

TLS-RF Series 4 Wireless System

Site Prep and Installation Manual



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OVERVIEW

Component Compatibility	1
Related Manuals	1
Related Drawings	2
Contractor Certification Requirements	2
Safety Symbols	3
TLS-RF Series 4 Wireless System Installation Literature and Drawings	4
RF Transmitter Installation Considerations	4
Wet or Below Grade Transmitter Locations	5
Transmitter Surge Protection	5
Battery Pack Replacement	6
Lithium Battery Disposal Considerations	6
Safety Precautions	7
General Precautions	7
Safety Warnings	8
Safety and Regulatory Content – TLS-RF Series 4 Wireless System	8

SITE CONSIDERATIONS – CONTROL DRAWING 9

EQUIPMENT DIMENSIONS

Gateway	10
Transmitter	11
Battery Pack	12

TLS-RF SERIES 4 WIRELESS SYSTEM INSTALLATION PROCEDURE SUMMARY

Special Equipment Required	13
Installation Procedure Summary	13

GATEWAY INSTALLATION

Gateway Installation Overview	15
Gateway Panel	16
TLS-450PLUS Ethernet Connectors	16
TLS4 Ethernet Connectors	17
Gateway Mounting Bracket Installation	17
Setup ATG to Recognize the Gateway	19
Connect and Register the Gateway with the ATG	22
Gateway Replacement	26

TRANSMITTER INSTALLATION

Transmitter Antenna Notes	31
Transmitter Installation – Sump	33
Mag Sensor Installation – Dispenser Pan	40
Surge Protector Installation	43
Splicing Surge Protector to Cables	43
Transmitter Cable Connections	48
Establishing Communication with the Transmitter	51

TROUBLESHOOTING

Antenna Propagation Basics	56
Antenna Operation	56
Free Space Loss	56
Attenuation	56
Scattering	57
Antenna Polarization	57
Interference	57
Gateway Diagnostics Overview Screen	58
Probe Diagnostics Overview Screen	61
Mag Sensor Diagnostics Screen	63
Gateway Troubleshooting	65
Gateway Registration Unsuccessful	65
Transmitter and Device Troubleshooting	66
Failure to Observe Correct LED Pattern	66
Transmitter Device Not Shown in Device Directory Screen	67
Probe Out Alarm	68
Communication Alarm	71
Transmitter DIP Switch Usage	72

APPENDIX A: TRANSMITTER DIP SWITCH SETTINGS.....	73
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FIGURES

Figure 1. Example TLS–RF Series 4 Wireless System Simplified Site Layout	9
Figure 2. Gateway Dimensions	10
Figure 3. Transmitter Dimensions	11
Figure 4. Battery Pack Dimensions	12
Figure 5. Gateway Installation Example	15
Figure 6. Gateway Panel Interface	16
Figure 7. TLS–450PLUS Ethernet Connections	16
Figure 8. TLS4 Ethernet Connections	17
Figure 9. Gateway Mounting Bracket – Dimensions Inches [mm]	18
Figure 10. Select Date and Time Setup Screen	19
Figure 11. Date and Time Setup Screen	20
Figure 12. Select Ethernet Port Setup Screen	20
Figure 13. Ethernet Port Setup Screen	21
Figure 14. Accessing Gateway Setup Screen	22
Figure 15. Gateway Setup Screen	22
Figure 16. Add Gateway Action Popup	23
Figure 17. Example Gateway Label – Serial Number	23
Figure 18. Entering Gateway Serial Number	24
Figure 19. Registered Gateway Screen	25
Figure 20. Edit Gateway Screen	26
Figure 21. Replacement Gateway Registration Screen	27
Figure 22. Network ID Field	28
Figure 23. Enter New Network ID	28
Figure 24. Save Network ID	29
Figure 25. Gateway Reconfiguring to New Network ID	29
Figure 26. Gateway Network ID Reconfiguration Complete	30
Figure 27. Positioning Horizontal Transmitter Antennas	32
Figure 28. Attaching 12.7 mm [1/2"] Conduit Clamps to Riser Hangers	34
Figure 29. Attaching 12.7mm Conduit to 12.7mm Clamps on Riser	35
Figure 30. Attach Transmitter to 332295–001 Bracket	36
Figure 31. Attach Conduit Clamps to Support Bracket	37
Figure 32. Installing Support Bracket at Recommended Transmitter Antenna Position	38
Figure 33. Example Mag Probe Transmitter Cable Connections	39
Figure 34. Attaching Transmitter To Support Bracket	41
Figure 35. Example Mag Sensor Transmitter Cable Connections	42
Figure 36. Single Channel Surge Protector Group	43
Figure 37. Cable Length Dimensions	44

Figure 38. Splice Connections	45
Figure 39. Removing Sealing Compound Clip	46
Figure 40. Pouring Sealing Compound Into Sleeve	47
Figure 41. Typical Input Wiring to Transmitter Terminal Block	49
Figure 42. Connecting Device and Power Cables to the Transmitter	50
Figure 43. Device Directory Screen	52
Figure 44. Example – Selecting First Transmitter Gateway Address	53
Figure 45. Example Wireless Device Setup Screen	54
Figure 46. Accessing Gateway Diagnostics Overview Screen	58
Figure 47. Example Gateway Diagnostics Overview Screen – Page 1	59
Figure 48. Example Gateway Diagnostics Overview Screen – Page 2	60
Figure 49. Accessing Probe Diagnostics Overview Screen	61
Figure 50. Example Probe Diagnostics Overview Screen – Page 1	62
Figure 51. Example Probe Diagnostics Overview Screen – Page 2	62
Figure 52. Accessing Mag Sensor Diagnostics Screen	63
Figure 53. Example Mag Sensor Diagnostics Screen – Page 1	63
Figure 54. Example Mag Sensor Diagnostics Screen – Page 2	64
Figure 55. Transmitter DIP Switch 1 Settings	73
Figure 56. Transmitter DIP Switch 2 Settings	74

TABLES

Table 1. Gateway Kit Components	14
Table 2. Transmitter Kit Components	31

OVERVIEW

This manual describes site preparation and installation procedures for the Veeder–Root TLS–RF Series 4 Wireless System.

Procedures contained within this manual include:

- Mounting the Gateway and registering it to the TLS–4xx console.
- Installing the Transmitter system components throughout the site.
- Troubleshooting guidance for the TLS–RF Series 4 Wireless System

Other required equipment, such as the TLS–4xx console and devices are to be installed following instructions shipped with the equipment.

After installing the TLS–RF Series 4 Wireless System, you must configure the devices in the TLS–4xx console following instructions contained in the console's System Setup Manual.

Component Compatibility

The TLS–RF Series 4 Wireless System is compatible with the following components:

- ATG specifications listed below:
 - Software version 10.P or higher
 - 8600 TLS-450PLUS console
 - 8601 TLS4 console (not compatible with TLS4i, TLS4c, and TLS4B consoles)
- Probes/Sensors listed below:
 - 8463 Mag Plus Probe (not compatible with Density Mag Plus Probes)
 - 857060–111 (305mm [12"] Mag Sensor, no leak detection)
 - 857060–112 (610mm [24"] Mag Sensor, no leak detection)

Related Manuals

- | | |
|--------------|--|
| • 577014–483 | TLS–RF Series 4 Wireless System Quick Startup Guide |
| • 577013–744 | Mag Plus Probe Installation Guide |
| • 577013–578 | TLS Monitoring Systems: Contractors' Site Preparation Guide |
| • 577014–127 | Intrinsically Safe Circuit Protector: Installation References |
| • 577014–031 | TLS Magnetostrictive Probes: International Installation Instructions |
| • 577014–055 | Grounding and Surge Protection: Recommended Practice |
| • 577014–245 | ATEX EU Foreign Language Manual Notice – provides Veeder–Root web address where installation instructions and safety information in multiple languages can be downloaded |
| • 577014–022 | TLS4 Site Certification Manual |
| • 577014–034 | TLS4 Quick Start Guide |
| • 577014–072 | TLS–450PLUS Operator's Quick Help Guide |
| • 577014–073 | TLS–450PLUS Site Prep and Installation Guide |
| • 577014–110 | TLS–450PLUS/TLS4 Operator's Manual |

Related Drawings

- 331940-005 ATEX TLS Radio Group Descriptive System Document
- 331940-105 IECEx RF System Descriptive System Document
- 331671-014 ATEX/IECEx/UKEx Safety Certification TLS-RF Console
- 331671-015 ATEX/IECEx/UKEx Safety Certification TLS Accessories

Contractor Certification Requirements

Veeder-Root requires the following minimum training certifications for contractors who will install and setup the equipment discussed in this manual:











Service Technician Certification (Previously known as Level 2/3): Contractors holding valid Technician Certifications are approved to perform installation checkout, startup, programming and operations training, system tests, troubleshooting and servicing for all Veeder-Root Series Tank Monitoring Systems, including Line Leak Detection.

TLS-4xx Technician Certification: Contractors holding valid TLS-4xx Technician Certifications are approved to perform installation checkout, startup, programming and operations training, troubleshooting and servicing for all Veeder-Root TLS-4xx Series Tank Monitoring Systems, including Line Leak Detection and associated accessories.

Warranty Registrations may only be submitted by selected Distributors.

Safety Symbols

The following safety symbols may be used throughout this manual to alert you to important safety hazards and precautions.

 EXPLOSIVE Fuels and their vapors are extremely explosive if ignited.	 FLAMMABLE Fuels and their vapors are extremely flammable.
 WARNING Pay close attention to the stated procedures and precautions to avoid the noted hazards.	 ELECTRICITY High voltage exists in, and is supplied to, the device. A potential shock hazard exists. Turn Off power to the device and associated accessories when servicing the unit.
 RESPIRATORY IRRITANT Epoxy sealant is irritating to eyes, respiratory system, and skin. Use only in well ventilated areas. Avoid breathing fuel vapors.	 WEAR EYE PROTECTION Wear eye protection when working with pressurized fuel lines or epoxy sealant to avoid possible eye injury.
 GLOVES Wear gloves to protect hands from irritation or injury when working with epoxy sealant.	 RESTRICT PUBLIC ACCESS Allowing unauthorized people or vehicles in the work area is dangerous. A combination of barricade types or other barriers appropriate to the job shall be used to guide traffic and secure the work area.
 NOTICE Important information and/or recommended practice.	 READ ALL RELATED MANUALS Knowledge of all related procedures before you begin work is important. Read and understand all manuals thoroughly. If you do not understand a procedure, ask someone who does.



TLS-RF Series 4 Wireless System Installation Literature and Drawings

It is important that installers have knowledge of all relevant procedures before installing a TLS-RF Series 4 Wireless System. Read and understand thoroughly, this manual and all relevant material from the part numbers listed in the Related Manuals and Related Drawings sections. If you do not understand a procedure, contact Veeder-Root. Each TLS-4xx Console has its own setup and installation manuals.

Refer to the 577013-578 TLS Monitoring Systems: Contractors' Site Preparation Guide for details about the ATEX examination certificates that control the TLS-RF Series 4 Wireless System and the corresponding Veeder-Root TLS Monitoring Systems site preparation requirements, including conditions for safe use that specifically apply to the Transmitter and Battery Pack.

This manual assumes the TLS-450PLUS/TLS4 is installed following the instructions included with the console.

Refer to <https://www.veeder.com/eu-manuals> for translations of this manual and the documents listed in the Related Manuals and Related Drawings sections. This website link is also provided in the 577014-245 ATEX EU Foreign Language Manual Notice.

RF Transmitter Installation Considerations

Install Transmitters in the sumps first and verify the sump Transmitters and devices are recognized by the ATG before installing Transmitters in the dispensers.

If possible, replacing the metal sump lids with non-metal sump lids should improve wireless communication performance.

Especially within metal sumps, locate the Transmitter as close as possible to the top and center of the containment space (e.g., within sump or dispenser) to maximize wireless communication performance.



The Transmitter antenna is properly assembled to the Transmitter in the factory to provide an IP-67 seal. If it is required to remove the antenna from the Transmitter, then ensure that the antenna is reinstalled properly by threading the antenna onto the connector until it bottoms out and then hand-tightening 1/4 turn. Do not over tighten the antenna onto the connector.

Ensure that the antenna does not contact another object or surface in the containment space, preferably providing at least 25.4mm (1") of clearance.

Orient the Transmitter antenna in a vertical position. If a vertical antenna position is not possible, such as might be the case in a dispenser cabinet, put the antenna in a horizontal position.

For sump installations using 12.7mm [1/2"] conduit pipe cut to appropriate length and 12.7mm (1/2") clamps, screws, and nuts provided in both kits P/N 330020-528 and 330020-835, raise the Transmitter as high in the sump as possible, preferably positioning the tip of the antenna within 25.4mm [1"] of the sump lid. Ensure that the antenna does not contact the lid or any other surface within the sump.

A Universal Sensor Installation kit (P/N 330020-012) may be required in dispenser installations for attaching the Transmitter/Battery Pack support bracket to cabinet plumbing or structural members.

Avoid metal obstructions and sources of electromagnetic interference within the line of sight between the Transmitter and Gateway. Avoid installing Transmitters within sumps that have vehicles parked over them for any length of time.

Wet or Below Grade Transmitter Locations

Installation of the Transmitter system in wet or below grade locations requires that the installer take steps to ensure that the equipment is mounted above the maximum water level.



The Transmitter will not function properly in water. Also, submersion of the Transmitter in water can cause permanent damage to the internal electronics.

Wireless devices will not function properly if certain conditions arise such as, but not limited to, the following:

- RF Interference and/or Obstructions – Due to site layout RF attenuating obstructions (e.g. metal lined sumps and/or sump lids), or interfering RF waves from other wireless systems. TLS-4xx and Insite360 functionality and services will perform at a degraded level if the RF transmission path is blocked or corrupted for more than a few minutes. Note that, to mitigate the impact of RF interference and/or obstructions on Probe Out alarming, the Device Timeout field (ATG Setup > Devices screen) can be adjusted.
- Improper equipment installation – Keep objects from improperly coming in contact with the antenna. Follow these installation instructions and mount the Transmitter in a fixed position to ensure maximum reliability of the Transmitter-to-Gateway connection. Proper antenna orientation is significant in achieving an optimal transmission path.
- Equipment Sump Parameters – Sumps intended for use with the Transmitter system must accommodate the worst case rainfall condition that could reasonably occur. The Transmitter and antenna are IP-67 rated but will not function properly underwater. If temporary standing water is anticipated within the sump, then the 857060-111 or 857060-112 Mag Sensor is an option for monitoring the water level and generating an ATG alarm if the level exceeds a programmed threshold that is below the height of the lowest point of the Transmitter system. A suitable water pump can be installed within the sump to mitigate the impact of standing water on the Transmitter system.

TLS-RF Series 4 Wireless System performance will be degraded should any of the above conditions occur and is not covered under the Veeder-Root Product Warranty. Corrective actions to such conditions are the responsibility of the station-site owner. Veeder-Root is not liable for any event that is a result of an improper installation or use of this equipment.



Transmitter Surge Protection

A surge arrester must conform to Clause 12 of IEC/EN 60079-25 and must be installed between the I.S. device and its Transmitter in accordance with the requirements for surge protection devices defined in Clause 16.3 of standard IEC/EN 60079-14 as follows:

1. Surge protection is required between each conductor of the cable including the screen and the structure where the conductor is not already bonded to the structure.
2. The surge protection device shall be capable of diverting a minimum peak discharge current of 10 kA (8/20 us impulse according to IEC 60060-1 for 10 operations).

3. The connection between the protection device and the local structure shall have a minimum cross-sectional area equivalent to 4mm² copper.
4. The cable between the intrinsically safe apparatus in Zone 0 and the surge protection device shall be installed in such a way that it is protected from lightning.
5. Any surge protection device introduced into an intrinsically safe circuit shall be suitably explosion protected for its intended location.
6. The use of surge protection devices which interconnect the circuit and the structure via nonlinear devices such as gas discharge tubes and semiconductors is not considered to adversely affect the intrinsic safety of a circuit, provided that in normal operation the current through the device is less than 10 µA.

The hard-wired Surge Protection Device P/N 848100–001 included in kit P/N 330020–528 meets the requirements above and is to be installed in accordance with local regulations. This Type 1 I.S. Circuit Protector with Encapsulation device is Ex ia (intrinsically safe circuits) rated for outdoor use.

848100–001 Construction: An encapsulated housing with flying lead connection wires for I.S. devices. Earth conductor must be connected to a grounded structure. Lightning protection component is a Gas Discharge Tube (GDT).

Ratings:

- Peak Current: 10,000 Amps with a (8/20 µS) waveform
- Working Voltage: 12.6 Volts or less
- Break Over Voltage: 75 Volts

Battery Pack Replacement

Battery Packs are sealed units which are forbidden to be opened as doing so can impair their intrinsic safety. They are installed in a hazardous location and must only be replaced by authorised service personnel for reasons of safety and to ensure correct system operation. Batteries are NOT user replaceable. Only replace Battery Packs with Veeder–Root P/N 332425–XXX. 332425–013 is provided in the ATEX/UKEX 330020–836 replacement Battery Pack kit.



Prolonged exposure to low temperatures reduces the expected life of the batteries.

Lithium Battery Disposal Considerations

Waste disposal of the Battery Pack must be in accordance with the local and national regulations and WEEE directive.

