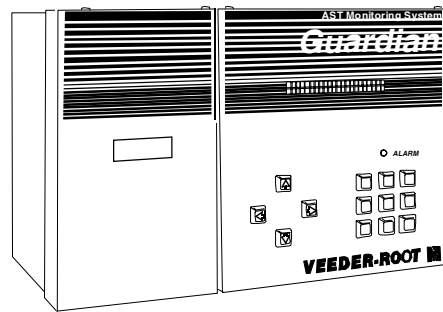


Guardian

AST Monitoring System

Site Prep and Installation Guide



Notice

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For complete warranty, technical support, and additional product information, refer to your console's Operator Manual.

DAMAGE CLAIMS

1. Thoroughly examine all components and units as soon as they are received. If damaged, write a complete and detailed description of the damage on the face of the freight bill. The carrier's agent *must* verify the inspection and sign the description.
2. Immediately notify the delivering carrier of damage or loss. This notification may be given either in person or by telephone. Written confirmation must be mailed within 48 hours. Railroads and motor carriers are reluctant to make adjustments for damaged merchandise unless inspected and reported promptly.
3. Risk of loss, or damage to merchandise remains with the buyer. It is the buyer's responsibility to file a claim with the carrier involved. Immediately advise your Veeder-Root representative, distributor, or the factory so that we may assist you.

RETURN SHIPPING

All product returns, including warranty replacements, repairs, and core credits, must be returned on an RGA (Returned Goods Authorization) for proper processing. To return a product under this procedure:

1. Call Customer Service at (800) 873-3313 to obtain an RGA number.
2. Clearly print the RGA number on the packages being returned. No package can be received without this number.
3. All shipments of Veeder-Root products must be prepaid.
4. If the Magnetostrictive Probe is damaged, return it in the original shipping container with shock absorbing material provided. Veeder-Root will accept no liability for damage caused by improper packing.
5. Address the shipment to Veeder-Root Co., 6th Avenue at Burns Crossing, Altoona, Pennsylvania 16602.
6. All warranty returns must also include a legible WSR (warranty service report) with problem description and corrective action sections filled out in detail.

FCC INFORMATION

This equipment complies with the requirements in Part 15 of the FCC rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

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Introduction

General

This manual contains installation and site preparation instructions for the Guardian AST Monitoring System for aboveground storage tanks.

Contractor Certification Requirements

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

Level 1 Contractors holding valid Level 1 Certification are approved to perform wiring and conduit routing, equipment mounting, probe and sensor installation, tank and line preparation, and line leak detector installation.

Level 2/3 Contractors holding valid Level 2 or 3 Certifications are approved to perform installation checkout, startup, programming and operations training, troubleshooting and servicing for all Veeder-Root Tank Monitoring Systems, including Line Leak Detection and associated accessories.

Warranty Registrations may only be submitted by selected Distributors.



Related Manuals










You must reference the appropriate manual below, to program the console:



576013-978 Guardian AST Monitoring System, Setup and Operation Manual.

Safety Symbols





The following safety symbols 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.

	<p>Electricity High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>
	<p>Turn Power Off Live power to a device creates a potential shock hazard. Always turn power off to the device and associated accessories when servicing the unit.</p>
	<p>No Smoking Sparks and embers from burning cigarettes or pipes can ignite fuels and their vapors.</p>
	<p>No Open Flames Open flames from matches, lighters, welding torches, etc. can ignite fuels and their vapors.</p>
	<p>No Power Tools Sparks from power tools (such as drills) can ignite fuels and their vapors.</p>
	<p>No Vehicles Moving vehicles in the area during service can create a potential for personal injury to you or others. Sparks from starting vehicles can ignite fuels and their vapors.</p>
	<p>No People in the Area Unauthorized people in the area during service can create a potential for personal injury to you and them.</p>
	<p>Use Safety Barricades Unauthorized people or vehicles in the work area are dangerous. Always use safety cones or barricades, safety tape, and your vehicle to block the work area.</p>
	<p>Injury Careless or improper handling of materials can result in bodily injury.</p>

	<p>Wear Eye Protection</p> <p>Epoxy sealant contains epoxy resin and vinyl cyclohexane dioxide. Avoid eye and skin contact.</p>
	<p>Read All Related Manuals</p> <p>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.</p>

Safety Warnings

 WARNING	
	<p>This system operates near highly combustible fuel storage tanks.</p> <p>Fire or explosion resulting in serious injury or death could result if the equipment is improperly installed or modified or is used in any way other than its intended use. Serious contamination of the environment may also occur.</p>
	<p>To ensure proper installation, operation, and continued safe use of this product:</p>
	<ol style="list-style-type: none"> 1. Read and follow all instructions in this manual, including all safety warnings. 2. Have equipment installed by a contractor trained in its proper installation and in compliance with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes. 3. Do not modify or use service parts other than those provided by Veeder-Root.

Description

The Guardian AST Monitoring System is designed for compliance and inventory control for aboveground storage tanks where in-tank leak detection is not required. The system is capable of monitoring one or two tanks and up to six sensors. The Guardian AST has three output relays and a RS-232 interface. You can adapt the Guardian AST Console to the needs of a particular site, such as monitoring input and output capabilities.

Temperature Ranges

- Operating Temperature Range: 32°F to 104°F (0°C to 40°C).
- Storage Temperature Range: -40°F to +162°F (-40°C to +74°C).

Hardware Features

The Guardian AST Console panel [Figure 1] has:

- A two-line, 24-character/line Liquid Crystal Display.
- A 13-key keyboard on the front panel which has control and alphanumeric functions for programming, operating and reporting.
- An internal audible warning and external visible alarm indicator.
- An optional report printer for hard copy documentation of inventory, sensor and alarm information, plus printed reports of all setup information.

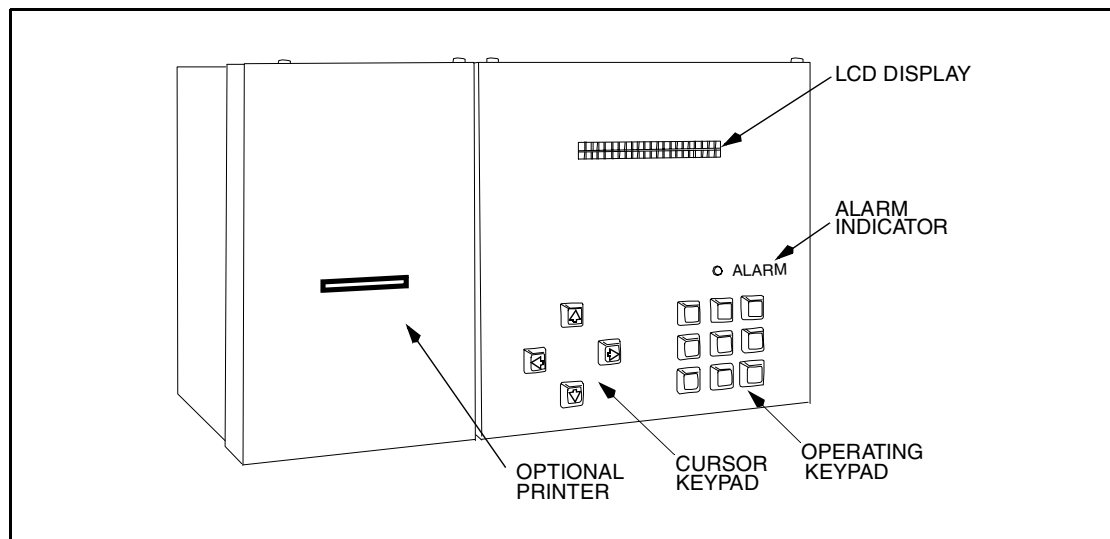


Figure 1. Guardian AST Console Front Panel

Console Interfaces

- Probe Interface - Accepts inputs from one or two in-tank Inventory-only Magnetostrictive Probes.
- Sensor Interface - Accepts inputs from up to six sensors from the types below:
 - High/low level sensor
 - Interstitial sensor for fiberglass tanks
 - Interstitial sensor for steel tanks
 - Piping sump sensor
 - Single-float hydrostatic sensor
 - Dual-float hydrostatic sensor

Output to Alarms and Other Devices

The Guardian AST Console provides three relay outputs to:

- Overfill alarms
- External audible and visible warning devices

Relays can shut down the STP if power to the console is lost or a leak is detected.

