

Fisher™ ARMOR™ 8000 Series Natural Gas Monitoring System

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Figure 1. ARMOR™ 8000 Series

Safety Messages

 WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Fisher equipment must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations and Emerson Process Management Regulator Technologies Inc. (Emerson) instructions.

Only personnel (including operators, maintenance crew and servicing team) trained in the proper procedures, codes, standards and regulations, for the applicable industries should install and service this equipment.

 WARNING

Read this manual before working with the product. For personal and system safety and for optimum product performance, ensure you thoroughly understand the contents before installing, using or maintaining this product.

EXPLOSIONS

Explosions could result in death or serious injury.

In an explosion proof/flame proof installation, do not remove the device cover when power is applied to the ARMOR 8000 Series.

ARMOR 8000 Series

Specifications

This section lists the specifications for the ARMOR™ 8000 Series. Factory specification is stamped on the nameplate fastened on the ARMOR 8000 Series at the factory.

Maximum Operating Temperature⁽¹⁾

Battery Power: -40 to 149°F / -40 to 65°C

External Power: -40 to 158°F / -40 to 70°C

Maximum Operating Pressure⁽¹⁾

1500 psig / 103 bar

Pressure Sensor Operating Pressure

Pressure Sensor 1 and 2:

0 to 1500 psig / 0 to 103 bar

Pressure Sensor 3 when configured:

0 to 1500 psig / 0 to 103 bar

Recommended Operating Conditions⁽²⁾

Relative Humidity: 0-95% non-condensing relative humidity

Pollution Degree: 3

Altitude: 2000 m / 6500 ft

Ingress Protection: IP66/NEMA Type 4

Enclosure Rating: Class 1 Div 2

Pressure Sensor

Accuracy: ± 0.5% of Pressure Span

HazLoc Rating: Class 1 Div 1

Travel Sensor when configured

Travel Measurement: Up to 3.9 in. / 100 mm

Accuracy: ± 0.25% of Travel Span

HazLoc Rating: Class 1 Div 2

Power Source

DC Power Source: DC Output of 9 to 24 VDC

Solar Power Controller: DC Output of 12V or 24VDC

Supported CAT M1 Bands

Band 2, Band 4, Band 5, Band 12 and Band 13.⁽³⁾

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

2. Device is designed for both outdoor and indoor installation where applicable standards and codes are met.

3. All other CAT-M1 and NB-IoT bands have been disabled through ARMOR firmware.

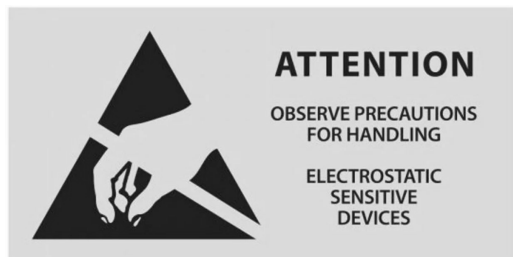
Installation of device in an explosive environment must be in accordance with appropriate local, national and international standards, codes and practices. Review the Product Certifications section of this manual for any restrictions associated with a safe installation.

Before connecting a handheld communicator (smartphone or PC) in an explosive atmosphere, ensure that the instruments are installed in accordance with non-incendive field wiring practices.

ELECTRICAL SHOCK

Electrical shock can result in death or serious injury.

Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.



Ensure the power to the device is off and the lines to any other external power source are disconnected or not powered while wiring the device.

Probes covered with plastic and/or with plastic discs may generate an ignition-capable level of electrostatic charge under certain extreme conditions. Therefore, when the probe is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Eliminate the risk of Electrostatic Discharge (ESD) prior to dismantling the transmitter head. Probes may generate an ignition-capable level of electrostatic charge under extreme conditions. During any type of installation or maintenance in a potentially explosive atmosphere, the responsible person should ensure that any ESD risks are eliminated before attempting to separate the probe from the device.

The enclosure should be grounded according to local and national installation codes. This can be accomplished via the external grounding terminal.

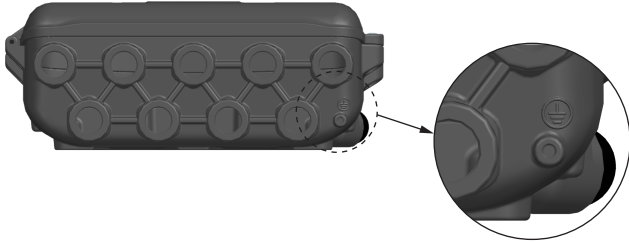


Figure 2. ARMOR Enclosure Grounding Location

PHYSICAL ACCESS

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental in protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

NOTICE

Replacement equipment or spare parts not approved by Emerson for use as spare parts could reduce the pressure retaining capabilities of the device and may render the instrument dangerous.

Improper assembly of pressure sensor or travel sensor can damage sensor module.

Set all hardware adjustments during commissioning to avoid exposing the device electronics to the hazardous environment after installation.

Safety notices with specific instructions are marked by a signal word, indicating the level of danger associated with the hazard:

- **⚠ SAFETY ALERT SYMBOL:** This symbol is used to alert you to potential personal injury hazards. Follow all safety messages that accompany this symbol to avoid injury or loss of life.
- **⚠ DANGER:** Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **⚠ WARNING:** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

- **⚠ CAUTION:** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **⚠ NOTICE:** Addresses practices not related to personal injury, such as property damage, equipment damage, data loss, hardware damage and/or software damage.

Introduction

Scope of the Manual

This manual provides specifications, installation, adjustment, maintenance instructions and parts ordering information for the ARMOR™ 8000 Series Natural Gas Monitoring System.

Product Configuration

This manual covers the following Fisher ARMOR™ models:

- **Pressure Monitoring Only**
One pressure, two pressures and three pressures monitoring up to 1500 psig / 103 barg.
- **Pressure Monitoring with Travel Monitoring**
Three pressures monitoring up to 1500 psig / 103 barg with 1 travel monitoring.

NOTICE

Device radio performance is not dependent on product/sensor configuration.

Intended Use

The ARMOR device is primarily designed for industrial and commercial applications supplying gas to furnaces, burners and other appliances. The ARMOR device allows customers to monitor the pressure and travel at regulator stations.

This product has been designed to be used with fuel gases of first and second family according to EN 437 and with other nonaggressive and nonfuel gases. For any other gases, other than natural gas, please contact your local sales agent.

If additional accessories (e.g. battery) are needed, it is recommended to use Emerson products. Emerson will not be responsible for any possible inefficiency due to installation of non-Emerson approved accessories.

Product Recycling/Disposal

WARNING

Read and understand all instructions. Failure to follow these instructions may result in system overpressure, serious personal injury or death.

Only qualified personnel (including operators, maintenance crew and servicing team) with the appropriate training and experience should service, maintain and operate, decommission and dispose the equipment. The equipment must be serviced, maintained, operated, decommissioned and disposed in accordance with local, state, national and federal codes, rules and regulations.

Always wear appropriate personal protective equipment when servicing, maintaining, operating, decommissioning and disposing the equipment to avoid personal injury.

1. Consider recycling equipment. Dispose of packaging in accordance with local and national legislation/regulations.
2. Where possible, recycle components such as metals and plastics in accordance with environmental regulations to minimize waste and environmental impact.
 - a. Plastic: Ensure it is dismantled and disposed of separately.
 - b. Steel: Disassemble and collect separately for recycling at designated centers.
 - c. Stainless Steel: Disassemble and collect separately for recycling at designated centers.
 - d. Aluminum: Disassemble and collect separately for recycling at designated centers.
 - e. Pneumatic/Electric Components: Disassemble for potential reuse if in good condition, otherwise overhaul and recycle them where possible.
3. Ensure that decommissioning and disposal activities do not harm the environment. This includes preventing contamination of soil, water and air.
4. Ensure that personnel involved in decommissioning and disposal are adequately trained and supervised. They should be familiar with the equipment, hazards and procedures involved.

Hardware Installation

This section, covers the installation considerations for Fisher ARMOR™ 8000 Series with Remote Cellular Monitoring.

WARNING

Procedures and instructions in this section may require special precautions to ensure the safety of personnel performing the operation.

Refer to Safety Messages.

Considerations

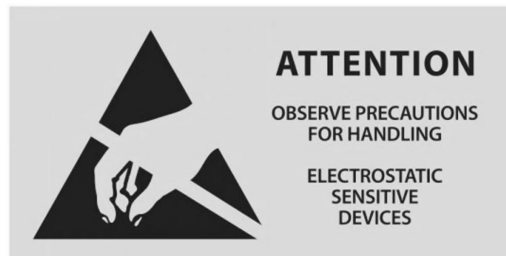
Installation

WARNING

Install the enclosed pipe plug in unused housing conduit opening with a minimum of five threads of engagement to comply with explosion-proof requirements.

Before connecting or disconnecting any wire or cable between the ARMOR device and the sensors, power off the ARMOR device. Failure to do so may generate a spark, which can cause an explosion in hazardous environments.

Avant de connecter ou de déconnecter un fil ou un câble entre l'appareil ARMOR et les capteurs, mettez l'appareil ARMOR hors tension. Le non-respect de cette consigne peut provoquer une étincelle et une explosion dans les environnements dangereux.



Measurement accuracy depends upon proper installation of ARMOR™ 8000 Series with wired pressure sensors and travel transducers. Mount ARMOR 8000 Series within 10 ft. / 3.05 m of the wired sensor to minimize sensor signal noise. Refer to the Pressure Sensor Installation section for details

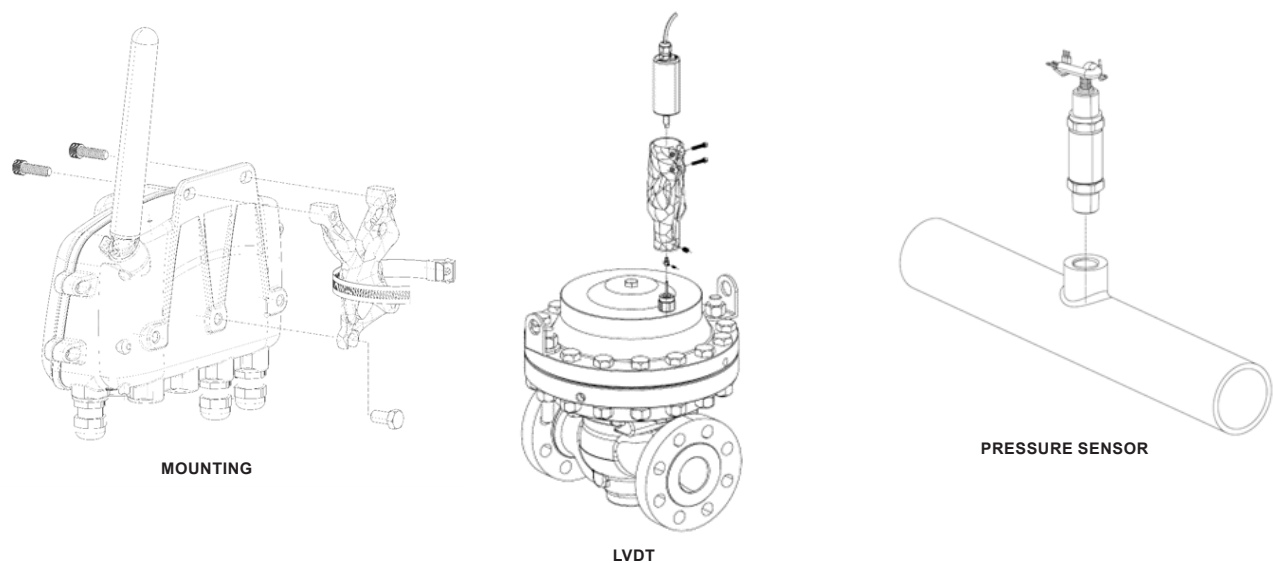


Figure 3. Installation Procedures

on sensor mounting to the process. Keep in mind the need for easy access, personnel safety and location with suitable environmental exposure. Install ARMOR™ 8000 Series to minimize vibration, shock and temperature fluctuation.

Environmental

Mount the device in an environment that has minimal ambient temperature change. Refer to the Specifications section in this document to view the sensing element operating limits. Mount the device so it is not susceptible to vibration and mechanical shock and does not have external contact with corrosive materials.