In compliance with European Union and EFTA market requirements, 332425–XXX Battery Pack batteries are marked in accordance with Directive 2006/66/EC as amended by Directive 2013/56/EU on batteries and accumulators and waste batteries and accumulators.

In the UK, similar requirements are defined by Statutory Instrument 2009 No. 890. The Waste Batteries and Accumulators Regulations 2009.

The 332425-XXX Battery Pack carries the following symbol to indicate that it contains batteries which cannot be disposed of in normal waste.



Safety Precautions

Retain and follow all product safety and operating instructions. Observe all warnings on the product and in the operating instructions. To reduce the risk of bodily injury, electric shock, fire, or damage to the equipment, observe the following precautions.



General Precautions



Heed service markings: Opening or removing the console cover may expose you to electric shock. Servicing of Veeder-Root equipment must be done by Veeder-Root authorised service contractors.



Use product with approved equipment: This product should be used only with Veeder-Root components identified as suitable for use with the TLS-RF Series 4 Wireless System.

Use the correct external power sources: This product should be operated only from the type of power sources indicated on the electrical ratings labels affixed to the components. If you are not sure of the type of power source required, contact Veeder-Root.

Safety Warnings



WARNING



This product is to be installed and operated in the highly combustible environment of a gasoline dispenser where flammable liquids and explosive vapors may be present.



FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.



Observe the following precautions:



1. Read and follow all instructions in this manual, including all safety warnings before installing, operating or servicing this equipment.
2. Before installing this device, turn Off, tag/lock out power to the affected dispenser, including submersible pumps.
3. Evacuate of all unauthorized persons and vehicles from the work area.
4. To protect yourself and others from being struck by vehicles, block off your work area with cones, safety tape or barricades during installation or service.
5. All service personnel on site must comply with all recommended safety practices identified by your employer and defined by federal (e.g. OSHA in United States), state, and local codes.
6. Substitution of components may impair suitability for use in hazardous locations.



Safety and Regulatory Content – TLS-RF Series 4 Wireless System

For Gateway safety and regulatory content, refer to the MTCAP-868-041A User Guide, which is available at www.multitech.com/brands/multiconnect-conduit-ap

EU Declaration of Conformity document 577014-497 declares that the Transmitter system (including Battery Pack) is in compliance with the essential requirements and other relevant provisions of the applicable EU Directives. Refer to the 577014-245 ATEX EU Foreign Language Manual Notice for the web address from where 577014-497 can be downloaded.

SITE CONSIDERATIONS – CONTROL DRAWING

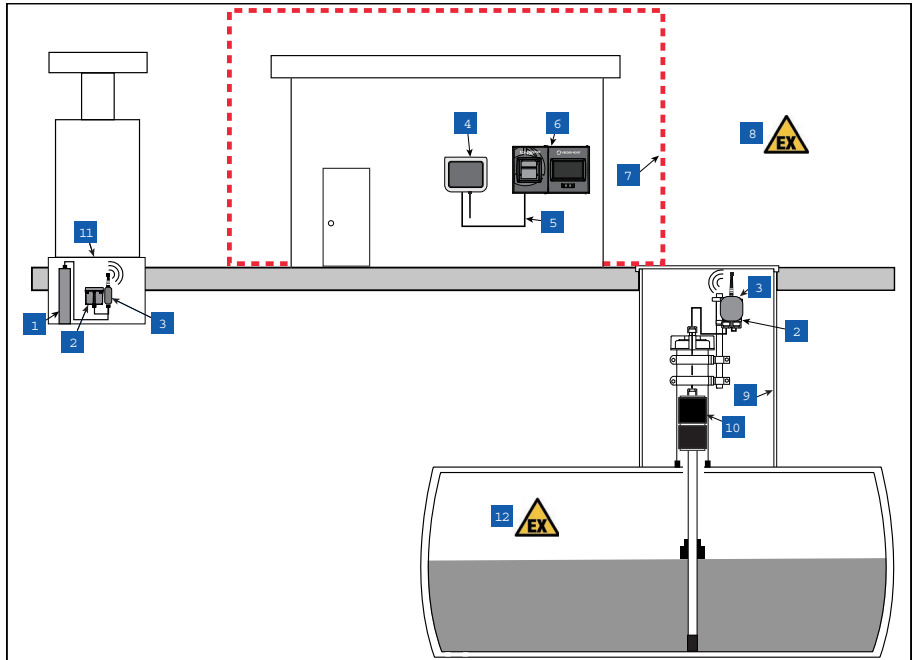


Figure 1. Example TLS-RF Series 4 Wireless System Simplified Site Layout

LEGEND FOR NUMBERED BOXES IN Figure 1

- | | |
|---|---|
| 1. Dispenser pan Mag Sensor | 6. TLS4/450PLUS console |
| 2. Battery Pack shown installed to 332295-001 Bracket | 7. Non-hazardous area |
| 3. Transmitter shown installed to 332295-001 Bracket | 8. Hazardous area, Class I Div. 1, Group D, Zone 1, Group IIA |
| 4. Gateway (No specific power source fusing required) | 9. Sump |
| 5. Ethernet cable | 10. Mag Plus Probe |
| | 11. Dispenser pan |
| | 12. Hazardous area, Class I Div. 1, Group D, Zone 0, Group IIA |

EQUIPMENT DIMENSIONS

Gateway

The Gateway dimensions are shown in Figure 2.

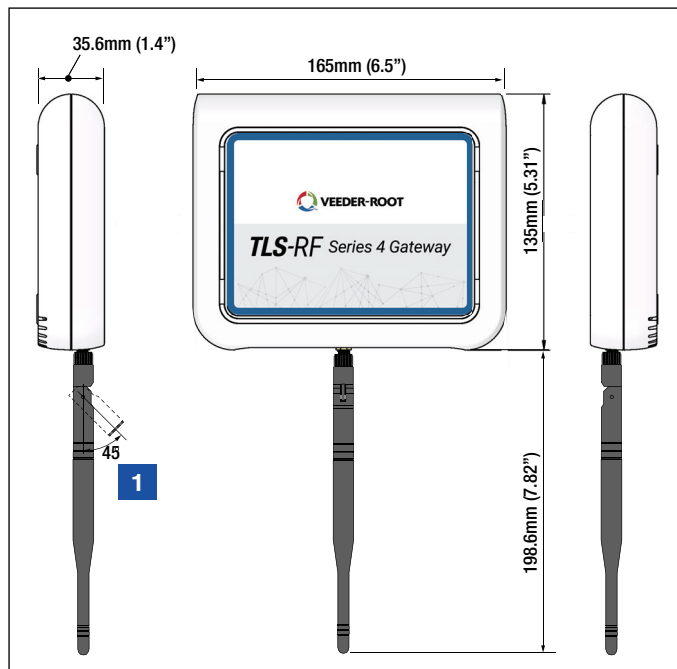


Figure 2. Gateway Dimensions

LEGEND FOR NUMBERED BOXES IN Figure 2

1. If installing Gateway on a metal wall, rotate antenna out 45 degrees away from the wall.

Transmitter

The Transmitter dimensions are shown in Figure 3.

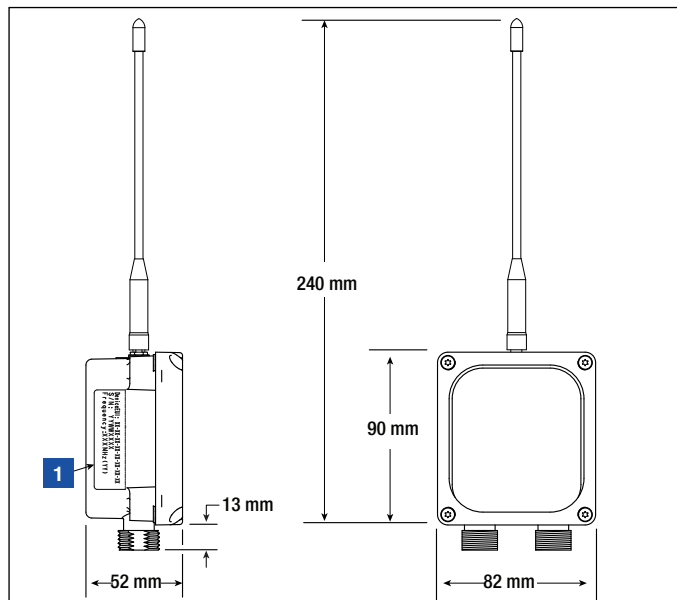


Figure 3. Transmitter Dimensions

LEGEND FOR NUMBERED BOXES IN Figure 3

1. Product information label, affixed to Transmitter
 - Device EUI: Radio identifier, which is visible within the TLS Console.
 - S/N: Transmitter identifier, which is not visible within the TLS Console, and is used for production tracking purposes.
 - Transmitter center frequency
 - Transmitter channel plan (which defines the number of RF channels and the configuration of each channel).

Battery Pack

The Battery Pack dimensions are shown in Figure 4.

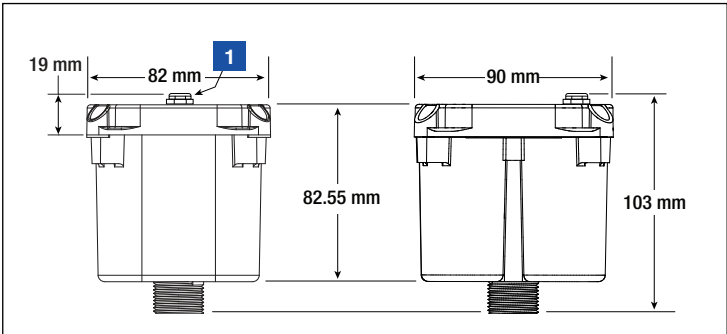


Figure 4. Battery Pack Dimensions

LEGEND FOR NUMBERED BOXES IN Figure 4

- 1. Battery Pack housing vent

TLS-RF SERIES 4 WIRELESS SYSTEM INSTALLATION PROCEDURE SUMMARY

Special Equipment Required

- Transmitter System:
 - T15 Torx bit and torque wrench, suitable for delivering and measuring between 1.6 and 2.0 Nm (14 and 18 inch-pounds) of torque.
 - Small blade screwdriver (maximum blade width 2.4 mm [3/32"])
 - Wire strippers
- Gateway:
 - Four 3.5mm (#6) screws, with anchors
 - Screwdriver
 - Drill

Installation Procedure Summary

1. If applicable, remove the battery isolator from the ATG's backup battery.
2. Install and power up the TLS-4xx console.
3. Install the Gateway mounting bracket on the wall.
4. Verify the ATG has software version 10.P or higher.
5. Set the ATG date and time.
6. Configure ETH2 for communication with the Gateway.
7. Register the Gateway to the ATG, using the Gateway serial number read from the label on the rear (facing the wall when mounted) of the unit.
8. Mount the Gateway to the mounting bracket.
9. Connect the Gateway to either of the ATG's (2) ETH2 port RJ-45 connectors.
10. Power up the Gateway.
11. Verify that the Gateway setup screen status is Registration Successful.
12. Record the following Transmitter identification information: location (e.g. tank number and product type), Device EUI, serial number for the device that the Transmitter is connected to.
13. Connect the first Transmitter to its device.
14. Power On the first Transmitter by connecting it to its Battery Pack.
15. Observe the first Transmitter's bright red LED (D8 on far left side of board) turning on, indicating that the Transmitter has joined the Gateway network.
16. Assign the first Transmitter to the address corresponding to its device's serial number indicated in the Diagnostics > Module > Device Directory screen. Refer to the "Establishing Communication with the Transmitter" section.
17. Verify that the device serial number shown in the first Transmitter's Setup > Device screen matches the serial number recorded in Step 11.
18. Once Transmitter 1 is recognized by the ATG, repeat Steps 11 to 17 for the remaining Transmitters. Only after a Transmitter is recognized do you proceed to the next one. Refer to the Troubleshooting Section if a Transmitter is not recognized by the ATG.

GATEWAY INSTALLATION

Installation of the Gateway must be done before installing the Transmitters.

The TLS–RF Series 4 Gateway kit includes the contents in Table 1:

Table 1. Gateway Kit Components

Qty.	Description
1	TLS–RF Series 4 Gateway
1	577014–482 Site Prep and Installation Manual
1	577014–483 Quick Startup Guide
1	RJ45 Ethernet Cable 1.8m (6')
1	Antenna
1	5 Volt Power Supply
1	Mounting Bracket
1	Bumpon set

Gateway Installation Overview

Figure 5 is a simplified overview of the Gateway installation.

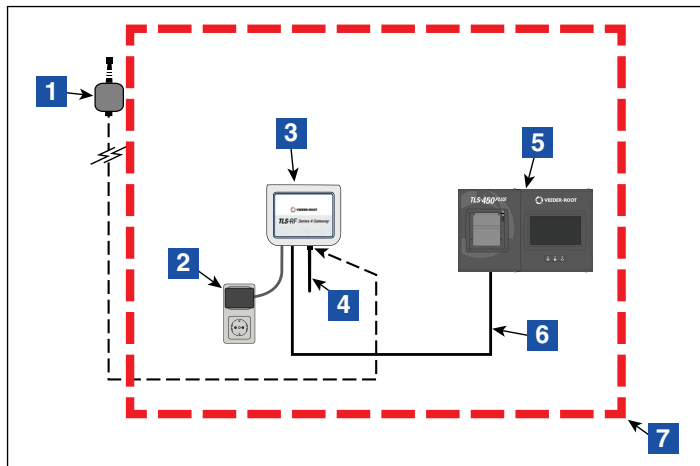


Figure 5. Gateway Installation Example

LEGEND FOR NUMBERED BOXES IN Figure 5

- | | |
|--|---|
| 1. Optional exterior antenna (may be used in lieu of the antenna included in the kit to improve Transmitter reception) | 5. TLS-450PLUS console shown. TLS4 console is also compatible with the Gateway. |
| 2. AC power source (wall outlet, 100– 240Vac) | 6. Gateway 'straight' Ethernet comm cable |
| 3. Gateway | 7. Non-hazardous location |
| 4. Antenna with +3 dBi of gain – shown in down (vertical) position. Set antenna in a 45 degrees (up) position if Gateway is mounted on a metal wall. | |

Gateway Panel

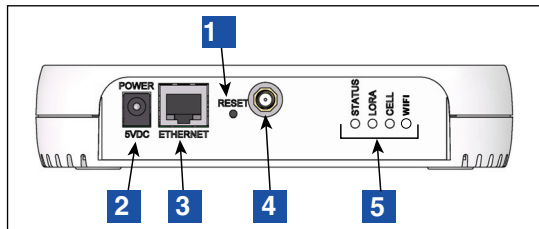


Figure 6. Gateway Panel Interface

LEGEND FOR NUMBERED BOXES IN Figure 6

- | | |
|-------------------------------------|---|
| 1. Gateway reset | 4. Gateway antenna connector – type RP-SMA (female) |
| 2. Gateway DC power connector | 5. Gateway LED status annunciators |
| 3. Gateway Ethernet RJ-45 connector | |

TLS-450PLUS Ethernet Connectors

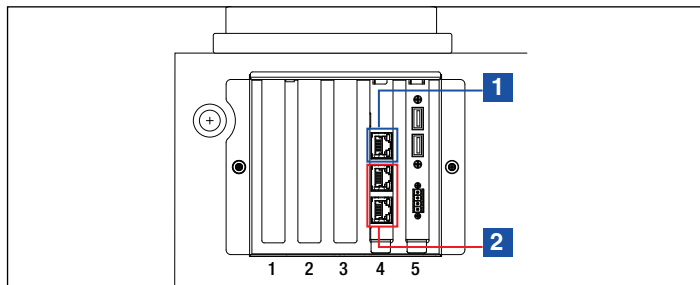


Figure 7. TLS-450PLUS Ethernet Connections

LEGEND FOR NUMBERED BOXES IN Figure 7

- | | |
|---|--|
| 1. Ethernet port 1 – ETH1 provides ATG network access | 2. Ethernet port 2 or 3 – ETH2 must be connected to the Gateway. |
|---|--|

TLS4 Ethernet Connectors

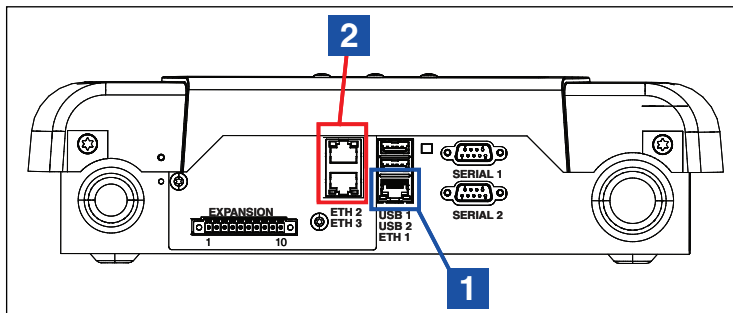


Figure 8. TLS4 Ethernet Connections

LEGEND FOR NUMBERED BOXES IN Figure 8

1. Ethernet port 1 – ETH1 provides ATG network access
2. Ethernet port 2 or 3 – ETH2 must be connected to the Gateway.

Gateway Mounting Bracket Installation



Refer to the label affixed to the Gateway for additional technical information.