Communications

The Guardian AST Console uses a RS-232 Interface port to provide serial communications (Figure 2). A terminal/PC connected directly or via modem can, through this interface, access system reports, status, and diagnostics using commands described in the console's Setup and Operation manual.

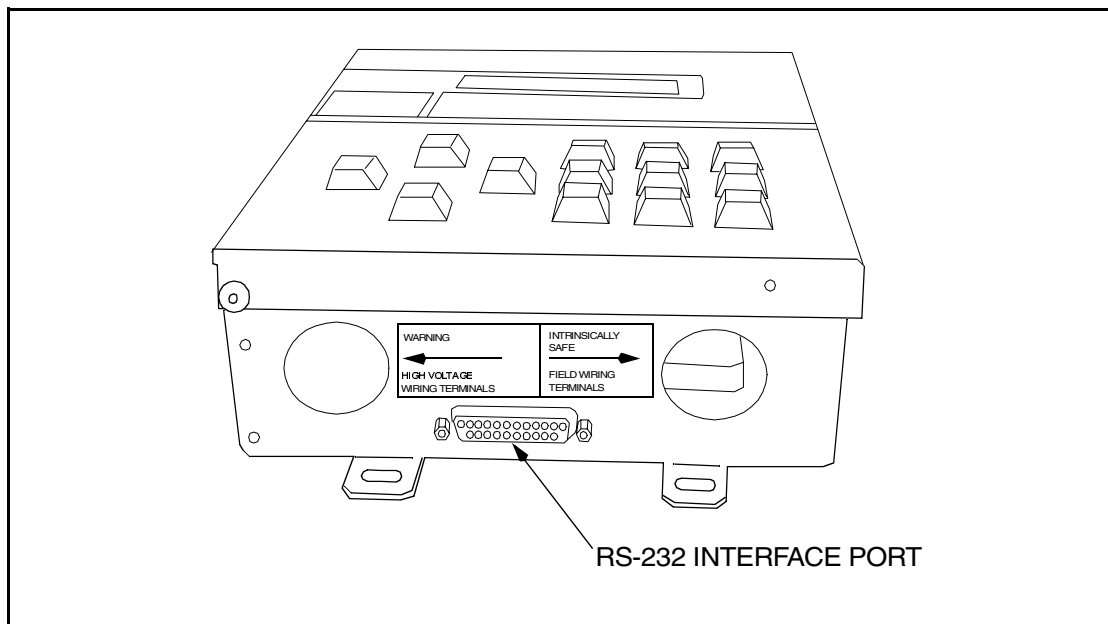


Figure 2. Conduit Entries and RS-232 Connector

Printer Interface

The Guardian AST Console also conveys the information it has monitored to the optional printer.

Probes

The Guardian AST Console will support up to two magnetostrictive probes for inventory-only measurement. Wiring procedures for these probes are described in this manual.

Inventory-only magnetostrictive probes are available in four standard lengths for the AST Console, or in custom lengths of from 24- to 72-inches (in one inch increments). Select a Mag 2 probe if tank diameter exceeds 72 inches. The Mag 2 probe is recommended since the AST performs inventory only measurements (no in-tank leak tests). Mag-2 probes are available in lengths up to 12 feet (144 inches).

Important  The AST Console is not capable of performing in-tank leak tests using probe measurements.

Sensor Capabilities

- Automatic, continuous leak sensing:
 - Tank interstitial space
 - Piping sump
 - Hydrostatic
- High and low liquid level in-tank point sensing.
- Audible alarm and display indicate leak location.

National Electrical Code Compliance

The following information is for general reference and is not intended to replace recommended National Electric Code (NEC) procedures. It is important for the installer to understand that electrical equipment and wiring located in Class I, Division 1 and 2 installations shall comply with the latest appropriate Articles found in the National Electric Code (NFPA 70) and the Automotive and Marine Service Station Code (NFPA 30A).

Probe- and Sensor-to-Console Wiring

WIRE TYPE

In order to ensure the best operating systems available, Veeder-Root **REQUIRES** the use of shielded cable for all probes and sensors regardless of conduit material or application. In these installations, shielded cable must be rated less than 100 picofarad per foot and be manufactured with a material suitable for the environment, such as Carol™ C2534 or Belden™ 88760, 8760.

Note: Throughout this manual, when mentioning any cable or wire being used for probe and sensor to console wiring, it will be referring to shielded cable.

WIRE LENGTH

Improper system operation could result in undetected potential environmental and health hazards if the probe- or sensor-to-console wire runs exceed 1000 feet. Wire runs must be less than 1000 feet to meet intrinsic safety requirements.

SPLICES

Veeder-Root recommends that no splices be made in the wire run between a sensor or probe junction box and the console. Each splice degrades signal strength and could result in poor system performance.

WIRE GAUGES - COLOR CODED

- Sensor- and probe-to-monitor wires should be #18, #16, or #14 AWG stranded copper wire. However, shielded cable is required in all applications.
- Wires carrying 120 Vac from the power panel to the console should be #14 AWG (or larger) copper wire for line, neutral and chassis ground (3); and #12 AWG copper wire for barrier ground.

Sensor and Probe Junction Boxes

Weatherproof electrical junction boxes with a gasketed cover are required on the end of each probe and sensor conduit run at the tank and sensor location. A separate Junction box is not required for the Hi-Lo sensor. Gasketing or sealing compound must be used at each entry to the junction box to ensure a waterproof junction. The interior volume of each junction box must be a minimum of 16 cubic inches.

Veeder-Root recommends the following junction boxes or equivalent:

- Appleton Electric Co. - JBDX junction box, JBK-B cover, and JB-GK-V gasket.
- Crouse-Hinds Co. - GRFX-139 junction box, GRF-10 cover, and GASK-643 gasket.

Installing the Optional Printer

Attaching the Optional Printer



Follow these steps to attach the optional printer.

1. Switch Off power to the console.
2. Carefully remove the knockouts on the console and the printer [Figure 3]. Do not pound or shock the unit during knockout removal.
3. Using the screws provided, attach the mounting plates to the printer box.
4. Pull the green ground wire, the 12-pin ribbon connector, and the 3-pin power plug out through the printer knockout hole.
5. Feed the wires from the printer through the console knockout hole. Carefully slide the printer onto the console and attach the mounting plates to the console. The printer should now be firmly attached to the console.