Installation Procedures

Mounting Procedure

- 1. Tighten all three mounting screws by hand with the bracket oriented as shown in Figure 3.
- 2. Tighten each bolt down to the proper torque values.
- 3. Install the pipe clamp as shown in Figure 3.
- 4. Orient the ARMOR 8000 Series unit plus mounting bracket on the pipe as desired and torque the hose clamp screw to the manufacturers specified torque.

NOTICE

In case of user provided mounting bracket(for ex, U-Bolt), user will ensure that the ARMOR unit is securely mounted in a vibration and shock free way.

Table 1. Torque Value

LOCATION	MAXIMUM TORQUE
Upper screw (2 required)	7.3 ft-lb / 9.90 N•m
Lower screw	13 ft-lb / 17.6 N•m

WARNING

ARMOR unit should not be wall-mounted. Wall mounting may cause unit to fall, resulting in injury or other hazards. Always follow mounting procedure to mount the ARMOR.

Linear Variable Differential Transducer (LVDT) Bracket and Installation (Figure 3)

- 1. Ensure that the regulator is in a closed position.
- 2. Remove the travel indicator cover exposing the travel indicator stem.
- 3. Thread the LVDT bracket onto the travel indicator housing per one of the options below:
 - Option 1: Tighten the LVDT bracket against the actuator housing then tighten the bracket set screw to prevent movement in the bracket.
 - Option 2: Tighten the LVDT bracket against the actuator housing then loosen the bracket until the LVDT bracket slot is positioned as desired. Tighten the LVDT set screw to prevent movement in the bracket.
- 4. Back out the LVDT adaptor set screw until the travel indicator stem on the regulator fits in the adaptor.

ARMOR 8000 Series

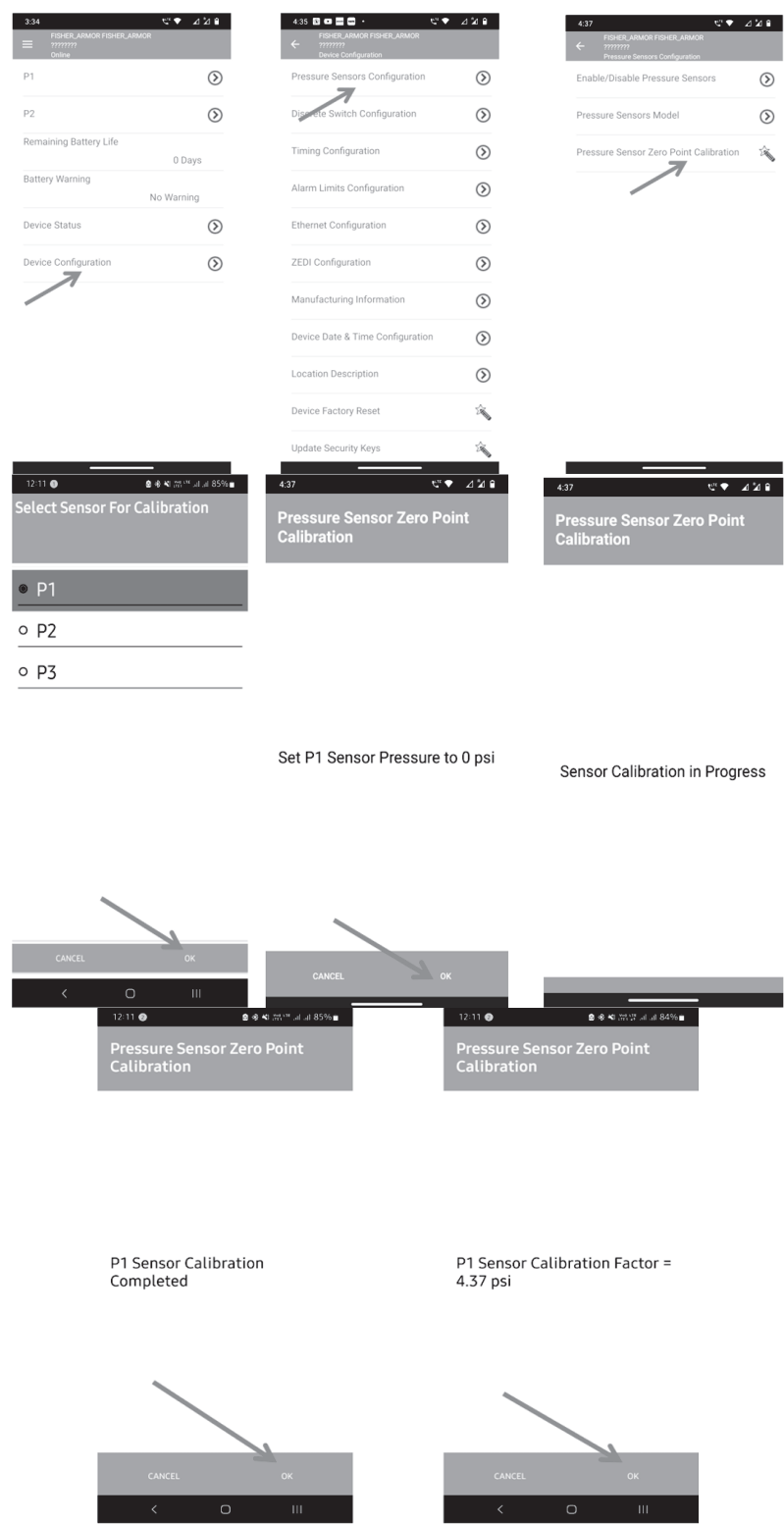


Figure 4. Pressure Sensor Zero-Offset Adjustment

5. Adjust the LVDT clamp screws until the LVDT slides in the bracket with minimal force but still able to be held in place without moving.
6. Adjust the LVDT in the bracket until the LVDT adaptor sits on the travel indicator stem of the regulator.
7. Tighten the LVDT adaptor set screw on the travel indicator stem. Final position of the LVDT will be set when the system is brought online.

LVDT Zero Calibration

NOTICE

Before zeroing the LVDT, verify the unit is in the fully open or closed position. This can be achieved by locking the unit up or removing all pressure from the regulator. Travel span error might be affected by regulator travel indicator manufacturing tolerances of upto 5%.

It is recommended to power cycle the device after calibration to verify that LVDT sensor calibration has been saved to the device.

1. Turn the unit on by connecting to power.
(Note: Device may take upto 1 minute to boot up)
2. Connect the AMS Device Configurator App with ARMOR. Set the sample rate to 1 second. (See Device Configuration>Timing Configuration>Sensor Scan Rate)
3. In the AMS Device Configurator App, navigate to the screen where the travel is displayed.
4. Adjust the LVDT in and out of the LVDT bracket until the travel on the AMS Device Configurator App reads the correct travel.
 - a. If the product is in the closed position the travel needs to read 0.5 to 0.8%.
 - b. If the product is in the fully open position the travel needs to read 100%.
5. Once the LVDT is in the correct position tighten the LVDT bracket clamp screws until the LVDT is fixed.

Pressure Sensor Installation (Figure 3)

Pressure sensor mounting should only be installed after the ARMOR™ 8000 Series unit is mounted to ensure adequate wire routing. Pressure Sensor should be installed with a compatible 1/4 NPT process fitting.

Recommendation:

- Install sensor on the regulator where possible for most accurate results.
- Ensure there are no restrictions (filters and valves) between the sensor and the regulator.
- Pre-twist the sensor in the opposite direction of install to prevent the wire from tangling.

Pressure Sensor Zero-Offset Adjustment (Figure 4)

All pressure sensors need to be adjusted for its zero-offset point on atmospheric pressure. Follow the steps below to calibrate the pressure sensors before mounting them onto pipelines.

1. Connect the pressure transducers in their respective positions of P1, P2 and P3.
2. Turn on the ARMOR unit.
3. Open the AMS Device Configurator App.
4. Connect the Mobile App to ARMOR via Bluetooth® connectivity.
5. Select the "Device Configuration" option as shown in Figure 4.
6. Select "Pressure Sensor Configuration" option.
7. Under "Pressure Sensor Configuration" select "Pressure Sensor Zero Point calibration" option.
8. Select specific pressure sensor P1/P2/P3 for its zero-point calibration then click on 'OK'.
9. Apply 0 psig/No pressure on selected pressure sensor, then click on the "OK" button then wait till the "Sensor Calibration Completed" screen appears.
10. "Sensor Calibration Factor" displayed on the screen then click on OK, "Action completed" pop-up on screen then click on Finish.
11. It completes the zero calibration for pressure sensor P1. Repeat steps 8-10 for P2 and P3.

Electrical Installation

This section, covers installation considerations for the Fisher ARMOR™ 8000 Series Natural Gas Monitoring System.



WARNING

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations.

Electrical installation for ARMOR™ 8000 Series should be performed without energized power to the device. All electrical connections for ARMOR 8000 Series should be completed with the power energized to ARMOR 8000 Series as the last step. Failure to follow these installation guidelines could result in death or serious injury.

Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury. Before connecting or powering up ARMOR 8000 Series in an explosive atmosphere, make sure the instruments are installed in accordance with hazardous location wiring practices. Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Process leaks could result in death or serious injury. Do not remove the transducers and sensors while in operation. Install and tighten transducers and sensors before applying pressure.

Electrical shock could cause death or serious injury. Use extreme caution when making contact with the leads and terminals.

Device cover is on a hinge and in certain installation configurations, the cover could swing open. Use caution when opening the transmitter cover.

Before closing the lid, inspect and clear all debris from the equipment to prevent operational issues or damage.

Ensure the lid is fully sealed to maintain system integrity and safety.

ARMOR 8000 Series device must be earthed to electrical ground through specified cable as mentioned in IEC standards.

Ensure that device is depowered before accessing the PCB. In case of battery power, verify that battery is disconnected before accessing the PCB.

Installation in Hazardous Area (Power Supply)

ARMOR 8000 Series installation requires earth bonding with the LVDT sensor and an external supply to system ground. Refer to Figure 5 for the Hazardous area installation with power supply.

If installation does not allow for earth bonding, then it is recommended to use Isolated DC-DC converter to isolate the external supply earth. Refer to Figure 6.

NOTICE

In case isolated DC-DC converter has an earth terminal at secondary (output) side, bond the ARMOR, LVDT and Secondary Earth to ground.

End user should ensure any converters not on the recommended list will meet local certifications.

Recommended isolated DC-DC converters for Hazardous area:

1. MINI-PS-12-24DC
Maker: Phoenix Contact
Model No: 2866284
2. QUINT4-PS
Maker: Phoenix Contact
Model No: 2910124
3. PRO DCDC 96W
Maker: Weidmuller
Model No: 2869000000

