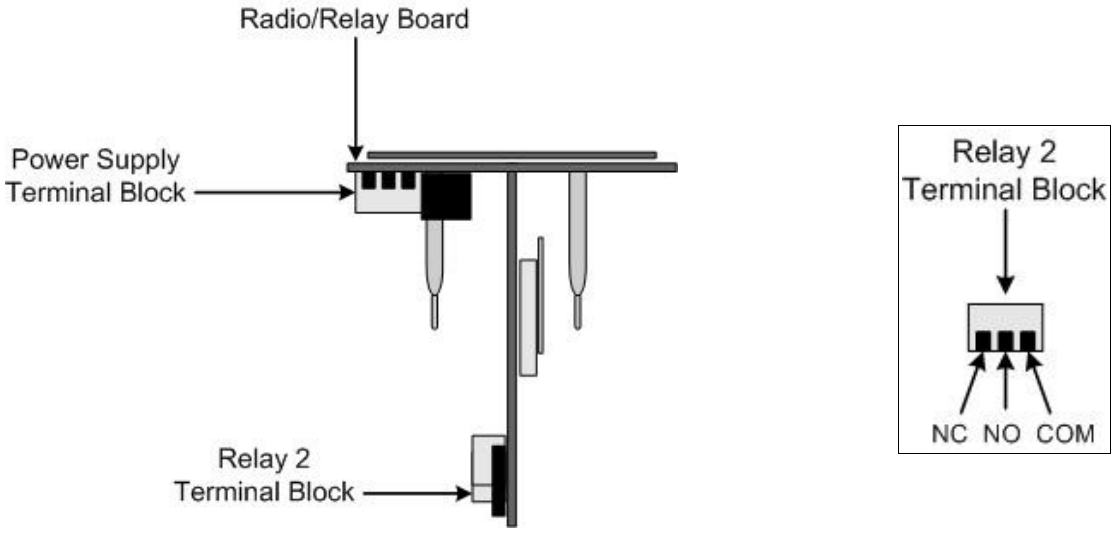
DC Alarm Configurations – Alarm 1 to Relay 1

1. Connect the “Hot” (positive) wire from the Relay 1 Alarm (light/horn) to the terminal labeled “NO” on the Relay 1 Terminal Block.
2. Connect the “Neutral” (ground) wire from the Relay 1 Alarm (light/horn) to the terminal labeled “GND” on the Power Supply Terminal Block.

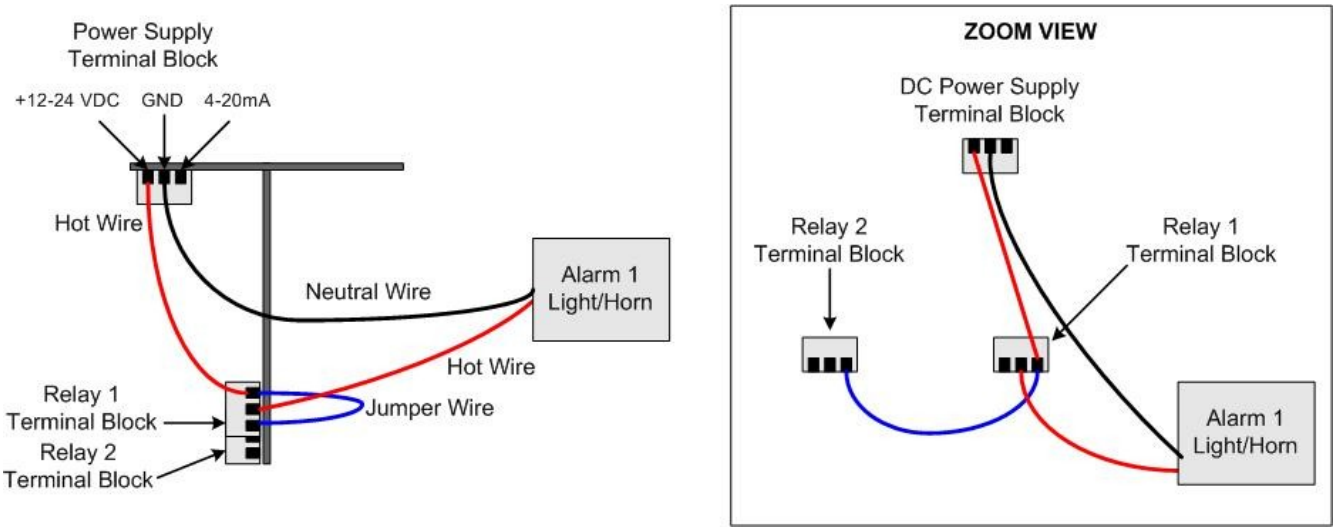


DC Relay Configurations – Relay 2 Power

1. Bring the two conductor cables from the Relay 2 Alarm (light/horn) to the Front Panel of the Radio/Relay Board using the proper certified 3/4" NPT cable gland or conduit fitting.
2. Run the two conductor cables for Relay 2 from the Relay 2 Alarm (light/horn) through the hole (hub) on the upper left side of the OI-6000 Enclosure.



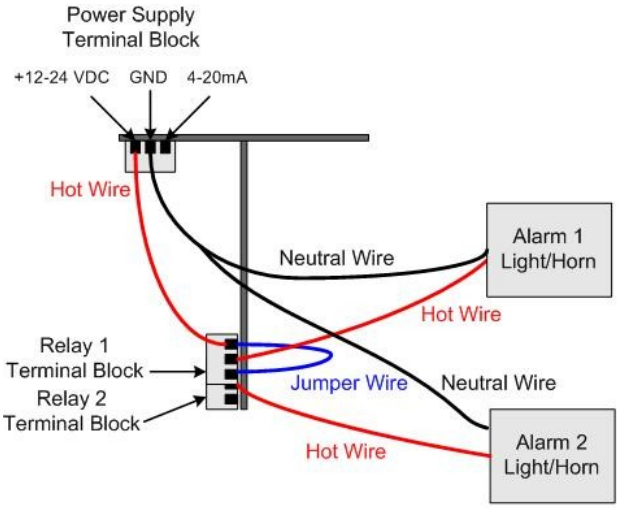
3. Jump a "Hot" wire from the terminal labeled "COM" on the Relay 1 Terminal Block to the terminal labeled "COM" on the Relay 2 Terminal Block.

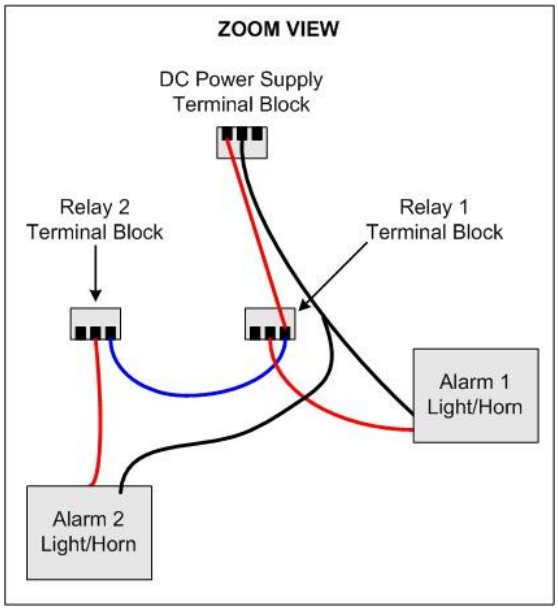


DC Alarm Configurations – Alarm 2 to Relay 2

1. Connect the “Hot” (positive) wire from the Relay 2 Alarm (light/horn) to the terminal labeled “NO” on the Relay 2 Terminal Block.
2. Connect the “Neutral” (ground) wire from the Relay 2 Alarm (light/horn) to the terminal labeled “GND” on the Power Supply Terminal Block.

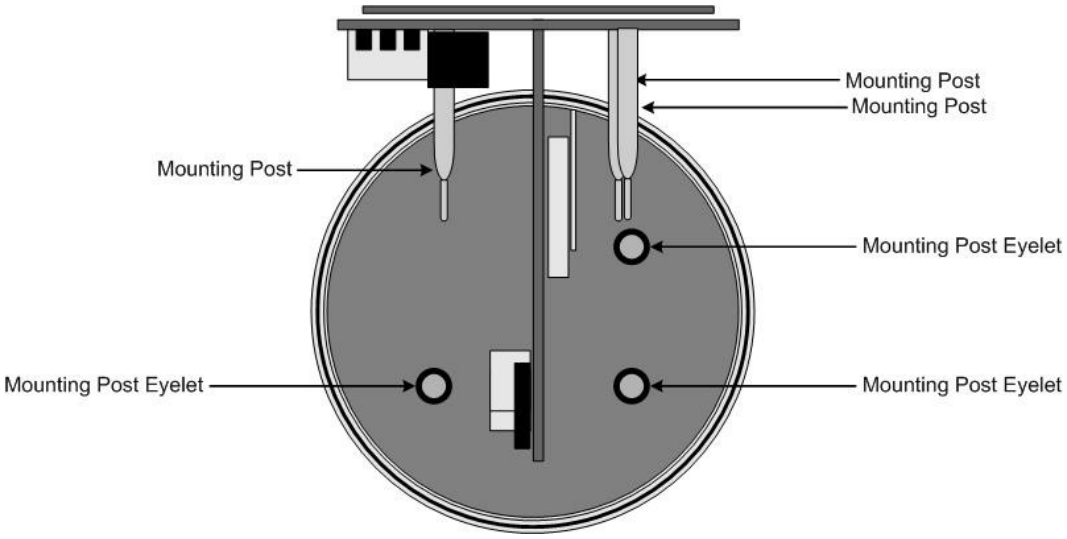
NOTE: The “Neutral” wires from Alarm 1 and Alarm 2 should be connected to occupy the same “GND” terminal on the Power Supply Terminal Block.



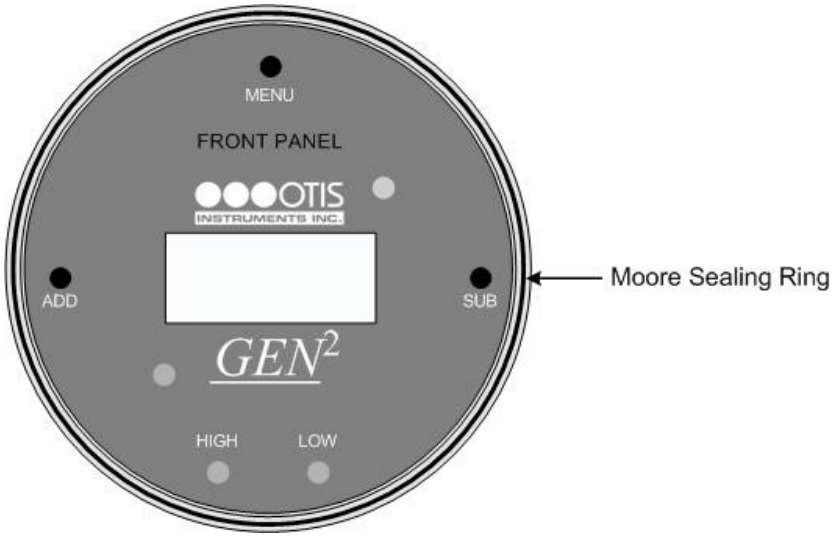


DC Relays/Alarms Configurations – Completion Steps

1. Replace the unit back in the Moore enclosure by matching each Back Panel mounting post to its corresponding eyelet inside the enclosure.



2. Verify that each mounting post is properly fitted in its corresponding eyelet inside the Moore enclosure.
3. Verify that the sealing ring located on the threads of the Moore base is still in place.

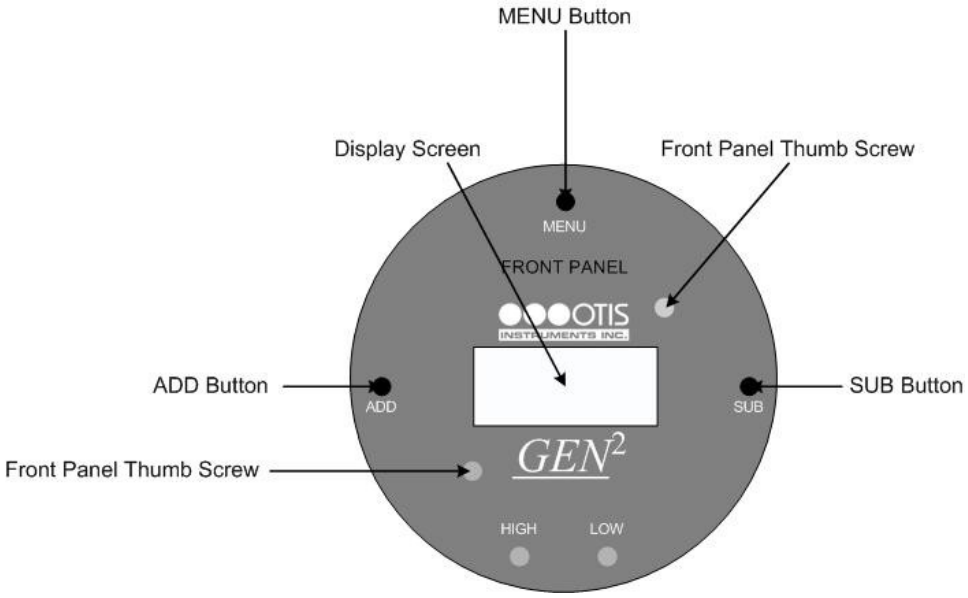


4. Place the Moore enclosure lid on top of the Moore enclosure base.
5. Rotate the lid until it is tightly screwed in place (approximately 20 rotations).

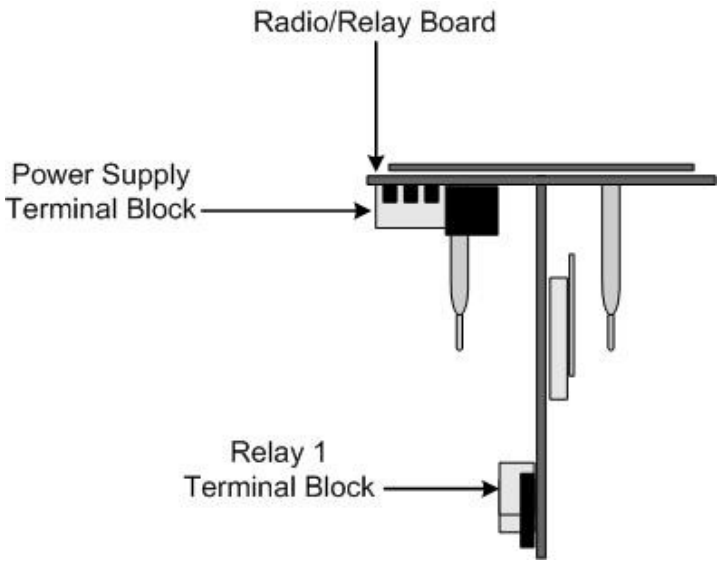
AC Relays/Alarms Configuration – Preparation Steps

1. Unscrew, remove and set aside the explosion proof Moore lid.
2. Using your thumb and forefinger, firmly grip the Front Panel Thumb Screws and lift it out of the Moore enclosure.

NOTE: Do not use any metal object to remove the Radio/Relay Board.