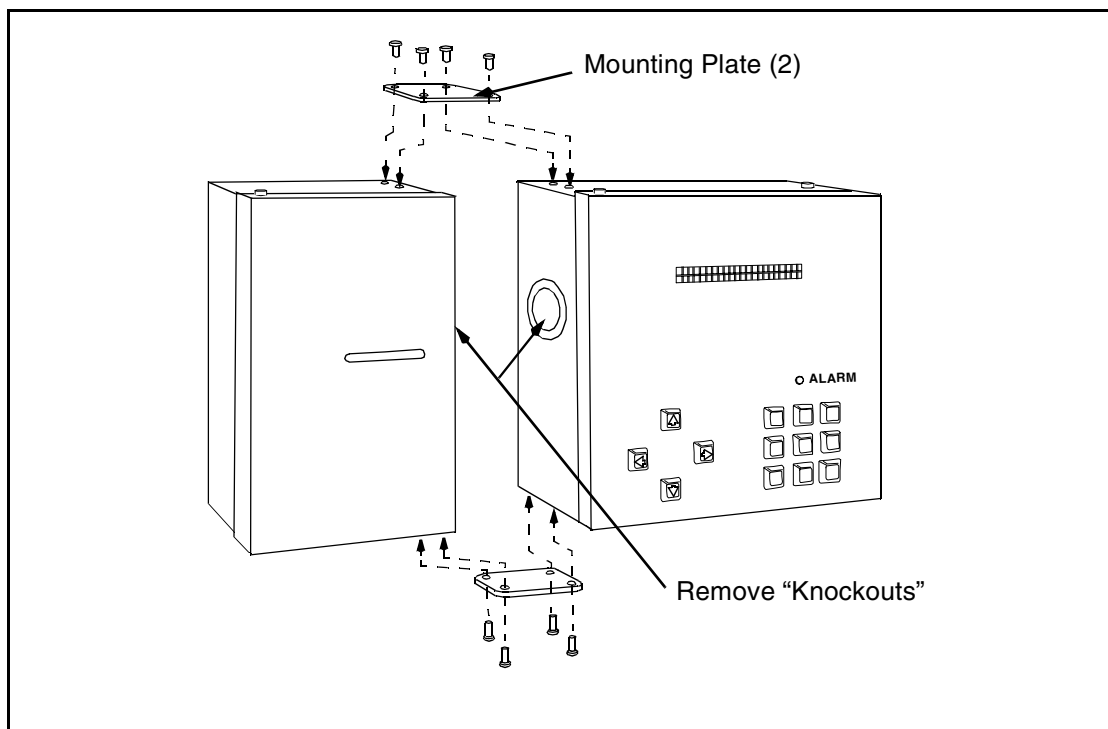


Figure 3. Attaching the Optional Printer

Wiring the Optional Printer

Follow these steps to connect the wiring of the optional printer to the Guardian AST Console [Figure 4].

1. Slide the plastic grommet into the knockout on the console to secure the wiring.
2. Attach the ground wire to the saddle clamp.
3. Attach the 3-pin connector (J1) to its receptacle on the power supply board.
4. Connect the 12-pin connector to the CPU board.

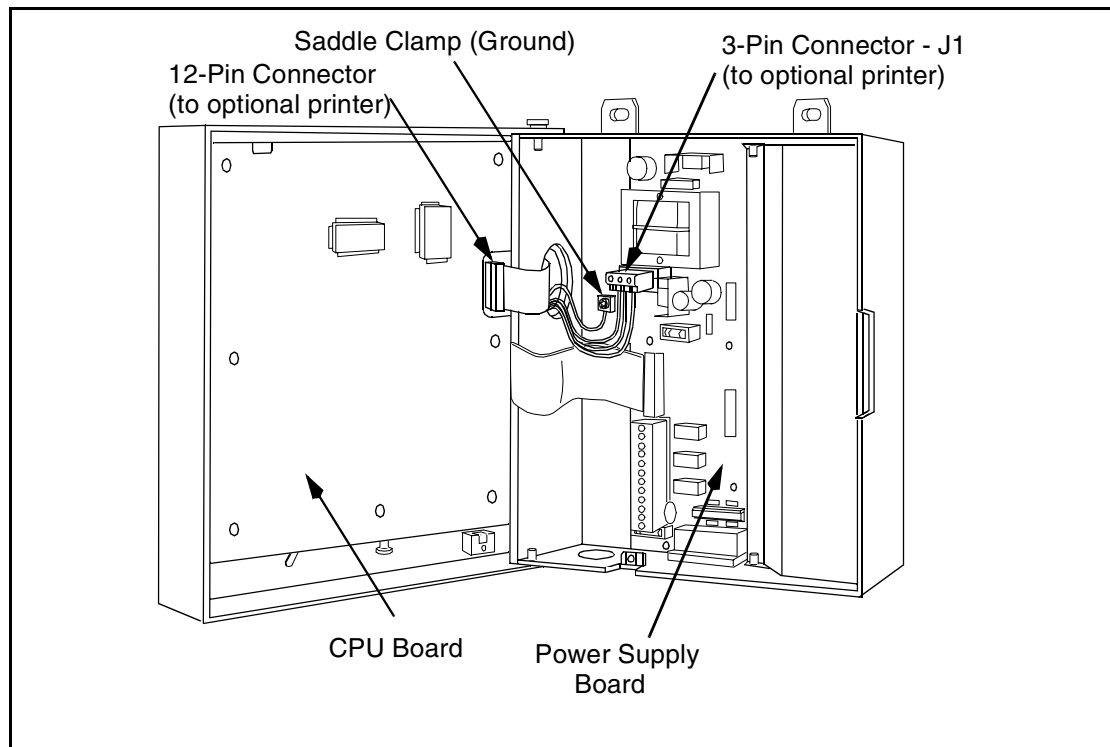





Figure 4. Wiring the Optional Printer

Installing the Console

Selecting a Console Location

 WARNING	
 	<p>Fuels and their vapors are extremely explosive if ignited.</p> <p>Fire or explosion resulting in serious injury or death could result if the console is improperly installed.</p> <p>Do not install the console in a volatile, combustible or explosive (Class I, Division I, Group D) atmosphere.</p>

Follow these guidelines and steps for selecting a console location [Figure 5].

1. Select a mounting location on the inside wall of any enclosed building. The console must be within 1000 feet of any connected probes and sensors.
2. Be sure the console will be protected from severe vibration, extremes in temperature and humidity, rain, and other conditions that could harm the equipment.
3. Consider the ease of routing power wiring conduit and probe and sensor conduit to the console as well as ease of access by station personnel who operate the unit.
4. Be sure the mounting is strong enough to support the console's weight. The Guardian AST Console is 8 inches wide by 10 inches long by 3-1/2 inches thick and weighs approximately 8 pounds. The printer is 5-1/4 inches wide by 10 inches long and weighs approximately 9 pounds.

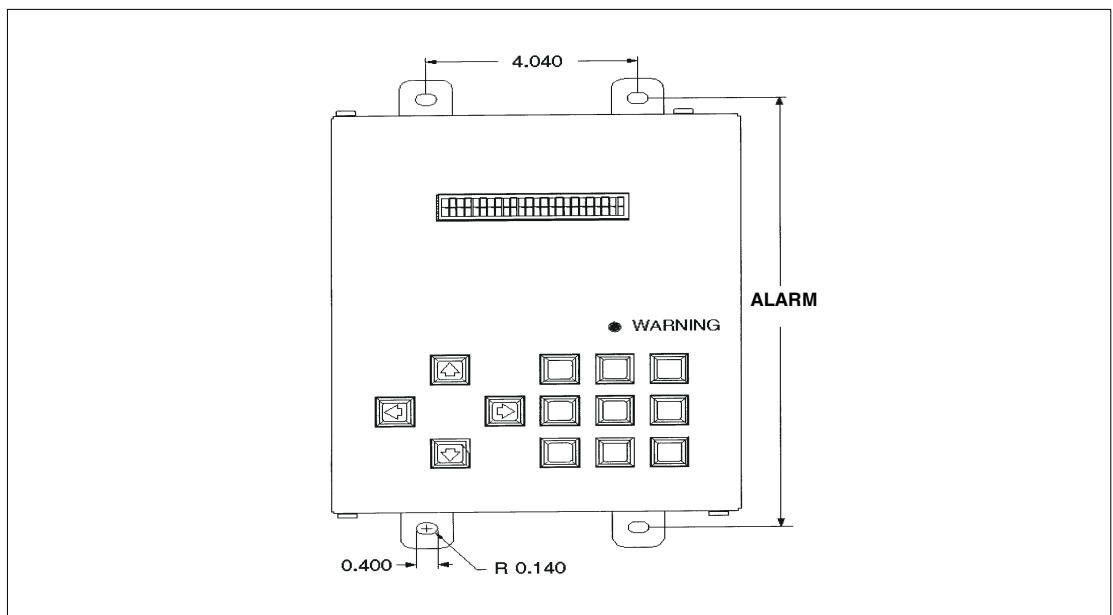


Figure 5. Console with Dimensions and Mounting Flange Locations

Mounting the Console

1. Locate and mark mounting points.
2. If fastening device requires inserts in the mounting surface, drill the appropriate holes and install the inserts. Up to 1/4-inch screws or bolts may be used.
3. Mount the console to the mounting surface through the holes in the four mounting flanges located on the top and bottom of the console.
4. Connect the power wiring conduit and probe and sensor wiring conduit(s) in the designated knockouts [Figure 6].