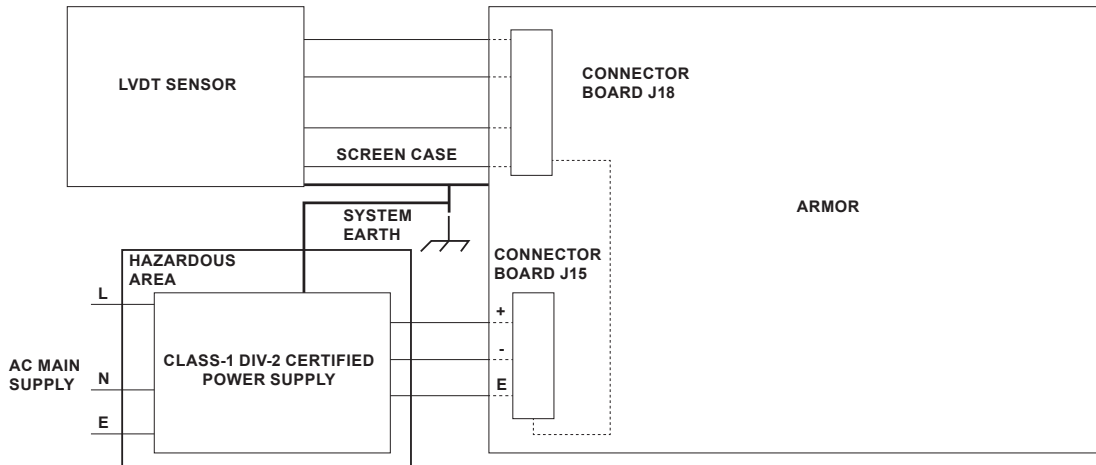


Figure 5. Hazardous Area Installation with Power Supply

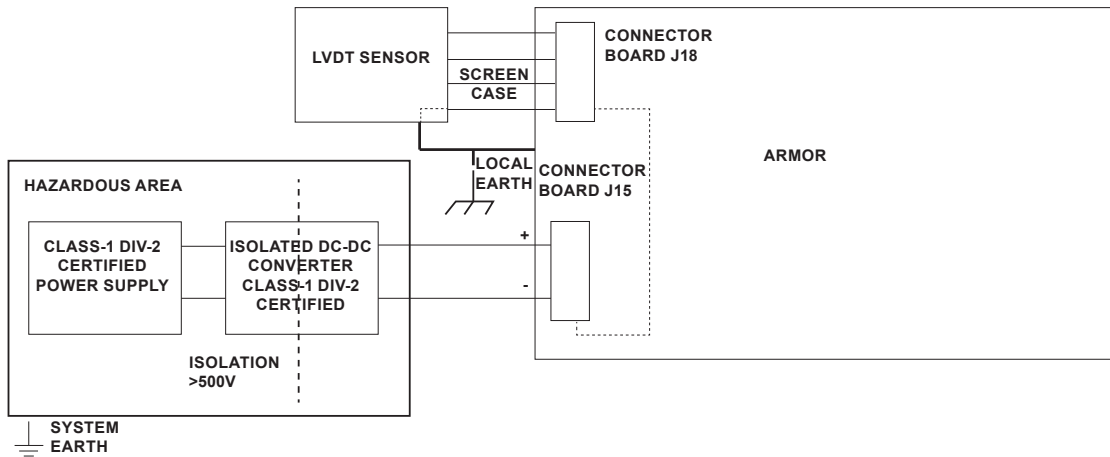


Figure 6. Isolated DC-DC Converter Installation

Installation in Hazardous Area (Solar Controller)

ARMOR 8000 Series installation requires earth bonding with the LVDT sensor and solar controller to system ground. Please refer to Figure 7 for the Hazardous area installation with solar controller.

If installation does not allow for earth bonding, it is recommended to use Class-1 Division-2 certified isolated DC-DC converters with solar controller as shown Figure 8.

Installation in Safe Area (Power Supply)

ARMOR 8000 Series installation requires earth bonding with the LVDT sensor and external supply to system ground. Refer to Figure 9 for Safe area installation with power supply.

If installation does not allow for earth bonding, it is recommended to isolate the external supply earth and ARMOR, LVDT earth using Isolated DC-DC Converters as shown in Figure 10.

Recommended isolated DC-DC converters for Safe/Ordinary area location installation are:

4. DDR-15G
Maker: Meanwell
Model No: DDR-15G-24
5. DDC30
Maker: XP Power
Model No: DDC3024S12

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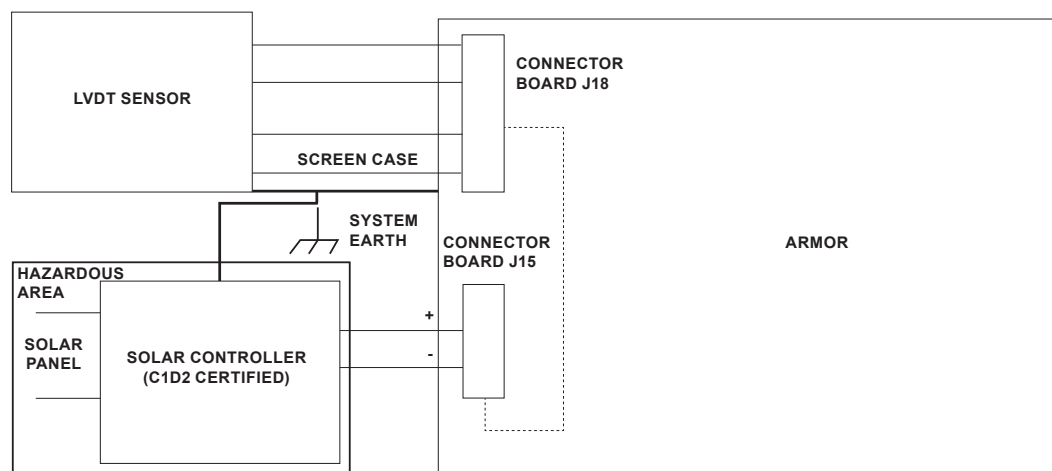


Figure 7. Hazardous Area Installation with Solar Controller

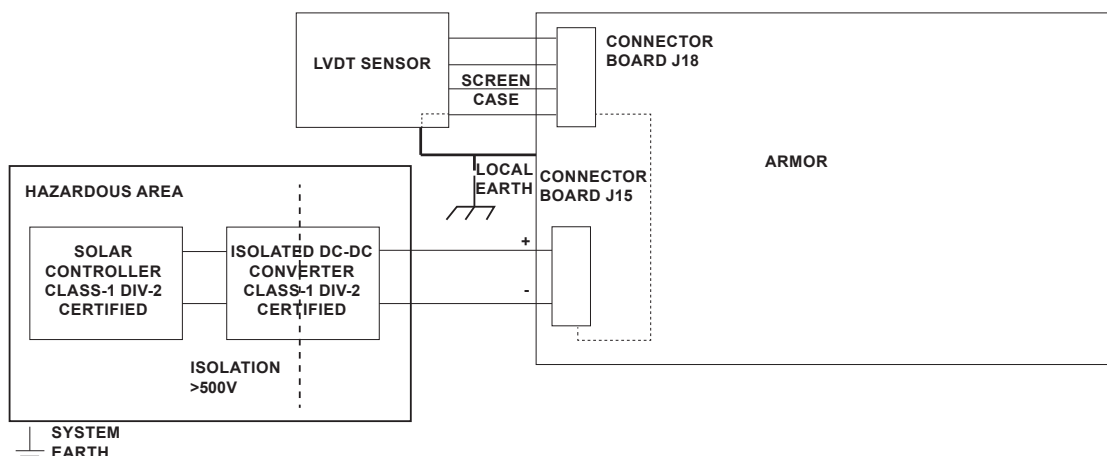


Figure 8. Class-1 Division-2 Certified Isolated DC-DC Converter Installation

NOTICE

End user should ensure any converters not on the recommended list will meeting local certifications.

Power Source Selection

The Fisher ARMOR™ Series Natural Gas Monitoring System supports two mutually exclusive sources of power, an external DC power source such as field power or power provided by a solar power controller or the internal Emerson Battery Pack, ERAA57423A0. This battery pack has internal short circuit protection. Under normal operating conditions, the battery pack will have a lifespan of 5 years.

As shown in Figure 11, there is a jumper on the main circuit board J101 which selects the power source for the ARMOR™ 8000 Series device, labeled “Ext Power” for external power source and “Batt” for the ARMOR 8000 Series internal battery pack.

Note

1. Emerson Battery Pack ERAA57423A0 should be replaced in safe area only.
2. Power source selection jumper should be selected in safe area only.
3. When using external power, use only a certified power supply having double or reinforced insulation to prevent electric shock. The power supply must have an output that complies with the requirements of IEC/UL/CSA/EN 61010-1 (limits specified in Clause 6.3.1 and 9.4) or classified as Class 2 or limited energy power source according to CSA C22.2 No. 223 and UL1310 or equivalent standard.

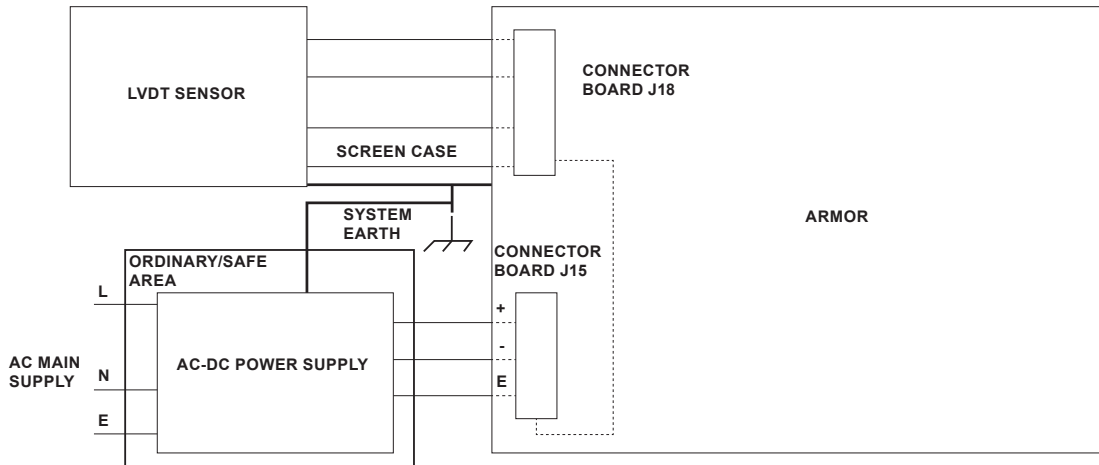


Figure 9. Safe Area Installation with Power Supply

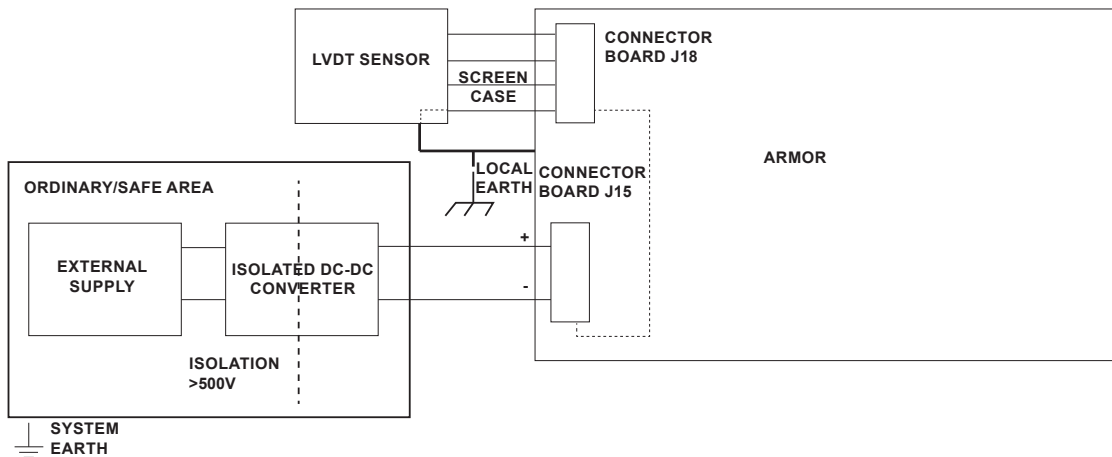


Figure 10. Isolated DC-DC Converter Installation for Safe Area

As shown in Figure 12, there is a connector J15 (bottom right) on the Connector circuit board assembly to which external power source for the ARMOR™ 8000 Series device, is connected.

The external Power source could be from an electrically isolated power source with an DC output of 9 to 24VDC or Solar Power controller with a DC output of 12V or 24VDC.

Travel Sensor (LVDT) Installation



WARNING

Before connecting or disconnecting any wire or cable between the ARMOR device and the sensors or transducers, power off the ARMOR 8000. Failure to do so may generate a spark, which can cause an explosion in hazardous environments.

Avant de connecter ou de déconnecter tout fil ou câble entre l'appareil ARMOR et les capteurs ou transducteurs, éteignez l'ARMOR 8000. Le non-respect de cette consigne peut générer une étincelle, susceptible de provoquer une explosion dans des environnements dangereux.

The Fisher ARMOR™ 8000 Series Natural Gas Monitoring System is compatible with the specific LVDT travel transducers provided within the packaging of the ARMOR™ 8000 Series unit. LVDT is connected with Manufacturer specific cable.

The LVDT utilizes a 4-wire system, LVDT power, LVDT out, Earth and Digital ground. These wires fit into the connector board for that is marked for each sensor at J18, Pins 1,2,3 and 4, see Figure 13. Refer to Table 2 for LVDT sensor connection.