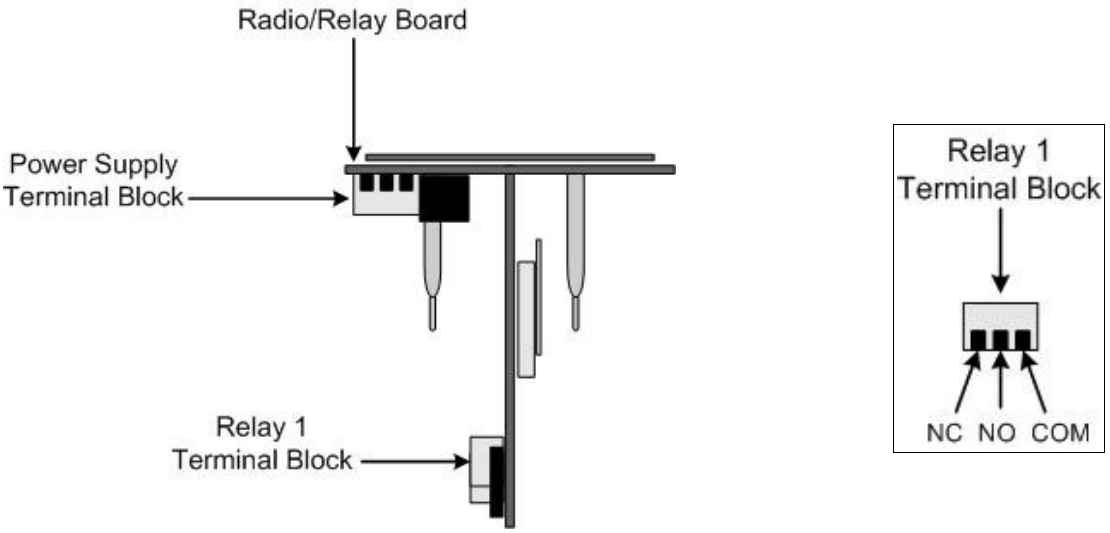


3. Turn the unit over so that the Radio/Relay Board is showing.

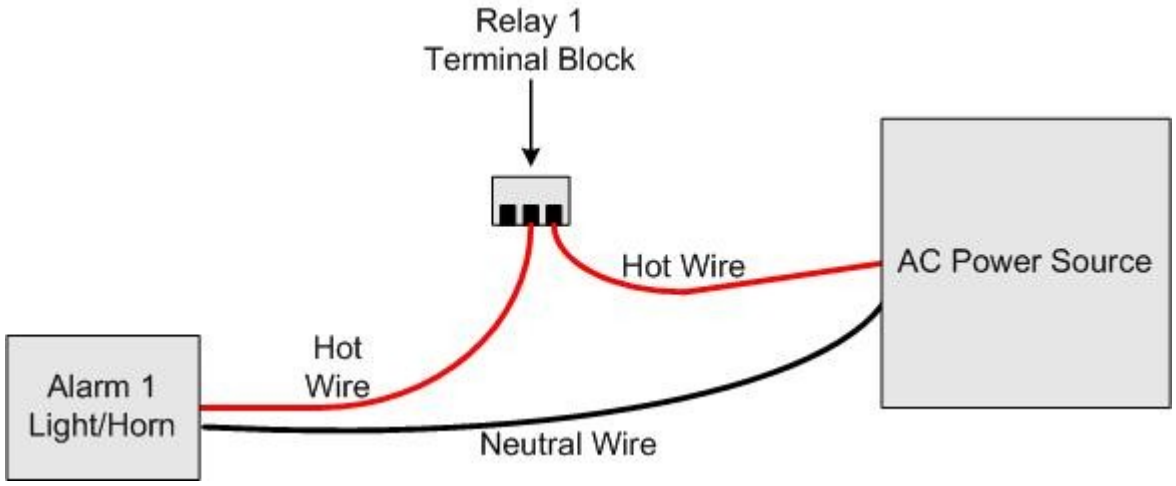


AC Relay/Alarm Configurations – Relay/Alarm 1

1. Bring the two conductor cables from the Relay 1 Alarm (light/horn) to the Front Panel of the Radio/Relay Board using the proper certified 3/4" NPT cable gland or conduit fitting.
2. Run the two conductor cables for Relay 1 from the Relay 1 Alarm (light/horn) through the hole (hub) on the upper left side of the OI-6000 Enclosure.

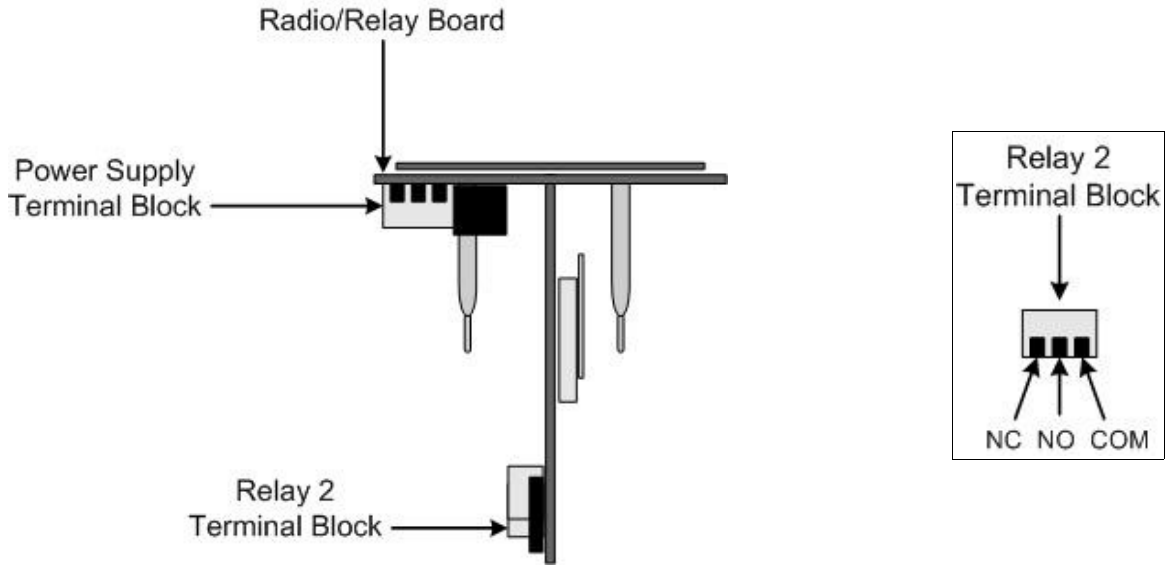


3. Connect the "Hot" (positive) wire from the Relay 1 Alarm (light/horn) to the terminal labeled "NO" on the Relay 1 Terminal Block.
4. Connect the "Neutral" (ground) wire from the Relay 1 Alarm (light/horn) to the AC power source Neutral.
5. Connect the "Hot" (positive) wire from the AC Power Source to the terminal labeled "COM" on the Relay 1 Terminal Block.

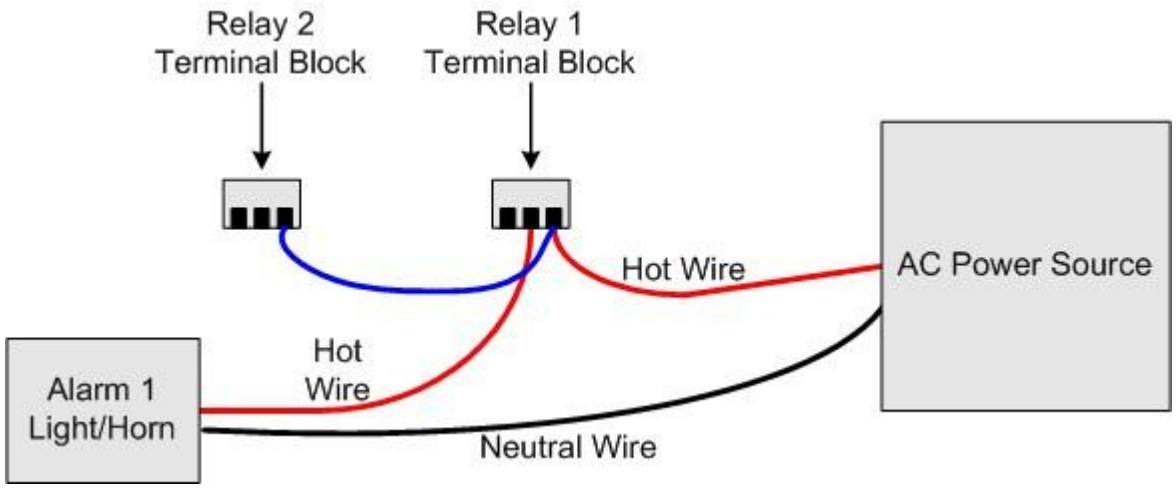


AC Relay/Alarm Configurations – Relay/Alarm 2

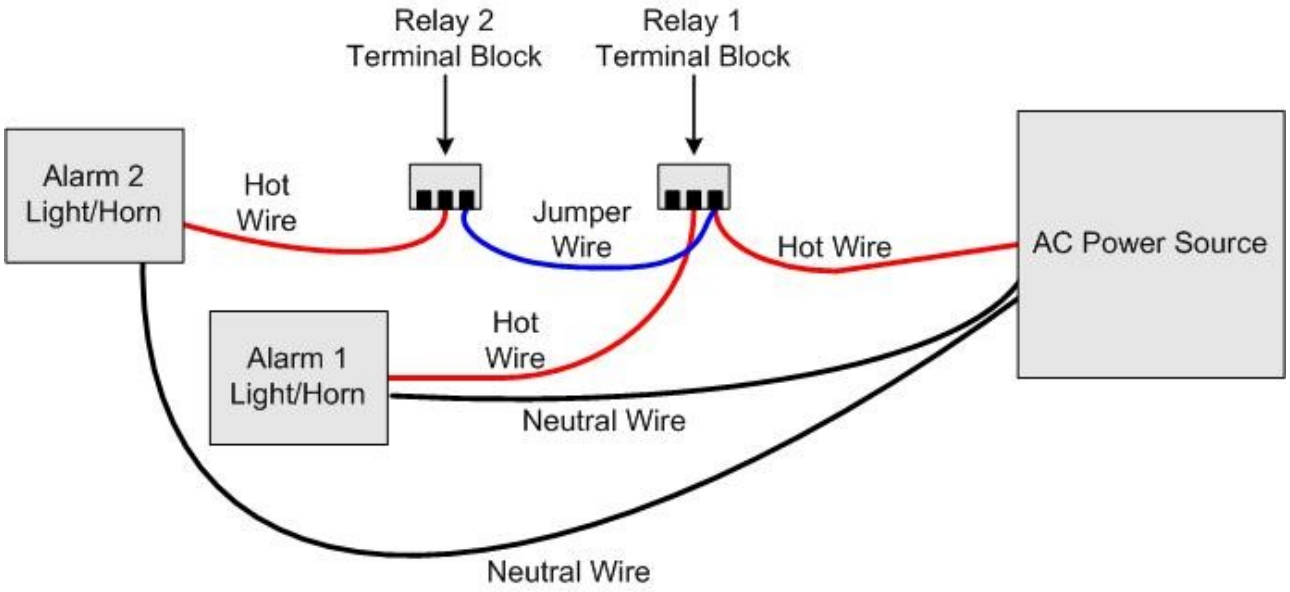
1. Bring the two conductor cables from the Relay 2 Alarm (light/horn) to the Front Panel of the Radio/Relay Board using the proper certified 3/4" NPT cable gland or conduit fitting.
2. Run the two conductor cables for Relay 2 from the Relay 2 Alarm (light/horn) through the hole (hub) on the upper left side of the OI-6000 Enclosure.



3. Jump a "Hot" wire from the terminal labeled "COM" on the Relay 1 Terminal Block to the terminal labeled "COM" on the Relay 2 Terminal Block.

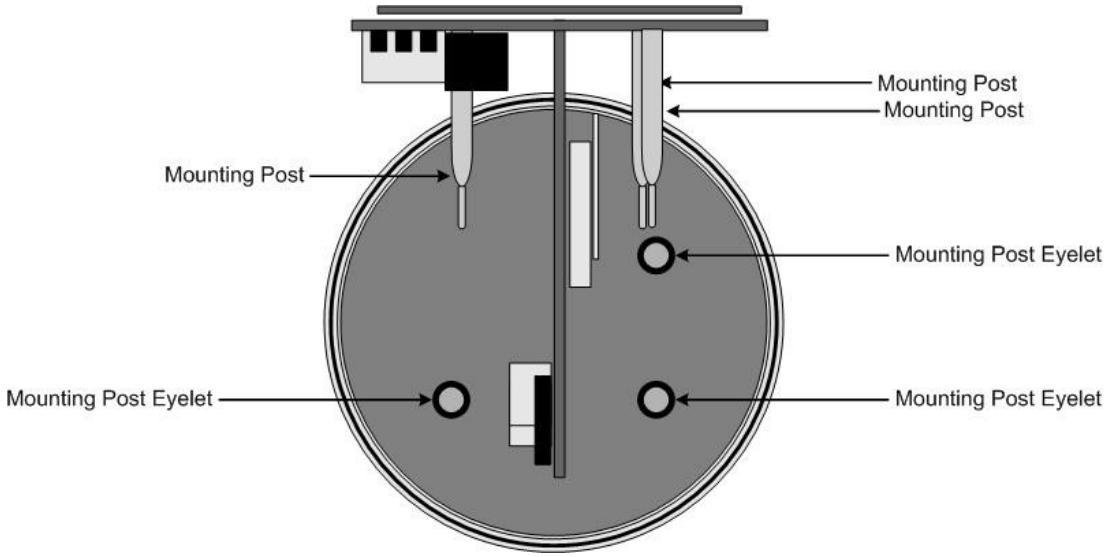


4. Connect the “Hot” (positive) wire from the Relay 2 Alarm (light/horn) to the terminal labeled “NO” on the Relay 2 Terminal Block.
5. Connect the “Neutral” (ground) wire from the Relay 2 Alarm (light/horn) to the AC power source Neutral.

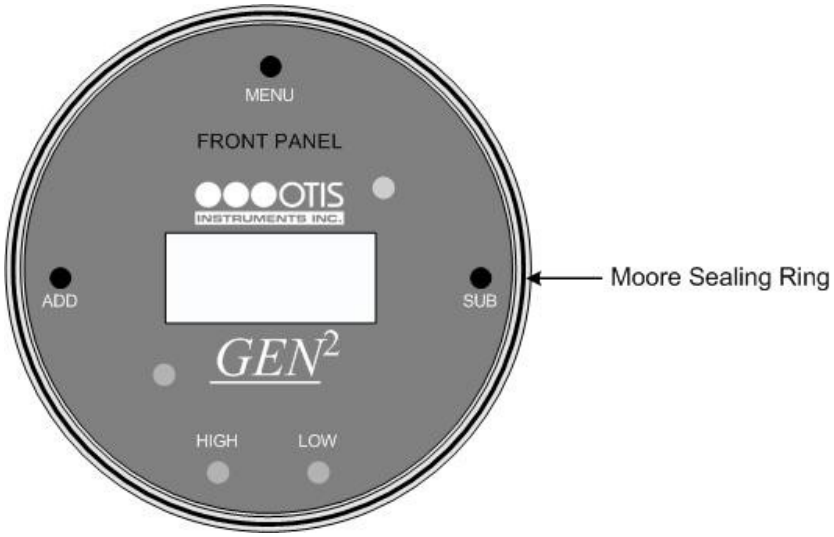


AC Relays/Alarms Configurations – Completion Steps

1. Replace the unit back in the Moore enclosure by matching each Back Panel mounting post to its corresponding eyelet inside the enclosure.



2. Verify that each mounting post is properly fitted in its corresponding eyelet inside the Moore enclosure.
3. Verify that the sealing ring located on the threads of the Moore base is still in place.



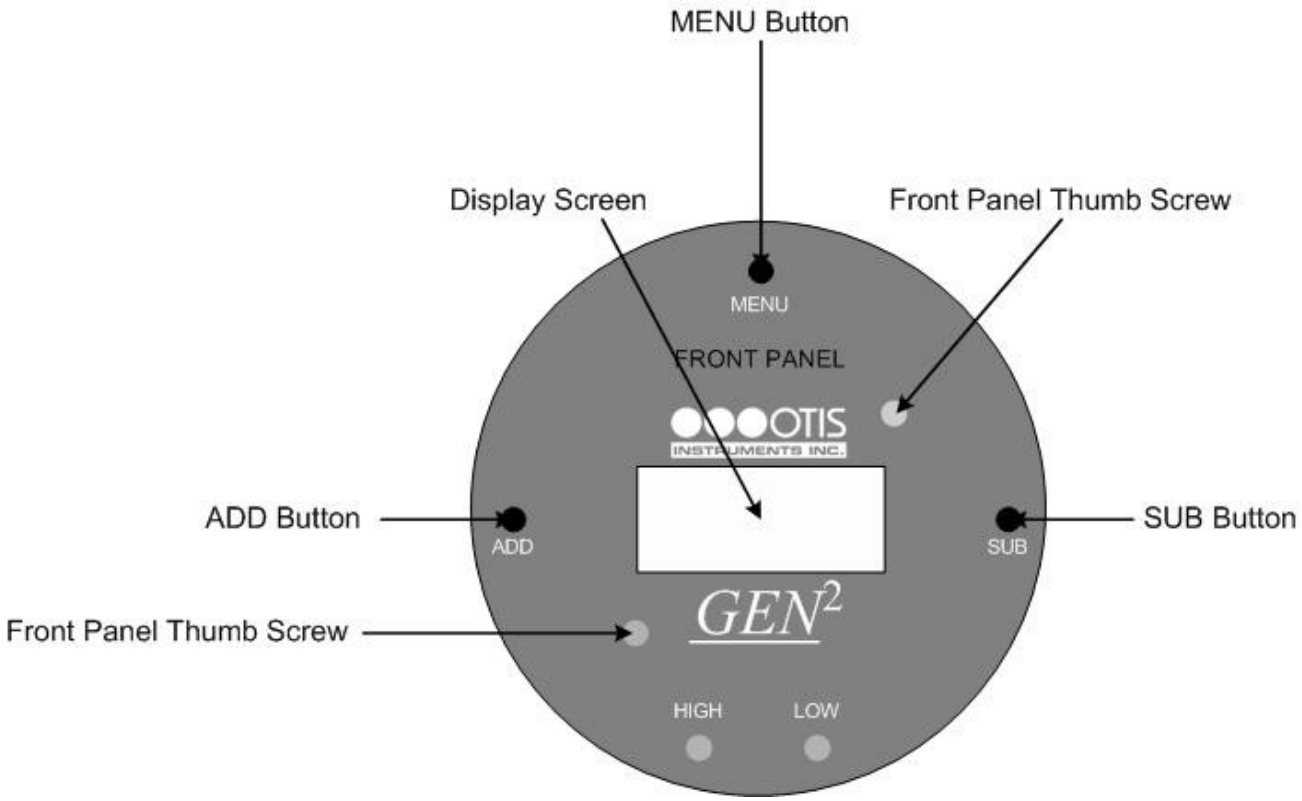
4. Place the Moore enclosure lid on top of the Moore enclosure base.
5. Rotate the lid until it is tightly screwed in place (approximately 20 rotations).