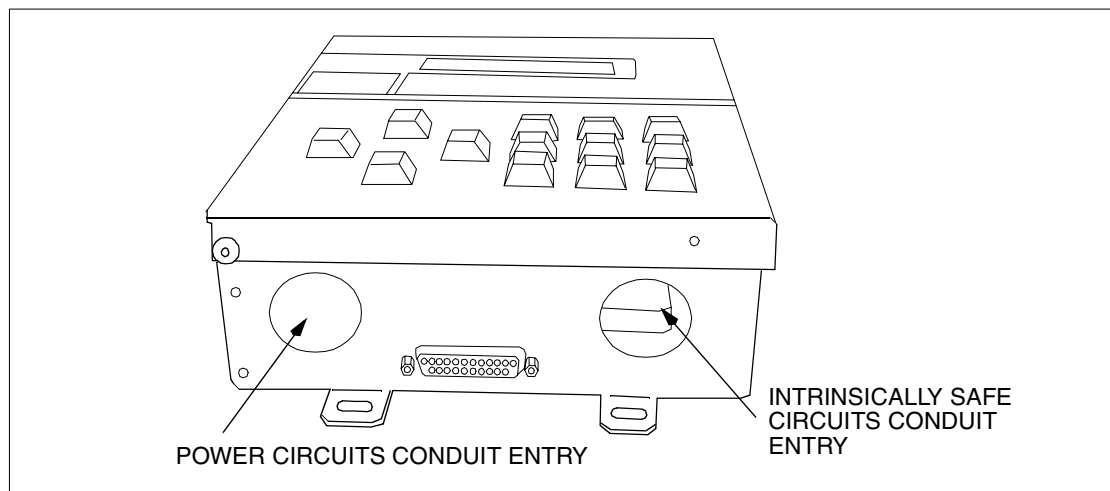







Figure 6. Conduit Knockouts for Probe and Sensor Wiring

Installing Console Power Conduit

 WARNING	
  	<p>Power wiring is not intrinsically safe.</p> <p>Explosion or fire, resulting in personal injury or death, property damage, and/or equipment damage could occur if the Guardian AST Console is not properly wired.</p> <p>To ensure safe and proper conduit and wiring installation:</p> <ol style="list-style-type: none"> 1. Read and follow all instructions in this manual, including all safety warnings, during conduit installation. 2. Ensure that conduits and wiring troughs from Guardian AST Console probes and sensors do not contain any other wires. Specifically, do not share power wiring conduit for the Guardian AST Console with wiring from intrinsically safe devices such as probes, sensors, and thermistors. 3. Ensure that power and Intrinsically-Safe device conduits enter the Guardian AST Console through their designated knockouts.

1. Install rigid metal conduit (3/4-inch or 1-inch I.P.S.) for console power from the power panel to the console location. Power wiring must enter the console through a designated knockout.
2. Pull three wires between the power panel and the Guardian AST Console; three #14 AWG (or larger) color-coded wires for line, neutral and ground.

Connecting Power Wiring to the Console

 WARNING	
 	<p>This device is installed in equipment where potentially lethal voltages may exist.</p> <p>Electrical shock, fire, or explosion resulting in serious injury or death may result if power is on during installation and high voltage is shorted across any barrier terminal.</p> <p>To ensure safe sensor wiring installation:</p> <ol style="list-style-type: none"> 1. Turn off power to the system before opening the front panel cover and connecting power, probe, and sensor wires. 2. Have equipment installed by a contractor trained in its proper installation and in compliance with all applicable codes including: National Electrical Code; federal, state, and local codes; and any other applicable safety codes.

General Wiring Practices and Guidelines

It is essential for your safety and for proper operation of the system that you observe all warning statements and carefully follow the instructions in this manual.

Be sure all wires entering the Guardian AST Console are color coded or marked to identify their source.

Power Supply Ratings

- Input power supply ratings (L1, NEUT, GND): 120 Vac, 60 Hz, 100 VA.
- Output power supply ratings (Alarm Relay Contacts, resistive load): 120 Vac, 5A Maximum (continuous) or 24 Vdc, 2A Maximum (continuous).

Connecting the Power Wires

1. Connect the power wires (L1, NEUT) to the proper terminals of the AC connector [Figure 7 on page 13].
2. Connect the ground wire (GND) to the proper terminal of the AC connector [Figure 7].
3. Check to be sure that the electrical resistance between the monitor ground terminal and a known good earth ground is less than 1-ohm.
4. Connect the console's AC supply power wires in the power panel to a separate dedicated circuit. Keep AC power to the console switched off and tagged at the breaker panel until the console is completely wired.



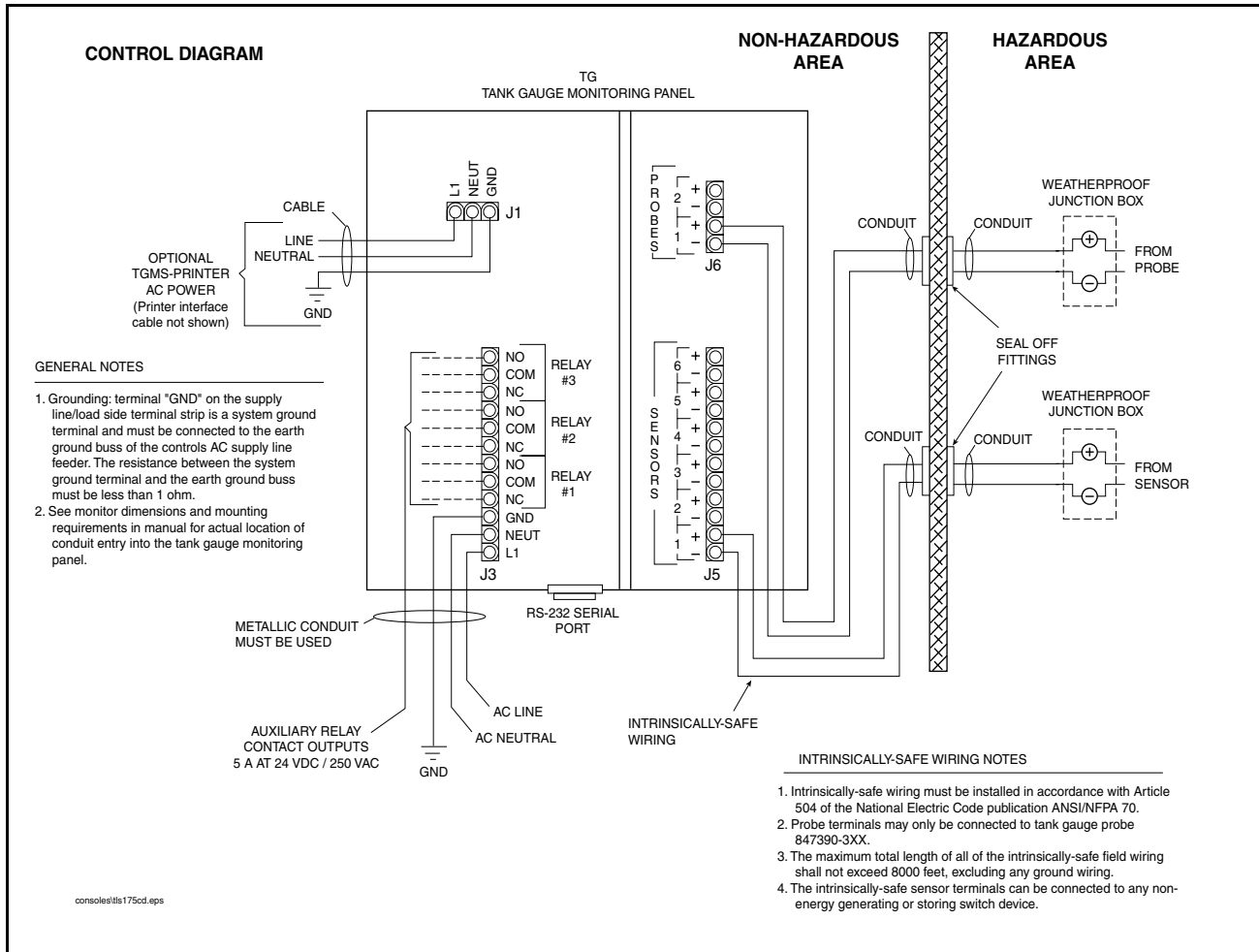


Figure 7. System Control Diagram

Determining Mag Probe Length

Determining Mag Probe Length - Dedicated Riser

1. Measure the distance from the bottom of the tank to the top of the probe riser pipe (A).
2. Measure the distance from the bottom of the probe riser pipe to the top of the probe riser pipe (B).
3. Subtract (B) from (A) to determine the correct tank diameter (C). Round tank diameter (C) up to next the highest inch and order that length probe.