ARMOR 8000 Series

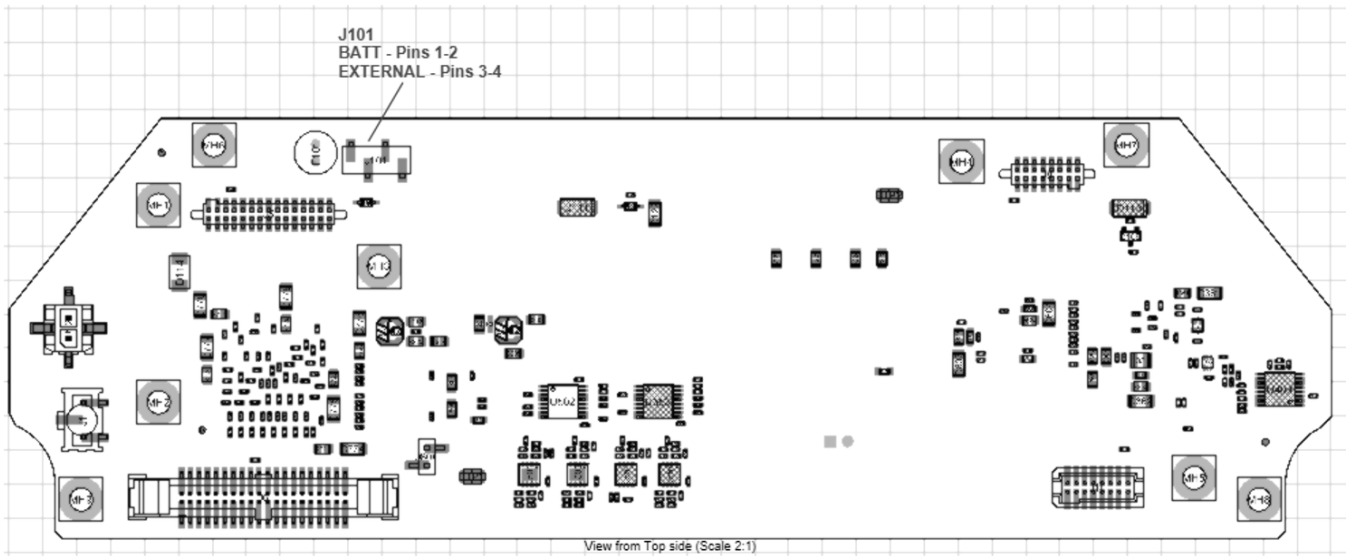


Figure 11. Jumper Diagram for ARMOR™ 8000 Series Power Supply

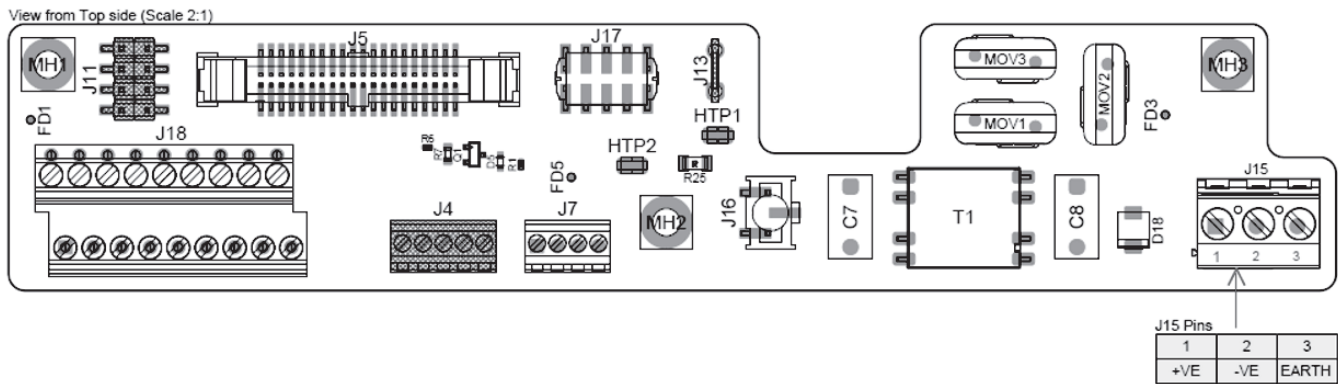


Figure 12. Screw Terminal Diagram for ARMOR 8000 Series Power Supply

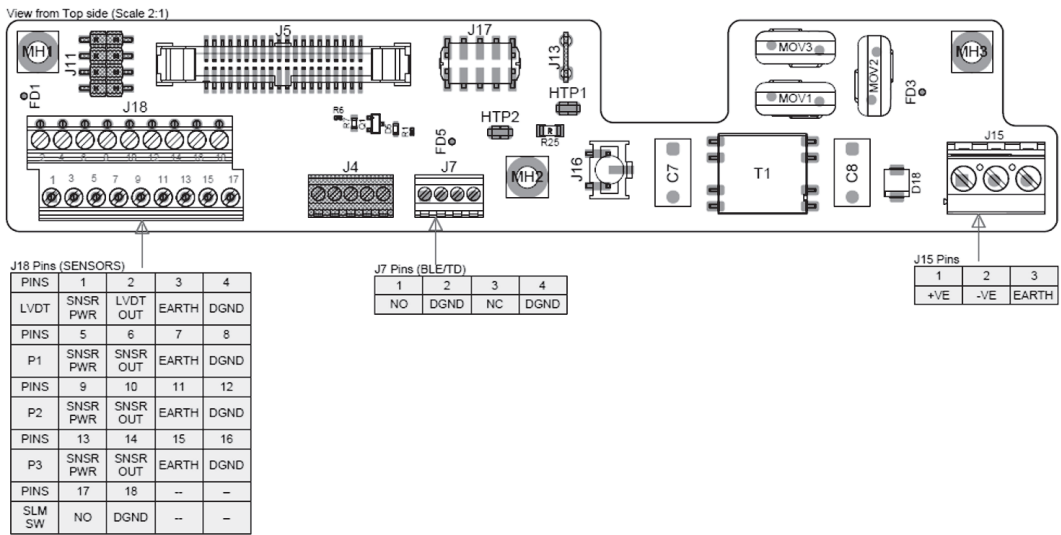


Figure 13. Screw Terminal Diagram for ARMOR 8000 Series Power Supply with J18, J7 and J15 Pins

Table 2. LVDT Connection

S/N	CONNECTOR (J18) PIN NUMBER	CABLE COLOR CODE	SIGNAL NAME	SIGNAL DESCRIPTION
1	Pin 1	Brown	5V_SEN_SUP1	+5V Power Supply
2	Pin 2	White	LVDT_OUT	Output
3	Pin 3	Black	EARTH	Earth
4	Pin 4	Blue	DGND	Digital Ground

Table 3. Pressure Sensor Connection

PRESSURE SENSOR	CONNECTOR (J18) PIN NUMBER	CABLE COLOR CODE	SIGNAL NAME	SIGNAL DESCRIPTION
P1	Pin 5	Red	5V_SEN_SUP1	U+ (Positive power supply terminal)
	Pin 6	Brown	PS1_OUT	S+ (Analog output)
	Pin 7	White	EARTH	Earth
	Pin 8	Black	DGND	U- (Negative power supply terminal)
P2	Pin 9	Red	5V_SEN_SUP1	U+ (Positive power supply terminal)
	Pin 10	Brown	PS2_OUT	S+ (Analog output)
	Pin 11	White	EARTH	Earth
	Pin 12	Black	DGND	U- (Negative power supply terminal)
P3	Pin 13	Red	5V_SEN_SUP1	U+ (Positive power supply terminal)
	Pin 14	Brown	PS3_OUT	S+ (Analog output)
	Pin 15	White	EARTH	Earth
	Pin 16	Black	DGND	U- (Negative power supply terminal)

Table 4. Slam-shut Switch Connection

S/N	CONNECTOR (J18) PIN NUMBER	CABLE COLOR CODE	SIGNAL NAME	SIGNAL DESCRIPTION
1	Pin 17	Red	SLAMSHUT_SW_NO	Slam shut Switch Normally Open
2	Pin 18	Black	DGND	Ground

Table 5. Tamper Detection Switch Connection

S/N	CONNECTOR (J7) PIN NUMBER	CABLE COLOR CODE	SIGNAL NAME	SIGNAL DESCRIPTION
1	Pin 3	Red	TD_SW_NC	Tamper Detection Switch
2	Pin 4	Red	DGND	Ground

Table 6. Bluetooth® Wake-Up Switch Connection

S/N	CONNECTOR (J7) PIN NUMBER	CABLE COLOR CODE	SIGNAL NAME	SIGNAL DESCRIPTION
1	Pin 1	Red	BLE_SW_NO	Bluetooth Wake-Up Reed Switch
2	Pin 2	Red	DGND	Ground

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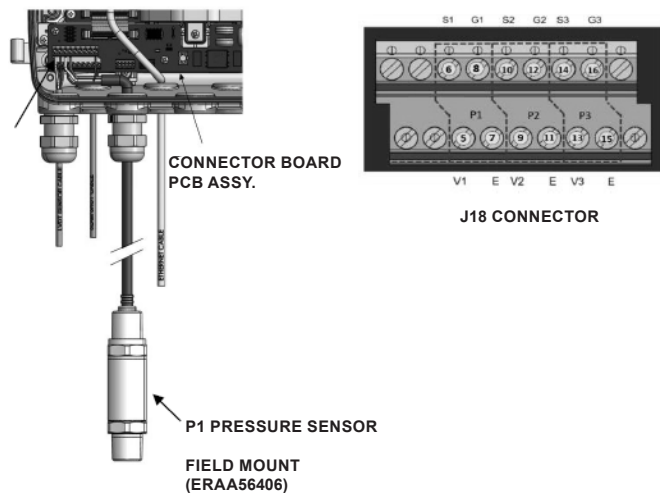


Figure 14. Pressure Sensor Installation

Pressure Sensor Installation (Figure 14)

The Fisher ARMOR 8000 Series Natural Gas Monitoring System is compatible with the specific pressure sensor provided within the packaging of the ARMOR 8000 Series unit.

The pressure sensor utilizes a 4-wire system, Power, Signal Out, Earth and Digital ground. These wires fit into the connector board that is marked for each sensor at J18, Pins 5 to 16. Refer to Table 3 for making connections of pressure sensor.

Discrete Input Installation

The Fisher ARMOR 8000 Series Natural Gas Monitoring System is compatible with a discrete input. Users, for example, can use the discrete input to connect a limit switch (Slam-shut) outputs to the available connector at the ARMOR 8000 Series unit.

The Limit Switch utilizes a 2-wire system, Normally Open contact and Digital ground. These wires fit into the connector board that is marked for Slam-shut Switch at J18, Pins 17 and 18. Refer to Table 4 for making connections for Slam-shut switch.

Tamper Switch Enclosure Security

The Fisher ARMOR™ 8000 Series Natural Gas Monitoring System can provide tamper resistance and detection mechanisms to protect against unauthorized physical access into the device.

The Tamper Detection switch is mounted inside the main enclosure and gets activated whenever there is a forced intrusion/unauthorized access to the device.

Bluetooth® is mark owned by Bluetooth SIG, Inc.

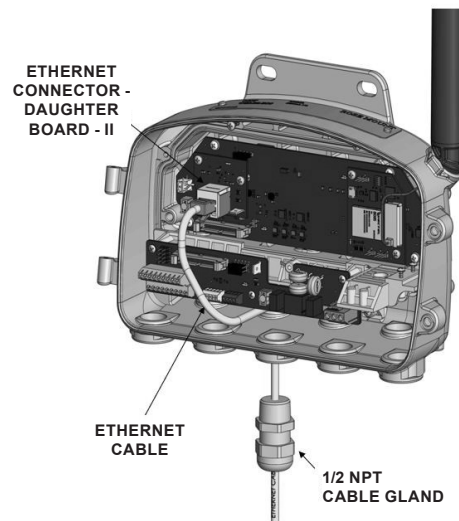


Figure 15. Ethernet Installation

The Tamper Detection Switch utilizes a 2-wire system, Normally Closed contact and Digital ground. These wires fit into the connector board for that is marked for Tamper Detection Switch at J7, Pins 3 and 4. Refer to Table 5 for making connections for Tamper Detection Switch.