Power On (from Power Off Mode)

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

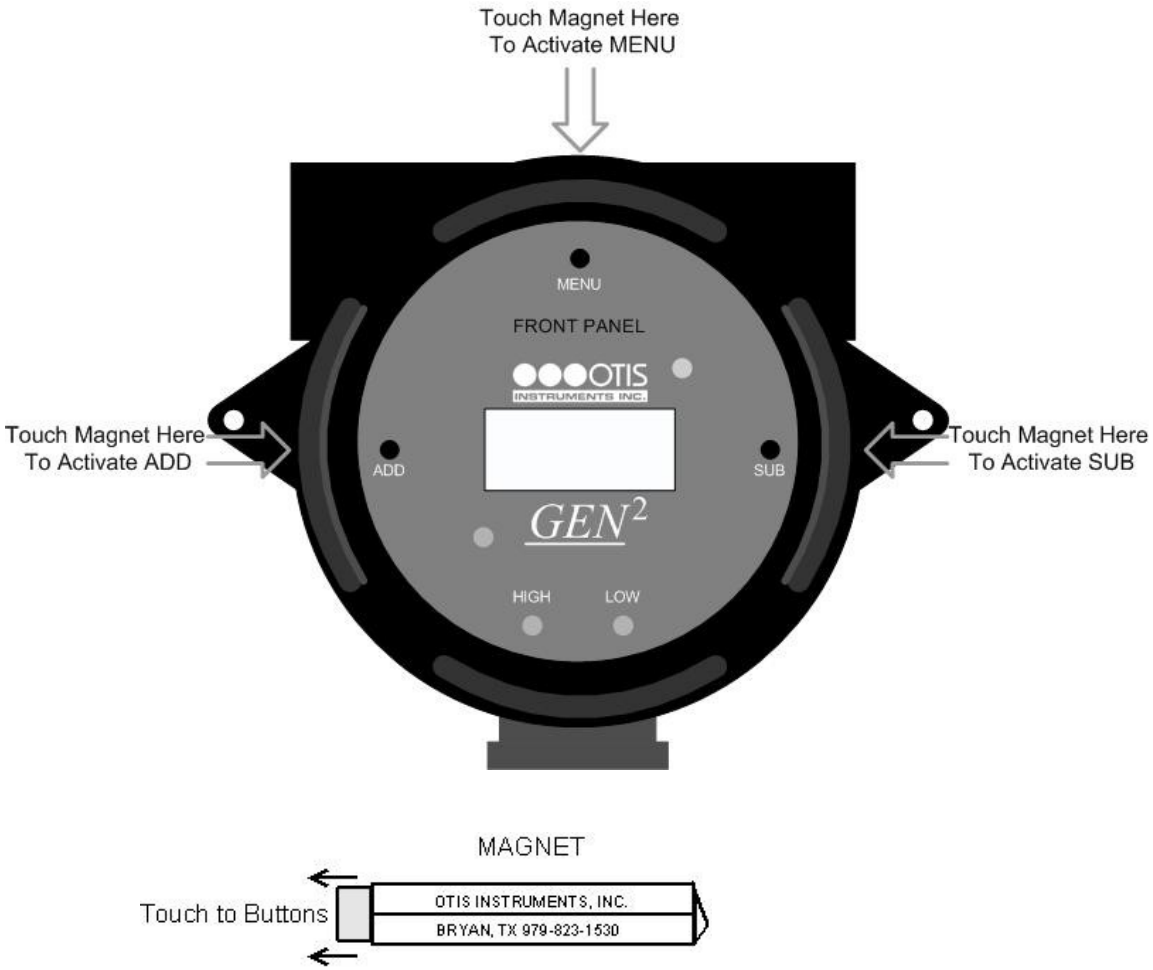
NOTE: If the OI-6000 is using wired power, the sensor assembly will automatically turn on when power is applied.

1. Locate *ADD* on the Front Panel.



2. Touch an Otis Instruments, Inc. distributed magnet to the left side of the device to activate *ADD* (and turn on the device).

   NOTE: When the magnet touches the device and a connection has been made a trapezoid will appear.



3. The device will then count down from 60 to 0.

   - From 60 to 30, the Display Screen will show the Otis Instruments, Inc. logo.
   - From 30 to 0, the Display Screen will show:

     OI-6000

     Version 0.x Build x

Power On cont...

4. When “0” is displayed, the device is in Normal Operating Mode and ready to operate.

NOTE: If the device is in Fault, the Display Screen will alternately show “0” and then:

Normal Mode

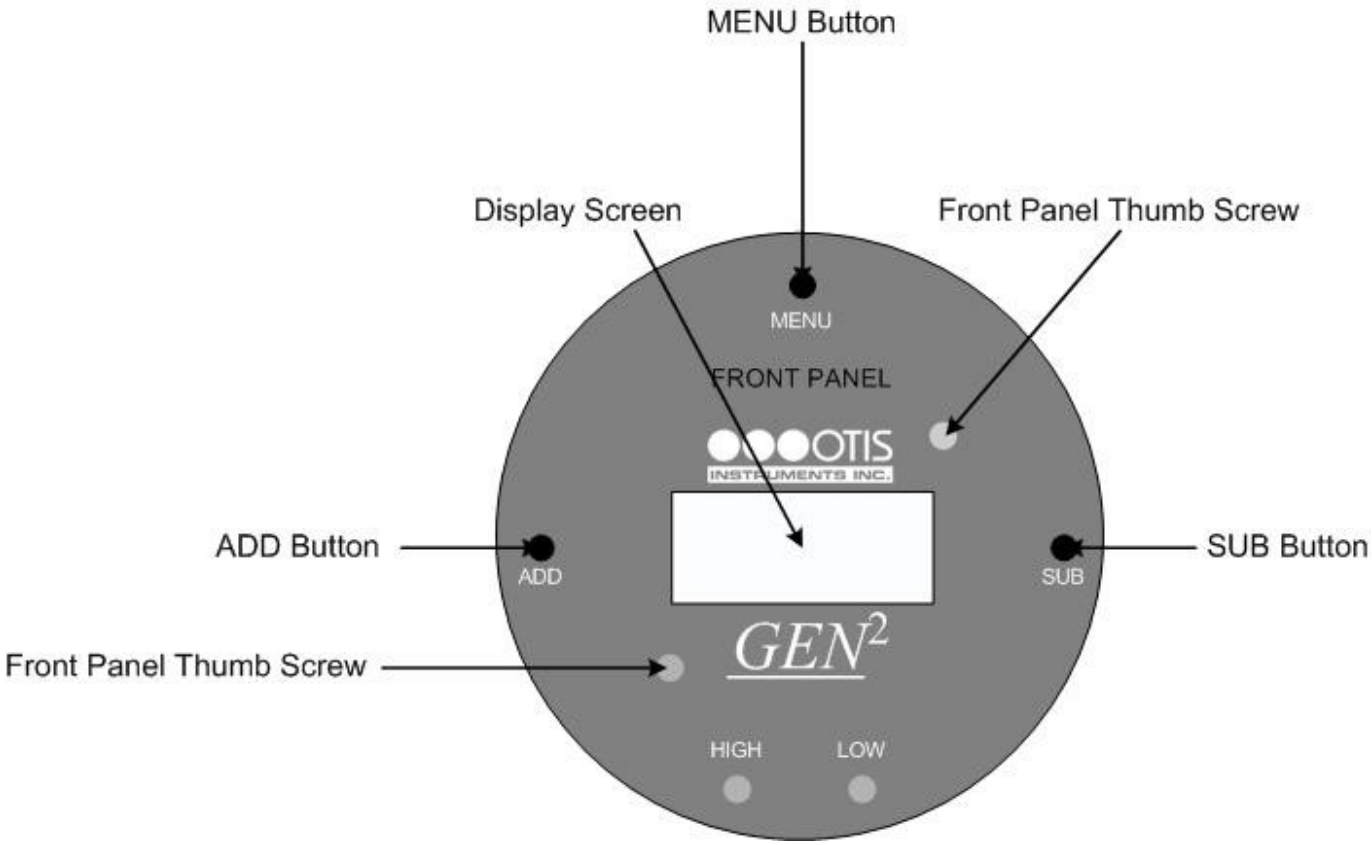
FXX *EXAMPLE: F14*

(Reason for fault) *EXAMPLE: NO PRIMARY MONITOR*

Power Off

Powering off the device shuts down the system. When powered off, the device is no longer transmitting signals so the receiving controller will display “FAU” for that sensor channel.

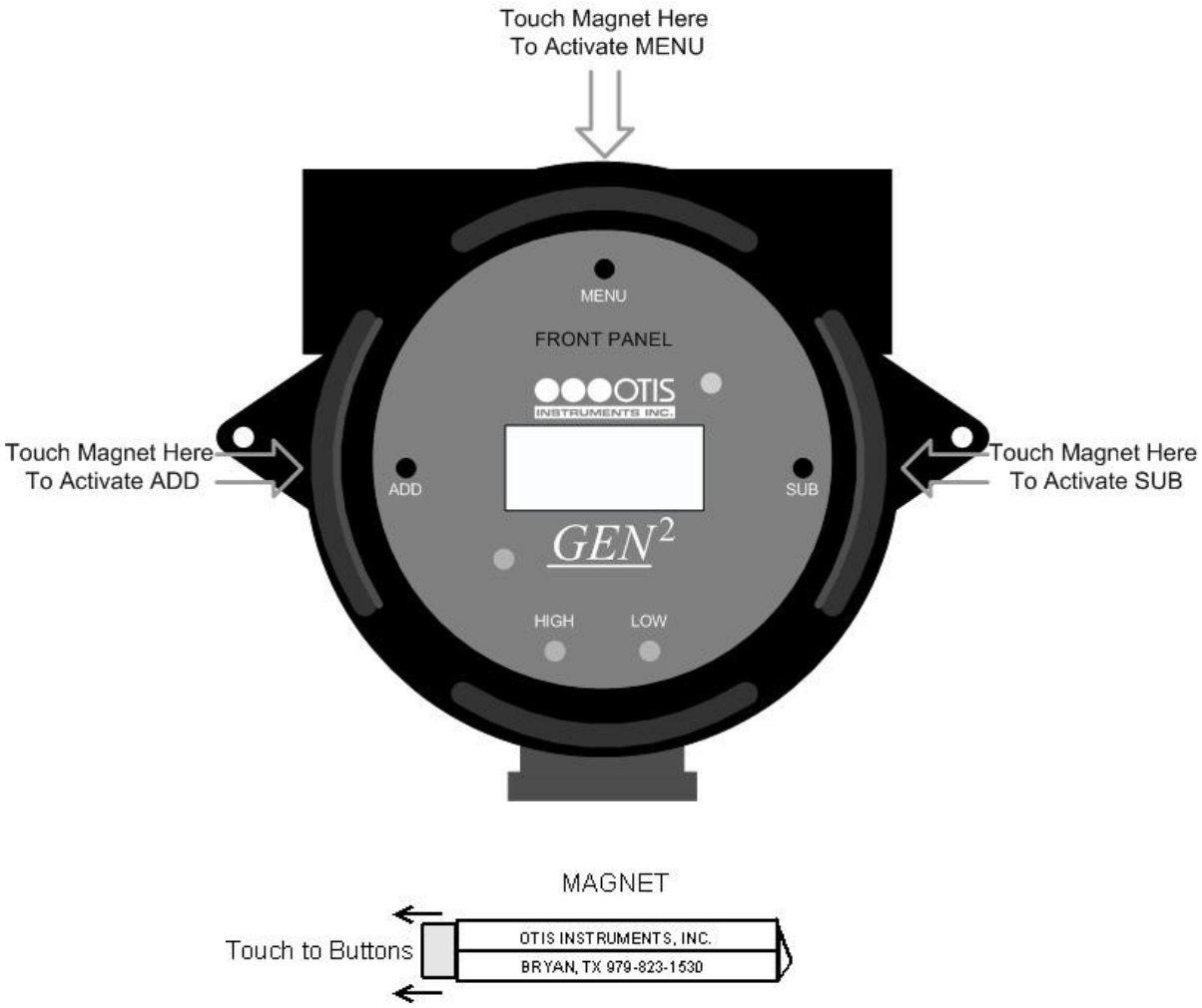
1. Locate *SUB* on the Front Panel.



Power Off cont...

2. Touch and hold an Otis Instruments, Inc. distributed magnet against the right side of the device for four seconds to activate *SUB (which turns* the device off).

NOTE: When the magnet touches the device and a connection is made, a trapezoid will appear on the display screen.



3. When powering off, the display screen will switch from showing “0” to “OFF”. The display will continue to show “OFF” (when power is being supplied to the unit) until the device is powered on.

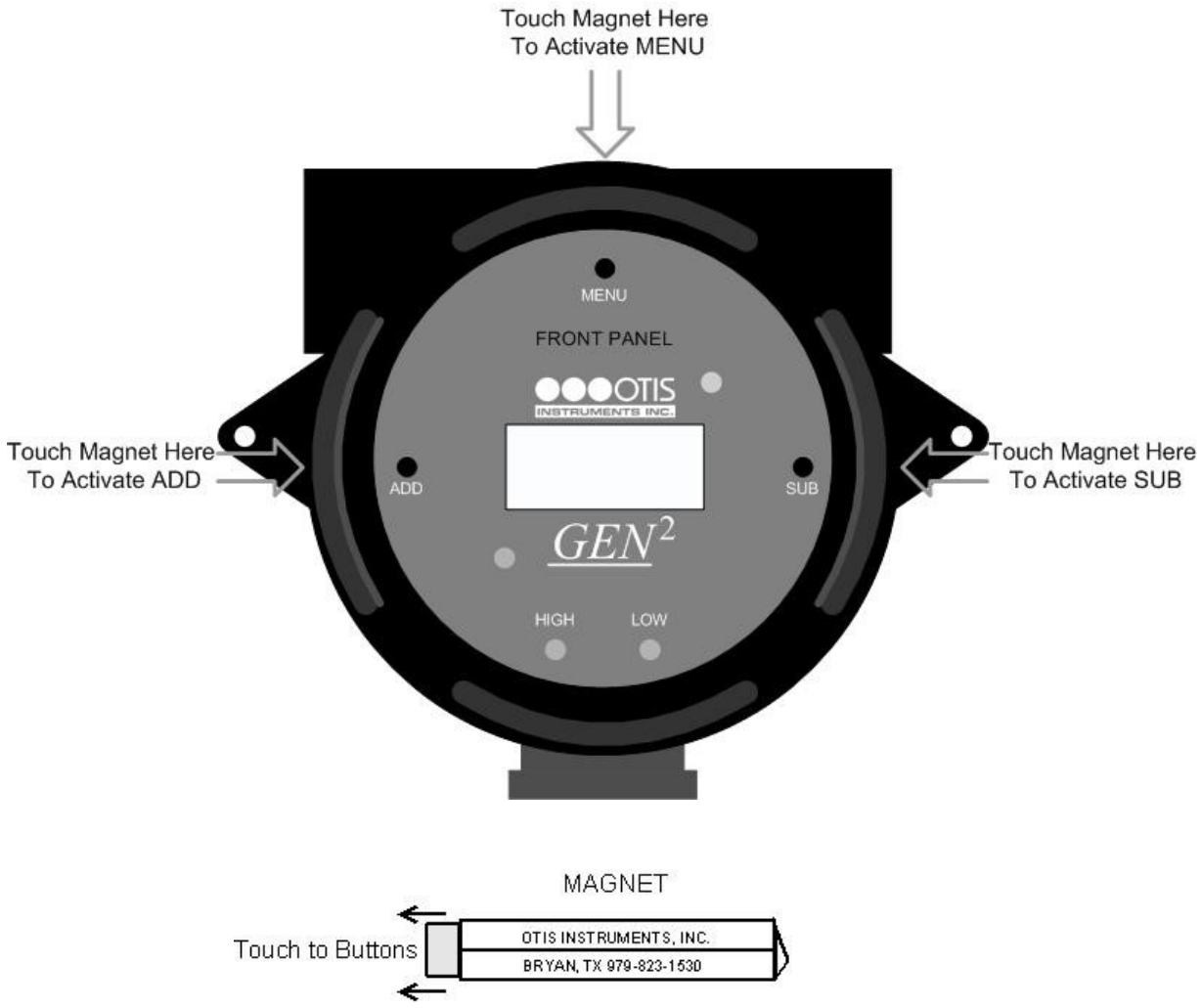
Basic Menu Mode

The Basic Menu Mode should be used to set the basic settings of the OI-6000 before initial use, and/or to adjust the basic settings to accommodate use. Basic Menu Mode options include: Null, Calibration, Set Low Alarm, Set High Alarm, and Radio Address.