It is recommended to change the default Gateway password that is found on the Gateway label on the rear of the unit. Refer to the 577014-483 TLS-RF Series 4 Wireless System Quick Startup Guide for instructions on how to change the Gateway password.

If the Gateway is instead mounted to its bracket prior to registering the Gateway with the ATG, then record the serial number of the Gateway from the label on the rear of the unit as it will be needed when registering the Gateway with the ATG.



Verify that, if applicable, the battery isolator is removed from the ATG's backup battery prior to Gateway installation. Failure to do so can result in the ATG being unable to successfully register the Gateway.

1. Select a mounting wall nearest the storage tanks/forecourt to provide optimum reception. Once the mounting wall has been determined, identify a position for the Gateway so the antenna will be clear of obstacles and will not interfere with employee traffic. The Gateway antenna should be at least 25.4mm (1") clear from any objects and be kept as far away as possible from electrically

conductive (in particular metal) objects. Avoid Gateway mounting locations which place metal obstructions or sources of electromagnetic interference within the lines of sight between the Gateway and Transmitters.

2. Get the mounting bracket (see Figure 9) and antenna from the Gateway installation kit. Locate a position on the wall to attach the Gateway mounting bracket.
3. Hold the mounting bracket against the wall and mark the screw locations on the wall. Drill holes for the screws and insert anchors. Place the mounting bracket over the anchors, using the bump-on set if desired, and secure it with screws.

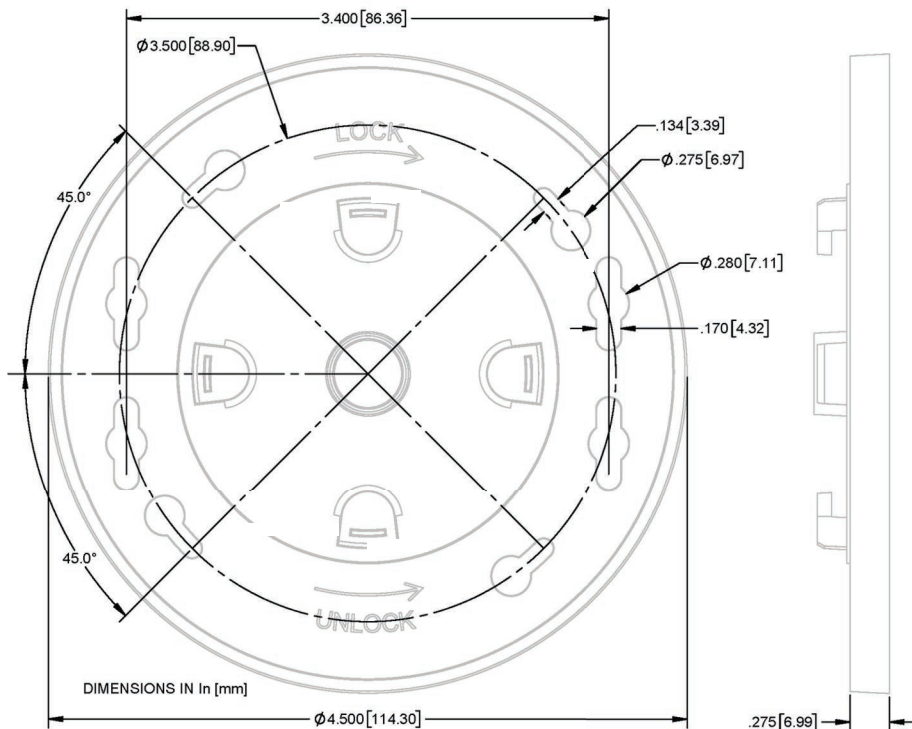


Figure 9. Gateway Mounting Bracket – Dimensions Inches [mm]

Setup ATG to Recognize the Gateway

1. Go to Menu>Setup>Date and Time (see Figure 10). Select Date and Time.

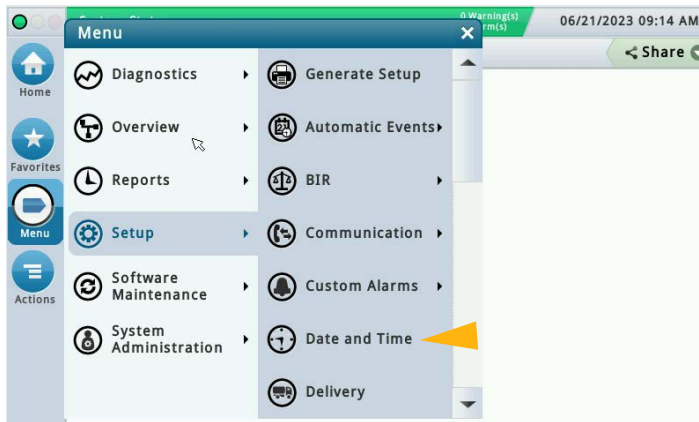


Figure 10. Select Date and Time Setup Screen

2. Set the current date (item 1, Figure 11) and time (item 2) and desired time zone (item 3). Alternatively, if desired and the ATG is connected to a network through ETH1, enable NTP (item 4) and then specify the NTP server (item 5). Select the ☒ button (item 6) to save the settings.

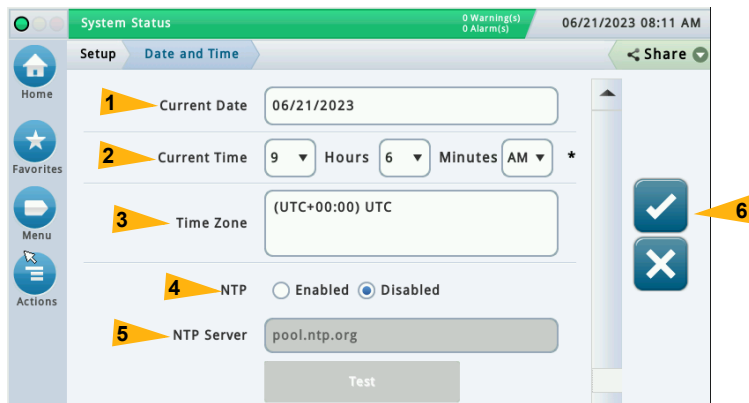


Figure 11. Date and Time Setup Screen

3. Go to Menu>Setup>Communication> Ethernet Port (see Figure 12).



Figure 12. Select Ethernet Port Setup Screen


4. In the Device Ribbon select Ethernet Port 2. Set the IP Address Type to **Static** (item 1, Figure 13), set the IP address for ETH2 to **192.168.4.14** (item 2), and set the IP Gateway Address to **192.168.4.1** (item 3). The remaining fields in the screen will self-populate. Select the  button (item 4) to save your choices.



Figure 13. Ethernet Port Setup Screen

Connect and Register the Gateway with the ATG

1. Select Menu>Setup>Communication>Gateway (see Figure 14).

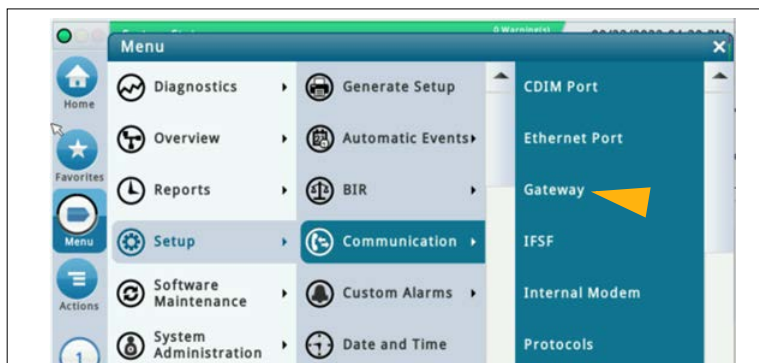


Figure 14. Accessing Gateway Setup Screen

2. In the Gateway setup screen select the Actions button (see Figure 15).

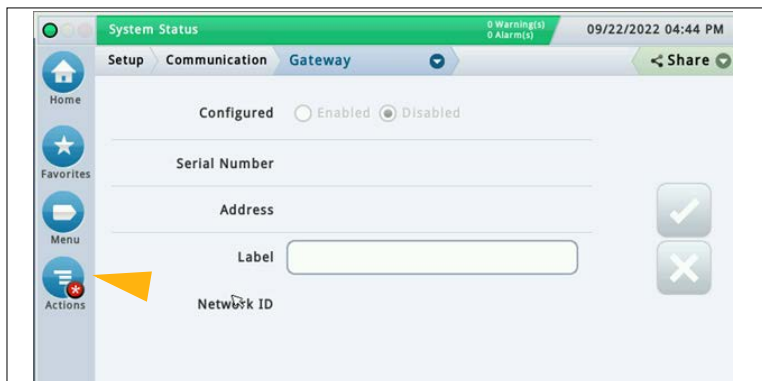


Figure 15. Gateway Setup Screen

3. Select **Add Gateway** from the popup window (see Figure 16).

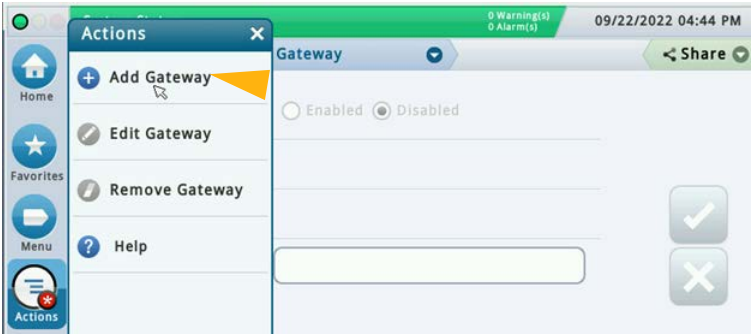


Figure 16. Add Gateway Action Popup

4. Read the Gateway serial number from the label on the rear of the unit. The serial number can be found on the label as depicted in Figure 17.

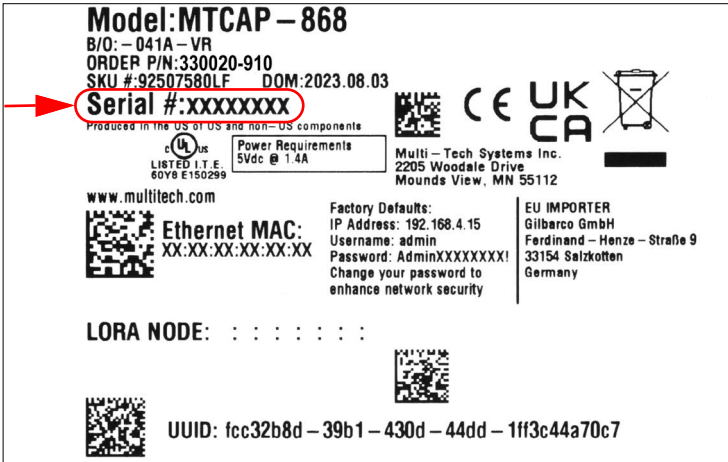



Figure 17. Example Gateway Label – Serial Number

5. Enter the Serial Number of the Gateway, (see example in Figure 18) then click the  button to save.

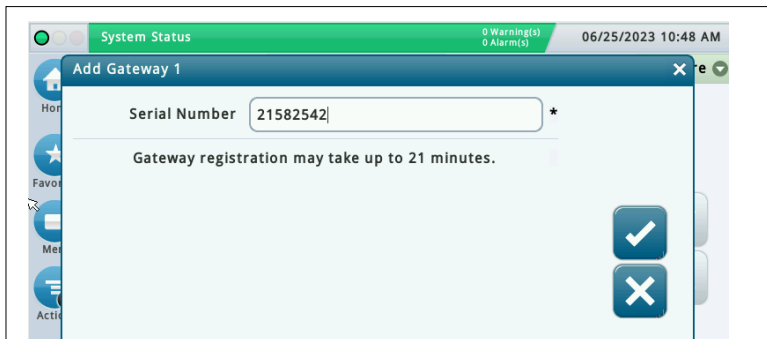



Figure 18. Entering Gateway Serial Number

 **The Gateway registration process can take up to 6 minutes from when the Gateway is powered up in Step 11 until 'Registration Successful' is shown on the Gateway setup screen per Figure 19. Fifteen minutes is allotted for the completion of Steps 6. through 10. As a result, the Add Gateway popup shown in Figure 18 indicates that Gateway registration may take up to 21 minutes to complete.**


6. Position the Gateway on the bracket and rotate it clockwise to lock it into place. Once mounted to the bracket the Gateway's antenna and panel interface will be facing down toward the floor.
7. Screw the Gateway antenna onto the antenna connector on the bottom of the unit.
8. If the mounting wall is metal, rotate the Gateway antenna up 45 degrees from vertical, otherwise the antenna should be pointing straight down.
9. Connect the Ethernet cable between the Gateway and the ATG. The Gateway must be connected to the TLS console's ETH2 port (either of the (2) RJ-45 connectors).
10. Connect the Gateway power cable to a dedicated outlet.
11. Power on the Gateway – observing the LED annunciators on the Gateway Panel Interface (ref. Figure 6) wait for the LORA LED to turn on solid and the STATUS LED to blink twice. This indicates that the Gateway is ready for use. However, another approximately 3 minutes is required after the Gateway LED's indicate that it is ready for use until the ATG receives the Gateway's identification/status information and then registers the Gateway to it.

 **After saving the Gateway Serial Number to the ATG in Step 5 above, Gateway registration must be completed within 1 hour of powering up the Gateway (1 hour is the Gateway discovery timeout setting). If >1 hour passes then it is necessary to power cycle the Gateway to successfully register the Gateway to the ATG.**

12. Figure 19 displays an example of a registered Gateway.



Figure 19. Registered Gateway Screen

13. Enter a label for the Gateway, then select the  button to save it. To aid with positive Gateway identification it is suggested to leverage the header fields from the ATG's Setup > Headers screen for the Gateway label.
14. Only change the Network ID field (default is 0) if necessary after reviewing the "Transmitter DIP Switch Usage" troubleshooting section.
15. Proceed to install each of the site Transmitters.

Gateway Replacement

If a Gateway which had already been registered to the ATG requires replacement, then perform the following steps to register the replacement Gateway to the ATG:

1. Select Menu > Setup > Communication > Gateway within the ATG (see Figure 14).
2. In the Gateway setup screen note the Network ID value shown. To avoid having to change the Transmitter Network ID DIP switch settings the Network ID of this replaced Gateway must match the Network ID of the replacement Gateway.
3. In the Gateway setup screen select the Actions button (see Figure 15).
4. Select Edit Gateway from the popup window (see Figure 16).
5. Read the replacement Gateway serial number from the label on the rear of the unit (see Figure 17).
6. Erase the Serial Number for the replaced Gateway and enter the Serial Number for the replacement Gateway (see Figure 20).

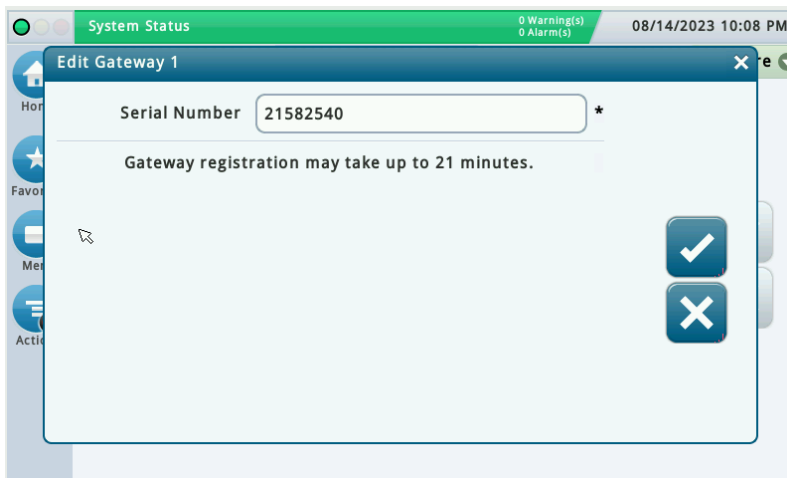


Figure 20. Edit Gateway Screen

7. Click the ☒ button to save the new Gateway serial number and begin the process of registering the replacement Gateway to the ATG (see Figure 21).



Figure 21. Replacement Gateway Registration Screen

! The Edit Gateway action edits the Serial Number for the existing Gateway database entry within the ATG. Alternatively, first the Remove Gateway action can be selected (which removes the Gateway database entry from the ATG) and then the Add Gateway action can be selected (as described in the section “Connect and Register the Gateway with the ATG” on page 22) to register the replacement Gateway to the ATG.

8. Disconnect the antenna and Ethernet and power cables from the replaced Gateway.
9. Rotate the replaced Gateway counter-clockwise to unlock and remove it from the bracket.
10. Refer to the NOTICE prior to Step 6. and Steps 6. through 13. in the section “Connect and Register the Gateway with the ATG” for instructions on mounting the replacement Gateway to the bracket and connecting the Gateway to the ATG in order to complete the registration process.
11. Verify that the Network ID of the replacement Gateway matches that of the replaced Gateway. If it does not then update the Network ID:

- Click the Network ID field (item 1, Figure 22).



Figure 22. Network ID Field

- Enter the matching Network ID and select the ☒ button (item 1, Figure 23).