Bluetooth® Switch Installation

The Fisher ARMOR 8000 Series Natural Gas Monitoring System is mounted with the Bluetooth Switch provided within the packaging of the ARMOR 8000 Series unit along with activated magnet.

The Bluetooth Switch utilizes a 2-wire system, Normally Open contact and Digital ground. These wires fit into the connector board that is marked for Bluetooth Switch at J7 Pins. Refer to Table 6 for making connections of Bluetooth Wake-up Switch.

Ethernet Cable Installation

1. **Insert the Ethernet cable:** Insert the CAT 5 Ethernet cable into the 1/2 NPT cable gland.
2. **Prepare the cable:** Remove the sleeve and crimp a RJ45 connector onto the cable.
3. **Seal the connection:** To prevent leaks, use PTFE tape to ensure a tight fit when screwing the cable gland into the bottom enclosure assembly.
4. **Connect to main board:** Plug the Ethernet cable into the main board as shown in Figure 15.

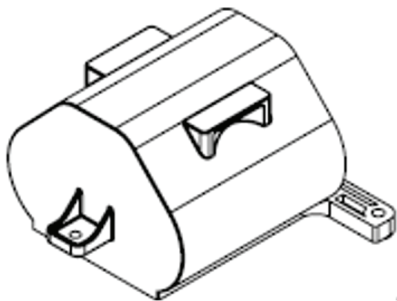


Figure 16. Field Replaceable Battery Pack

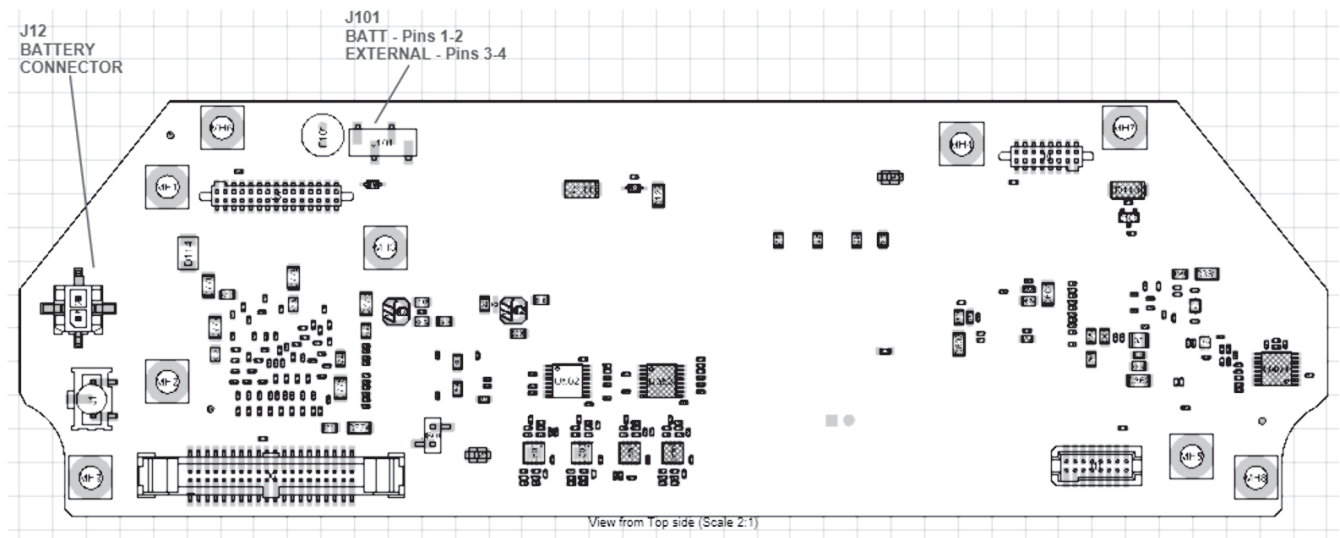


Figure 17. Battery Power Source Connection for ARMOR™ 8000 Series

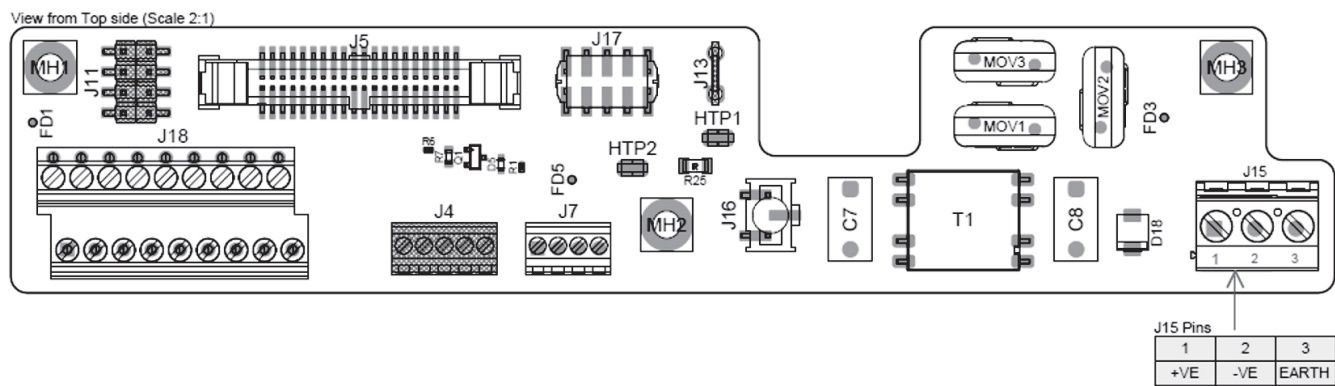
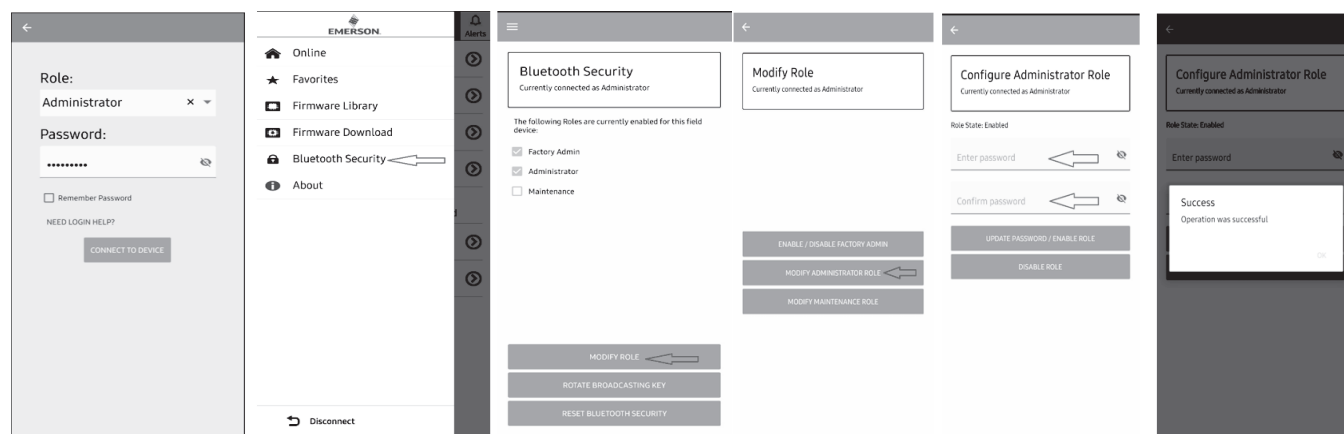


Figure 18. J15 Connector Board

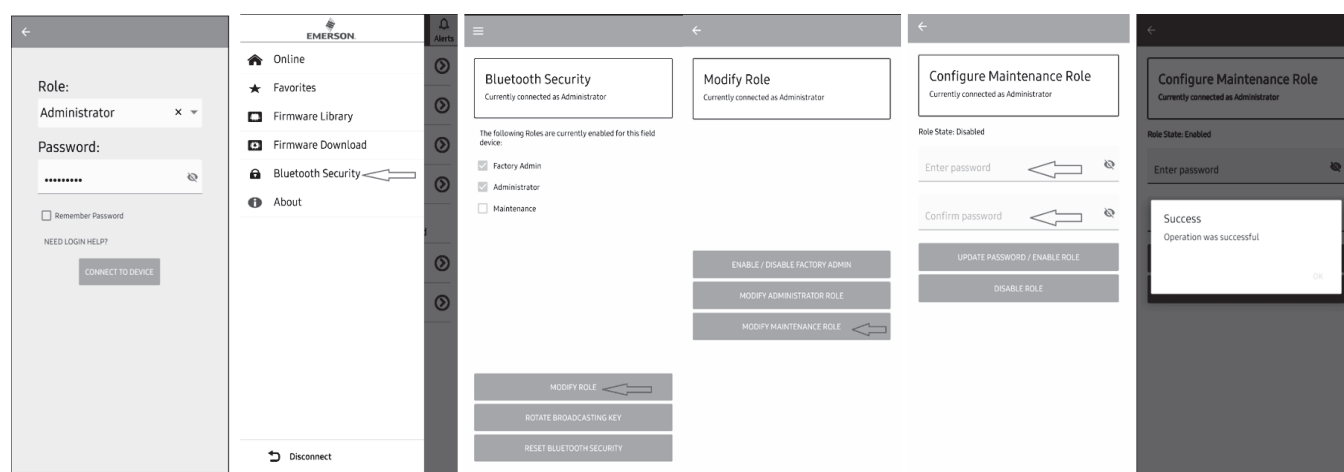
Table 7. External Power Connection

S/N	CONNECTOR (J15) PIN NUMBER	CABLE COLOR CODE	SIGNAL NAME	SIGNAL DESCRIPTION
1	Pin 1	Red	Ex_SUP (+Ve)	V+ Supply
2	Pin 2	Black	Ex_SUP (-Ve)	Ground
3	Pin 3	Clear/Green	EARTH	Earth

ARMOR 8000 Series



ADMINISTRATOR USER PROFILE



MAINTENANCE USER PROFILE

Figure 19. Configuring User Profile

Power Supply Options for ARMOR™



WARNING

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations.

ARMOR device needs to be removed and moved to a safe area before the Battery Pack can be replaced.

Lithium Ion is a fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 212°F / 100°C or expose contents to water.

The Fisher ARMOR™ 8000 Series Natural Gas Monitoring system operates on 9 to 24VDC External supply at the terminal of the power input. The system has a provision of in-built field replaceable battery pack, ERAA57423A0.

The field replaceable battery pack connector is fitted with connector J12 on Main Board as shown in the Figure 17. Battery leads are positive (+Ve) Red and negative (-Ve) Black in color. Battery connector is a guided connector and will fit according to the polarity on J12. Battery pack should be tightened with three screws on battery bracket in enclosure.

During Battery mode operation, Ethernet connectivity is not available on the device and cellular reporting of data to DeltaV SaaS Cloud is done typically every

24 Hrs with an option of different configurations from minimum of 1 hour to 7 days.

External DC supply of 9 to 24VDC can be connected to power up Fisher ARMOR™ 8000 Series device. It can be either achieved with external isolated power source with an DC output of 9 to 24VDC or Solar Power controller with a DC output of 12V or 24VDC. External power connector is provided on connector board J15 to wire connections.

Note

For optimal performance, it is recommend to use a minimum of 20 AWG wire cables when connecting the device to an external power supply.

During external Power supply operation Ethernet connectivity to device is available. Devices perform their operation in full functionality mode. Cellular data is updated with every scan rate at DeltaV SaaS cloud. Refer to Table 7 for external power connections.

Configuration

Configuring with Bluetooth® Application

You can configure the ARMOR™ 8000 Series monitoring device either before or after installation. To ensure that all transmitter components are in working order prior to installation, configure the device on the bench using the applicable communication device and power supply.

Emerson provides a series of available ANDROID phones/Tablets from different manufacturers which can be installed with ARMOR Mobile app available in Google Play™ store.

For updated list of compatible devices please refer to document titled [AMS Device Configurator – Bluetooth® Device Compatibility](#). This can be found under Resources on the Emerson Bluetooth® Connectivity webpage.

Note

Administrator credentials can be found on product documentation shipped with the product. If the documentation is unavailable or cannot be located, please contact your local Emerson representative for assistance.