NOTE: All Basic Menu Mode options may not apply to your application (ex: radio address will not apply for applications without a radio).

Null

1. Touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



Change/Check Null cont...

2. The display screen will show:

Null
Press
ADD
to auto null

NOTE: A message will be sent to the receiving controller indicating that the sensor is in Null Mode..

3. As the Display Screen instructs, press *ADD* to auto null.
4. The Display Screen will then show:

Null
Is Sensor In
Clean Air?
Yes No

5. Press *ADD* for "yes" or *SUB* for "no".

NOTE: If too much time elapses between when ADD is pressed and when the question regarding clean air is answered, the device will default back to the primary Null screen. If this occurs, simply press ADD again.

6. The Display Screen will show:

Null
Auto Nulling . . .
6 (the device will count down from 6 to 0)

Change/Check Null cont...

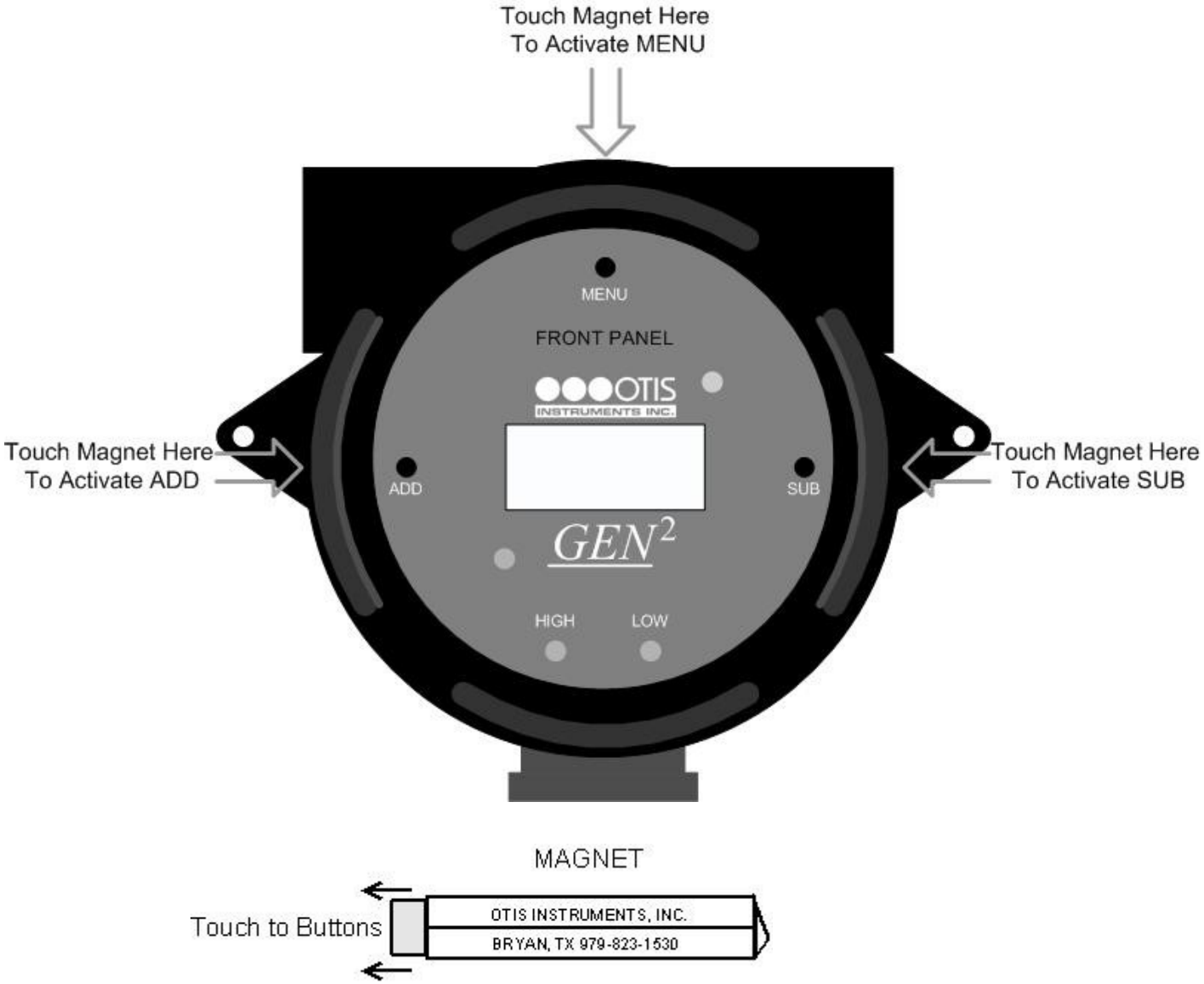
7. Once the device has been Nulled, the Display Screen will show:

Null
Auto NULL
Complete

8. Once the Null is set, proceed to the next step.

Calibration

1. After the Null has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.

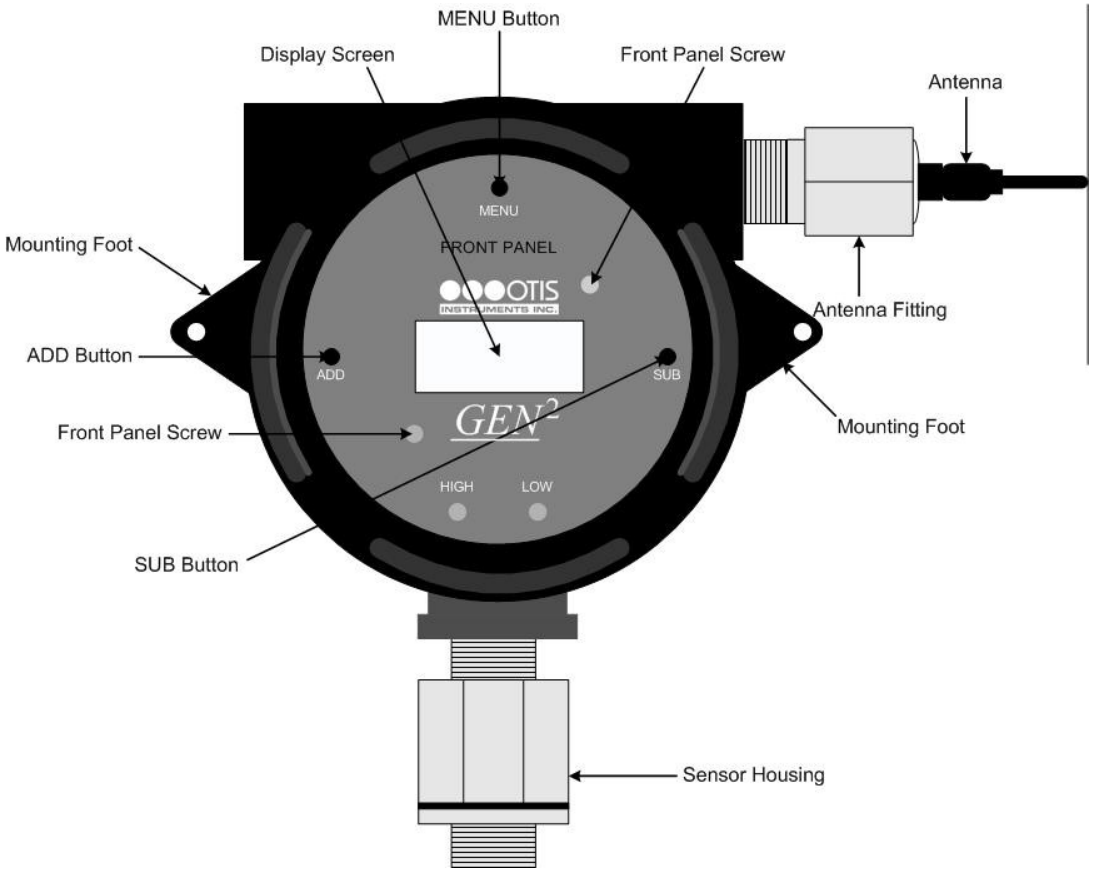


Setting Calibration cont...

2. The display screen will show:

Calibration
0.0
ADD SUB

3. Unscrew and remove the sensor rainguard from the sensor housing.



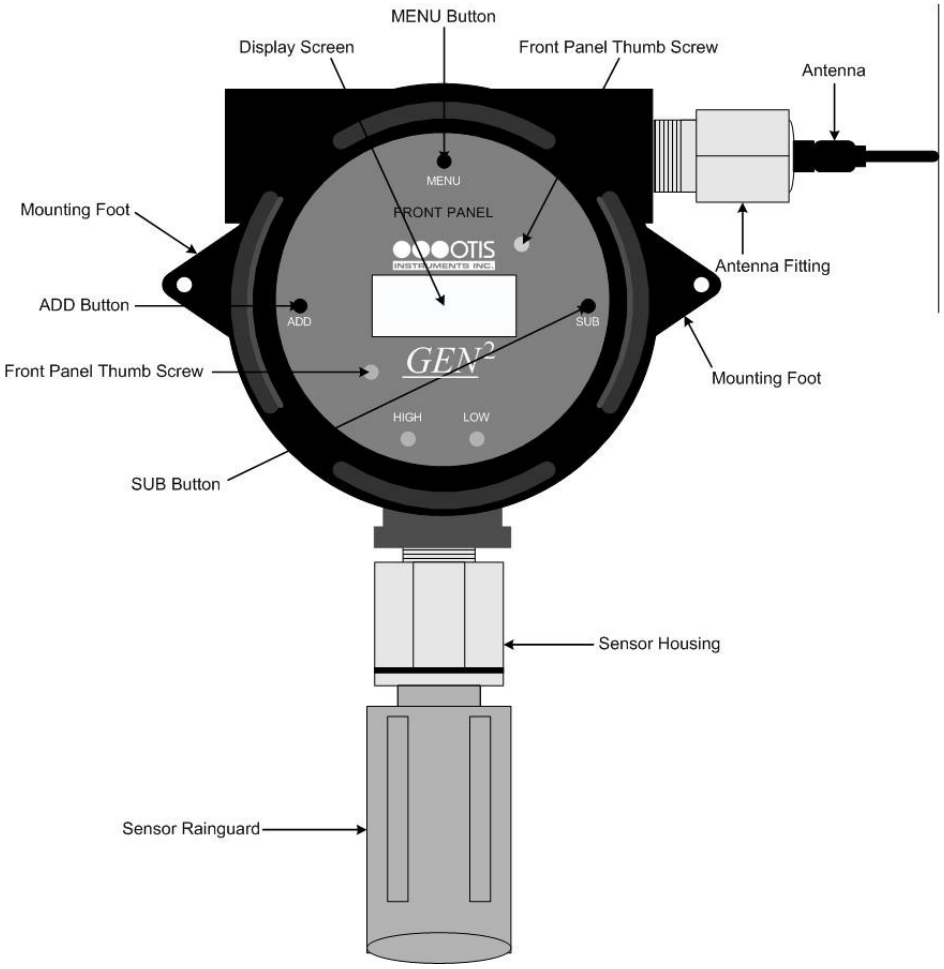
4. Replace the sensor rainguard with an Otis OI-410 Calibration Cup.
5. Apply a known calibration gas to the OI-410 Calibration Cup that is attached to the sensor housing.
6. The sensor's detection of gas will begin to climb in value as shown on the display screen.
7. Watch the display screen until the number displayed stops increasing (or after approximately 90 seconds).

Setting Calibration cont...

8. Touch the magnet to *ADD* (increase) or *SUB* (decrease) to manipulate the reading on the display screen to match that of the calibration gas.

   EXAMPLE: If the calibration gas is 25 PPM (or %) and the number on the display screen is 22 PPM (or %), touch the magnet to *ADD* until the screen reads 25 PPM (or %)

9. The device is now calibrated.
10. Unscrew the OI-410 Calibration Cup.
11. Reattach (screw on) the sensor rainguard to the sensor housing.

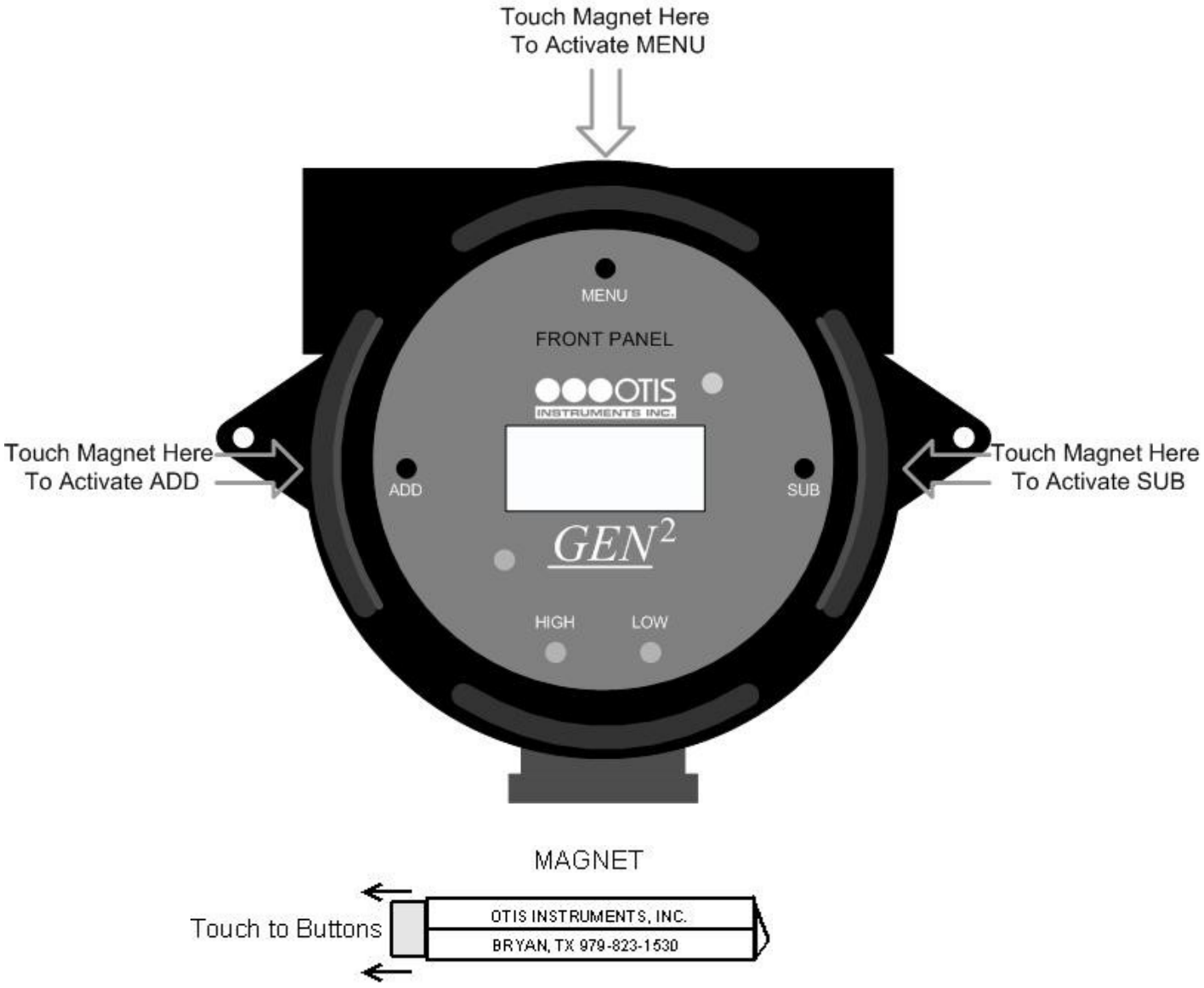


12. Once Calibration is complete, proceed to the next step.

Setting Low Alarm

NOTE: The maximum value that can be set for either relay is 60% of full scale concentration.

1. After Calibration is complete (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



Setting Low Alarm cont...