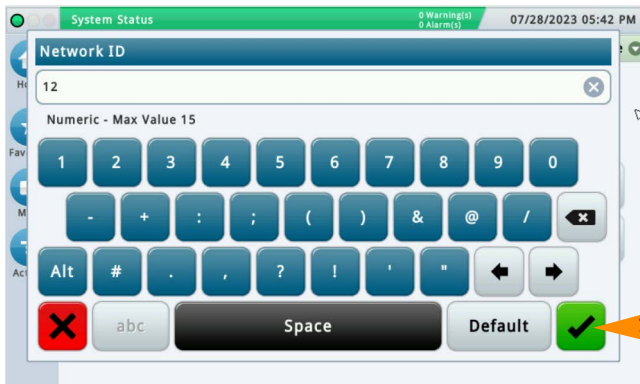



Figure 23. Enter New Network ID

- The * (item 1, Figure 24) that now appears next to the Network ID field indicates that the Network ID has been changed but not saved. Verify the Network ID value and then select the  button (item 2, Figure 24) to save the Network ID to the replacement Gateway.

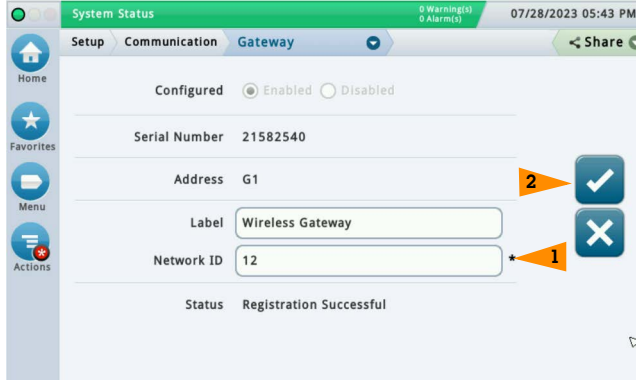


Figure 24. Save Network ID

- While the Gateway is reconfiguring to the new Network ID the field is invisible (see Figure 25). Typically, Gateway reconfiguration completes within 45 seconds, although occasionally the timing is such that almost 3 minutes is required.

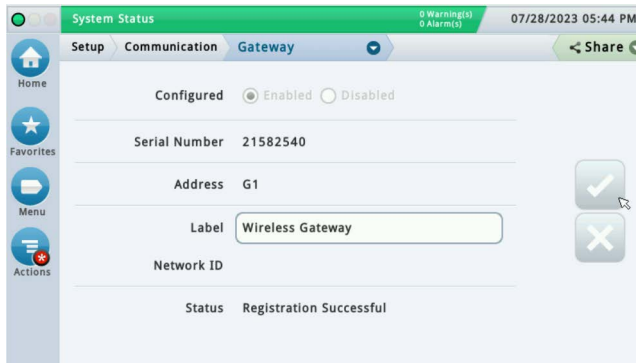


Figure 25. Gateway Reconfiguring to New Network ID

- Gateway reconfiguration has completed when the Network ID field reappears and the * is removed from next to the Network ID field (see Figure 26).

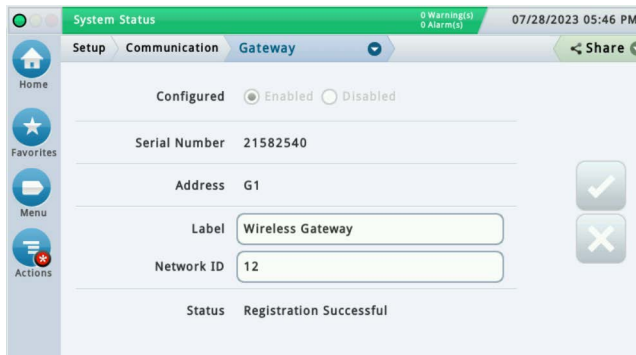


Figure 26. Gateway Network ID Reconfiguration Complete



Within 20 minutes of the replacement Gateway registering to the ATG, each of the Transmitters that were connected to the replaced Gateway will cause their devices to go into either Probe Out or Communication alarm while the Transmitters connect to the replacement Gateway's network. The alarms will automatically clear, typically within 3 minutes.

TRANSMITTER INSTALLATION

The TLS–RF Series 4 Transmitter System kit includes the contents in Table 2:

Table 2. Transmitter Kit Components

Qty.	Description
1	TLS–RF Series 4 Transmitter
1	Battery Pack
1	577014–245 ATEX EU Foreign Language Manual Notice
1	330020–528 or 330020–835 Installation Hardware Kit – Includes hardware required to install Transmitter and Battery Pack
1	(only for kits that include 330020–528) 577014–127 Intrinsically Safe Circuit Protector: Installation References
1	577013–578 ATEX TLS Monitoring Systems Contractors' Site Preparation Guide
1	577014-497 TLS–RF Series 4 Wireless Transmitter & Battery Pack EU Declaration of Conformity
1	331940–005 ATEX TLS Radio Group Descriptive System Document
1	334195–001 Power Cable 1.5m (5')

Transmitter Antenna Notes

1. Position the Transmitter as high and away from electrically conductive components and electromagnetic interference sources in the sump/dispenser as possible for the reasons below:
 - Less susceptibility to multipath interference
 - Less prone to being submerged in liquid (which degrades radio performance)
 - Better line of sight between the Gateway and Transmitter
2. Where it is impossible to install the Transmitter with the antenna oriented vertically (perpendicular to the ground), the antenna must be oriented horizontally (parallel with the ground) and pointed approximately 90 degrees to the location of the Gateway (see Figure 27).

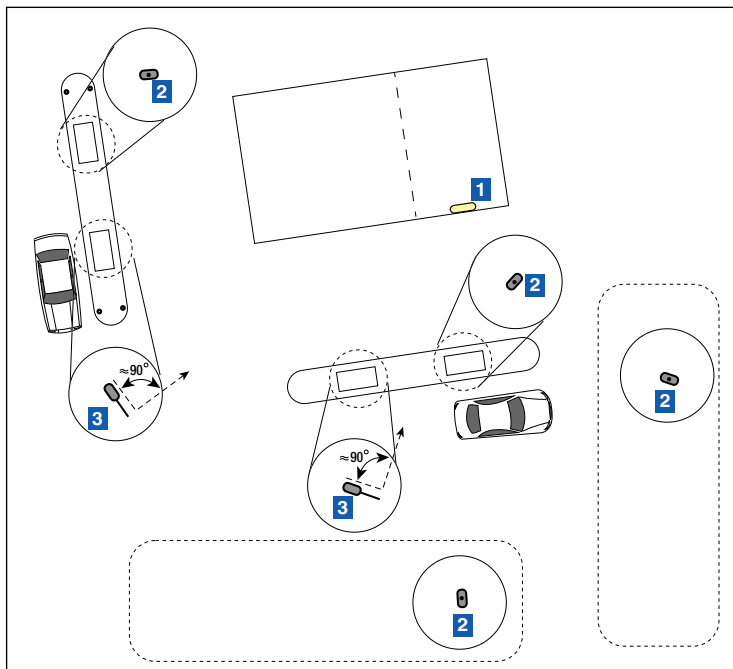


Figure 27. Positioning Horizontal Transmitter Antennas

LEGEND FOR NUMBERED BOXES IN Figure 27

1. Gateway location (antenna in vertical (down) position) – Locate on wall nearest tanks.
2. Transmitter antenna in vertical position – no orientation requirements
3. Transmitter antenna in horizontal position – recommend be set at 90 degree offset to Gateway antenna.



WARNING



FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.

Explosive vapors or flammable liquids could be present near locations where fuels are stored or being dispensed. The TLS-RF Series 4 Transmitter and Battery Pack are not explosion proof but are intrinsically safe devices approved for use in Group IIA hazardous locations.

The TLS-RF Series 4 Transmitter and Battery Pack are suitable for installation in Zone 1.

To protect yourself and others from being struck by vehicles, block off your work area with cones, safety tape or barricades during installation or service.

Transmitter Installation – Sump

Prior to taking the Transmitters out to their installation locations record the location of each Transmitter along with its Device EUI number from the product information label on the side of each Transmitter (see Figure 3). Also record the serial number for the device (i.e. Probe or Sensor) that the Transmitter is wired to. You will need these numbers during device setup and for diagnostics. The Transmitter Device EUI can also be found on the product information label on the interior of each Transmitter.

Refer to the “Troubleshooting – Transmitter DIP Switch Usage” section and Appendix A for guidance and information regarding DIP switch usage.

A Transmitter/Battery Pack pair is required for each device that will be monitored by the ATG. Follow the steps below to install the Transmitter system.

1. Attach the two 12.7 mm [1/2"] conduit clamps to the two riser hangers from the installation hardware kit (330020–528 or 330020–835) (50.8 mm [2"] or 101.6 mm [4"], as required) as shown in Figure 28. Orient riser hangers so holes for 12.7mm (1/2") clamps are vertically aligned.

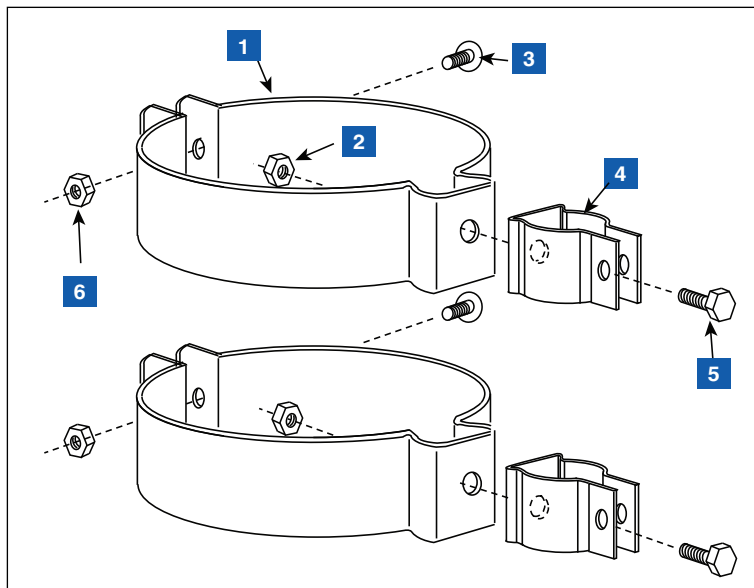


Figure 28. Attaching 12.7 mm [1/2"] Conduit Clamps to Riser Hangers

LEGEND FOR NUMBERED BOXES IN Figure 28

- | | |
|--|---|
| 1. 50.8 mm or 101.6 mm riser hanger [as required] – 2 places | 5. 6.35mm–20 x 12.7mm (1/4"–20 x 1/2") hex head bolt – 2 places |
| 2. 6.35mm–20 (1/4"–20) hex nut – 2 places | 6. Nut provided with riser hanger – 2 places |
| 3. Bolt provided with riser hanger – 2 places | |
| 4. 12.7mm (1/2") metal conduit clamp (bolt not shown) – 2 places | |

2. Attach 12.7 mm (1/2") conduit to the 12.7 mm (1/2") metal clamps as shown in Figure 29 and tighten. The clamp bolts are integral to the clamps and do not require retention nuts.

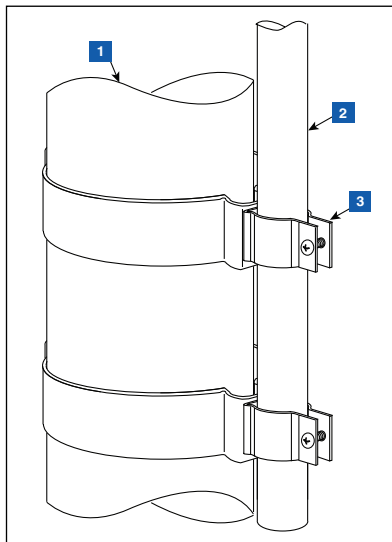


Figure 29. Attaching 12.7mm Conduit to 12.7mm Clamps on Riser

LEGEND FOR NUMBERED BOXES IN Figure 29

- | | |
|---|--|
| <ol style="list-style-type: none">1. Probe Riser2. Customer supplied 12.7mm (1/2") conduit.
For a sump installation the conduit should be of an appropriate length to allow for the Transmitter to be installed with a 25.4mm (1") gap between the antenna tip and sump lid. | <ol style="list-style-type: none">3. 12.7mm (1/2") metal clamps with integral bolts – 2 places |
|---|--|

3. Attach Transmitter to support bracket as shown in Figure 30.

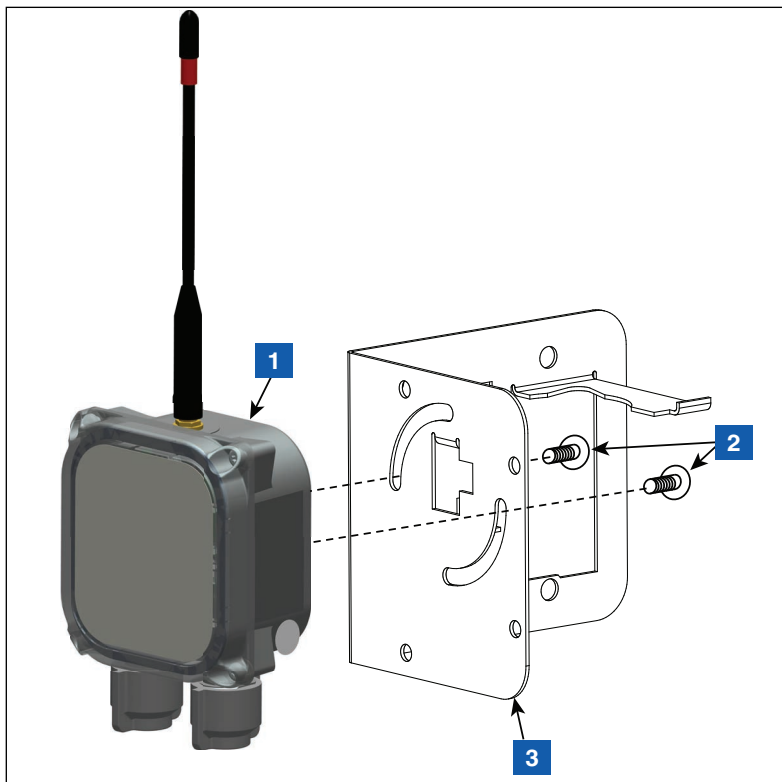


Figure 30. Attach Transmitter to 332295-001 Bracket

LEGEND FOR NUMBERED BOXES IN Figure 30

1. Transmitter
2. #10-32 x 12.7mm (½") taptite screw – 2 places

3. Support bracket

4. Attach two 12.7mm (1/2") plastic clamps to the support bracket as shown in Figure 31.

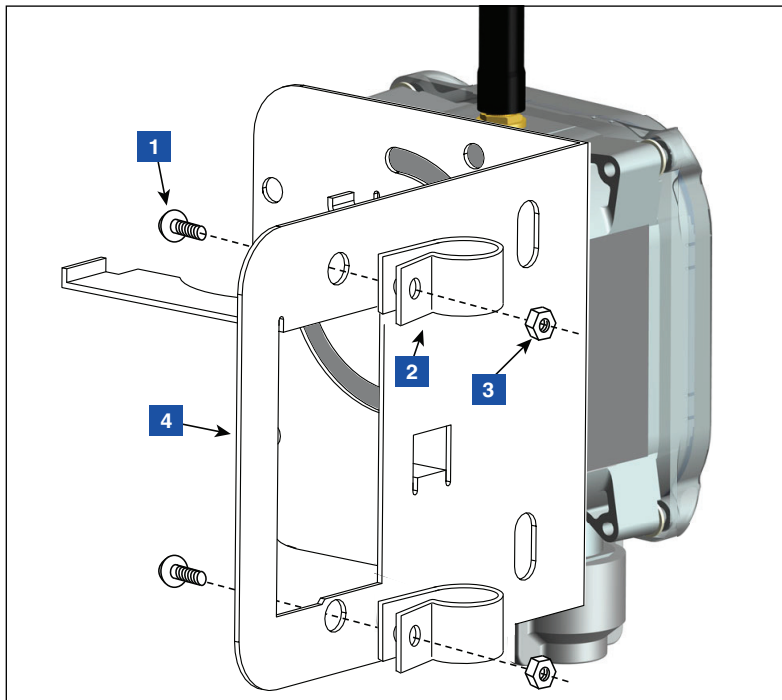


Figure 31. Attach Conduit Clamps to Support Bracket

LEGEND FOR NUMBERED BOXES IN Figure 31

- | | |
|---|------------------------------|
| 1. #10-32 x 12.7mm (1/2") tapite screw – 2 places | 3. #10-32 hex nut – 2 places |
| 2. 12.7mm (1/2") plastic clamp – 2 places | 4. Support bracket |

5. Loosen the clamps installed in Step 4 on the back of the support bracket and slide the two clamps down over the conduit. Position the support bracket so the tip of the antenna is about 25.4mm (1 inch) below the top of the sump, then tighten the two conduit clamps (see Figure 32). Insert the Battery Pack into its support bracket cradle as shown.