Configuring User Profile (Figure 19)

Administrator User Profile

1. Log-in using Administrator credentials.
2. Select:
 - a. Bluetooth Security
 - b. Modify Role
 - c. Modify Administrator Role
3. Enter password and confirm password.
4. Select "Update Password/Enable Role", then click "OK".

Maintenance User Profile

1. Log-in using Administrator credentials.
2. Select:
 - a. Bluetooth Security
 - b. Modify Role
 - c. Modify Maintenance Role
3. Enter password and confirm password.
4. Select "Update Password/Enable Role", then click "OK".

How to Configure

Each unique application of the Fisher ARMOR 8000 Series may require different steps to commission and configure the transmitter. This section provides an overview of the procedures to perform common configuration tasks on your ARMOR device.

1. Place the supplied magnet near to Bluetooth Wake-up switch (behind the open/close screw point for the enclosure).
2. Enable Bluetooth Subsystem using magnet for triggering reed switch.
3. Open ARMOR mobile application on mobile device.

Note

Recommended distance for Bluetooth Switch operation is within 10 ft. Bluetooth Switch should take between minimum 1 to 10 minutes to connect with the device.

4. Connect to device using "AMS Device Configurator" mobile app via Bluetooth connectivity.

ARMOR 8000 Series

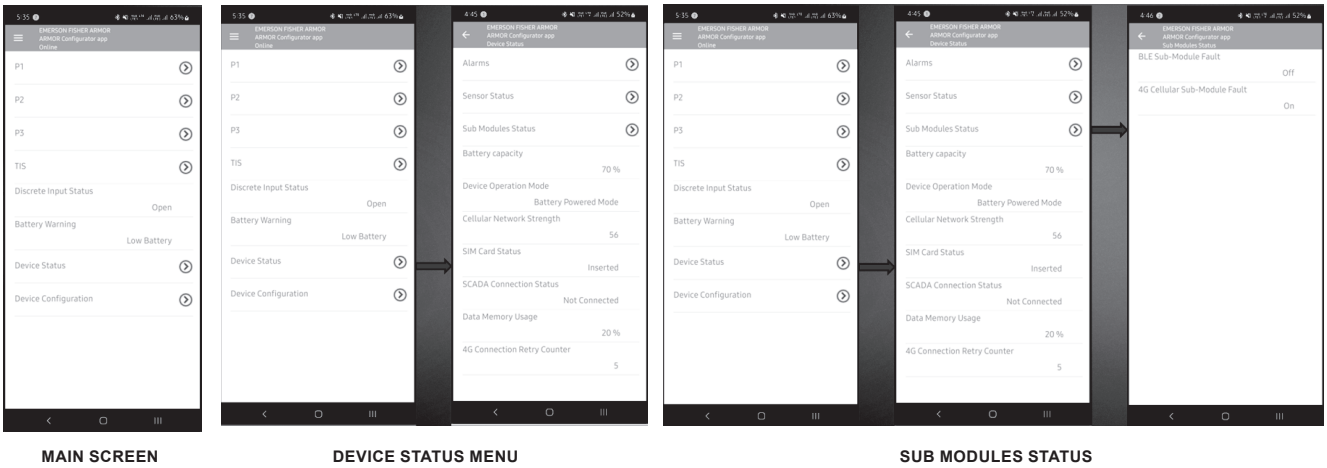


Figure 20. Sub-Module Status

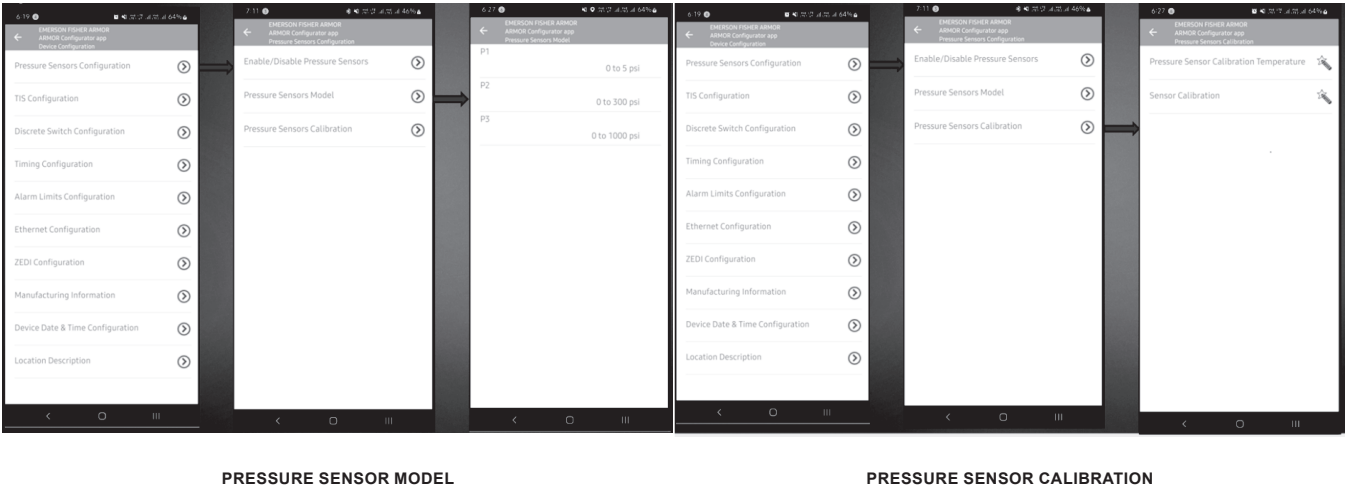
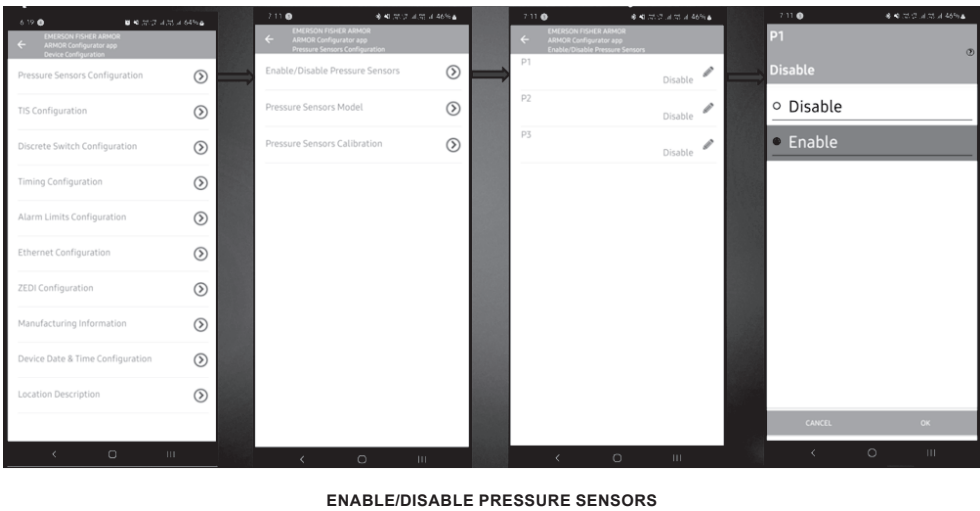
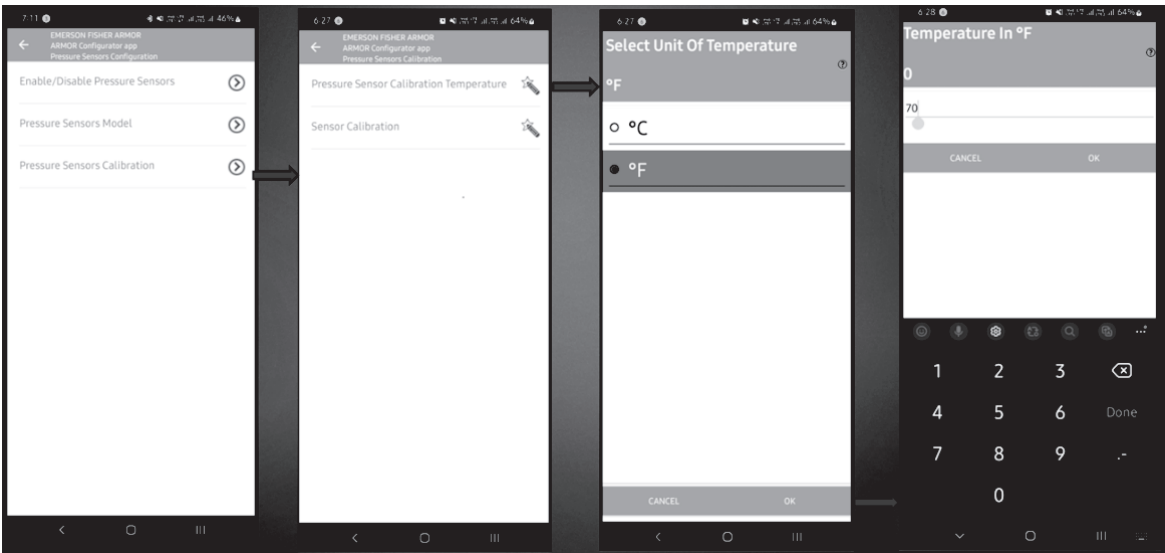
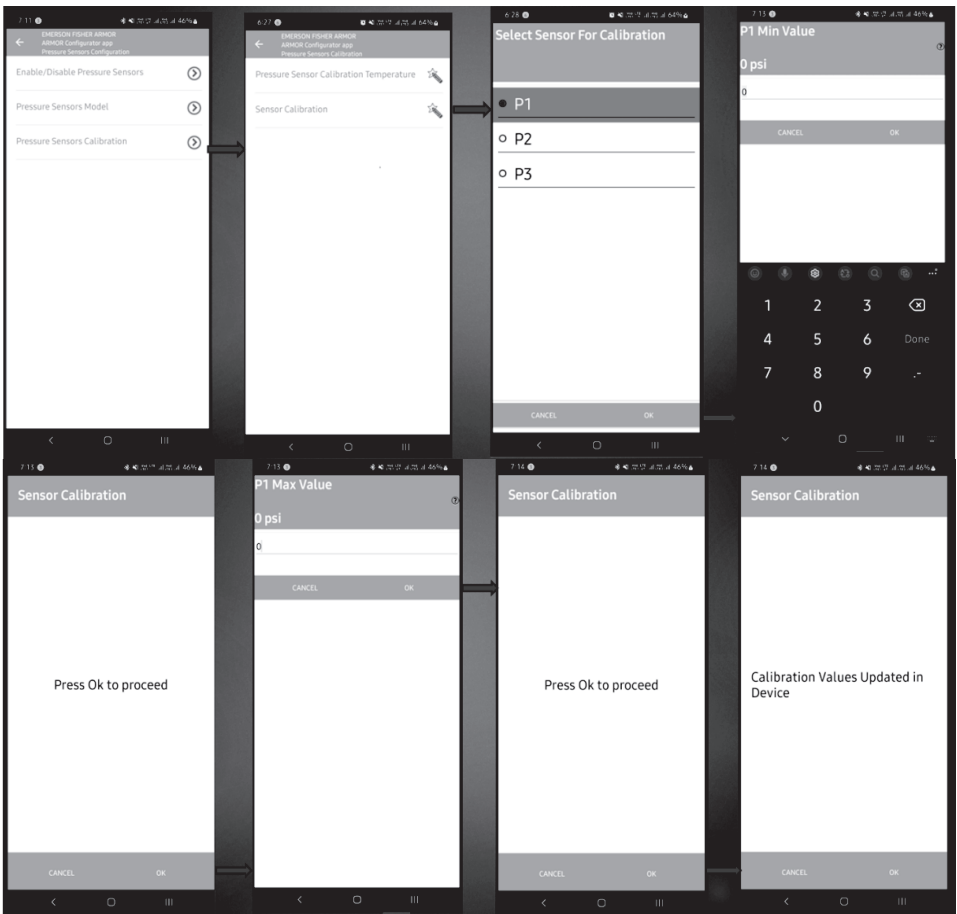