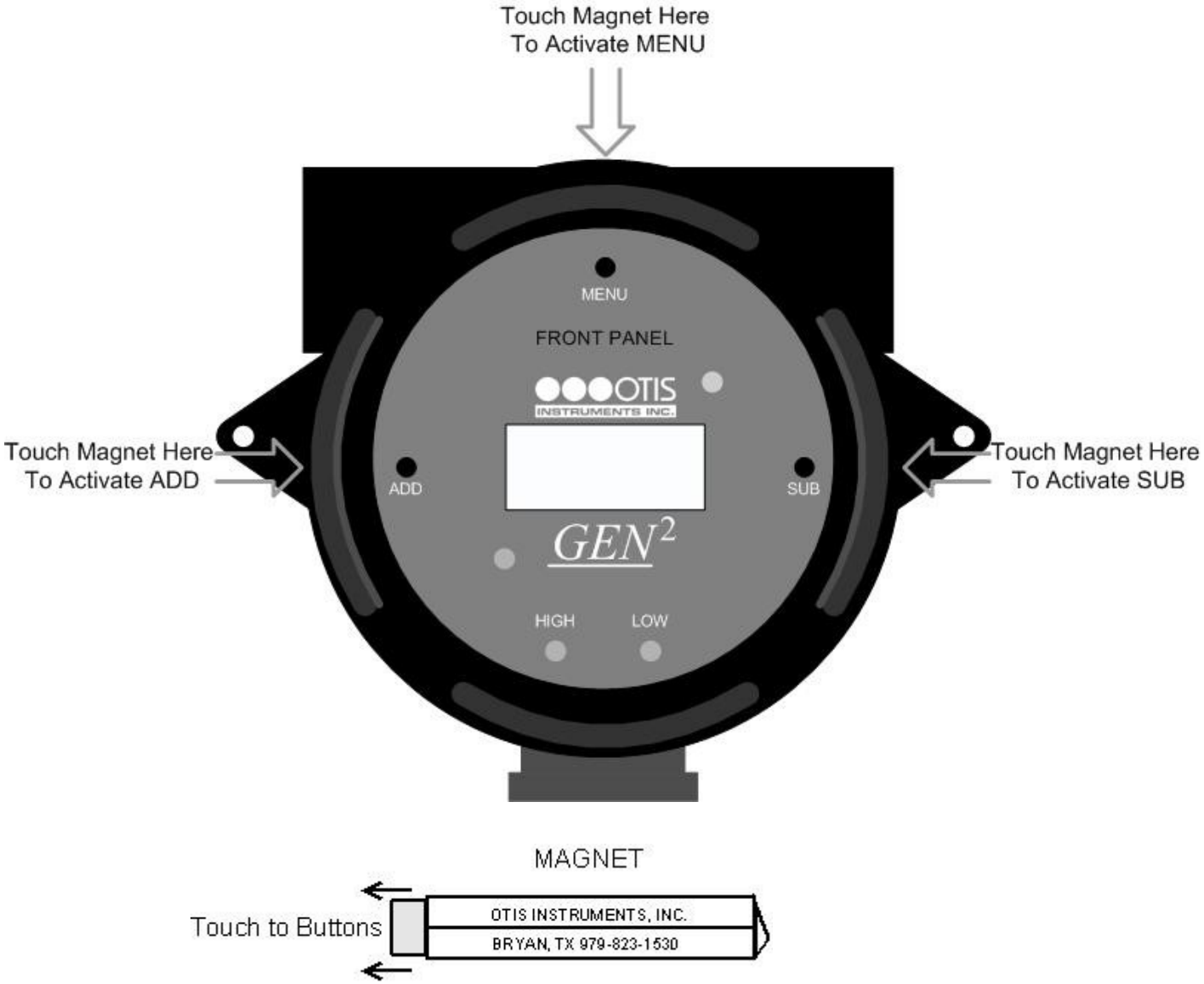
2. The display screen will show:

Set Low Alarm
10
ADD SUB

3. Press *ADD* to increase, or *SUB* to decrease the Low Alarm setting.
4. Once the Low Alarm is set, proceed to the next step.

Setting High Alarm

1. After the Low Alarm is set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



Setting High Alarm cont...

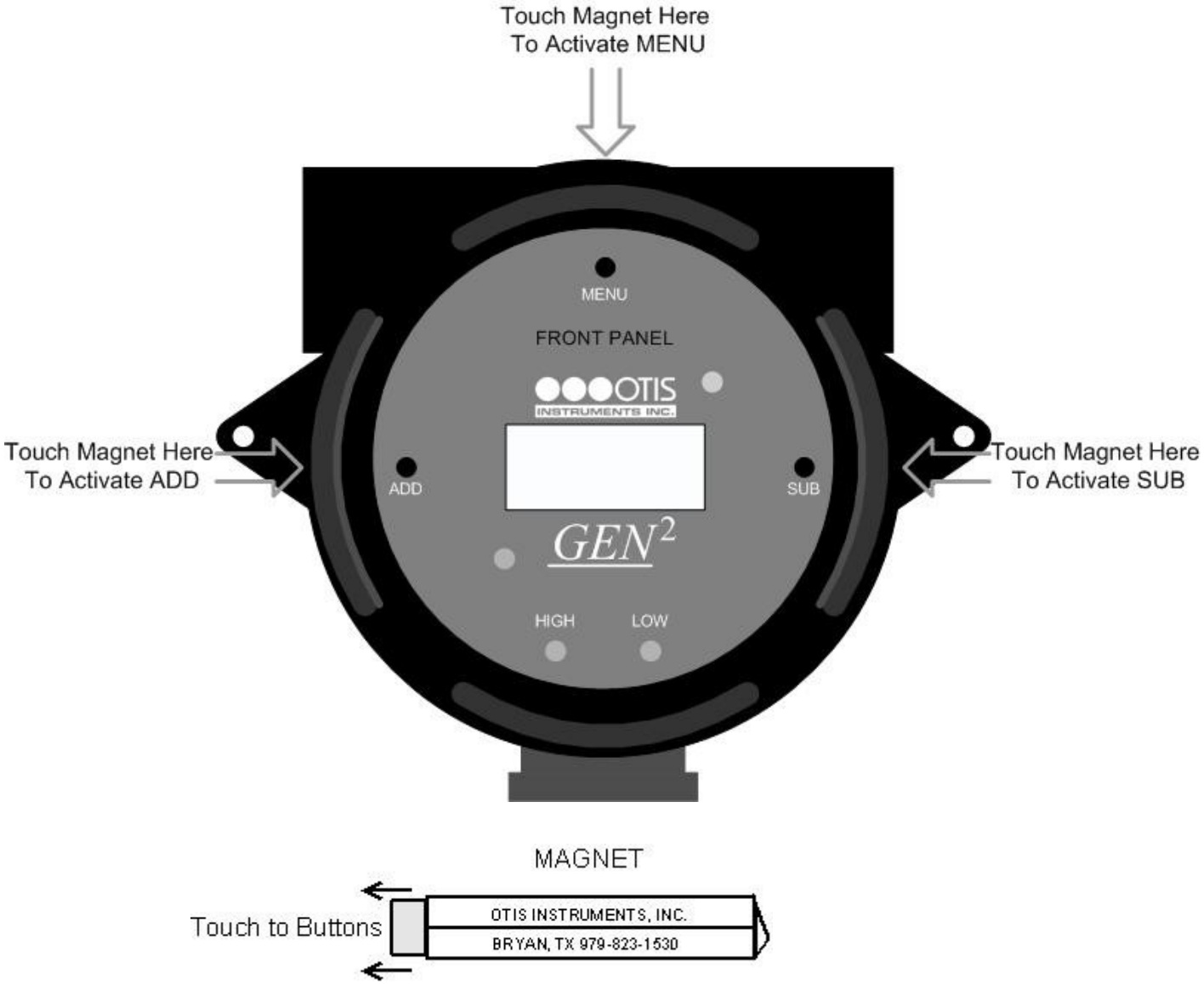
2. The display screen will show:

Set High Alarm
15
ADD SUB

3. Press *ADD* to increase, or *SUB* to decrease the High Alarm setting.
4. Once the High Alarm is set, proceed to the next step.

Setting Radio Address

1. After the High Alarm is set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



Setting Radio Address cont...

2. The display screen will show:

Radio Address
1
ADD SUB

3. Press *ADD* to increase, or *SUB* to decrease the Radio Address setting.
4. Once the Radio Address is set, press *MENU* to exit Basic Menu Mode.
5. The device is now in Normal Operating Mode. The Display Screen should show one of the following:

0
H2S PPM (Gas Type / Unit of Measure)

0
LEL % (Gas Type / Unit of Measure)

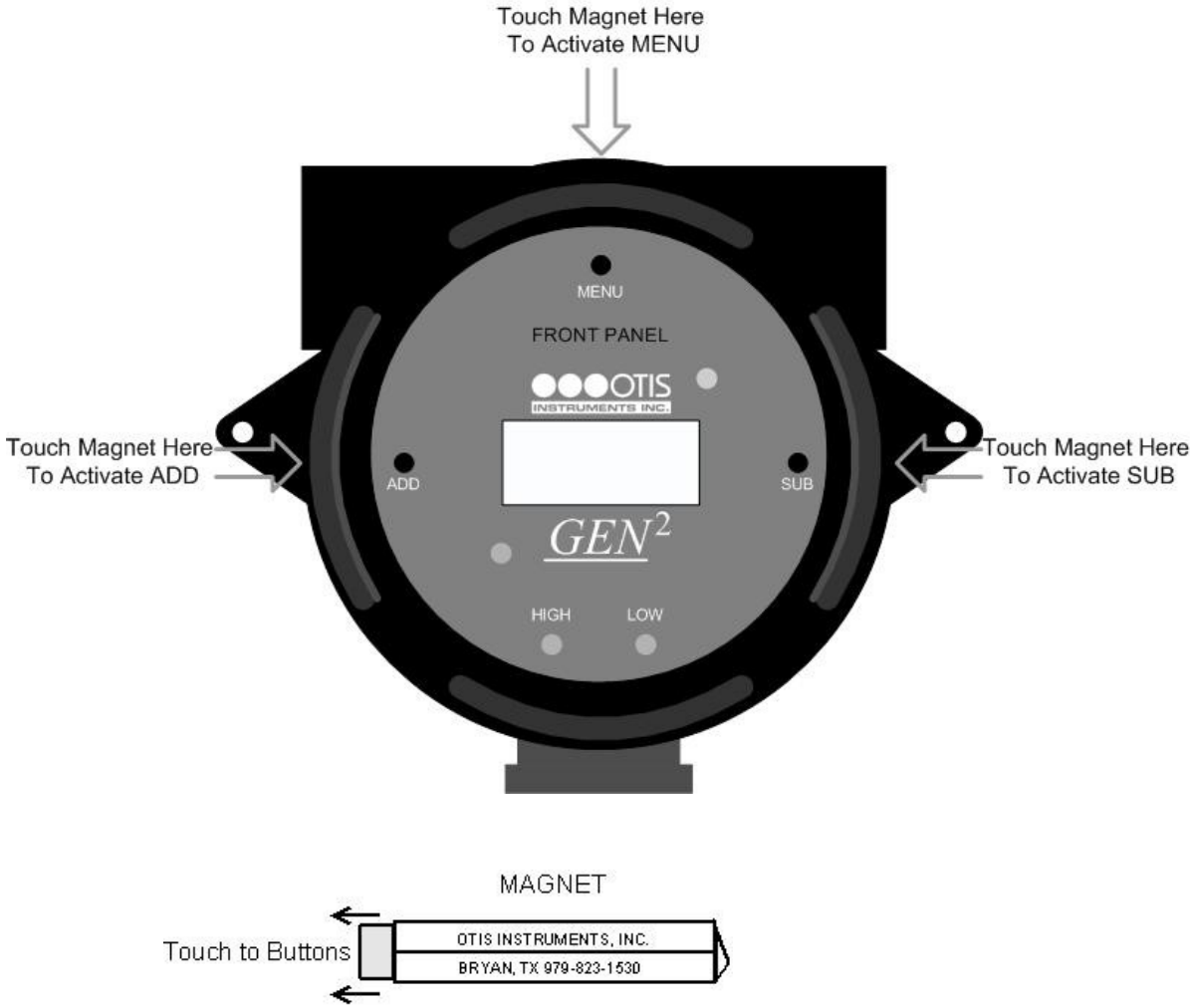
Advanced Menu Mode

The Advanced Menu Mode allows the user to: Test Relays/Alarms, set the Network ID, view the unit's Diagnostics, view the Sensor('s) Info, Set Modbus Address, Set Baud, and Set 4-20mA.

Relay/Alarms Test Setting

The relay/alarms test should be completed periodically to ensure full functionality of the relay/alarms, and accurate transmission of radio waves from the device to the transmission controller.

1. While the device is in Normal Operating Mode, Touch and hold an Otis Instruments, Inc. distributed magnet against the top side of the device for approximately six seconds to active *MENU* and enter the Advanced Menu Mode.



Relay/Alarms Test cont...

2. The Display Screen will show:

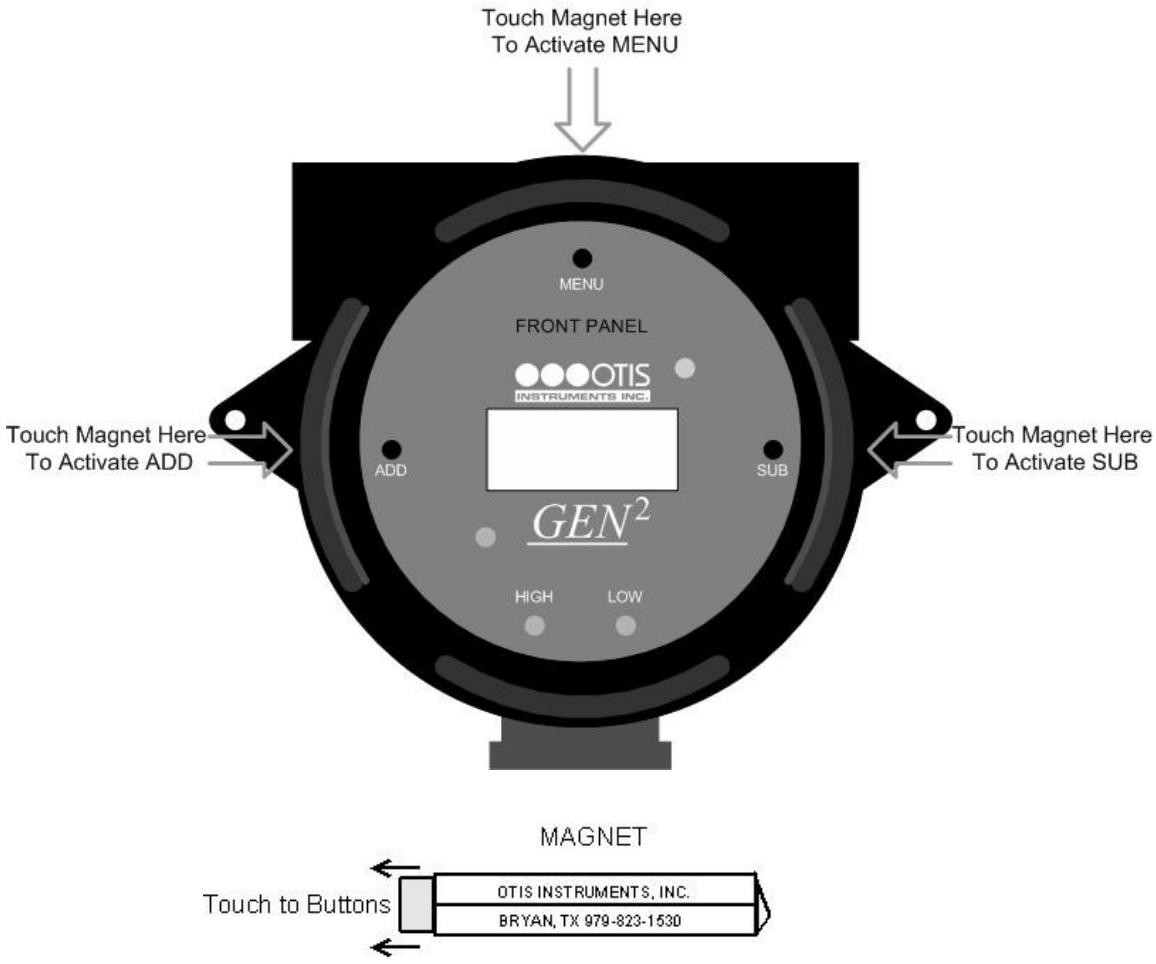
Relay Test
0
ADD SUB

3. Touch the magnet to *ADD* to increase the reading by 5 PPM (or %). Continue touching the magnet to *ADD* until the increasing number reaches the pre-set level to trigger the relay/alarms.
4. Once the Relay/Alarm Test is complete, continue to the next step.

Setting Network ID

To ensure proper communication with the receiving monitor, set the Network ID to match the one assigned to the monitor.