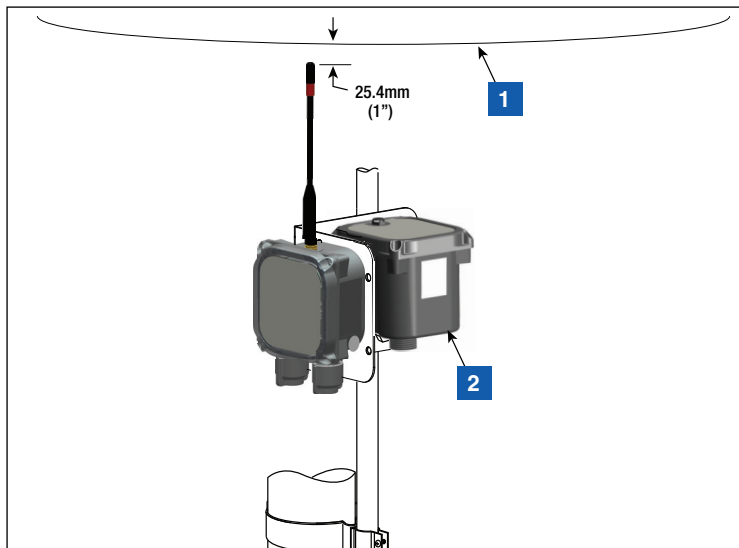
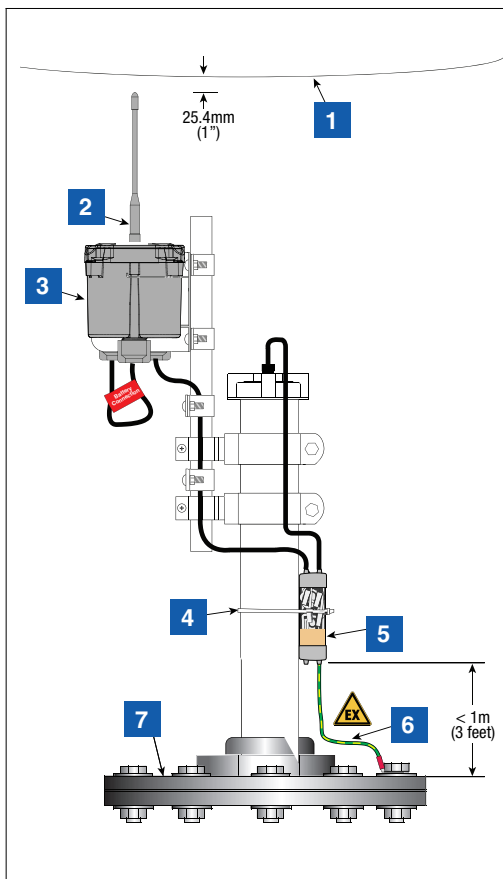


Figure 32. Installing Support Bracket at Recommended Transmitter Antenna Position

LEGEND FOR NUMBERED BOXES IN Figure 32

- | 1. Top of sump | 2. Battery Pack |
|--|-----------------|
| 6. Get the surge protector from the 330020–528 installation hardware kit and splice it in the cable between the device (e.g. Mag Probe or Mag Sensor) and the Transmitter as described in “Surge Protector Installation” on page 43. | |
| 7. Secure cables to the 12.7mm (½”) conduit using (2) 12.7mm (½”) plastic clamps, (2) #10–32 x 25.4mm (1”) screws, and (2) #10–32 hex nuts included in the kit. | |
| 8. Refer to Figure 33 for an example of a completed Transmitter installation within a sump. | |



LEGEND FOR NUMBERED BOXES IN Figure 33

1. Top of sump
2. Transmitter attached to support bracket. Positioned so antenna tip is within 25.4mm (1") of sump cover.
3. Battery Pack
4. Tie wrap Surge Protector to riser.
5. Single channel surge protector from installation hardware kit. Install within 1m (3 feet) of tank entry. Reference manual 577014-055 for more information.
6. Bond surge protector's 12 AWG (4mm²) protective earth wire to earth. Hardware not supplied in the installation kit may be required to make this connection. Refer to 577014-055 Grounding and Surge Protection: Recommended Practice for installation details.
7. Tank flange

Figure 33. Example Mag Probe Transmitter Cable Connections

Mag Sensor Installation – Dispenser Pan

1. A Transmitter/Battery Pack pair is installed with each Veeder–Root Mag Sensor in dispenser pans.
2. Install the Mag Sensor in the dispenser's pan area following instructions accompanying the sensor.
3. Using two #10–32 x 12.7mm (½") taptite screws from the installation kit, attach the Transmitter to the support bracket that has the two circular slots (see Figure 34). Do not tighten screws at this time.
4. Using 25.4mm x 152.4mm (1" x 6") slotted flat bar, two 6.35mm–20 x 76.2mm (¼"–20 x 3") bolts, and two 6.35mm–20 (¼"–20) hex nuts from the installation hardware kit, clamp the support bracket to the DIN railing/tubular support at or below shear valve (see Figure 35).
5. Insert the Battery Pack into its support bracket cradle.
6. Splice the Surge Protector into the cable connecting the Mag Sensor to the Transmitter as discussed in "Surge Protector Installation" on page 43.

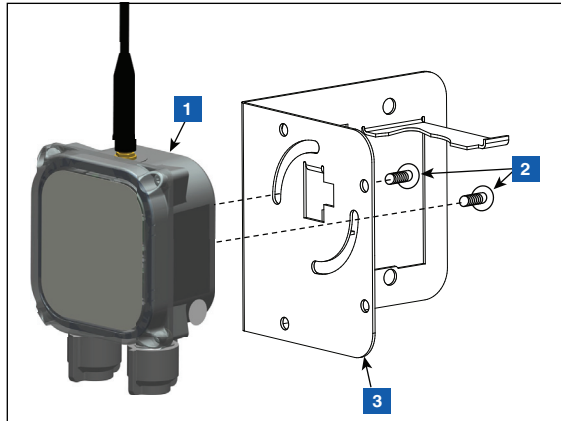


Figure 34. Attaching Transmitter To Support Bracket

LEGEND FOR NUMBERED BOXES IN Figure 34

- | | |
|---|--------------------|
| 1. Transmitter | 3. Support Bracket |
| 2. #10-32 x 12.7mm [1/2"] taptite screws – 2 places | |

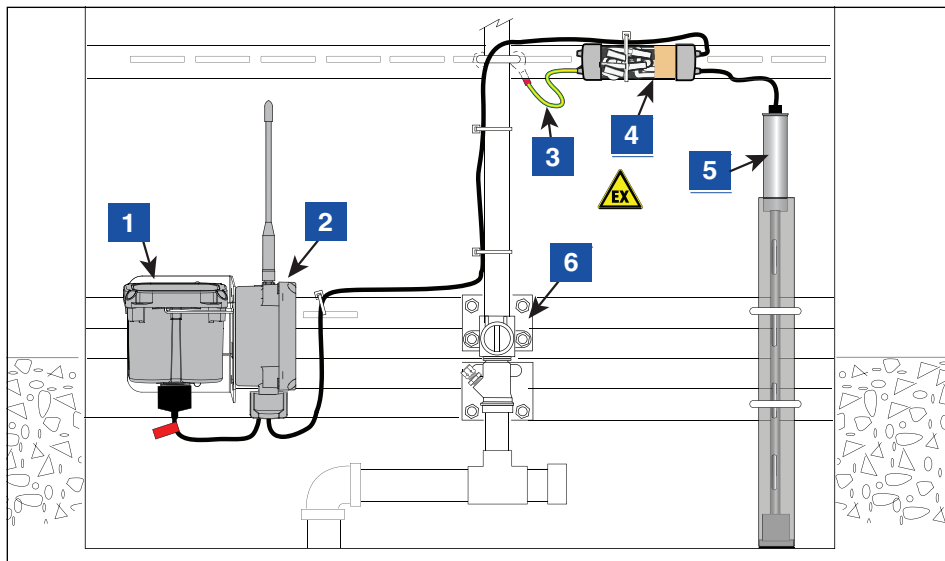


Figure 35. Example Mag Sensor Transmitter Cable Connections

LEGEND FOR NUMBERED BOXES IN Figure 35

1. Battery Pack

2. Transmitter in vertical position



It may be necessary to remove the Transmitter from the Support Bracket and tie wrap it to a higher structural/piping member in the hydraulic compartment to improve Transmitter wireless communication performance and/or achieve a vertical antenna position.



3. Bond surge protector's 12 AWG (4mm²) protective earth wire to earth. Hardware not supplied in the installation kit may be required to make this connection. Refer to 577014–055 Grounding and Surge Protection: Recommended Practice for installation details.
4. Single channel surge protector from installation hardware kit. Reference manual 577014–055 for more information.
5. Dispenser Mag Sensor
6. Shear valve

Surge Protector Installation

Get the surge protector components from the Transmitter Installation Hardware kit P/N 330020–528 (see Figure 36).

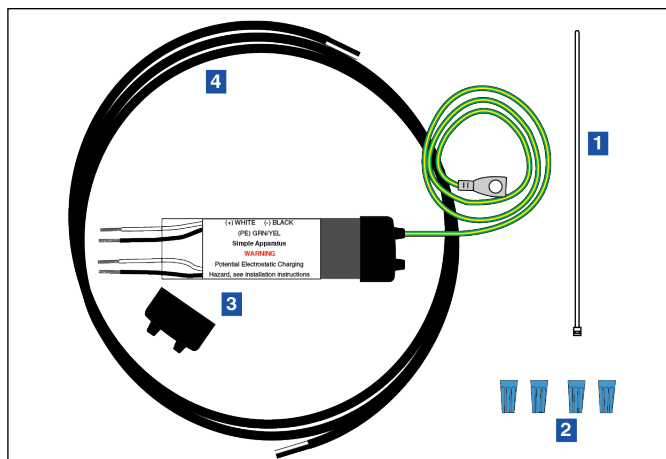


Figure 36. Single Channel Surge Protector Group

LEGEND FOR NUMBERED BOXES IN Figure 36

- | | |
|---------------|------------------------------|
| 1. Cable wrap | 3. Surge protector |
| 2. Wire nuts | 4. Cable (1.5m [5'], 18 AWG) |

Splicing Surge Protector to Cables

1. Cut the soft vinyl epoxy enclosure end cap entrance holes to accommodate each cable diameter. Keep the hole sizes to a minimum. Insert about 127mm (5") of the 1.5m (5') cable provided in the Transmitter installation hardware kit and the device's cable through the openings [Figure 37]. The 1.5m (5') cable provided in the kit will already have 76mm (3") of the outer jacket removed from the end to insert through the openings, while the other end to connect to the Transmitter will already have 38mm (1.5") of the outer jacket removed. Remove 76mm (3") of the outer jacket from the device's cable. Trim the insulation from the conductors. The 1.5m (5') cable provided in the Transmitter Installation Hardware kit will be connected to the Transmitter.

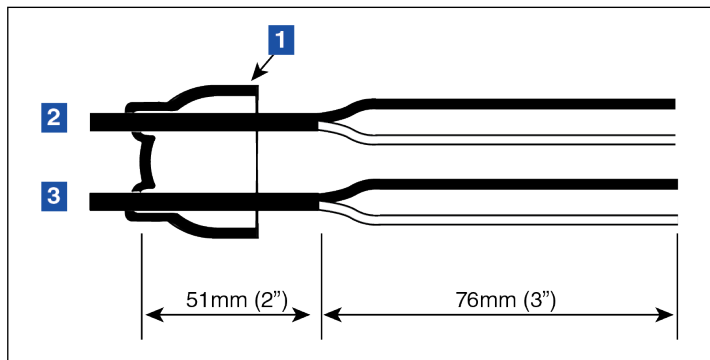


Figure 37. Cable Length Dimensions

LEGEND FOR NUMBERED BOXES IN Figure 37

- | | |
|------------------------|---------------------------|
| 1. Surge protector cap | 3. Cable from Transmitter |
| 2. Cable from device | |

- Make the connections to the four black and white wires in the surge protector using wire nuts as shown in Figure 38.

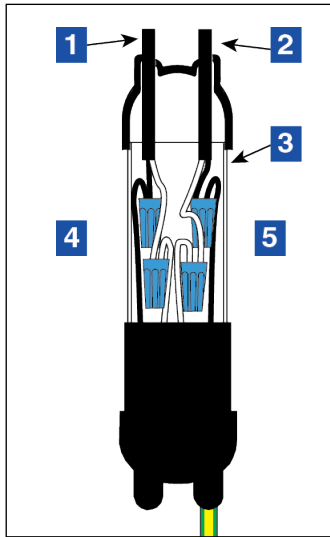


Figure 38. Splice Connections

LEGEND FOR NUMBERED BOXES IN Figure 38

- | | |
|---|--|
| 1. Cable from Transmitter | 5. Connect device cable wires to surge protector wires black to black and white to white |
| 2. Cable from device | |
| 3. Surge protector enclosure | |
| 4. Connect Transmitter cable wires to surge protector wires black to black and white to white | |

3. Center the splices in the clear plastic sleeve. Assemble the surge protector enclosure, making sure the sleeve is fully inserted into each of the vinyl end caps. Rotate the sleeve cover until both openings line up. Place the enclosure on a level surface.



WARNING



Sealing compound contains isocyanate. Vapor and liquid may cause sensitization. May be irritating to the eyes.

Avoid skin and eye contact. Avoid repeated and prolonged breathing of vapor. Use only in well ventilated areas or wear respiratory protection. Wear chemically resistant gloves.

Inhalation – provide fresh air. In case of eye contact flush eyes with plenty of water for 10 minutes and get medical attention. If ingested do not induce vomiting. Get medical attention. Wash with soap and water in case of skin contact.

4. Remove bag of “Sealing compound” from foil package. Grasp the ends, one in each hand, then pull sharply to remove plastic clip [Figure 39].

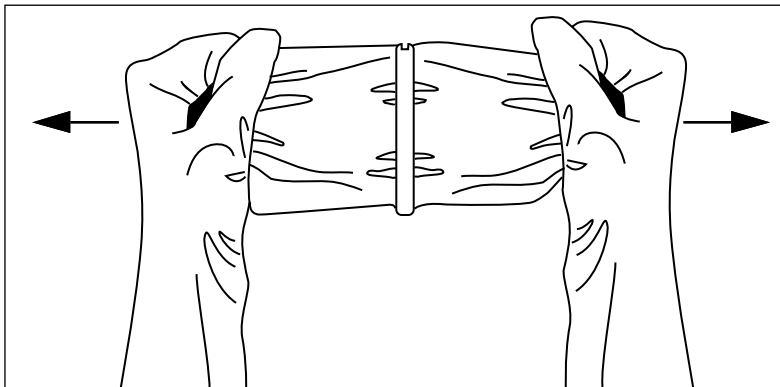


Figure 39. Removing Sealing Compound Clip

5. Thoroughly mix compound together. Invert bag several times while squeezing compound from one end to the other for a minimum of one minute.
6. Once the mixture feels warm, immediately cut one corner and slowly fill the surge protector's plastic sleeve. Stop just short of filling the entire sleeve. Do not overfill. [Figure 40].

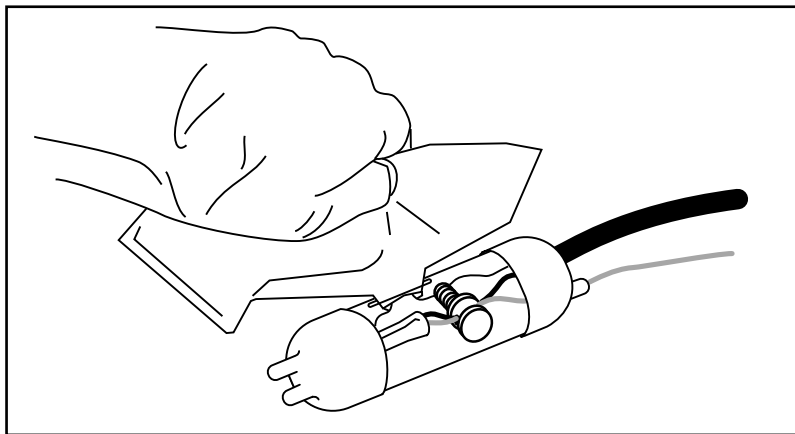


Figure 40. Pouring Sealing Compound Into Sleeve

7. With a twisting motion, rotate the outer clear plastic barrel to close the pouring slot.
8. Wait at least five minutes, then use the large cable tie to mount the surge protector to the riser pipe or dispenser hardware as applicable and connect green/yellow protective earth wire from surge protector to an appropriate earthed connection point.

Transmitter Cable Connections

1. The label on the cover of the Transmitter indicates the cable entry points to be used for the device and power cables.



To prevent ignition of flammable or combustible atmosphere do not connect to the Battery Pack at this time.

2. Using a T15 Torx torque wrench, remove the cover of the Transmitter and set it aside



Do not leave the cover removed while the Transmitter is unattended. Damage can occur to the electronics that are exposed to the environment with the cover removed.

3. Get the two cord grip nuts and two bushings from the installation hardware kit. Slide the nut and then bushing onto each cable in the orientation shown in Figure 42. Verify that the bushing taper is oriented as shown in Figure 42 to ensure proper sealing.
4. Attach the cable from the surge protector to the DEVICE terminal block (white to PWR and black to GND) and the power cable to the BATTERY terminal block (white to PWR and black to GND) as shown in Figure 41 and Figure 42. Hand tighten both cable entry cord grip nuts until the cables are held firmly. Pull on the cables to verify that the nuts and bushings are relieving strain from the wire/terminal connections.