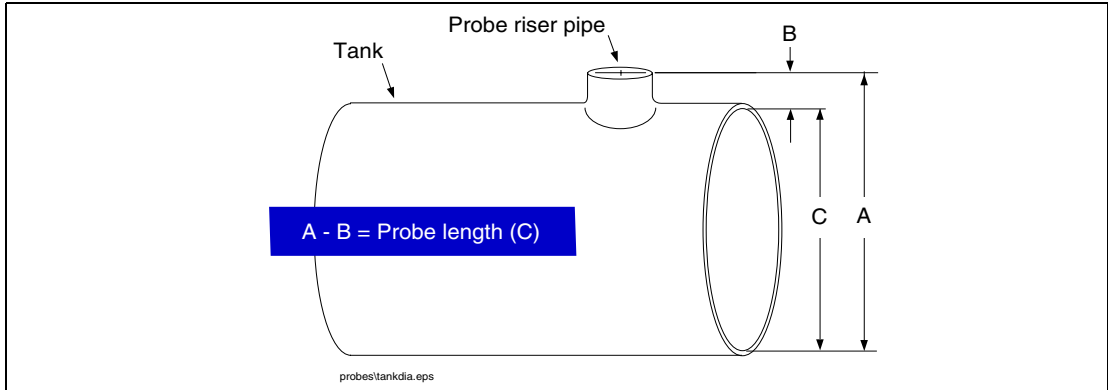


Figure 8. Calculating the Correct Mag Probe Length for dedicated riser installation

Standard and Custom Mag Probe Lengths

After you determine the probe length needed, refer to Figure 9 for a list of available standard Mag Probe lengths (custom probe lengths are available at extra cost). *NOTE: Inaccurate readings will result if probes are not the correct length for the given tank diameter.*

IMPORTANT

If the probe length exceeds the diameter of the tank, the float may become lodged in the riser pipe when the tank is overfilled. Install an optional split-ring collar (Part number 576008-617) onto the probe shaft to prevent the float from entering the riser pipe.

3" minimum distance required between canister and riser cap for cable connector. (Reference)

14.5" canister height (Reference)

Probe length (see chart)

Standard Probe Lengths (ft/in.)	Custom Probe Lengths* (in.)
4'-0"	24"
5'-0"	↑ in 1-inch increments ↓
5'-4"	
6'-0"	
	72"

probeslastlgh.eps

**Select a Mag 2 probe for lengths exceeding 72"*

Figure 9. Standard and Custom Mag Probe Lengths

Special Mag Probe Installation Kits

In addition to the Mag Probe installation kits shipped with each probe (containing floats, spacer rings, cable, etc.), your installation may also require one or more of the special kits described in this section.

AST Installation Kit

This kit is recommended when installing Mag Probes into an aboveground tank. This kit contains a length of flexible conduit, connectors, etc., for easier probe access. The kit contents are listed in Table 1 and shown in Figure 10.

Table 1: Mag Probe installation kit- Part No. 312020-984

Quantity	Description	Part Number
5 ft.	3/8" Flexible conduit	576008-294
1	3/8" Adaptor nut	329972-002
2	3/8" Straight liquidtight connectors and related parts	576008-295
1	Cord Grip Group	331028-001

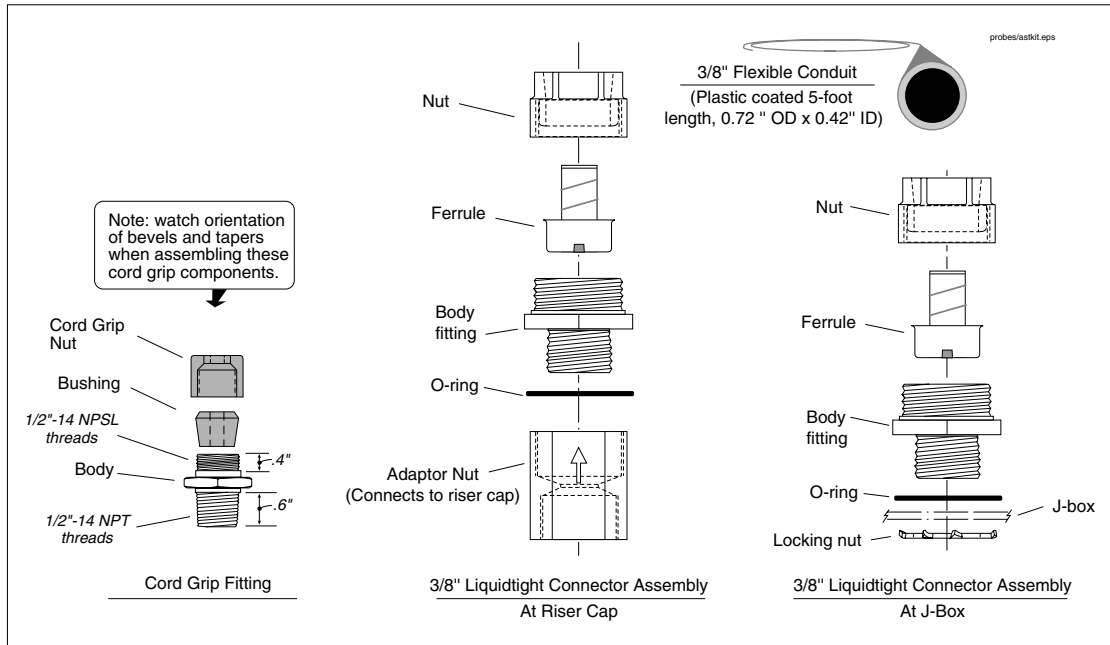


Figure 10. Mag Probe Installation Kit

Riser Cap Kit for Mag Probe Installations

The cap on the riser containing the Mag Probe must be modified to allow the Probe’s cable to exit the riser. This modification requires making a 1/2”-14 NPT tapped hole in the cap for a cord grip. Veeder-Root offers two types of drilled and tapped Riser Cap kits, or you may be able to modify the existing riser cap.

Cap and Cord Grip Kit

This Riser Cap kit (Table 2) contains a non-metallic cap which screws onto the 4” NPT riser (Figure 11). The cap comes drilled and tapped with a cord grip.

Table 2: Cap and cord grip kit- Part No. 330020-282

Quantity	Description	Part Number
1	Cap Riser	331106-001
1	Gasket	331140-001
1	Bushing - Cord Grip	330787-001
1	Nut - Cord Grip	330594-001

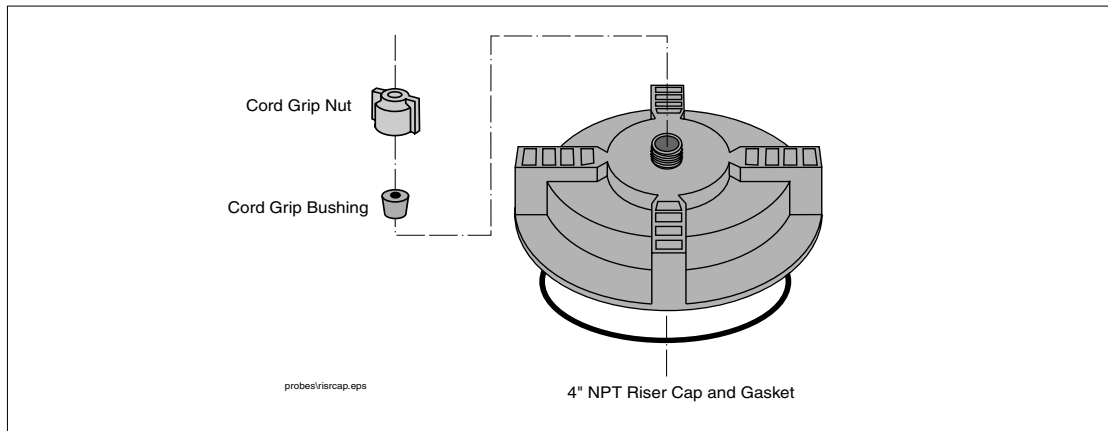


Figure 11. Cap and Cord Grip Kit

Metal Cap and Ring Kit

This riser cap kit contains a metal ring which screws onto the 4”NPT riser and a quick-release metal cap which clamps onto the ring (Table 3). The cap comes drilled and tapped with a cord grip (Figure 12).