1. After the Relay/Alarms Test is complete (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the MENU button.



2. The display screen will show:

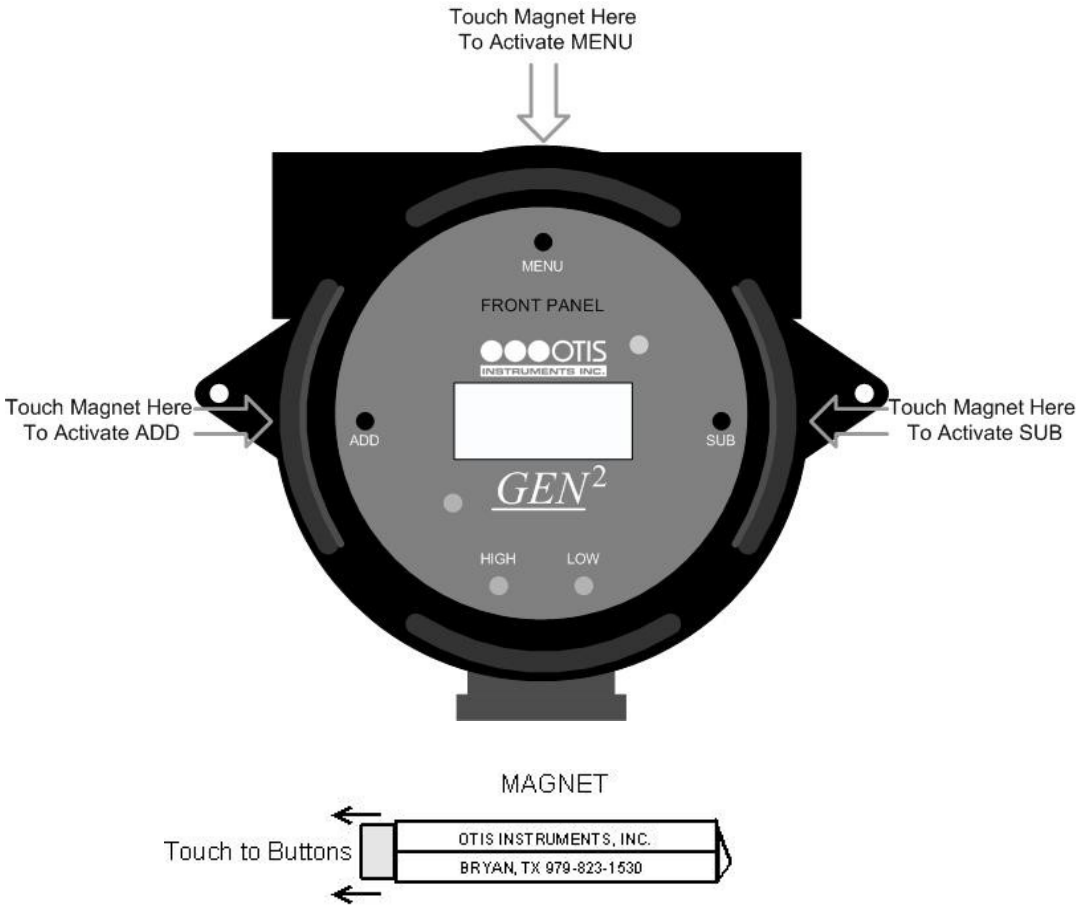
Network ID
5
ADD SUB

3. Touch the magnet to *ADD* (increase) or *SUB* (decrease) until the desired Network ID is displayed—this value will be a number from 1-78.
4. Once the Network ID is set, continue to the next step.

Diagnostics

The diagnostics screen allows the user to view the RSSI, Scale of the unit, Power (in Volts), and Sensor (in volts).

1. After the Network ID is set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU*



2. The display screen will show:

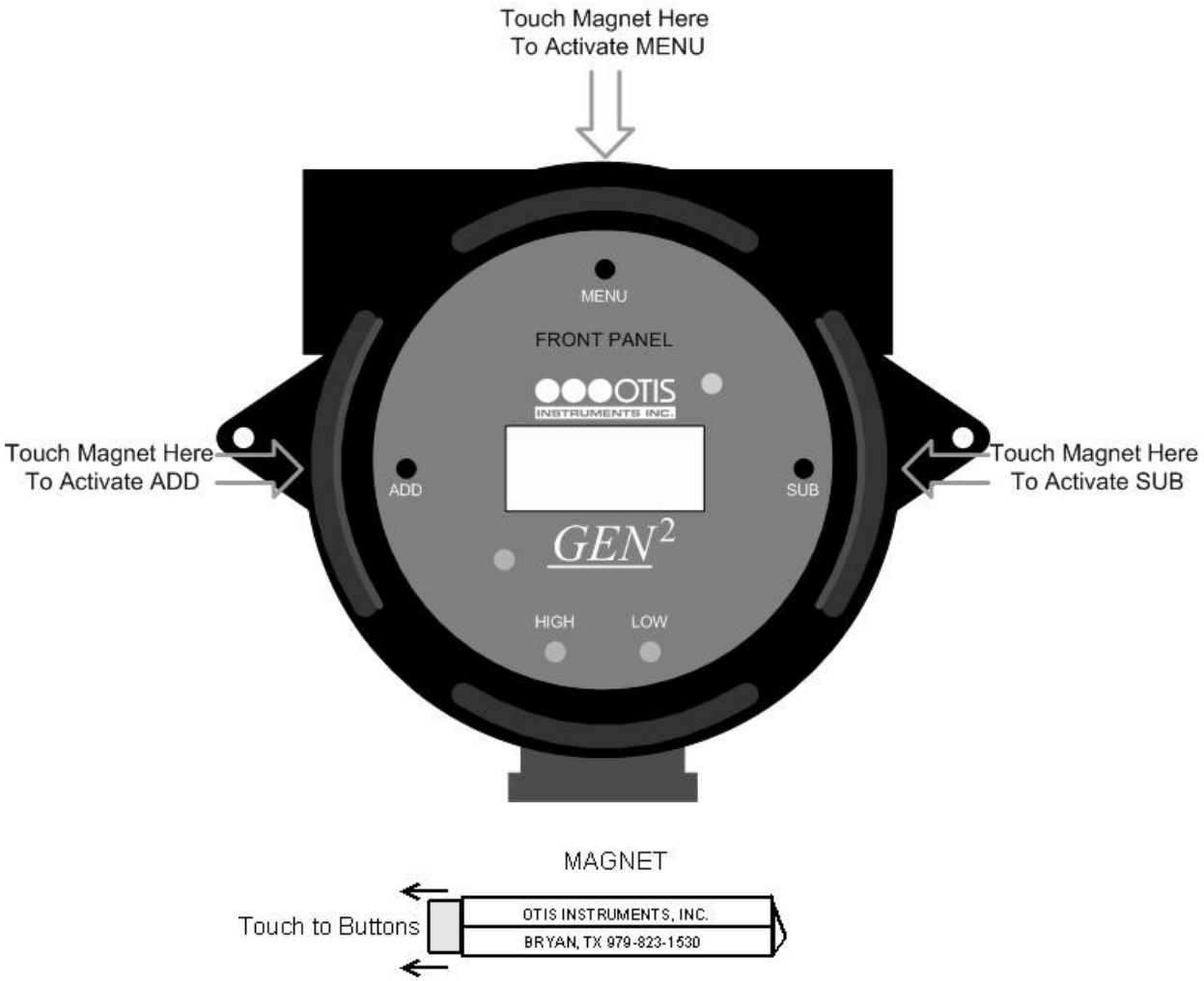
DIAGNOSTICS
RSSI: x
Scale: xxx
Power: xx.xv
Sensor: x.xxxxv

3. Once the Diagnostics have been viewed, continue to the next step.

Unit Info

The Sensor Info screen allows the user to view the date and serial number of the unit.

1. After the Diagnostics have been viewed (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



2. The display screen will show:

UNIT INFO

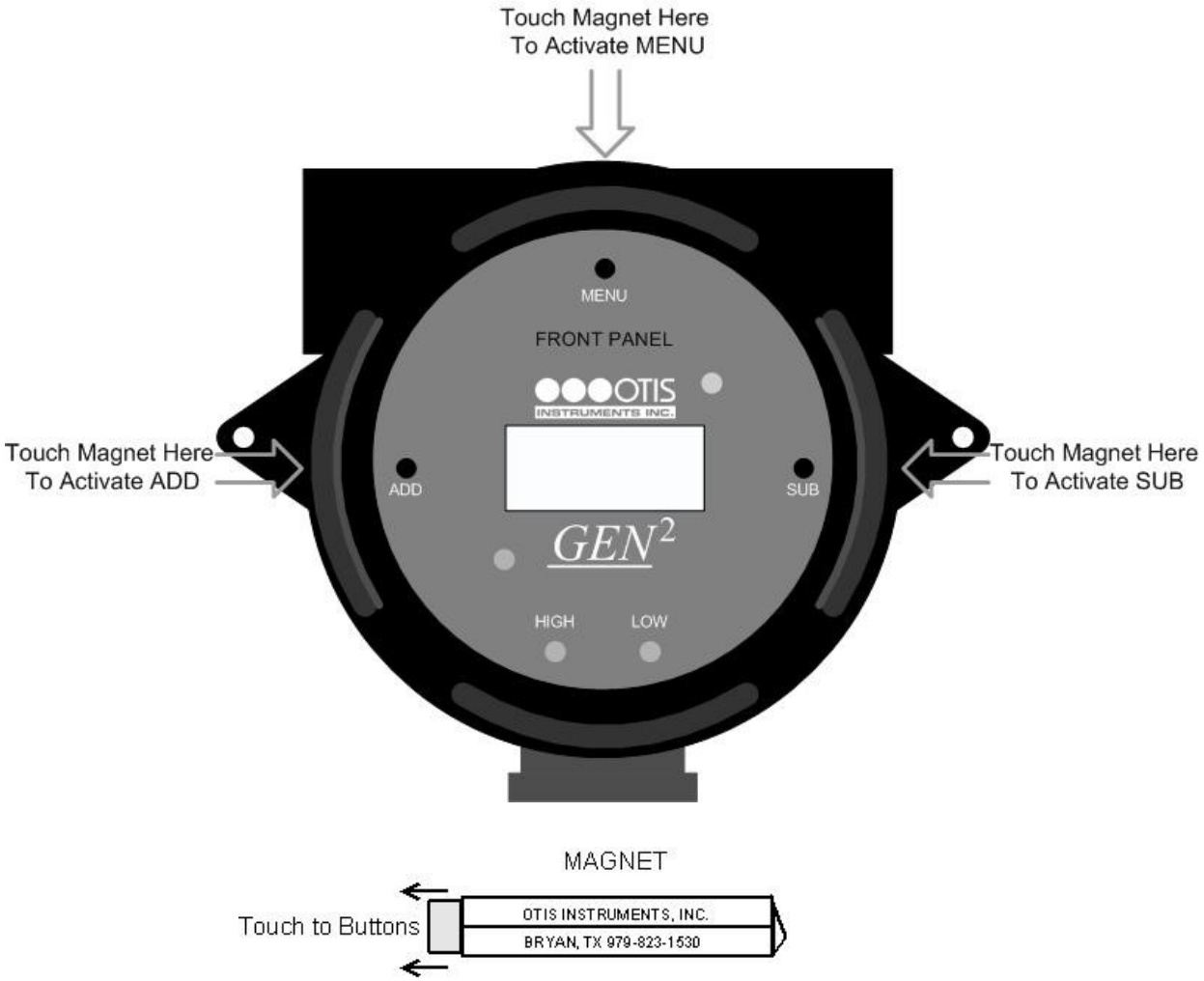
Date: MM.DD.YYYY
Serial #: xxxxxx

3. Once the Sensor Info has been viewed, continue to the next step.

Background Gas Setting

With this menu option the user can adjust the background gas setting. The default Background Gas Setting is "4" on all GENII products.

1. After the Sensor Info has been viewed (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



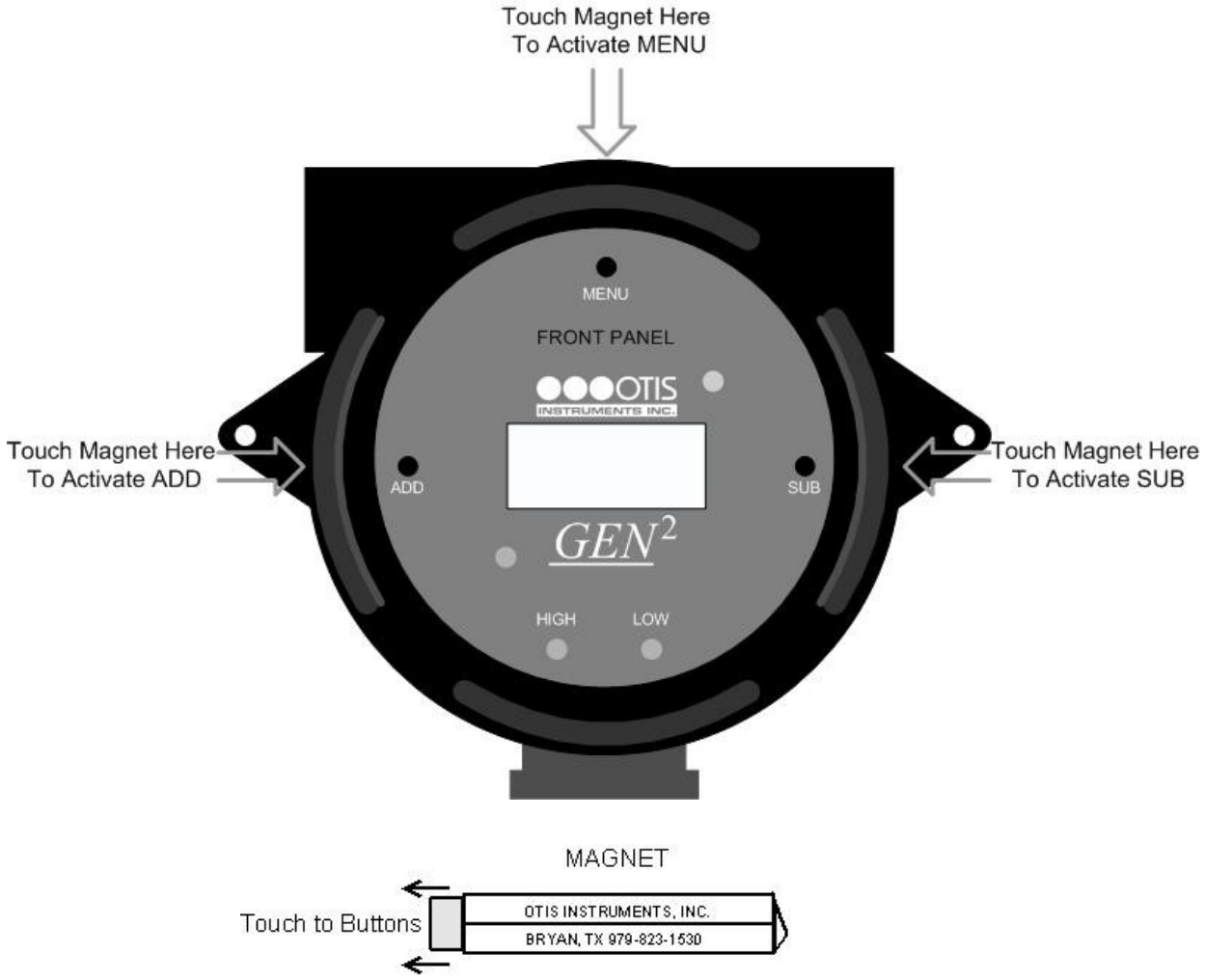
2. The display screen will show:

Background
4
ADD SUB

3. Press *ADD* (increase) or *SUB* (decrease) to adjust the Background Gas Setting.
4. Once the Background Gas Setting has been set, continue to the next step.