Observe polarity for all cable connections.

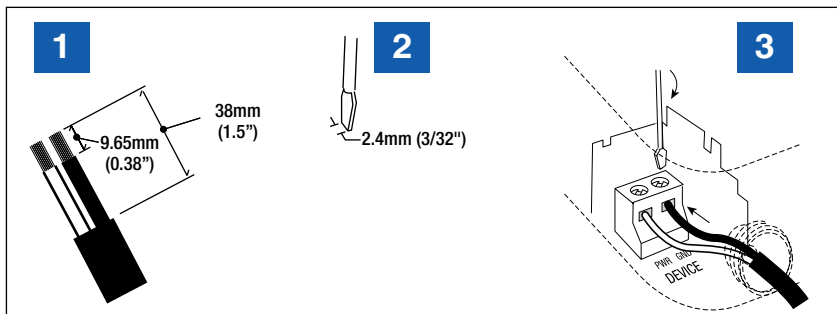


Figure 41. Typical Input Wiring to Transmitter Terminal Block

LEGEND FOR NUMBERED BOXES IN Figure 41

- | | |
|--|--------------------------------------|
| 1. Strip back cable and wire jackets the amount shown. | 3. Wires must be tight in terminals! |
| 2. Use a screwdriver with the proper blade width. | |

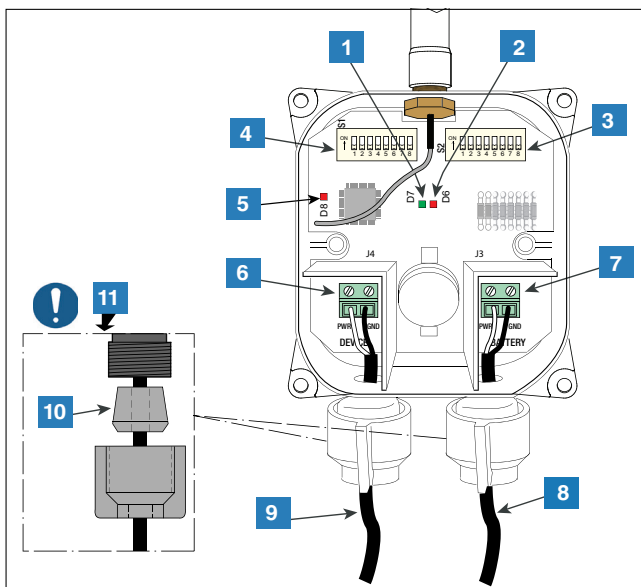


Figure 42. Connecting Device and Power Cables to the Transmitter

LEGEND FOR NUMBERED BOXES IN Figure 42

1. Green LED (D7) – ON during a device poll by the Transmitter
2. Red LED (D6) – ON when the radio is sent data for transmission
3. Switch 2 DIP switches
4. Switch 1 DIP switches
5. Red LED (D8) – ON for 20 seconds once the radio establishes a connection with the Gateway. D8 will turn off within 20 seconds if the radio disconnects from the Gateway and attempts to establish a new connection.
6. Device input terminals (PWR and GND). Observe polarity!
7. Power input terminals (PWR and GND).
8. Cable from Battery Pack – observe polarity
9. Cable from surge protector
10. Cord grip bushing
11. Orient tapered bushing as shown when attaching cord grips to Transmitter. Hand tighten the cord grip nuts until the cables are held firmly.

Establishing Communication with the Transmitter

Starting with the first Transmitter, follow the steps below to establish/verify ATG recognition of the Transmitter and its device.

1. Verify that the Gateway is registered to the ATG, as described in the “Gateway Installation” section.
2. With the Transmitter already connected to its device connect the Transmitter power cable to the Battery Pack. Upon power on the Transmitter begins in the diagnostic mode of operation, whereby the Transmitter diagnostic message is transmitted every 2 minutes for 30 minutes (default) – see DIP Switch 1, DIP 1–3 settings. When the diagnostic timeout is reached (default is 30 minutes) the Transmitter transitions to the normal mode of operation, whereby the Transmitter diagnostic message is transmitted every 6 hours.
3. With the cover removed from the Transmitter and the (4) screws retained to the cover by the retaining washers, observe the following Transmitter LED patterns (ref. Figure 42):
 - a. Upon power up the green LED (D7) blinks rapidly for ~5 seconds, then slowly for ~30 seconds.



If the Transmitter is unable to join the Gateway network during the first series of attempts which lasts ~55 seconds, then D7 will again blink rapidly for ~5 seconds, then slowly for ~30 seconds before performing a second series of join attempts.

- b. Bright red LED (D8 on far left side of board) turns on – this indicates that Transmitter has joined the Gateway network.
- c. Every 6 seconds (default – see DIP Switch 2, DIP 1–4 settings) the green LED (D7) will blink once – this indicates a device poll by the Transmitter.



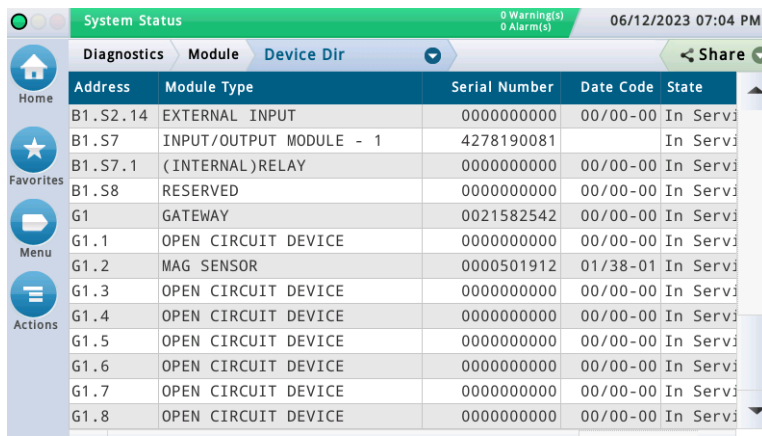
If the green LED (D7) blinks more than once at a time, then the device polls are suffering from Parity, Partial, and/or Communication Errors. As a result the device will not appear in the Device Directory screen as described in Step 4. Refer to the “Following Bright Red LED (D8) Turning On, Green LED (D7) Blinks More Than Once at a Time” sub-section of the “Failure to Observe Correct LED Pattern” troubleshooting section for steps to take to resolve the issue.

- d. The dimmer red LED (D6) to the right of the green LED blinks when the radio is sent data for transmission.



The Transmitter LED's will turn off ~2 minutes after the bright red D8 LED turns on to conserve energy.

4. At the ATG, navigate to the Diagnostics > Module > Device Directory screen (see Figure 43). Verify the following:
 - Serial number for the device connected to the Transmitter is listed in the "Serial Number" column, and the "Module Type" column indicates the expected device type (e.g. Mag Probe or Mag Sensor) – record the address listed for the Device/Transmitter (e.g. G1.1) for use in the next step.
 - State for both the Gateway (e.g. address G1) and Device/Transmitter (e.g. address G1.1) is "In Service".



The screenshot shows the 'System Status' interface with a green header bar. Below the header, there are tabs for 'Diagnostics', 'Module', and 'Device Dir'. The 'Device Dir' tab is selected. A table lists various system components with columns for Address, Module Type, Serial Number, Date Code, and State. The table includes entries for B1.S2.14, B1.S7, B1.S7.1, B1.S8, G1, and a series of G1.x devices (G1.1 to G1.8).

Address	Module Type	Serial Number	Date Code	State
B1.S2.14	EXTERNAL INPUT	0000000000	00/00-00	In Servi
B1.S7	INPUT/OUTPUT MODULE - 1	4278190081		In Servi
B1.S7.1	(INTERNAL)RELAY	0000000000	00/00-00	In Servi
B1.S8	RESERVED	0000000000	00/00-00	In Servi
G1	GATEWAY	0021582542	00/00-00	In Servi
G1.1	OPEN CIRCUIT DEVICE	0000000000	00/00-00	In Servi
G1.2	MAG SENSOR	0000501912	01/38-01	In Servi
G1.3	OPEN CIRCUIT DEVICE	0000000000	00/00-00	In Servi
G1.4	OPEN CIRCUIT DEVICE	0000000000	00/00-00	In Servi
G1.5	OPEN CIRCUIT DEVICE	0000000000	00/00-00	In Servi
G1.6	OPEN CIRCUIT DEVICE	0000000000	00/00-00	In Servi
G1.7	OPEN CIRCUIT DEVICE	0000000000	00/00-00	In Servi
G1.8	OPEN CIRCUIT DEVICE	0000000000	00/00-00	In Servi

Figure 43. Device Directory Screen

5. Navigate to the Setup>Device screen and select the device type (e.g., Probe or MAG Sensor) from the ribbon on the bottom. If the selected device number (e.g. Probe 1) has the Configured field set to Enabled, then instead select a different device number that has the Configured field set to Disabled. In the **Address** field select the down arrow and select the address noted in Step 4. (e.g. G1.1) (see Figure 44).

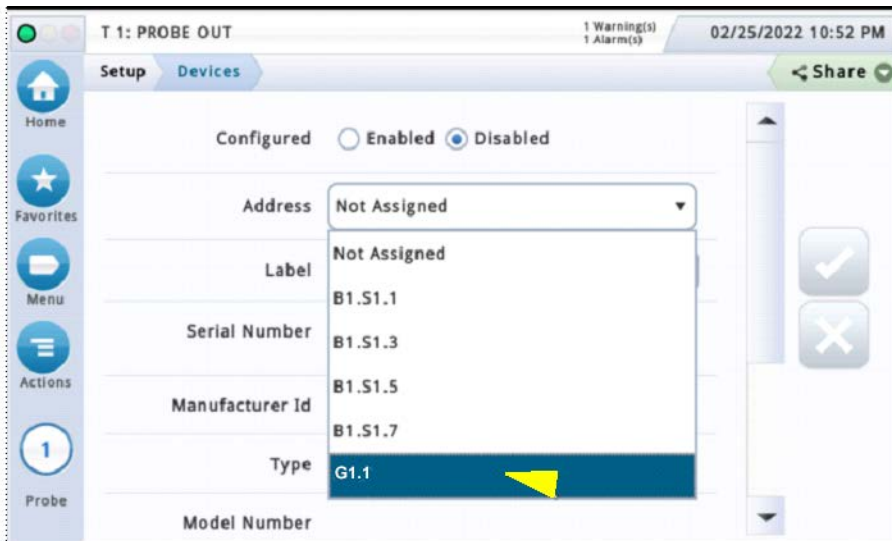


Figure 44. Example – Selecting First Transmitter Gateway Address


6. Next enter a label for the Transmitter (e.g., Unleaded Tank).
7. The Device Timeout field is by default set to 10 minutes. If the ATG does not receive a message from the device after this timeout period an alarm is posted by the ATG. The timeout value can be lowered to 5 minutes, or increased to at most 24 hours. If the radio signal quality for a device's Transmitter is very poor then the Device Timeout can be increased to a value such that communication alarms no longer get raised during normal operation.

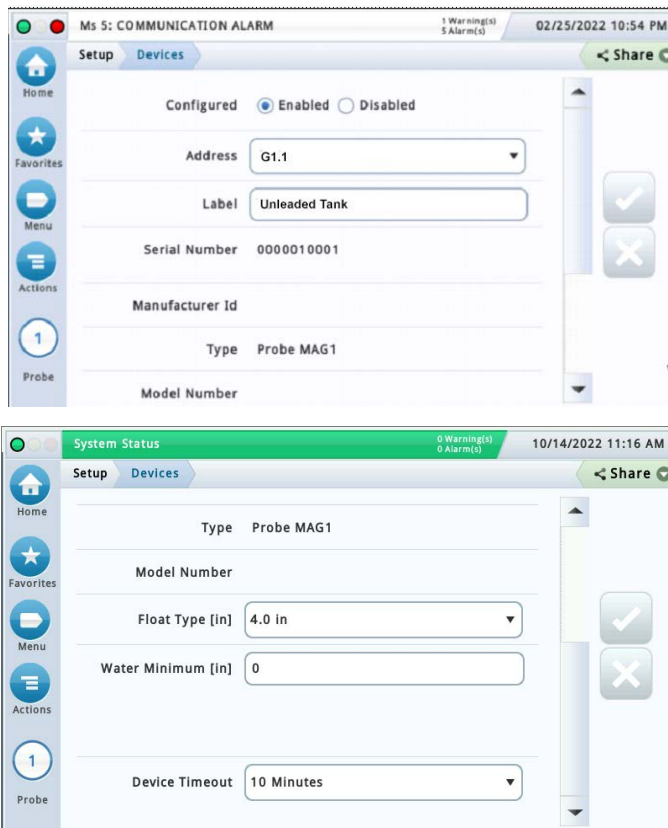


To see the Device Timeout field it may be necessary to close (select "X") the ribbon on the bottom of the screen.



If several Probe Outs are observed from each of at least three devices with the Device Timeout for each set to 10 minutes (default), then installing an external antenna with cable in place of the antenna included in the Gateway kit can improve radio signal quality across all Transmitters. Ensure that the external antenna and cable conform to the applicable regulations as detailed in 577014-497, including that the antenna has a maximum gain of +3 dBi.

8. Select and enter the values for the other Setup > Device screen fields according to the type of device being setup.
9. Select the Enabled radio button within the Configured field, then select the  button to save your choices (see example in Figure 45).



The figure consists of two screenshots of a mobile application interface for setting up a wireless device. Both screenshots show the 'Setup > Devices' screen for a device named 'Ms 5: COMMUNICATION ALARM'.

Top Screenshot:

- Status Bar:** 1 Warning(s), 5 Alarm(s), 02/25/2022 10:54 PM.
- Navigation:** Home, Favorites, Menu, Actions, Probe (1).
- Configured:** Enabled (selected), Disabled.
- Address:** G1.1 (dropdown menu).
- Label:** Unleaded Tank (text field).
- Serial Number:** 0000010001 (text field).
- Manufacturer Id:** (text field).
- Type:** Probe MAG1 (text field).
- Model Number:** (text field).
- Actions:** Checkmark (✓) and X (✗) buttons.

Bottom Screenshot:

- Status Bar:** 0 Warning(s), 0 Alarm(s), 10/14/2022 11:16 AM.
- Navigation:** Home, Favorites, Menu, Actions, Probe (1).
- Type:** Probe MAG1 (text field).
- Model Number:** (text field).
- Float Type [in]:** 4.0 in (dropdown menu).
- Water Minimum [in]:** 0 (text field).
- Device Timeout:** 10 Minutes (dropdown menu).
- Actions:** Checkmark (✓) and X (✗) buttons.

Figure 45. Example Wireless Device Setup Screen

10. Navigate to the device's Diagnostics screen (e.g. Diagnostics > Probes > Overview) and select the device. Within the Network Information tab on the Diagnostics screen check the S/N Ratio and RSSI values against the following ranges:

- S/N Ratio: Less than 5 dB
- RSSI: Less than (more negative) than -100.0 dBm

If either value falls within the above ranges, then the device's Transmitter's wireless communication performance is poor – refer to the "Transmitter and Device Troubleshooting" section for troubleshooting guidance.

11. Replace the cover securely onto the Transmitter housing following the procedure below to ensure a watertight seal:
 - Verify the four cover screws are retained to the cover by the retaining washers; if not then press on the retaining washers to hold the screws in place.
 - The cover gasket is designed to be retained by the cover. However, if the gasket requires reseating to the cover then make sure that the cover gasket is free of dirt and debris on both sides of the gasket and that the inside of the cover is clean in the gasket area. Position the gasket into the cover groove, assuring that it is pressed fully into the groove and sitting completely flat.
 - Assemble the cover onto the enclosure, tightening the screws to between 1.6 and 2.0 Nm (14 and 18 inch-pounds). Using an alternating 'X' pattern, continue to tighten the screws until they are tightened to specification. Verify that gaps don't exist between the cover, washers and enclosure.
12. Proceed to the next Transmitter and repeat Steps 2 through 12. Continue until all Transmitters and devices are recognized by the ATG.



Do not power cycle the Gateway following the installation of each Transmitter.

TROUBLESHOOTING

Antenna Propagation Basics

The propagation of radio waves in the TLS–RF Series 4 Wireless System is influenced by several factors:

Antenna Operation

The antenna is a transducer, which converts radio frequency (RF) electrical energy fed to it (via the transmission line) to an electromagnetic wave propagated into space. This process is reciprocal in nature – the antenna will perform identically in Transmit or Receive mode. The same Antenna and Transmission Line path is used for both transmit and receive functions. Distortion of or damage to either the Gateway or Transmitter antenna will result in distortion of the electromagnetic wave, leading to the received radio frequency electrical energy being attenuated and/or multipath interference corrupting the data encoded within the wave. Additionally, the antennas should not touch and be kept as clear as possible from electrically conductive (in particular metal) objects which can distort the electromagnetic wave as it propagates from the antenna.