Table 3: Metal cap and ring kit - Part No. 312020-952

Quantity	Description	Part Number
1	Ring Adaptor and gasket	514100-332
1	Cap and gasket	327869-003
1	Group Cord Grip	331028-001

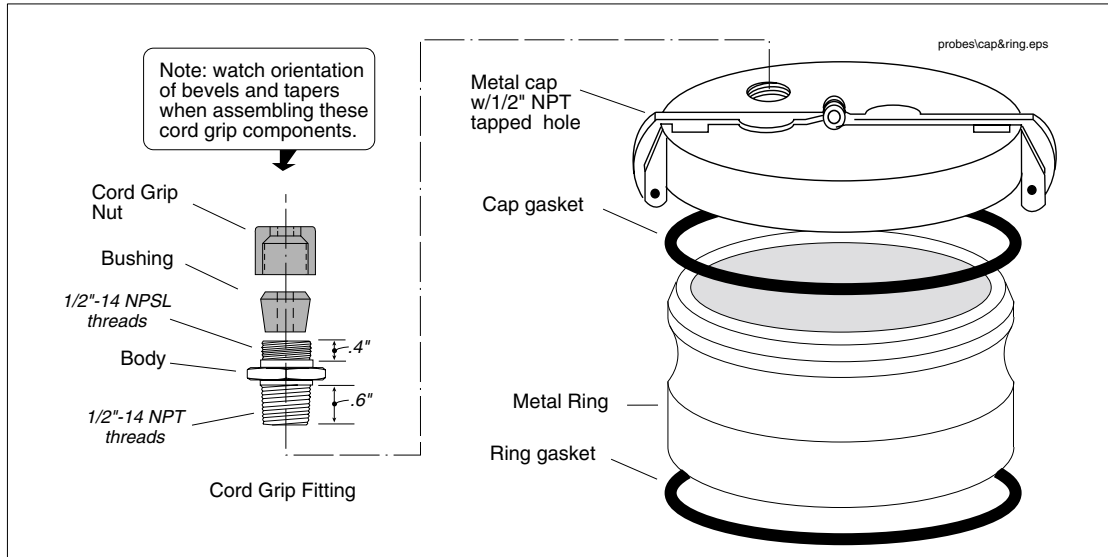


Figure 12. Metal Cap and Ring Kit

MODIFYING AN EXISTING METAL CAP

In order to ensure that the riser cap seals properly to the probe cable and riser, we recommend that you purchase one of the kits available for this purpose. Riser Caps from other manufacturers may require modification. If you use your own metal riser cap, you must drill and tap it for a cord grip fitting as follows.

1. Remove the cap to a non-hazardous location.
2. Drill and tap the cap for a 1/2"-14 NPT cord grip thread [Figure 13].

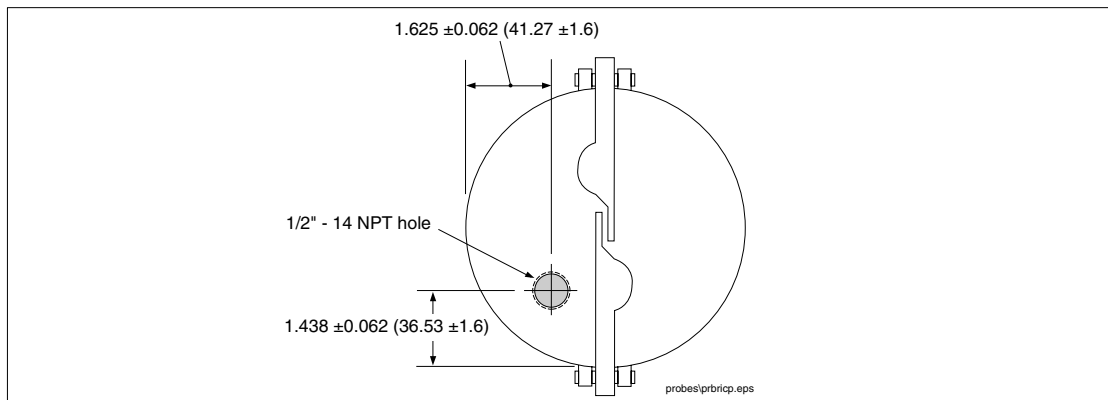









Figure 13. Modifying an existing metal riser cap

Mag Probe Installation

 WARNING	
    	<p>This product is to be installed in systems operating near locations where highly combustible fuels or vapors may be present.</p> <p>Fire or explosion resulting in serious injury or death could result if the equipment is improperly installed or modified. Serious contamination of the environment may also occur.</p> <p>You may be working on a raised, curved, and slippery surface, and in an area where vehicle traffic may occur. Serious injury or death could result if you slip off the tank or the platform lift is struck by a vehicle.</p> <p>To ensure proper installation, operation, and safe use of this product:</p> <ol style="list-style-type: none">1. Read and follow all instructions in this manual, including all safety warnings.2. Have equipment installed by a contractor trained in its proper installation and in compliance with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes.3. Wear non-skid shoes and use a stable platform lift to access the tank's probe riser.4. To protect yourself and others from being struck by vehicles, block off your work area during installation or service.

Installing the Probe in a Dedicated Riser

1. Remove any sludge from the bottom of the tank.
2. Check that floats, boot, and cable are assembled correctly on probe (ref. Mag Probe Assembly Guide).
3. Gently slide the float(s) to the bottom of the probe shaft before raising the probe. Carefully lower the probe into the riser pipe until the boot rests on the bottom of the tank [See Figure 14].

Important  *Handle probes carefully. Striking or dropping the probe will result in loss of calibration and could cause permanent damage.*