Relay 1: Latching/Unlatching

1. After the Background Gas Setting has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



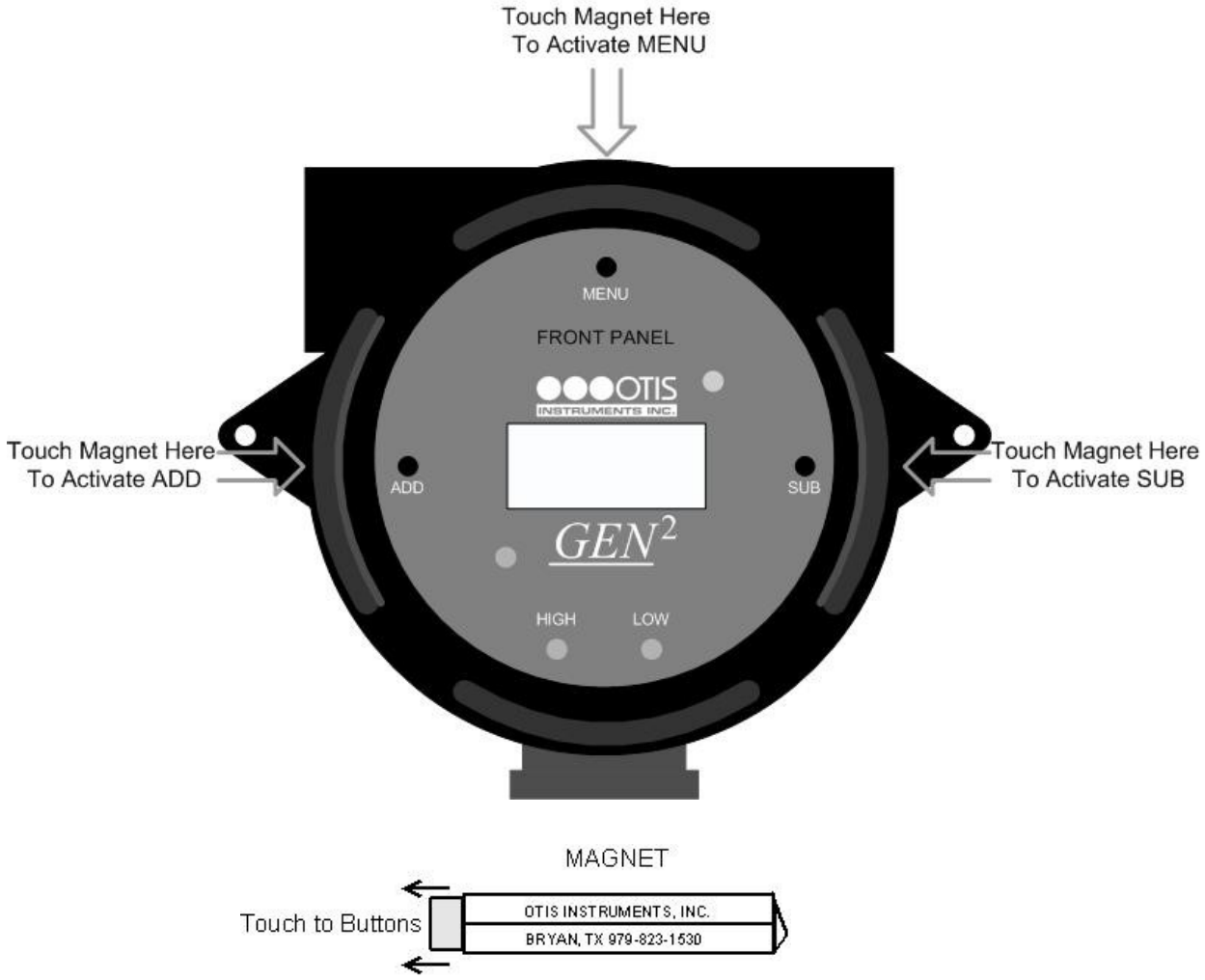
2. The display screen will show:

Relay 1
State: UnLatch
ADD SUB

3. Press *ADD* or *SUB* to toggle between "Latch" and "UnLatch".
4. Once the Relay 1: Latching/Unlatching has been set, continue to the next step.

Relay 2: Latching/Unlatching

1. After Relay 1: Latching/Unlatching has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU* button.



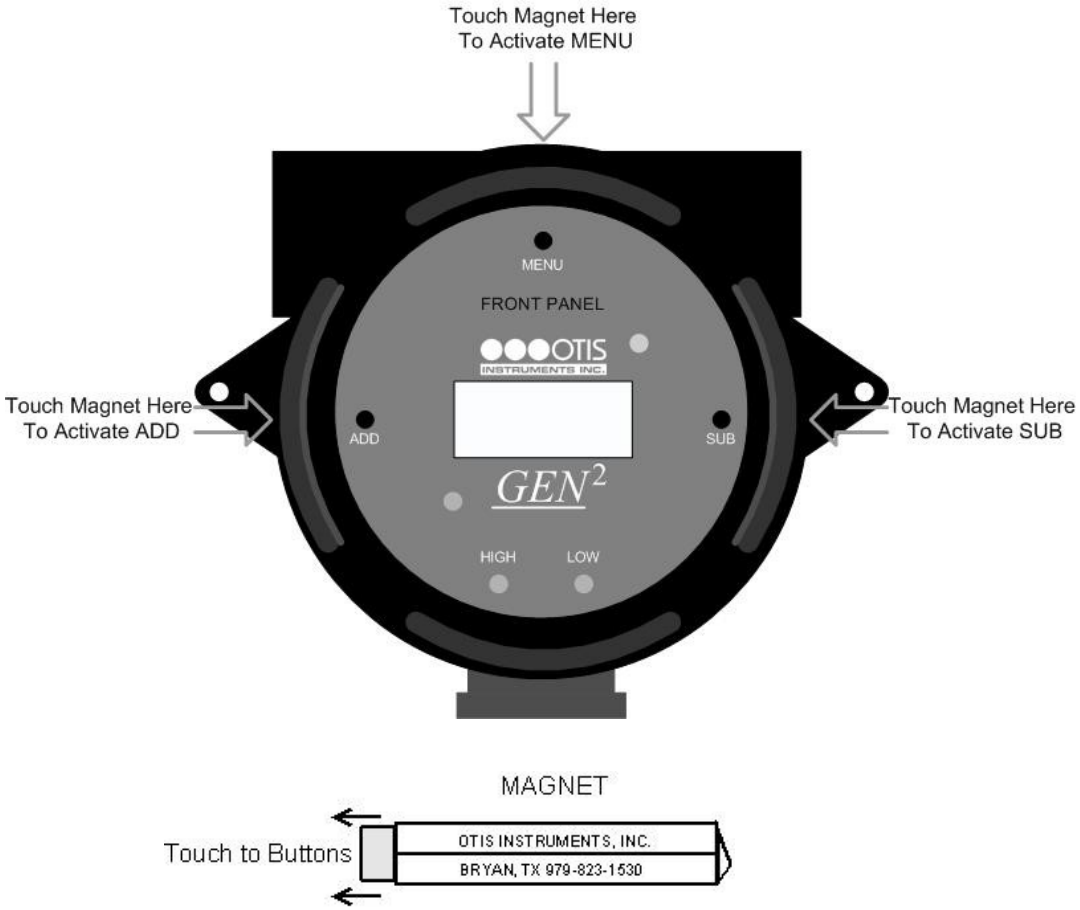
2. The display screen will show:

Relay 2
State: UnLatch
ADD SUB

3. Press *ADD* or *SUB* to toggle between "Latch" and "UnLatch".
4. Once the Relay 2: Latching/Unlatching has been set, continue to the next step.

Setting Modbus Address

1. After the Relay 2: Latching/Unlatching has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU*



2. The display screen will show:

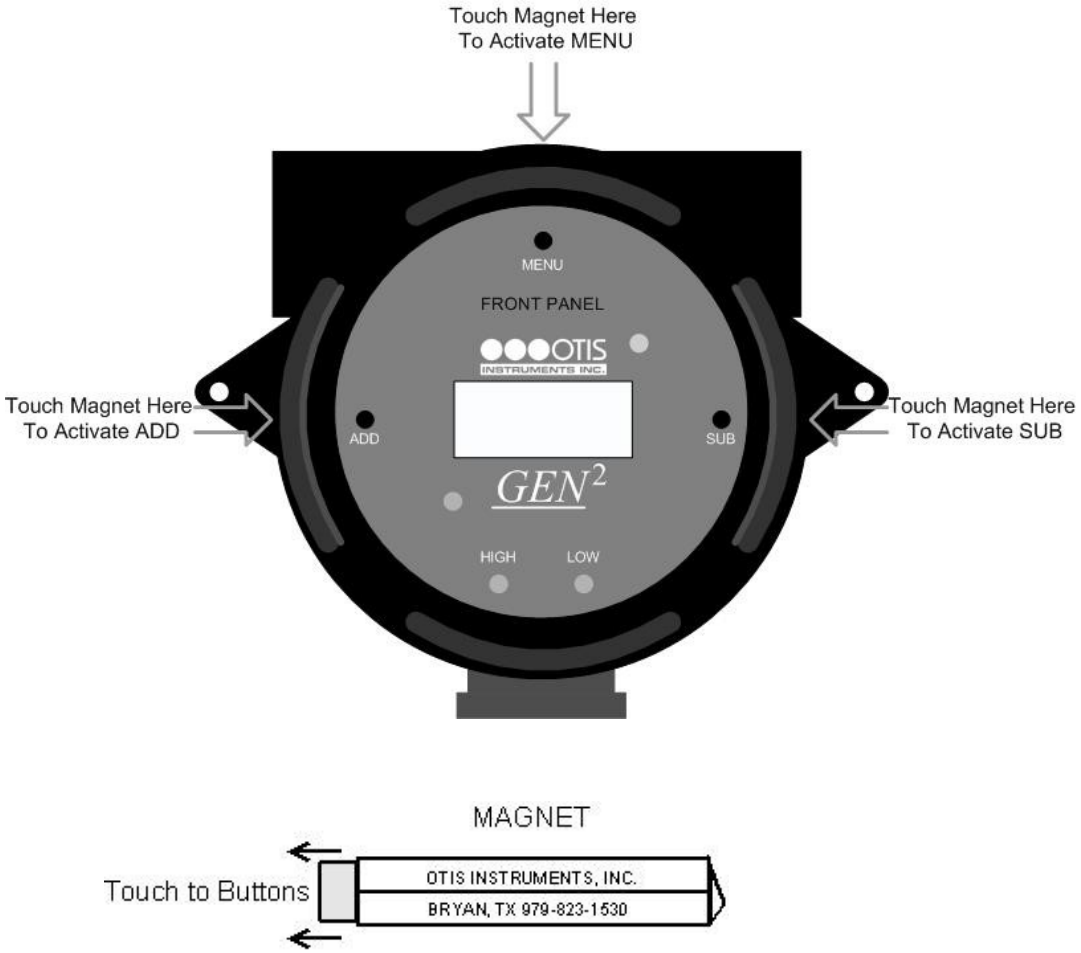
Modbus
Address
1
Add Sub

3. Touch the magnet to *ADD* (increase) or *SUB* (decrease) until the desired Modbus Address is displayed.

4. Once the Modbus Address has been set, continue to the next step.

Setting Baud

1. After the Modbus Address has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU.*



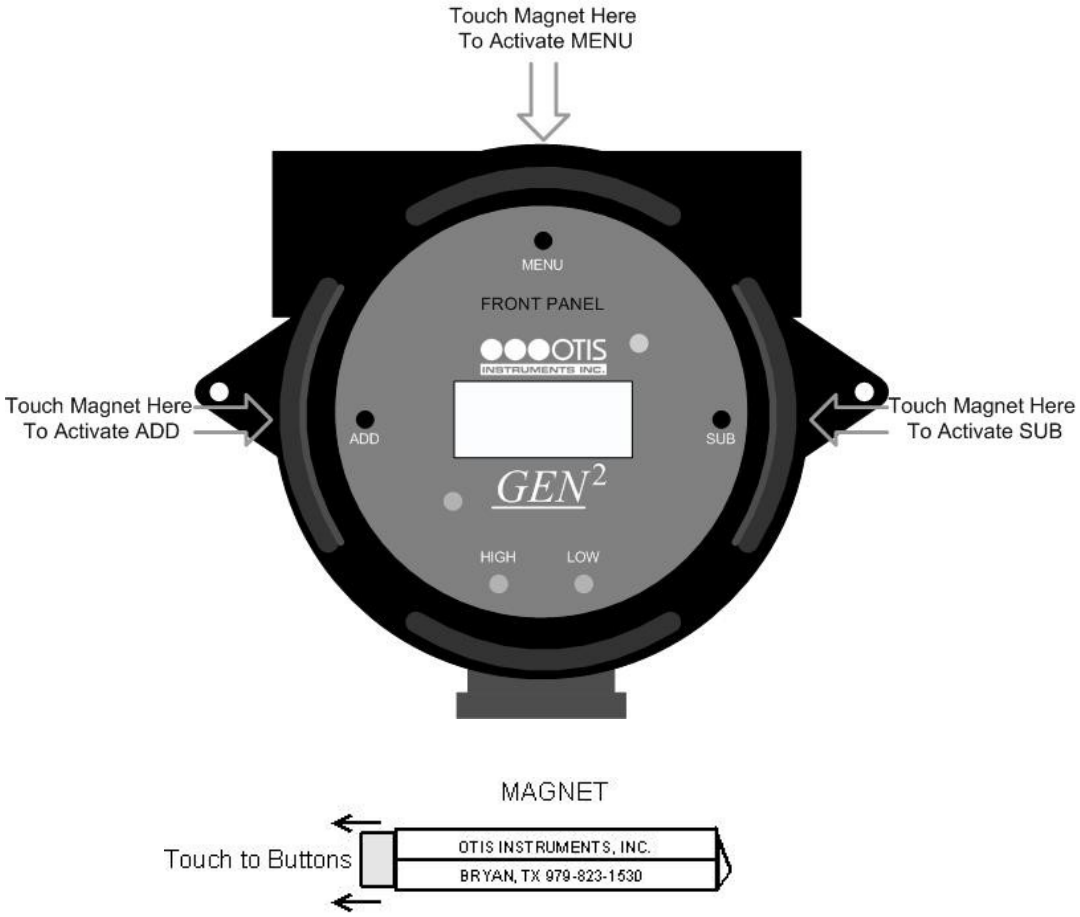
2. The display screen will show:

Modbus
Baud
9600
Add Sub

3. Touch the magnet to *ADD* (increase) or *SUB* (decrease) until the desired Baud is displayed.
4. Once the Baud has been set, continue to the next step.

Setting 4-20 mA

1. After the Baud has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU*.



2. The display screen will show:

Set 4-20 mA
Offset
4.xx mA
Add Sub

NOTE: If there is a device hooked up to the 4-20 mA, proceed with calibration. If there is nothing hooked up to the 4-20 mA, proceed to the next menu screen by touching the magnet to MENU.

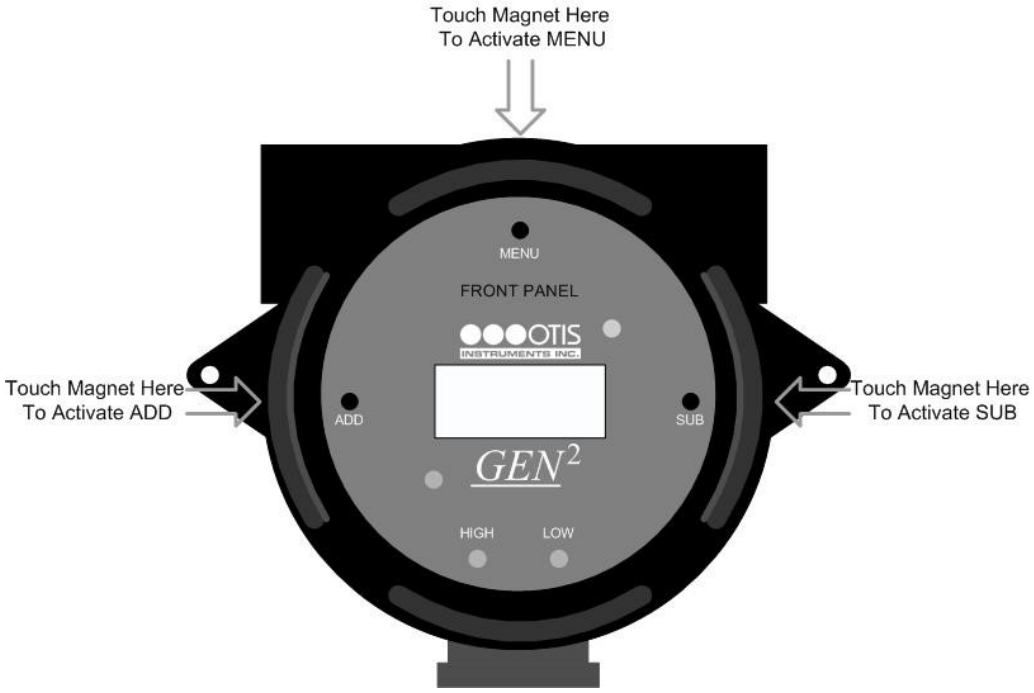
Setting 4-20 mA cont...

3. While setting up the 4-20 mA, the 4-20 will output a 4 mA—this is the equivalent of a zero reading of PPM (or %). On the device connected to the 4-20, make sure it indicates the low end of the desired scale. Touch the magnet to *ADD* (increase) or *SUB* (decrease) until the correct value is displayed on the connected device.