Free Space Loss

Signal power is diminished by geometric spreading of the wavefront, commonly known as Free Space Loss (FSL). For TLS–RF Series 4 Wireless System sites having relatively small distances between the Gateway and Transmitters, FSL is not an issue given that the installation guidance provided in the following sections is adhered to:

- RF Transmitter Installation Considerations
- Gateway Mounting Bracket Installation
- Connect and Register the Gateway with the ATG
- Transmitter Antenna Notes

Attenuation

When the electromagnetic wave signal passes through solid objects, some of the wave's energy is absorbed. The most convenient way to express this is by adding an "allowed loss" to the FSL. Attenuation can vary greatly depending upon the structure of the object the wave is passing through. Metal in the object greatly increases the attenuation. Greater thickness also increases the loss. General rules of thumb for attenuation are:

Trees account for 10 to 20 dB of loss per tree in the direct path. Loss depends upon the size and type of tree. Large trees with dense foliage create greater loss.

Walls account for 10 to 15 dB depending upon the construction. Interior walls are on the low end and exterior walls, especially those with stucco, create greater loss.

Floors of buildings account for 12 to 27 dB of loss. Floors with concrete and steel are at the high end and wood floors are at the low end.

Mirrored walls have very high loss because the reflective coating is conductive.

Scattering

RF waves can reflect off of many things and the wavefront propagated from the antenna combines with reflected waves off of objects that are not in the direct path. This effect is usually described as multipath, fading, Rayleigh fading or wave dispersion. When RF waves combine they can be distorted. The distortion degrades the ability of the receiver to recover the encoded data.

Antenna Polarization

Polarized omni-directional antennas (used in the TLS–RF Series 4 Wireless System) are subject to severe wave pattern distortion in the direction of their mounting (vertically or horizontally). For this reason, the TLS–RF Series 4 Wireless System Gateway antenna must be mounted vertically or, if the Gateway is mounted to a metal wall, up to 45 degrees from vertical as described in the section “Connect and Register the Gateway with the ATG” on page 22 and the Transmitter antenna mounted vertically (preferred), or horizontally (90 degrees apart as shown in Figure 27).

Interference

Interference may be caused by several possible sources:

- RF waves of the same frequency as the TLS–RF Series 4 Wireless System originating from other systems
- Wave reflections / multipath interference
- Radio transmitter or receiver overload, produced by high–power adjacent Transmitters such as cell tower or electricity transmission lines/transformers.

Gateway Diagnostics Overview Screen

1. Select Menu>Diagnostics>Gateway>Overview (see Figure 46) to access the Gateway Diagnostics Overview Screen (see Figure 47 and Figure 48). Select the Gateway to view information from (Item 2, Figure 47).

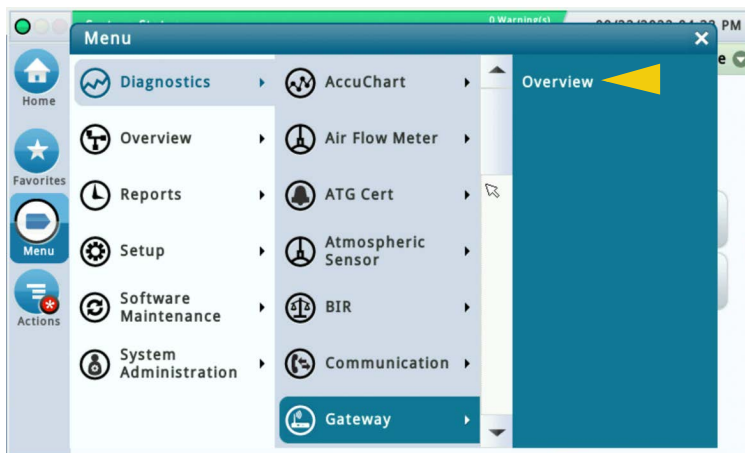


Figure 46. Accessing Gateway Diagnostics Overview Screen

2. Scroll down to view the rest of the screen (see Figure 48). The Gateway S/N shown in the example below will be the S/N you entered when registering the Gateway (ref. Item 1, Figure 47).

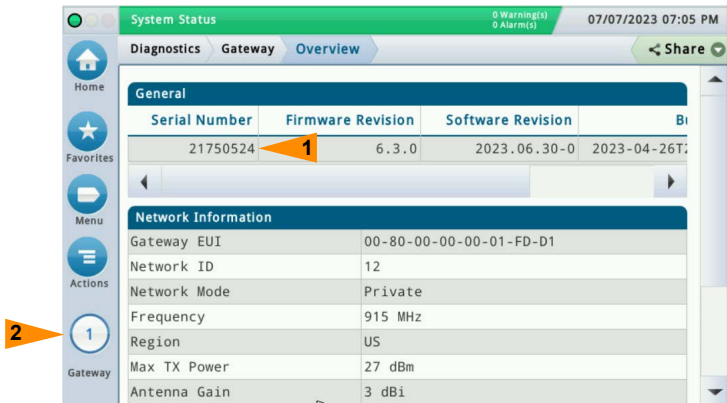


Figure 47. Example Gateway Diagnostics Overview Screen – Page 1

3. As you scroll down the Gateway Diagnostics Overview screen, notice the Associated Devices table which shows the Transmitters on the network and both the Device EUI of (Item 1, (scroll to the right of the Label column to view the Device EUI column) Figure 48) and the serial number for the device (Item 2, Figure 48) connected to each Transmitter.

The screenshot displays the 'Gateway Diagnostics Overview' screen. At the top, a green status bar shows 'System Status' with '0 Warning(s)' and '0 Alarm(s)', and the date/time '06/12/2023 07:02 PM'. Below this is a navigation bar with 'Diagnostics', 'Gateway', and 'Overview' tabs, and a 'Share' button. A left sidebar contains icons for Home, Favorites, Menu, Actions, and Gateway (labeled '1').

The main content area is divided into two sections:

- Network Information:** A table with the following data:

Gateway EUI	00-80-00-00-01-E4-13
Network ID	10
Network Mode	Private
Frequency	868 MHz
Region	EU
Max TX Power	27 dBm
Antenna Gain	3 dBi
- Associated Devices:** A table with the following data:

Type	Enabled	Serial Number	Device ID	Address	Label	Device EUI
MAG SENSOR	Enabled	0000501912	2	1 G1.2	Front	00

Orange callout arrows point to the 'Serial Number' column (labeled '2') and the 'Device EUI' column (labeled '1') in the 'Associated Devices' table.

Figure 48. Example Gateway Diagnostics Overview Screen – Page 2

Probe Diagnostics Overview Screen

1. Select Menu>Diagnostics>Probe>Overview (see Figure 49) to access the Probe Diagnostics Overview Screen (see Figure 50 and Figure 51). Select the Probe to view information from (Item 2, Figure 50).

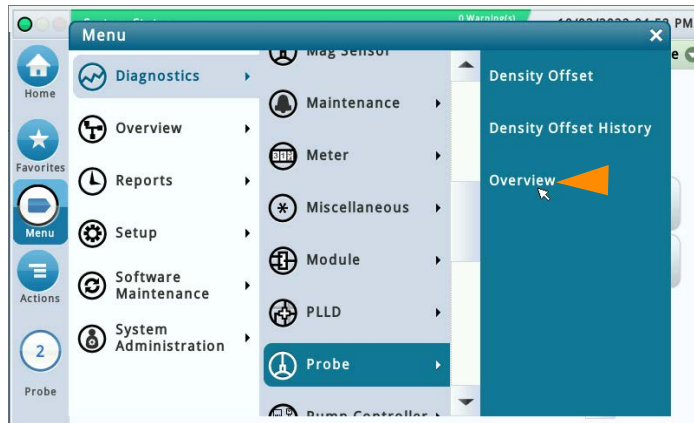


Figure 49. Accessing Probe Diagnostics Overview Screen

2. Scroll down the Probe Diagnostics Overview screen to view all of the device information fields. Note the serial number for the device (ref. Item 1, Figure 50), which maps to an Associated Device (ref. Item 2, Figure 48).

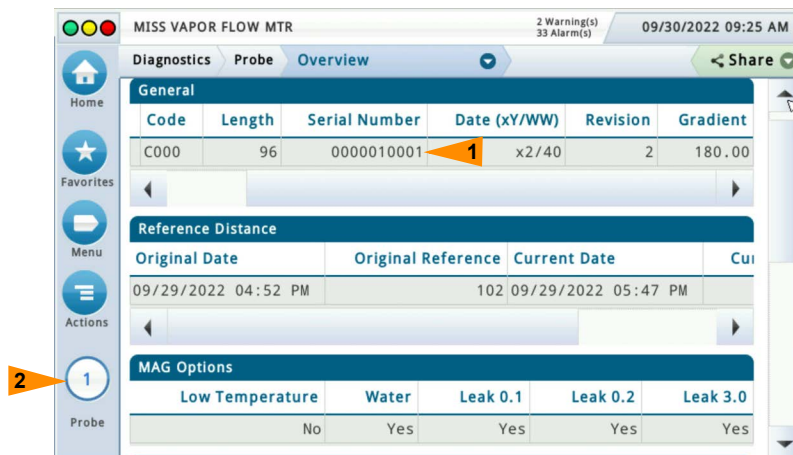


Figure 50. Example Probe Diagnostics Overview Screen – Page 1

3. The Transmitter Device EUI (item 1) in the Network Information tab in Figure 51 below is found on the product information label on either the side (ref. Figure 3) or interior of the Transmitter.

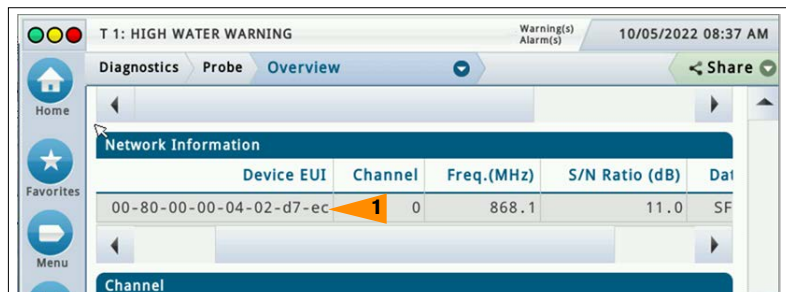


Figure 51. Example Probe Diagnostics Overview Screen – Page 2

Mag Sensor Diagnostics Screen

1. Select Menu>Diagnostics>Mag Sensor (see Figure 52) to access the Mag Sensor Diagnostics Screen (see Figure 53 and Figure 54). Select the Mag Sensor to view information from (Item 2, Figure 53)

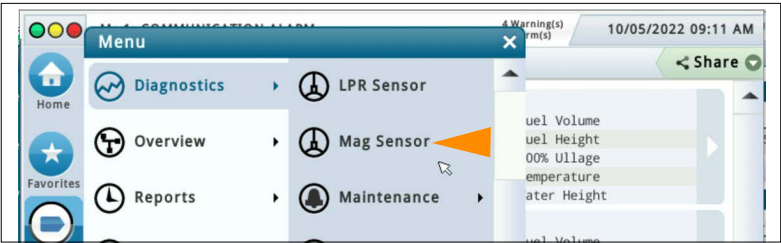


Figure 52. Accessing Mag Sensor Diagnostics Screen

2. Scroll down the Mag Sensor Diagnostics screen to view all of the device information fields. Note the serial number for the device (ref. Item 1, Figure 53), which maps to an Associated Device (ref. Item 2, Figure 48).

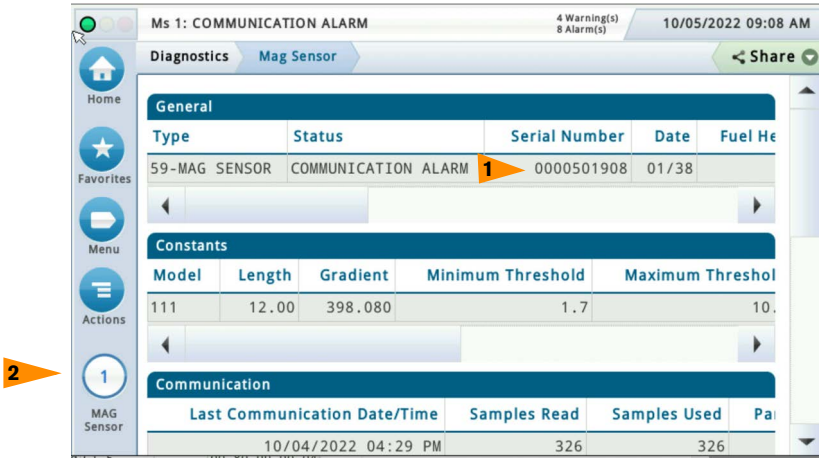


Figure 53. Example Mag Sensor Diagnostics Screen – Page 1

3. The Transmitter Device EUI (item 1) in the Network Information tab in Figure 54 below is found on the product information label on either the side (ref. Figure 3) or interior of the Transmitter.

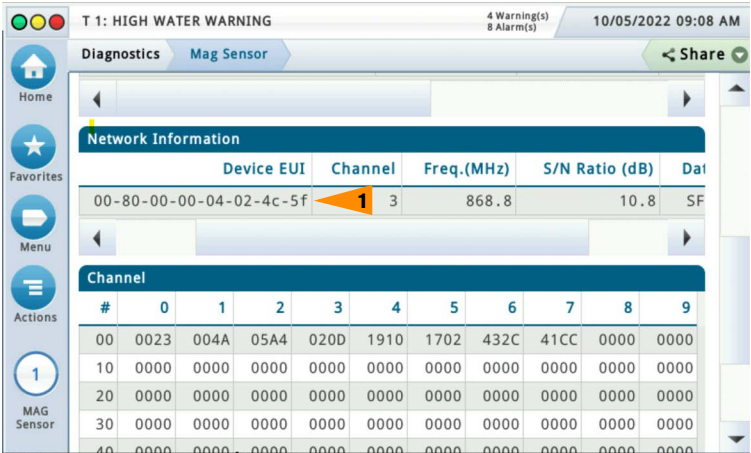


Figure 54. Example Mag Sensor Diagnostics Screen – Page 2

Gateway Registration Unsuccessful

If a fault occurs during the Gateway registration process and remains unresolved 21 minutes after the Add Gateway action is performed, then "Registration Failed" will be shown as the registration status in the ATG Setup > Communication > Gateway screen.

1. Verify the following:
 - Gateway serial number shown in the ATG Setup > Communication > Gateway screen matches the serial number on the Gateway label.
 - ETH2 Ethernet port is configured properly, as described in the "Setup ATG to Recognize the Gateway" section.
 - If applicable, the battery isolator is removed from the ATG's backup battery.
 - ATG date/time is correctly set.
 - Gateway LORA LED is turned on solid and its STATUS LED is blinking twice.
2. Gateway discovery timeout (1 hour) may have been reached. Power cycle the Gateway to reset the discovery timer. Registration status should be shown as "Registration Successful" in the ATG Setup > Communication > Gateway screen within 6 minutes of power up. Verify that approximately 3 minutes after the Gateway is powered its LORA LED is turned on solid and its STATUS LED is blinking twice.
3. Perform the Add Gateway action (ATG Setup > Communication > Gateway screen) again, as described in the section "Connect and Register the Gateway with the ATG" on page 22.
4. Ethernet cable may be defective. Either verify that the Ethernet cable functions properly or try a different Ethernet cable.
5. After completing troubleshooting Steps 1 through 4, if the Gateway is still unable to successfully register to the ATG then power cycle the ATG. Registration status should be shown as "Registration Successful" in the ATG Setup > Communication > Gateway screen within 3 minutes of ATG boot completion, indicated by the ATG user interface being displayed on its screen.
6. Gateway configuration may be corrupted. If the source of the corruption cannot be determined and resolved by logging into the Gateway and then reviewing its user interface screens, then hold the Gateway's reset button for between 5 and 30 seconds and then release to reset its configuration to factory default. Following reset the registration status should be shown as "Registration Successful" in the ATG Setup > Communication > Gateway screen within 9 minutes. Note that holding the Gateway's reset button for less than 5 seconds and then releasing will reboot the Gateway without changing its configuration.

Transmitter and Device Troubleshooting

Failure to Observe Correct LED Pattern

There are three different ways that the Transmitter LED's can fail to indicate the correct LED pattern that is described in the section "Establishing Communication with the Transmitter" on page 51.

Bright Red LED (D8) Does Not Turn On

This indicates that the Transmitter is unable to join the Gateway's network. Troubleshoot by performing the following steps:

1. Verify that the Transmitter and Gateway installation considerations and steps from the RF Transmitter Installation Considerations, Gateway Mounting Bracket Installation, Connect and Register the Gateway with the ATG and Transmitter Antenna Notes sections are adhered to.
2. Verify that the Transmitter is wired correctly, according to the "Transmitter Cable Connections" section. If the cable connections are wired backward (i.e. device to BATTERY terminal block, and Battery Pack to DEVICE terminal block), then the green LED (D7) will appear dimmer than normal if it is powered sufficiently to turn on.
3. Verify that the Gateway and Transmitter are both configured for the same Network ID. Refer to the "Troubleshooting – Transmitter DIP Switch Usage" section and Appendix A for details on performing this verification step.
4. With the Battery Pack disconnected from the Transmitter short the Transmitter's BATTERY terminals with a jumper wire for 1 minute. Doing this will ensure that the Transmitter is fully reset prior to power up.
5. Replace the Transmitter antenna.
6. Replace the Gateway antenna.
7. If possible, move the Transmitter outside of the containment space, closer to the Gateway. If this step enables the Transmitter's device to be viewed within the Device Directory screen, but then moving the Transmitter back to the installation location causes the device to go Out of Service according to the Device Directory's State field, then identify either a new Transmitter or Gateway installation location that will provide more reliable wireless communication.
8. Replace the antenna included in the Gateway kit with an external antenna with cable. Mount the external antenna in a location that has clear line of sight to the Transmitters. Ensure that the external antenna and cable conform to the applicable regulations as detailed in 577014-497, including that the antenna has a maximum gain of +3 dBi.