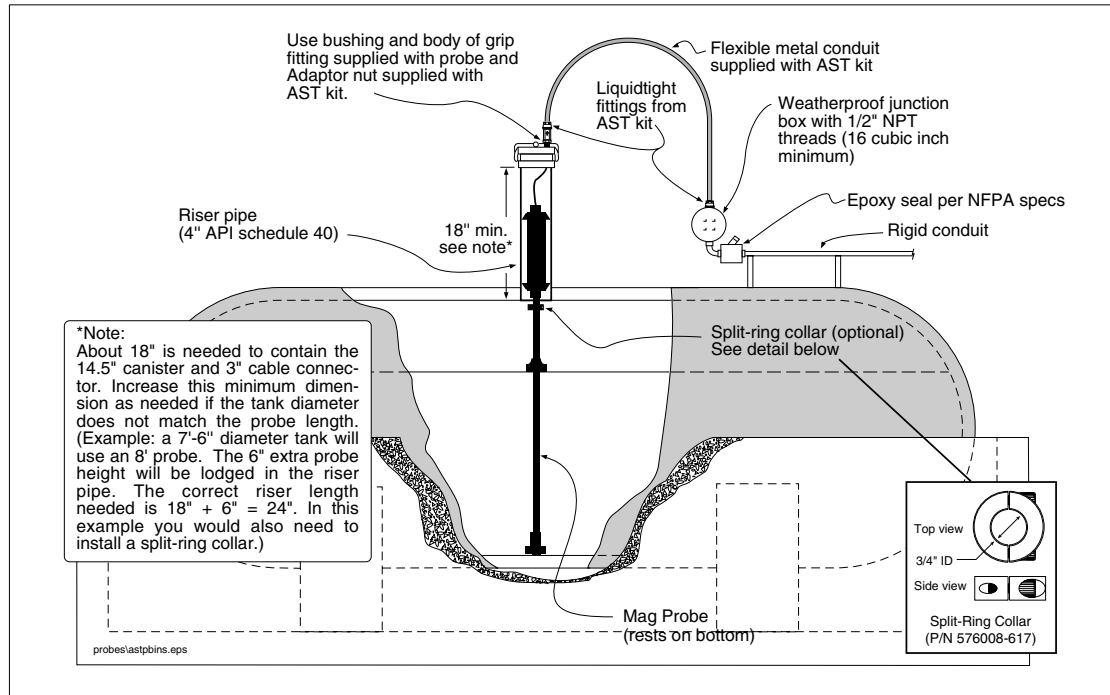


Figure 14. Probe installation - dedicated riser

Riser Cap Attachment

1. If you are using the one piece cap (see Figure 11 on page 16), push the end of the probe cable through the cap and cord grip bushing, leaving a minimal amount of slack between the probe and cap. Discard the cord grip nut and attach the Adaptor Nut from the AST kit to the cap (see Figure 10 on page 15). Tighten the Adaptor Nut until the cable is held firmly. Go to Step 3.
2. If you are installing the metal cap and ring (see Figure 12 on page 17), screw the ring onto the 4" riser until the gasket contacts the pipe, then use a pipe wrench to tighten it an additional 3/4 turn. Using UL-classified pipe sealant (suitable for the fuels involved), screw the cord grip fitting into the tapped hole and tighten. Place the cord grip bushing in the fitting. Discard the cord grip nut and loosely screw the Adaptor Nut from the AST kit onto the cord grip fitting (Figure 10). Push the cable through the metal cap, bushing, and Adaptor nut, then clamp the cap onto the ring. Make sure there is a minimal amount of slack between the probe and cap, then tighten the Adaptor Nut until the cable is held firmly.
3. Next assemble the liquidtight connectors on both ends of the flexible conduit as shown in Figure 10. Push the cable through the flexible conduit assembly and into the J-box. Connect the flexible conduit assembly to the Adaptor Nut on one end and the J-box on the other.
4. Tighten the fittings until snug. Splice and seal the wires in the J-box as shown in the Probe and Sensor Field Wiring on page 26.

Sensor Installation

Sensor Installation Diagrams



Each sensor supplied by Veeder-Root is accompanied by an installation manual. For reference only, Figure 15 through Figure 20 show sensor installation examples. When installing Veeder-Root sensors you must consult and adhere to the procedures given in the installation manual shipped with the sensor.