4. Once the 4-20 mA Setting (Low) has been set, continue to the next step.

4-20 mA Setting (High)

1. After the 4-20 mA Setting (Low) has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU*



2. The display screen will show:

Set 4-20 mA

Offset

20.xx mA

Add Sub

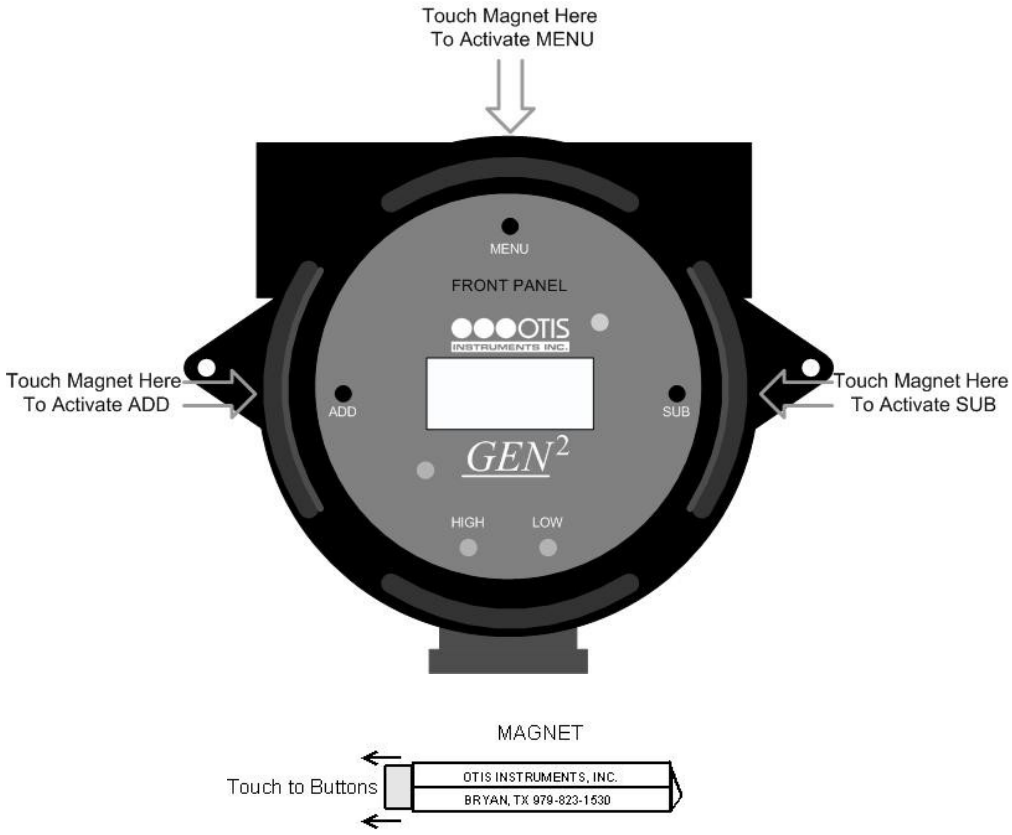
NOTE: If there is a device hooked up to the 4-20 mA, proceed with calibration. If there is nothing hooked up to the 4-20 mA, proceed to the next menu screen by touching the magnet to MENU.

Setting 4-20 mA (High) cont...

3. While setting up the 4-20 mA, the 4-20 will output a 20 mA—this is the equivalent of a full-scale reading of PPM (or %). On the device connected to the 4-20, make sure it indicates the high end of the desired scale. Touch the magnet to *ADD* (increase) or *SUB* (decrease) until the correct value is displayed on the connected controller.
4. Once the 4-20 mA Setting (High has been set, continue to the next step.

Setting LCD Contrast

1. After the 4-20 mA Setting (High) has been set (see above), touch an Otis Instruments, Inc. distributed magnet to the top side of the device to activate the *MENU*



2. The display screen will show:

CONTRAST

33

Add Sub

3. Touch the magnet to *ADD* (increase) or *SUB* (decrease) until the contrast is at the desired setting.

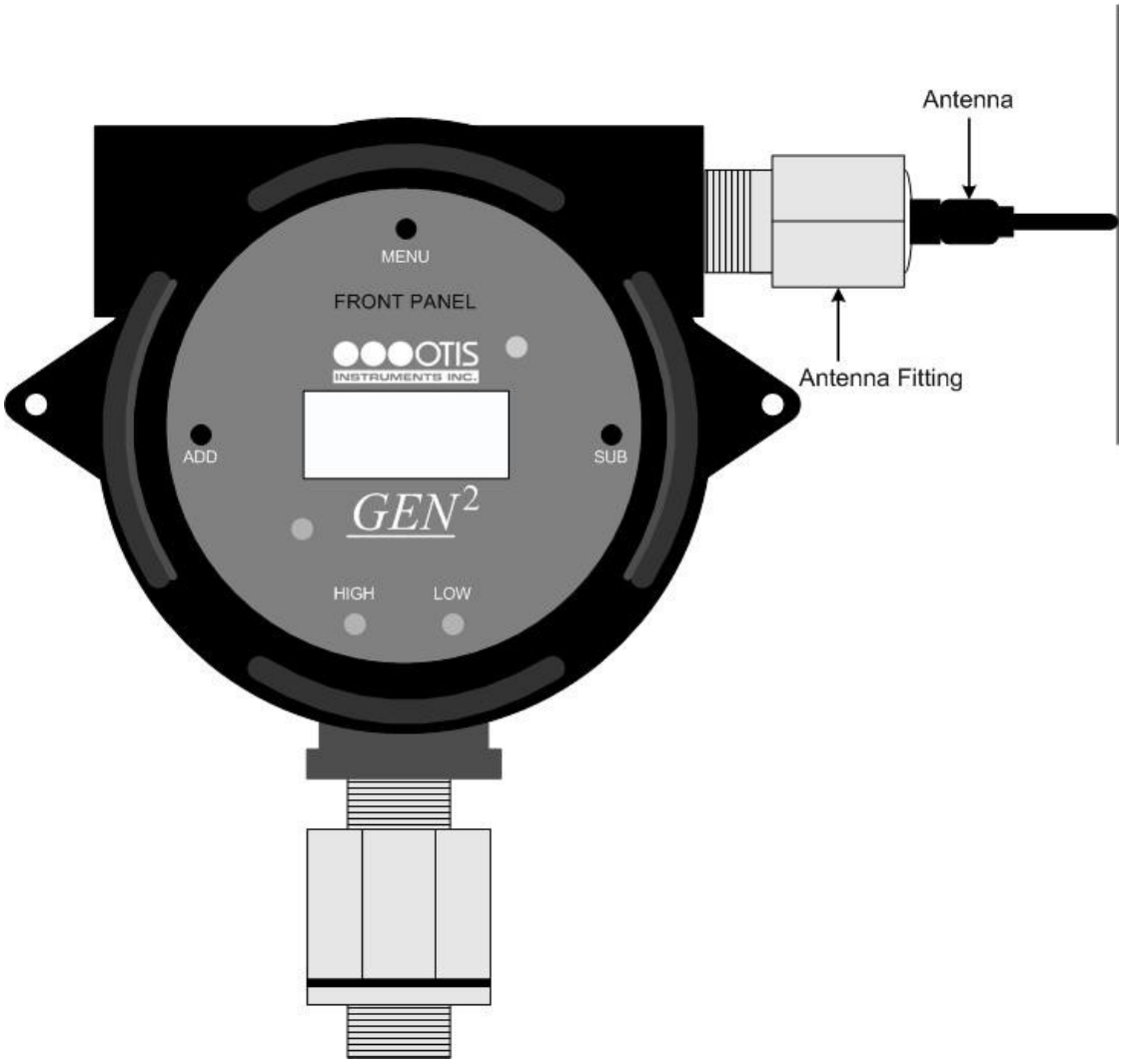
4. Once the Contrast has been set, press *MENU* to exit the Advanced Menu Mode.

5. The device is now in Normal Operating Mode.

Antenna Replacement

The antenna is used to aid in sending clear and reliable radio signals to the transmission controller. The current antenna can be replaced by an appropriate Otis Instruments, Inc. approved 2.4 GHz antenna placed on the fitting on the right side of the device.

1. Power off the device by touching and holding an Otis Instruments, Inc. distributed magnet against the right side of the device for four to six seconds to activate *SUB* (which turns off device).
2. Unscrew the current antenna located on the Antenna Fitting.



3. Screw the new antenna into the antenna fitting.

APPENDIX A: Additional Product Information

Theory of Operation

The OI-6000 has two distinct parts--the main electronics board and the sensor electronics (located in the sensor housing). These components are connected by a short-socket ribbon-cable which allows the operator to repair or replace those parts independently (in case of damage or a failure).

The Catalytic Bead, Electro-Chemical or Infrared sensor element is located in the sensor housing, which has two electronics boards. These boards convert the signal from the sensor and transfer it to the main electronics board via the ribbon cable. The main electronics board then takes that signal, analyzes it, and displays it on the LCD screen—along with other relevant information. That information includes: gas sensor reading, supply voltage, target gas type, gas measurement unit (PPM or %), and RSSI (radio signal strength to the monitor). The referenced gas reading is then sent via radio signal to the monitor.

The operator uses the menu system to null (set zero) and calibrate the sensor during the first install, or after a sensor element replacement. The sensor assembly can be calibrated every 90 days, but is recommended by the manufacturer to be calibrated every 30 days. If the OI-6000 is powered up in the presence of gas, once the count down is complete the device will immediately respond to that gas (there is no auto power up null).

Temperature Ranges

Electrochemical:

CO: Operating temperature: -20°C to + 50°C (NEMOTO)
H2S: Operating te mperature: -20°C to + 50°C (NEMOTO)
NH3: Operating temperature: -30°C to + 50°C (NEMOTO)
Cl2: Temperature Range -20°C to + 40°C (CITYTECH)
HCl: Temperature Range -20°C to +40°C (CITYTECH)
HCN: Temperature Range -40°C to +40°C (CITYTECH)
O2: Temperature range °C -30 to 55 (ALPHASENSE)
SO2: -20°C to +50°C (CITYTECH)
H2: Temperature Range -20°C to +40°C (CITYTECH)
HF: Temperature Range -20°C to +40°C (CITYTECH)
F2: Temperature Range -10°C to + 40°C (CITYTECH)

Catalytic Bead:

Gen I: Temperature Range: -20°C to +70°C (NEMOTO)
Gen II: Temperature Range: -20°C to +150°C (NEMOTO)

Infrared:

IR: Operating temperature range: -20°C to +50°C (-4°F to 122°F) (DYNAMENT)
IRLT: Operating temperature range: -40°C to +50°C (-4°F to 122°F)

Using Modbus Sensors with Otis Instruments, Inc. Monitors

Certain monitors sold by Otis Instruments, Inc. have the capability of accepting Modbus sensor inputs. Modbus is a communication protocol that uses an RS485 serial connection, and can accept a number of different devices.

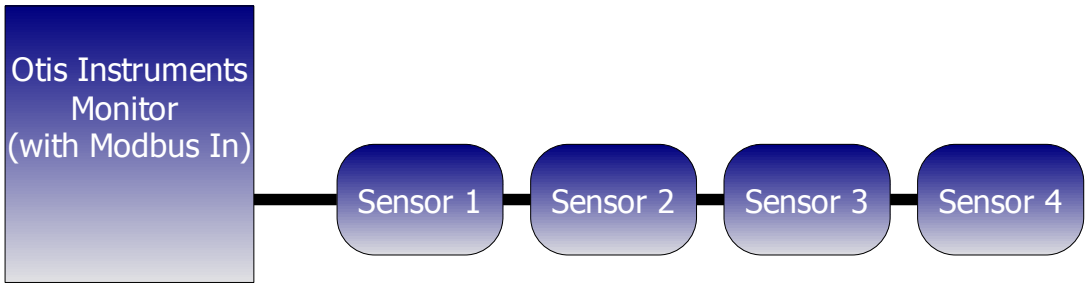
Based on the type of circuit used, there is a limit on how many devices can be connected to a Modbus sensor network. Currently at Otis Instruments, there is a limit of 32 devices on a single network. The data is transferred along the Modbus network at a specified rate, which means that there will be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

Operation

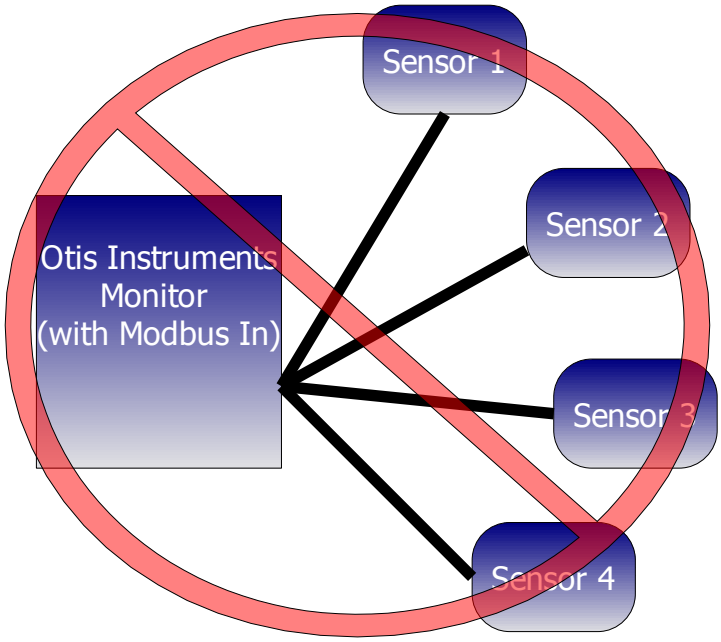
The physical length of a Modbus connection from the monitor to the last sensor cannot exceed 4000 feet. Twisted pair is required for connections, and shielded twisted pair is recommended if there will be any additional noise in the area of operation (such as motors, switching relays, etc.). Also, with 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. **Examples of properly and improperly connected daisy-chained networks can be found on the following page.**

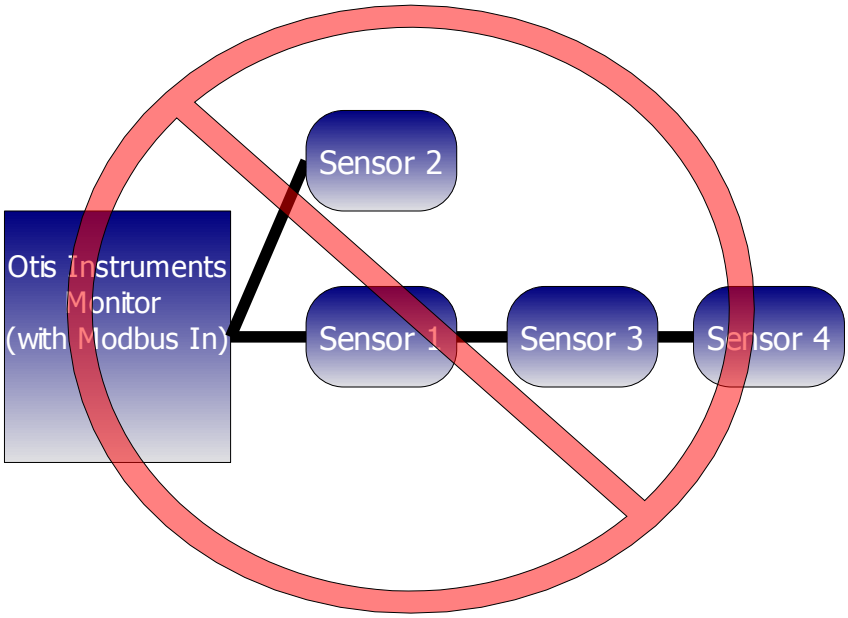
Terminating resistors should also be taken into consideration for long distances, while short and medium lengths can function normally without the resistor. Short lengths are generally less than 100ft, medium lengths range from 100-1000ft, and long lengths can be considered any distance greater than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



Drawing 1: CORRECT WAY TO DAISY CHAIN



Drawing 2: INCORRECT METHOD



Drawing 3: INCORRECT 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).

Specifications

Sensor Type:	Catalytic Bead, Electro-Chemical or Infrared
Power:	+12-35 Volts DC
Current Draw:	100 mA (max); actual draw depends on options & sensor type
Radio:	2.4 GHz ISM, 100 mW, 2.5 miles LOS
Relays:	6.3A @ 250 VAC; 5A @ 30 Volts DC
Output:	4-20mA (3-wire); RS-485 Modbus
Unit Address:	1 to 255
Display:	Graphical LCD, sunlight readable (transflective), LED back-light, 128x64 resolution
Interface:	Three push buttons (MENU, ADD, SUB); three corresponding magnetic, non-intrusive switches; non-intrusive calibration
Enclosure:	Otis-Blue explosion/flame-proof
Certifications:	CSA certified, Class 1, Div I, Groups C and D Ex d IIB, Zone 1 Aex d IIb
Warranty:	Hardware: One year (limited) Sensor: One year (varies with sensor type)

Warranty Statement for **WireFree Model OI-6000**

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 customer service at 979.776.7700 or Otis@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).

Sensor

The sensor contained in the device is covered under a one-year limited warranty (varies with sensor type).

Otis Instruments, Inc.

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