Green LED (D7) Either Never Turns On or Stops Blinking Within 30 Seconds

This indicates that power is interrupted to the Transmitter. Troubleshoot by performing the following steps:

1. Verify that the Transmitter is wired correctly, according to the "Transmitter Cable Connections" section. If the cable connections are wired backward (i.e. device to BATTERY terminal block, and Battery Pack to DEVICE terminal block), then the green LED (D7) will appear dimmer than normal if it is powered sufficiently to turn on.
2. Measure the Battery Pack voltage – while disconnected from the Transmitter if the Battery Pack does not measure at least 3.5 volts then replace it.
3. With the Battery Pack disconnected from the Transmitter short the Transmitter's BATTERY terminals with a jumper wire for 1 minute. Doing this will ensure that the Transmitter is fully reset prior to power up.
4. Replace the power cable to the Battery Pack.

Following Bright Red LED (D8) Turning On, Green LED (D7) Blinks More Than Once at a Time

Multiple blinks (e.g. double, triple, or quintuple) of the green LED (D7) indicates that device polls are suffering from Parity, Partial, and/or Communication Errors. Troubleshoot by performing the following steps:

1. Verify the device wiring to the Surge Protector.
2. Verify the Surge Protector wiring to the Transmitter.
3. Measure the Battery Pack voltage – while disconnected from the Transmitter if the Battery Pack does not measure at least 3.5 volts then replace it.
4. Replace the device cable to the Surge Protector (which includes the receptacle that threads into the device).
5. Replace device – first review and execute the troubleshooting tips in the device's Troubleshooting page within the ATG On-Board Help prior to replacing the device.

Transmitter Device Not Shown in Device Directory Screen

If the Device Directory screen (Diagnostics > Module > Device Directory) does not list the device connected to the Transmitter whose LED pattern was verified as described above within 10 minutes, and the Gateway is successfully registered to the ATG, then either poor wireless network performance or Transmitter joined to another Gateway network is the likely cause. Troubleshoot by performing the following steps:

1. Ensure that the Transmitter antenna has clearance of at least 25.4mm (1") from any objects and surfaces.

2. Verify that the line of sight between the Transmitter and Gateway is clear of metal obstructions and sources of electromagnetic interference.
3. Replace the Transmitter antenna.
4. Replace the Gateway antenna.
5. If possible, move the Transmitter outside of the containment space, closer to the Gateway. If this step enables the Transmitter's device to be viewed within the Device Directory screen, but then moving the Transmitter back to the installation location causes the device to go Out of Service according to the Device Directory's State field, then identify either a new Transmitter or Gateway installation location that will provide more reliable wireless communication.
6. Replace the antenna included in the Gateway kit with an external antenna with cable. Mount the external antenna in a location that has clear line of sight to the Transmitters. Ensure that the external antenna and cable conform to the applicable regulations as detailed in 577014–497, including that the antenna has a maximum gain of +3 dBi.
7. If taking the previous steps to improve wireless network performance still does not enable the device to appear in the Device Directory screen, then the problem may be the Transmitter joined the network for a TLS-RF Series 4 Gateway which is not connected to the TLS-4xx console. This scenario can occur if a Gateway connected to another TLS-4xx console which is within wireless range of the Transmitter has the same Network ID as the Gateway connected to the TLS-4xx console. Resolve this issue by changing the Gateway "Network ID" field (refer to section "Connect and Register the Gateway with the ATG" on page 22) and "Network ID" DIP switch setting for all Transmitters (refer to section "Transmitter DIP Switch Usage" on page 72 and Appendix A). The Gateway "Network ID" field and "Network ID" DIP switch setting for all Transmitters must match.

Probe Out Alarm

Refer to the Troubleshooting>Probe page within the ATG On-Board Help for troubleshooting tips that apply to Probes that communicate to the ATG using either the TLS-RF Series 4 Wireless System or a wired connection to the ATG's USM (TLS-450PLUS) or USIOM (TLS4). Refer to the 577014–110 TLS-450PLUS/TLS4 Operator's Manual for more information on using On-Board help.

Probe Out alarm troubleshooting steps that apply to the TLS-RF Series 4 Wireless System only:

1. Within the Device Directory screen (Diagnostics > Module > Device Directory) check the State of the Gateway that is networked to the Probe whose State is indicated as Out of Service. If the Gateway State is also indicated as Out of Service, then the Gateway is unable to communicate to the ATG; reference the Gateway Troubleshooting topics above to resolve this issue.
2. Within the Device Directory screen (Diagnostics > Module > Device Directory) identify the Address and Serial Number for the Probe whose State is indicated as Out of Service. This Address and Serial Number will be referenced in the Device Assignments and Probe Diagnostics Overview screens, respectively.
3. Within the Device Assignments screen (Diagnostics > Module > Device Assignments) identify the Primary Assignment (e.g. Pb 1) and Secondary Assignment (e.g. T 1) for the Address whose state was identified as Out of Service on the Device Directory screen. These Primary Assignment and Secondary Assignment values will be referenced in the Probe Diagnostics Overview and Device Setup screens.

4. Within the Probe Diagnostics Overview screen (Diagnostics > Probes > Overview) select the Probe that matches the Primary Assignment and Secondary Assignment values from the Device Assignments screen whose state was identified as Out of Service on the Device Directory screen (e.g. Probe 1: Tank 1). Review the following in the Probe Diagnostics Overview screen:

- a. **General Tab**

Verify that the Probe values and information is as expected, including the Serial Number value.

- b. **Network Information Tab**

Verify that the Status value is Connected. If the Status value is Disconnected, then the Gateway is unable to communicate to the ATG; reference the Gateway Troubleshooting topics above to resolve this issue.

- c. **Communication Tab**

Status value should be Probe Out; if the value is instead OK then the Probe Out condition should be resolved. The Last Communication Date/Time value indicates the timestamp of the last message received from the Probe's Transmitter, which may provide insight into the cause of the Probe Out. In particular, if the Last Communication Date/Time value is within the Device Timeout window (e.g. within the last 10 minutes if the Device Timeout field is set to the default 10 minutes), then the Probe, Probe cable, or Surge Protector (and not the Transmitter) is the cause of the Probe Out.

- d. **Network Information Tab**

Verify that the S/N Ratio and RSSI values do not indicate poor wireless communication performance between the Probe's Transmitter and the Gateway. The following value ranges are indicative of poor wireless communication performance:

- S/N Ratio: Less than 5 dB
- RSSI: Less than (more negative) than -100.0 dBm

If the S/N Ratio and/or RSSI values indicate poor wireless communication performance, and the considerations and steps in the RF Transmitter Installation Considerations, Gateway Mounting Bracket Installation, Connect and Register the Gateway with the ATG, and Transmitter Antenna Notes sections are verified as being adhered to, then troubleshoot by performing the following steps:

- 1.Ensure that the Transmitter antenna has clearance of at least 25.4mm (1") from any objects and surfaces.
- 2.Verify that the line of sight between the Transmitter and Gateway is clear of metal obstructions and sources of electromagnetic interference.
- 3.Replace the Transmitter antenna.
- 4.Replace the Gateway antenna.
- 5.The issue could be resolved by adjusting the Device Timeout value. Within the Device Setup screen (Setup > Device) select the Probe that matches the Primary Assignment and Secondary Assignment values from the Device Assignments screen whose state was identified as Out of Service on the Device Directory screen (e.g. Probe 1: Tank 1). The Device Timeout can be increased to a value such that Probe Out alarms no longer get raised during normal operation.

- 6.If possible, move the Transmitter outside of the containment space, closer to the Gateway. If this step enables the S/N Ratio and RSSI values to be outside the ranges indicated above, but then moving the Transmitter back to the installation location causes the S/N Ratio or RSSI value to again be within the poor wireless communication performance range, then identify either a new Transmitter or Gateway installation location that will provide more reliable wireless communication.
- 7.Replace the antenna included in the Gateway kit with an external antenna with cable. Mount the external antenna in a location that has clear line of sight to the Transmitters. Ensure that the external antenna and cable conform to the applicable regulations as detailed in 577014–497, including that the antenna has a maximum gain of +3 dBi.

e. **Communication Tab**

Verify that the Parity, Partial, and Communication Errors values are all zero. If any values are non-zero, then check/replace the following in the listed order:

- 1.Transmitter submersion within water
- 2.Probe wiring to the Surge Protector
- 3.Surge Protector wiring to the Transmitter
- 4.Battery Pack voltage – while disconnected from the Transmitter, the Battery Pack should measure at least 3.5 volts.
- 5.Replace Probe cable to the Surge Protector (which includes the receptacle that threads into the Probe).
- 6.Signs of water ingress into the Transmitter – if water is present and/or the metal terminal block partitions are rusted then photograph the evidence (including the cord grip nut and cover gasket installations) for the RGA return and replace the Transmitter.
- 7.Probe – first review and execute the troubleshooting tips in the Troubleshooting>Probe page within the ATG On–Board Help prior to replacing the Probe.

5. If the Probe Out alarm occurred while the Gateway was powered down, and then following Gateway power up and reconnection to the TLS-4xx console (i.e. Network Information Tab's Status value is Connected) the Probe Out alarm persists, then the problem may be while the Gateway was powered down the Transmitter(s) joined the network for a Gateway which is not connected to the TLS-4xx console. This problem may affect all system Transmitters, although one or more Transmitters may be outside the range of being able to join the adjacent Gateway's network. This scenario can occur if a Gateway connected to another TLS-4xx console which is within wireless range of the Transmitter(s) has the same Network ID as the Gateway connected to the TLS-4xx console. Resolve this issue by changing the Gateway "Network ID" field (refer to section "Connect and Register the Gateway with the ATG" on page 22) and "Network ID" DIP switch setting for all Transmitters (refer to section "Transmitter DIP Switch Usage" on page 72 and Appendix A). The Gateway "Network ID" field and "Network ID" DIP switch setting for all Transmitters must match.

Communication Alarm

Refer to the Troubleshooting>Sensor page within the ATG On–Board Help for troubleshooting tips that apply to Sensors that communicate to the ATG using either the TLS–RF Series 4 Wireless System or a

wired connection to the ATG's USM (TLS-450PLUS) or USIOM (TLS4). Refer to the 577014-110 TLS-450PLUS/TLS4 Operator's Manual for more information on using On-Board help.

Communication alarm troubleshooting steps that apply to the TLS-RF Series 4 Wireless System only:

1. Troubleshooting steps are similar to those listed for Probe Out alarm.
2. Note that within the Mag Sensor Diagnostics screen (Diagnostics > Mag Sensor), unlike the Probe, there is no Communication tab – Status value to check. However, like the Probe, the Last Communication Date/Time value does indicate the timestamp of the last message received from the Mag Sensor's Transmitter.

Transmitter DIP Switch Usage



Changing the DIP switch settings (ref. Appendix A) should only be done in consultation with Veeder-Root Tech Support, after all other troubleshooting steps have been performed first in an effort to diagnose and resolve the issue.



Changing the DIP switch settings requires that the Transmitter be power cycled for the new settings to take effect.

- “Transmitter Diagnostic Timeout” DIP switch setting sets the duration following Transmitter power up that the Transmitter’s Diagnostic Message is transmitted at a 2 minute interval.
- “Data Rate Configuration” DIP switch setting sets the radio’s data rate / spreading factor configuration. A larger spreading factor value is associated with lower data rate, higher power consumption, and greater wireless link budget.
- “Poll/Transmit Interval” DIP switch setting sets the poll and transmission intervals for different operation modes (Idle, Dispense, Delivery, Fall/Rise). A larger transmission interval or poll value is associated with less frequent Transmitter/Device data updates within the ATG and longer Battery Pack lifetime. Regulations may dictate maximum permitted interval values.
- “Network ID” DIP switch setting sets the wireless network that the Transmitter is a member of. The “Network ID” DIP switch setting must match the corresponding Gateway “Network ID” setting (refer to the ATG Setup > Communication > Gateway screen – Network ID field; see Figure 19). Only change the Network ID setting if wireless performance deteriorating interference is suspected from another wireless network (which may be associated with either a TLS-RF Series 4 Wireless System or another type of wireless system), or if it is suspected that the Transmitter has joined the network for another TLS-RF Series 4 Gateway which is not connected to the TLS-4xx console.

APPENDIX A: TRANSMITTER DIP SWITCH SETTINGS

Use this appendix for DIP switch settings for all Transmitters in the network.

DIP switch locations for the Transmitter are shown in Figure 55 (Switch 1) and Figure 56 (Switch 2). Select Transmitter diagnostic timeout using only the Switch 1. DIP switches 1 – 3 combinations shown. Switch 1 DIP switches 4 – 6 are reserved for Veeder–Root diagnostic use only.

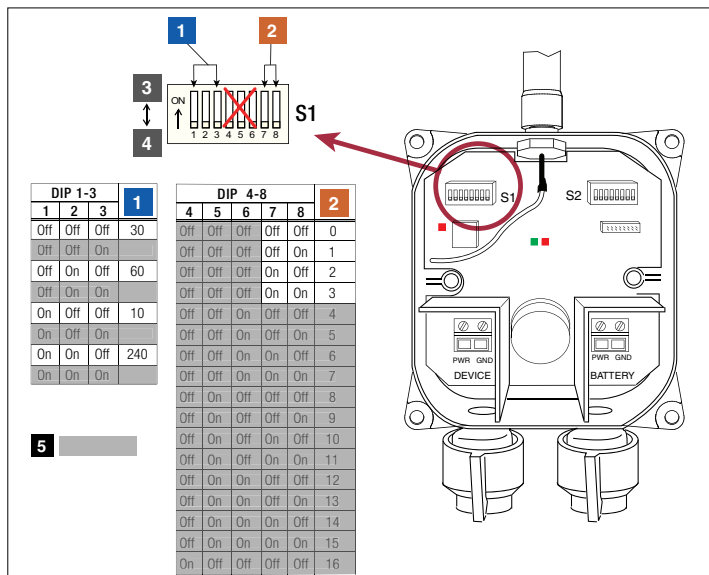


Figure 55. Transmitter DIP Switch 1 Settings

LEGEND FOR NUMBERED BOXES IN Figure 55

1. Transmitter diagnostic timeout (Minutes)
2. Data Rate
 - a. 0 = Default setting (SF:7)
 - b. 1 = Enable ADR
 - c. 2 = Midrange (Alternating SF:7 & SF:8)
 - d. 3 = Long range (Alternating SF:8 & SF:9)
3. On – switch in up position
4. Off – switch in down position
5. Do not set shaded switch positions

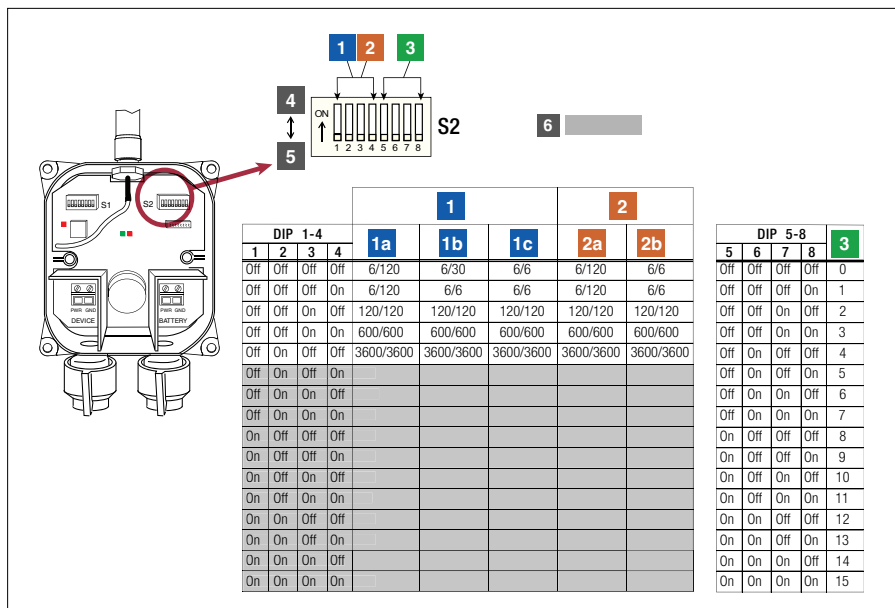


Figure 56. Transmitter DIP Switch 2 Settings

LEGEND FOR NUMBERED BOXES IN Figure 56

- Mag Plus Probe Transmitter Poll/Transmit Interval (Seconds)
 - No Change (Idle) – Poll/TX
 - Fall (Dispense) – Poll/TX
 - Rise (Delivery) – Poll/TX
- Mag Sensor Transmitter Poll/Transmit Interval (Seconds)
 - No Change (Idle) – Poll/TX
 - Change (Fall/Rise) – Poll/TX
- Network ID – default is 0 – change is only required if another wireless network is nearby and interfering with this one.
- On – switch in up position
- Off – switch in down position
- Do not set shaded switch positions



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