Figure 21. Pressure Sensor Configuration Procedure



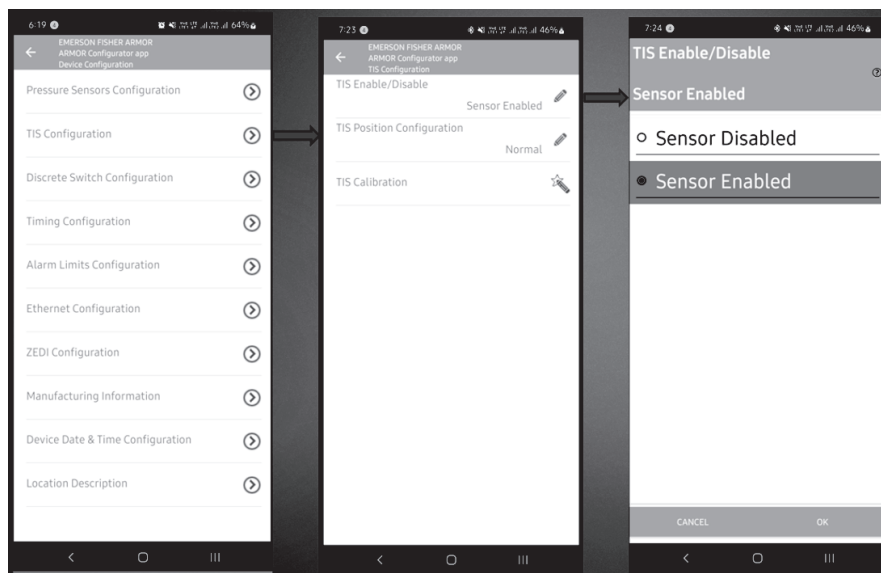
PRESSURE SENSOR CALIBRATION TEMPERATURE



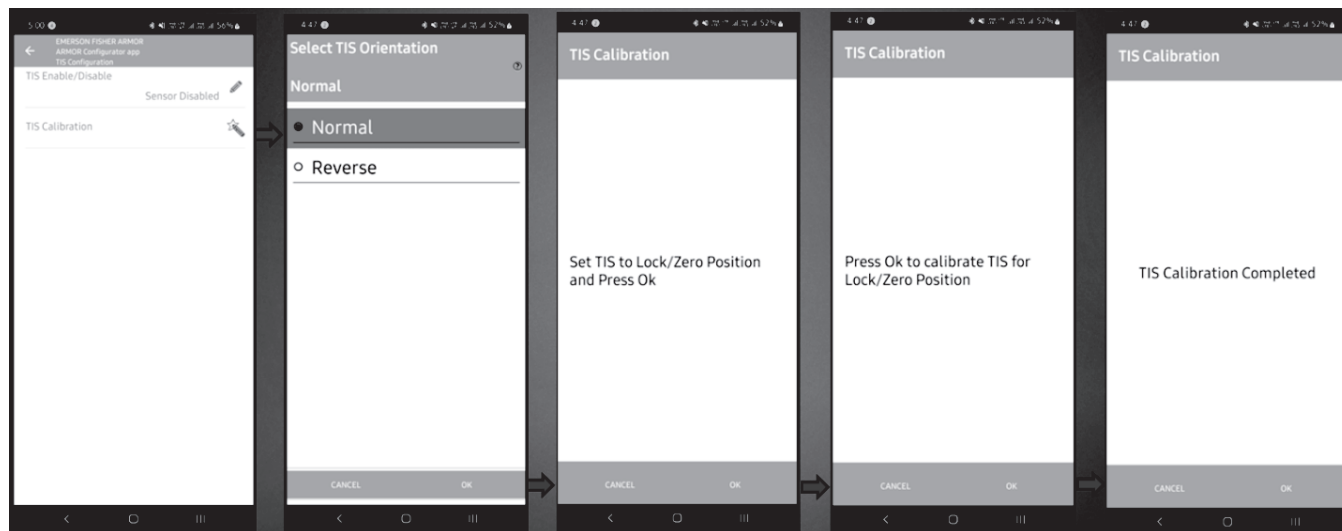
SENSOR CALIBRATION

Figure 22. Temperature and Sensor Calibration

ARMOR 8000 Series



TRAVEL SENSOR ENABLE/DISABLE CONFIGURATION



**TIS CONFIGURATION MENU VIEW
(TIS CONFIGURATION)**

Figure 23. Travel Sensor Configuration Procedure

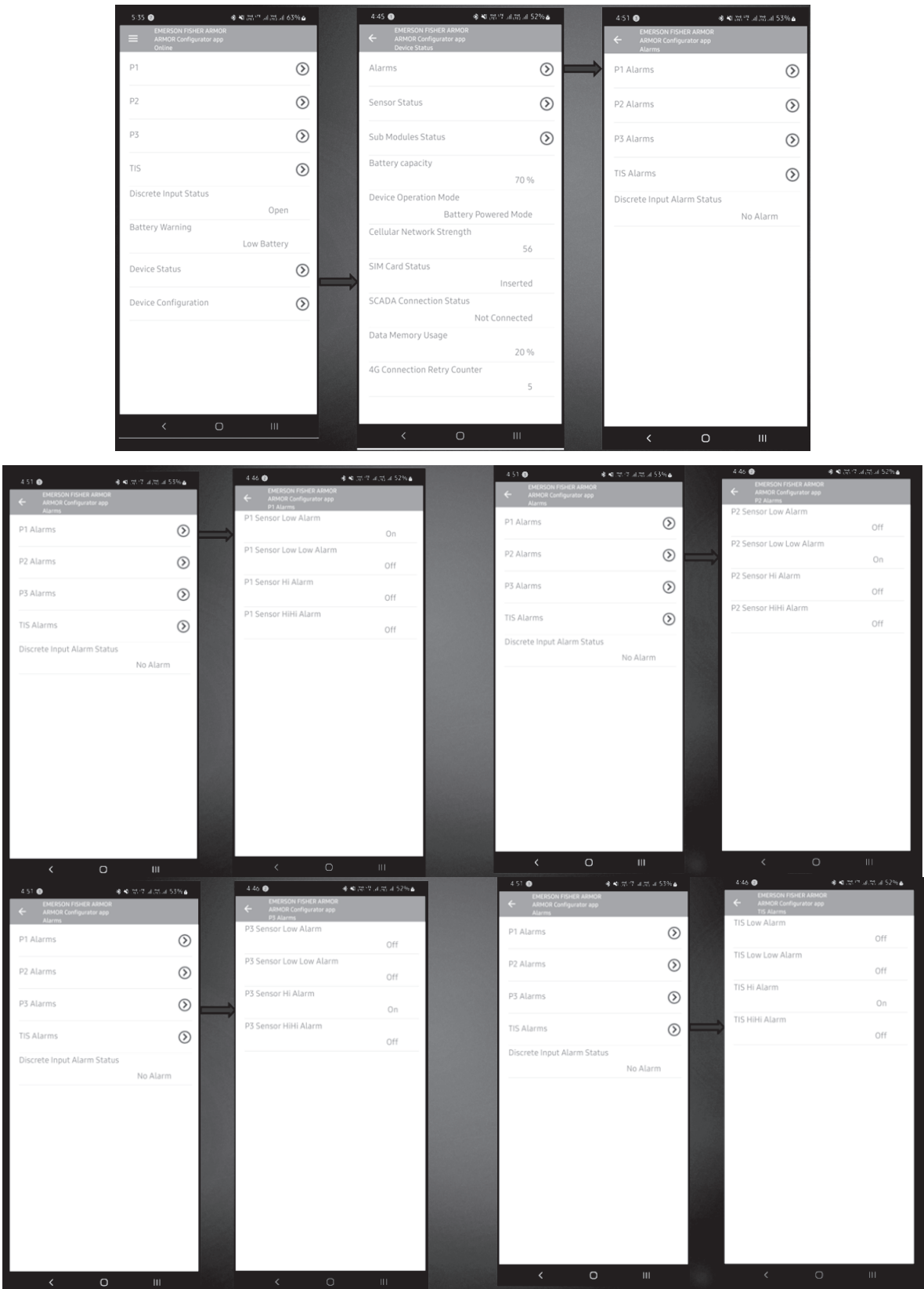
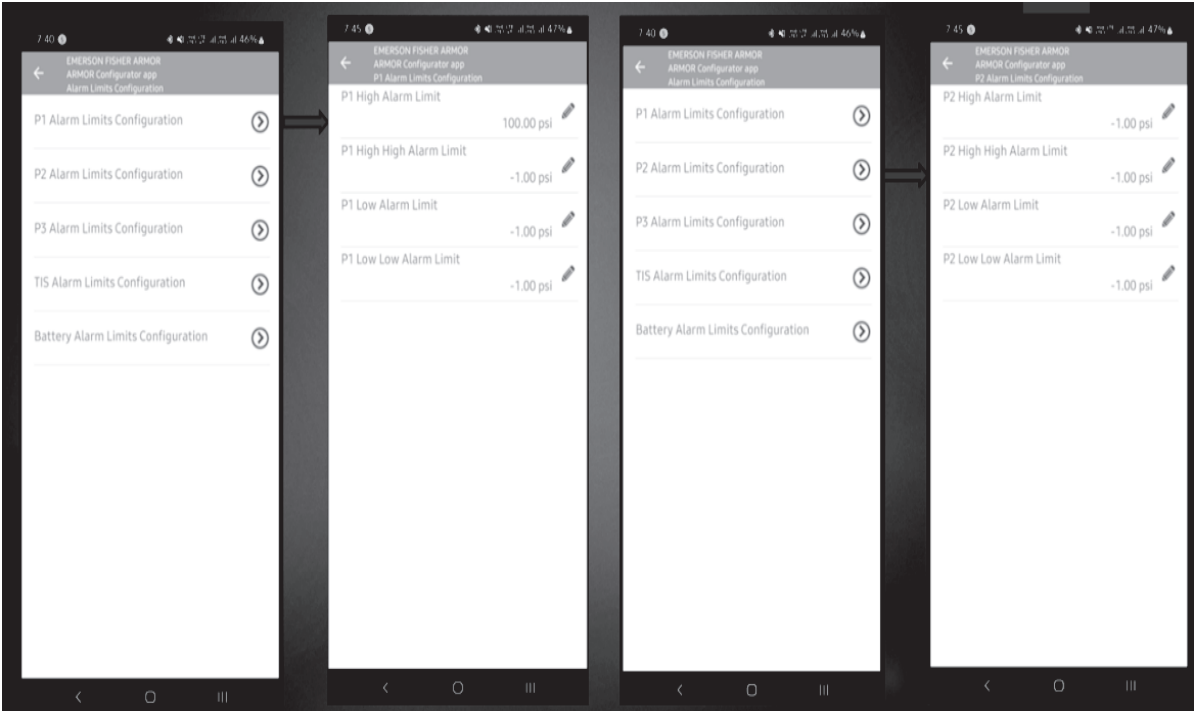
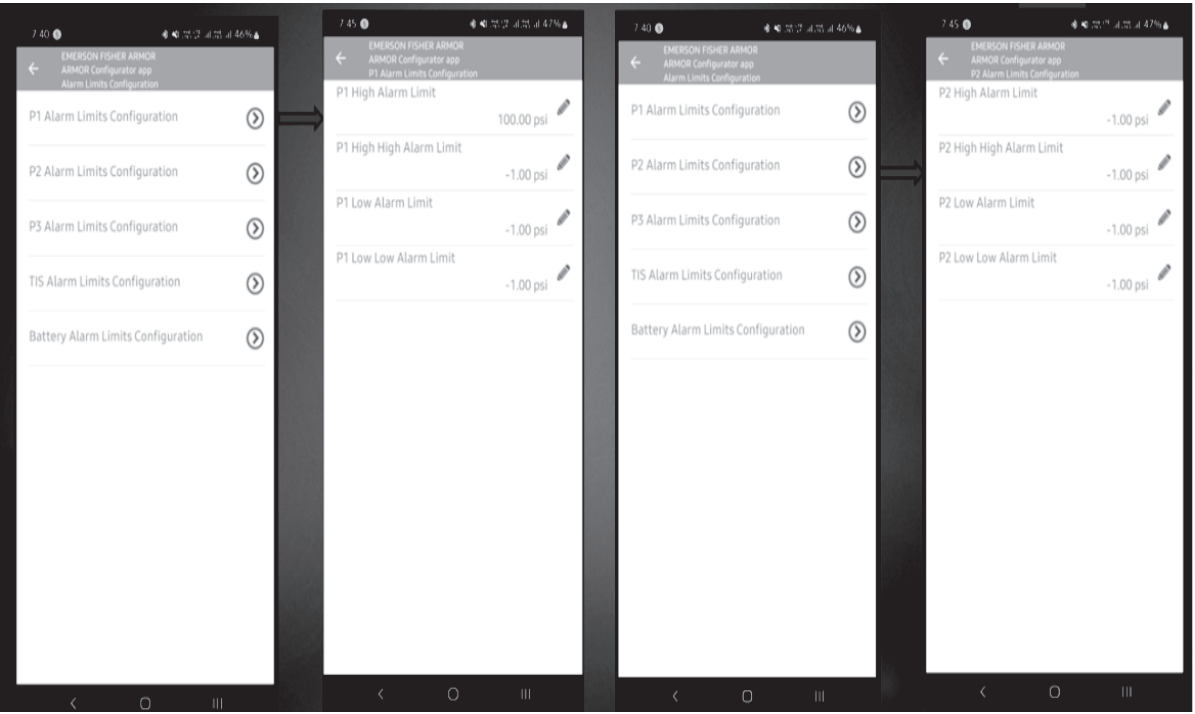


Figure 24. Alarm Configuration Procedure

ARMOR 8000 Series

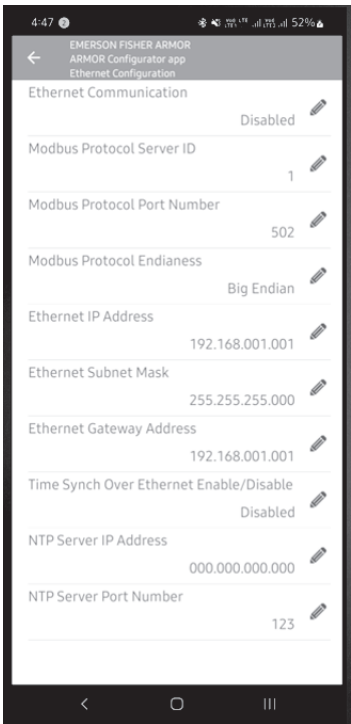


P1 AND P2 ALARMS



P3 AND TIS ALARMS

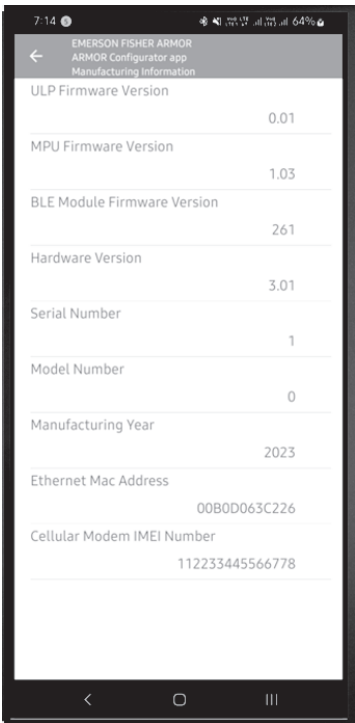
Figure 25. Alarm Limits Configuration Procedure



ETHERNET CONFIGURATION



DELTAV SAAS CONFIGURATION



MANUFACTURING CONFIGURATION

Figure 26. Miscellaneous Configuration

ARMOR 8000 Series

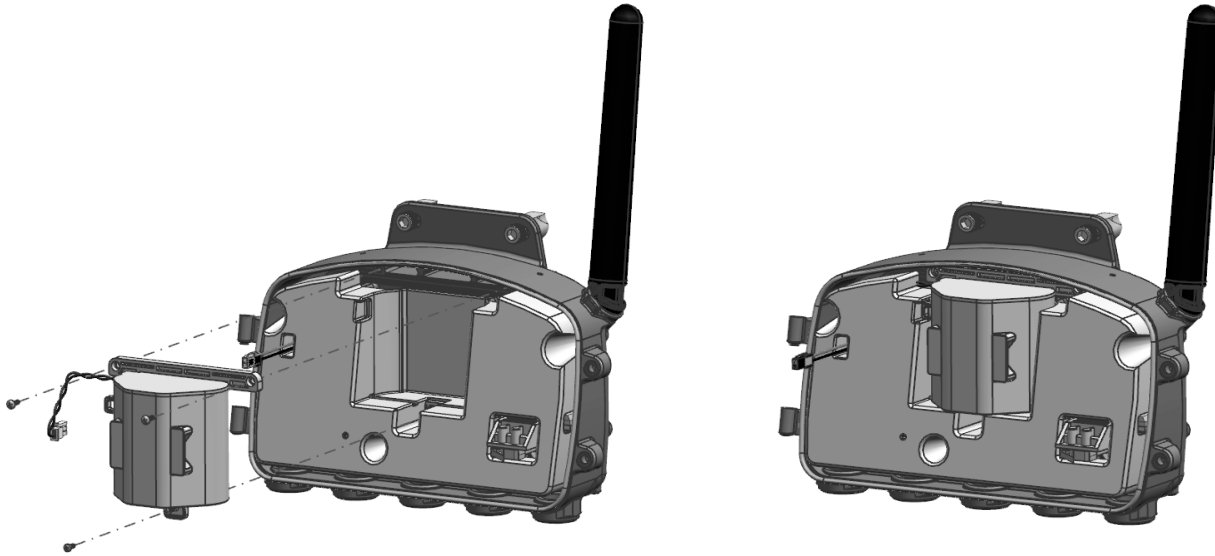


Figure 27. Battery Replacement

Table 9. Troubleshooting

ISSUE	SOLUTION
Bluetooth® connectivity is not functioning	• Ensure magnet is close enough to wake up the device. • Reboot device by unplugging and plugging the battery pack. • Ensure mobile device is close to the ARMOR™ product (less than 10 ft). • Ensure mobile device is compatible with AMS Device Configurator App⁽¹⁾
Sensors are not transmitting data to the Bluetooth Switch application	• Consult the wiring diagrams and ensure that the connections to the ARMOR device are securely fastened.
Bluetooth configurator application does not open	• Update the AMS Device Configurator App on the Google Play™ store to the latest version. • Ensure mobile device is compatible with AMS Device Configurator App⁽¹⁾

1. [AMS Device Configurator – Bluetooth® Device Compatibility](#)

5. In Mobile Application, device name as “ARMOR” with specified UID should be visible under “Available device list”.
6. Select the “ARMOR” device in “Available device list”.
7. Select “Role” and enter specified “Password” for user authentication.
8. After Successful connection see Figures 19 to 25 for configuration steps.

Sub-Module Status

- a. From the main screen select device status;
- b. Select Sub-Module status.
- c. Choose either Bluetooth Enable Sub-Module fault or 4G Cellular Sub-Module fault.

Pressure Sensors Configuration: Enable/Disable

- a. From device configuration menu, select pressure sensor configuration.
- b. Select Enable/Disable pressure sensors.
- c. Tick Enable or Disable for each pressure.

Pressure Sensors Configuration: Pressure Sensor Model

- a. From device configuration menu, select Pressure sensor configuration.
- b. Select Pressure sensors model
- c. Choose pressure range for each pressure.

Pressure Sensors Configuration: Pressure Sensor Calibration Temperature

- a. From device configuration menu, select Pressure sensor configuration.

- b. Select pressure sensors calibration.
- c. Select pressure sensors calibration temperature.
- d. Select unit of temperature.
- e. Input temperature value.

Pressure Sensors Configuration: Sensor Calibration

- a. From device configuration menu, select Pressure sensor configuration.
- b. Select pressure sensors calibration.
- c. Select sensor calibration.
- d. Select sensor for calibration (P1, P2 or P3)
- e. Input Pressure Value in the “.00” format. (Only whole numbers are accepted, including the decimal points).
- f. Press OK to proceed.

Travel Sensor Configuration: Enable/Disable

- a. From device configuration menu, select TIS configuration.
- b. Select TIS Enable/Disable.
- c. Tick Sensor Enabled or Sensor Disabled.

Travel Sensor Configuration: Calibration

- a. From device configuration menu, select TIS configuration.

Table 10. Regulator TIS Orientation

REGULATOR	TIS ORIENTATION
1098	Normal
EZL	Normal
EZH	Normal
EZR	Normal
LS200	Reverse

- b. Select TIS Calibration
- c. Select TIS Orientation,(Normal or Reverse).
- d. Press OK to set TIS to Lock/Zero Position.
- e. Press OK to calibrate TIS for Lock/Zero Position.
- f. Press OK to complete.

Alarm Configuration

- a. From the main screen select device status.
- b. Select Alarms.

- c. Select either P1, P2, P3, TIS Alarms or Discrete Input Alarm Status for No Alarm.
- d. Choose which of the following alarms to turn on.
 - Sensor Low
 - Sensor Low-Low
 - Sensor High
 - Sensor High-High

Alarm Limits Configuration

- a. From device configuration menu, select Alarm Limits Configuration.
- b. Select either P1, P2, P3, TIS or Battery Alarm Limits Configuration.
- c. For P1, P2, P3 and TIS Alarm Limits, input Pressure Values for High, High-High, Low and Low-Low Alarm Limit.
- d. For Battery Alarm Limit, input % value for Battery Capacity Low and Low-Low Alarm Limit.

Miscellaneous Configuration

- a. From device configuration menu, select which item needs to be configured.
 - Ethernet Configuration
 - DeltaV SaaS Configuration
 - Manufacturing Configuration
- b. Input necessary information.

Maintenance

Battery Replacement (Figure 27)



WARNING

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations.

ARMOR device needs to be removed and moved to a safe area before the Battery Pack can be replaced.

Lithium Ion is a fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 212°F / 100°C or expose contents to water.

ARMOR 8000 Series

1. Install the Power Module into the bottom enclosure using two M3 x 0.5 mm Thread, 8 mm Long Pan Head Phillips screws.
2. The other end must be mounted to the connector board bracket using a No. 4 Size, 3/8 in. Long Phillips Rounded Head Thread-Forming screw.
3. Connect the battery cable into the provided battery umbilical cable connected to the main board battery point.
4. Verify that the snap contact is correctly made with the main board connector.

Recommended battery pack (key 43) ERAA57423A0 is available only through Emerson specified vendors.

Troubleshooting

If ARMOR device still fails to function, please contact your local Impact Partner for an in-depth diagnosis and further steps to get the monitoring device back up and running.

Parts Ordering

When corresponding with your local Sales Office about this equipment, include the type number, serial number and other information stamped on the nameplate.

When ordering replacement parts, reference the key number of each needed part and specify the eleven character part number as found in the following parts list.

Parts List

Key	Description	Part Number
25	Cable Glands	ERAA56275A0
26	Plugs	ERAA56276A0
28	Pressure Sensor	
	0 to 5 psig / 0 to 0.3 bar	ERAA56406A0
	0 to 100 psig / 0 to 6.9 bar	ERAA56406A1
	0 to 500 psig / 0 to 34.5 bar	ERAA56406A2
	0 to 1500 psig / 0 to 103 bar	ERAA56406A3
42	ARMOR Bracket	ERAA53713A0
43	Field Replaceable Battery Pack	ERAA57423A0
48	Travel Sensor Cable	ERAA58541A0

Appendix

Compliance Statements

FCC Compliance Statement (USA)

FCC ID: W68ARMOR-8000

Compliance Statements: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including, an interference that may cause undesired operation.

Caution Statements:

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Industry Canada (IC) Compliance Statement

IC ID: IC:8247A-ARMOR8000

Compliance Statements: This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Déclarations de conformité: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage.
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution Statements:

- This equipment complies with radio frequency exposure limits set forth by Industry Canada for an uncontrolled environment.

- This equipment should be installed and operated with a minimum distance of 20 cm between the device and the user or bystanders.

Déclarations de mise en garde:

- Cet équipement est conforme aux limites d'exposition aux radiofréquences définies par Industrie Canada pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance du dispositif et l'utilisateur ou des tiers.

Information to the User

For Class A and Class B digital devices, information to the user is required to include the following statements (Section 15.105):

For a Class A digital device or peripheral, the instructions furnished to the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For a Class B digital device or peripheral, the instructions furnished to the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

ARMOR 8000 Series

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