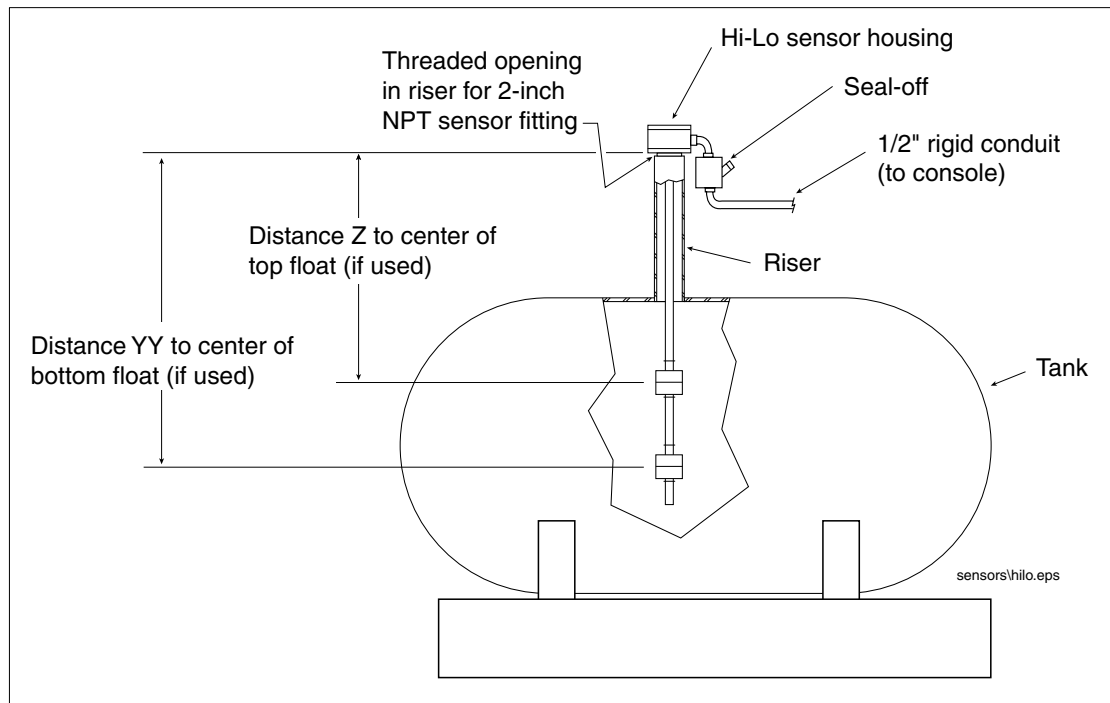


Figure 15. Example Hi-Lo Sensor Installation

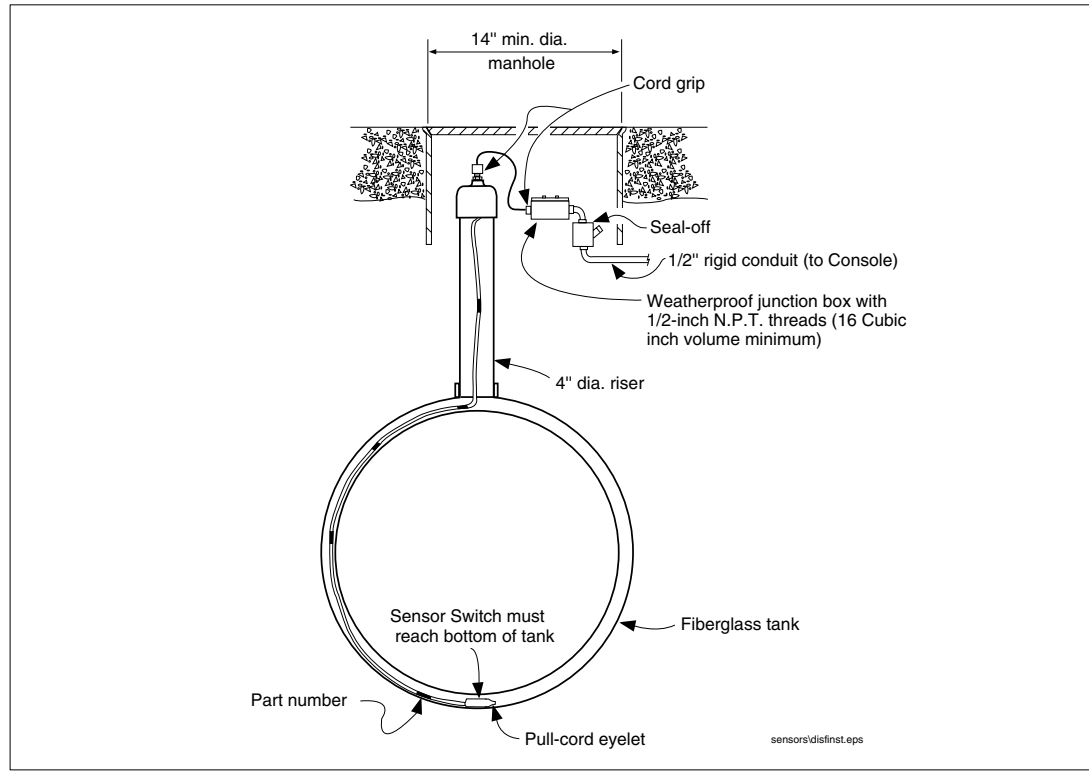


Figure 16. Example Interstitial Sensor Installation - Fiberglass UST

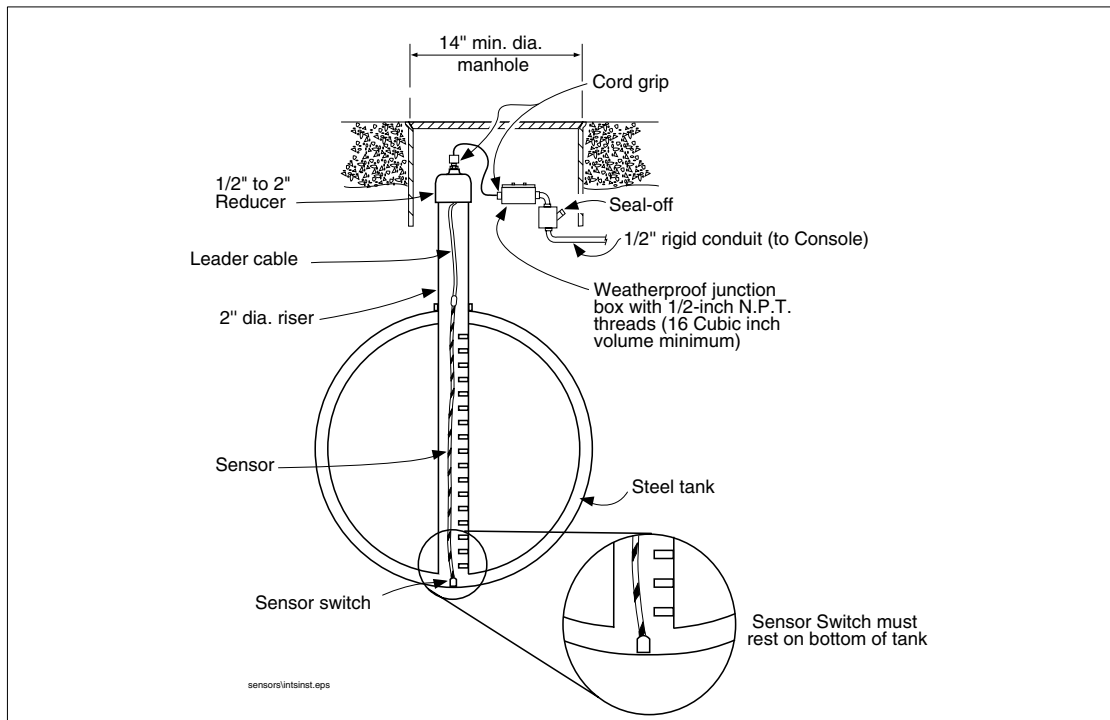


Figure 17. Example Interstitial Sensor Installation - Steel UST

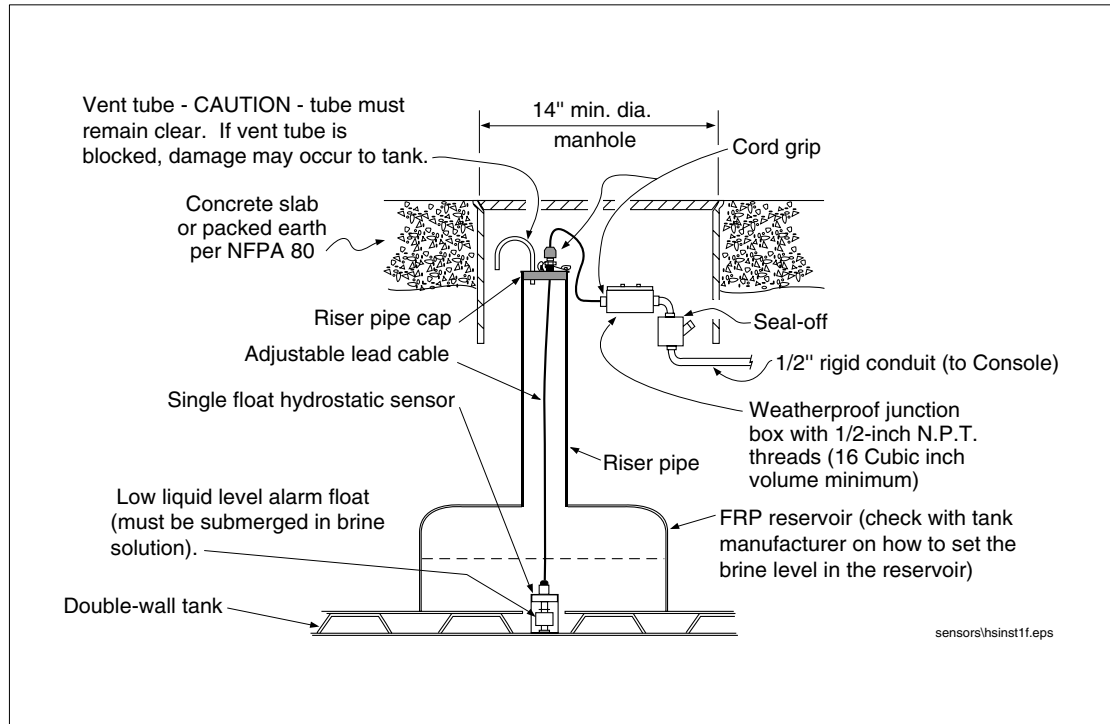


Figure 18. Example Hydrostatic Reservoir Single Float Sensor Installation

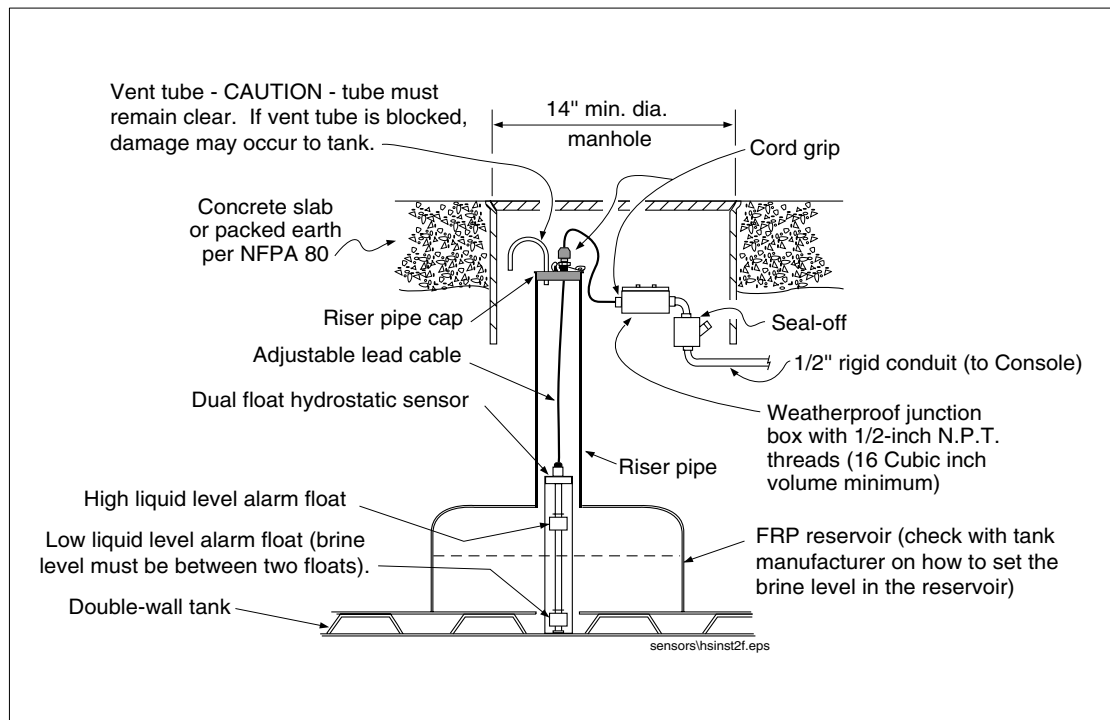


Figure 19. Example Hydrostatic Reservoir Dual Float Sensor Installation

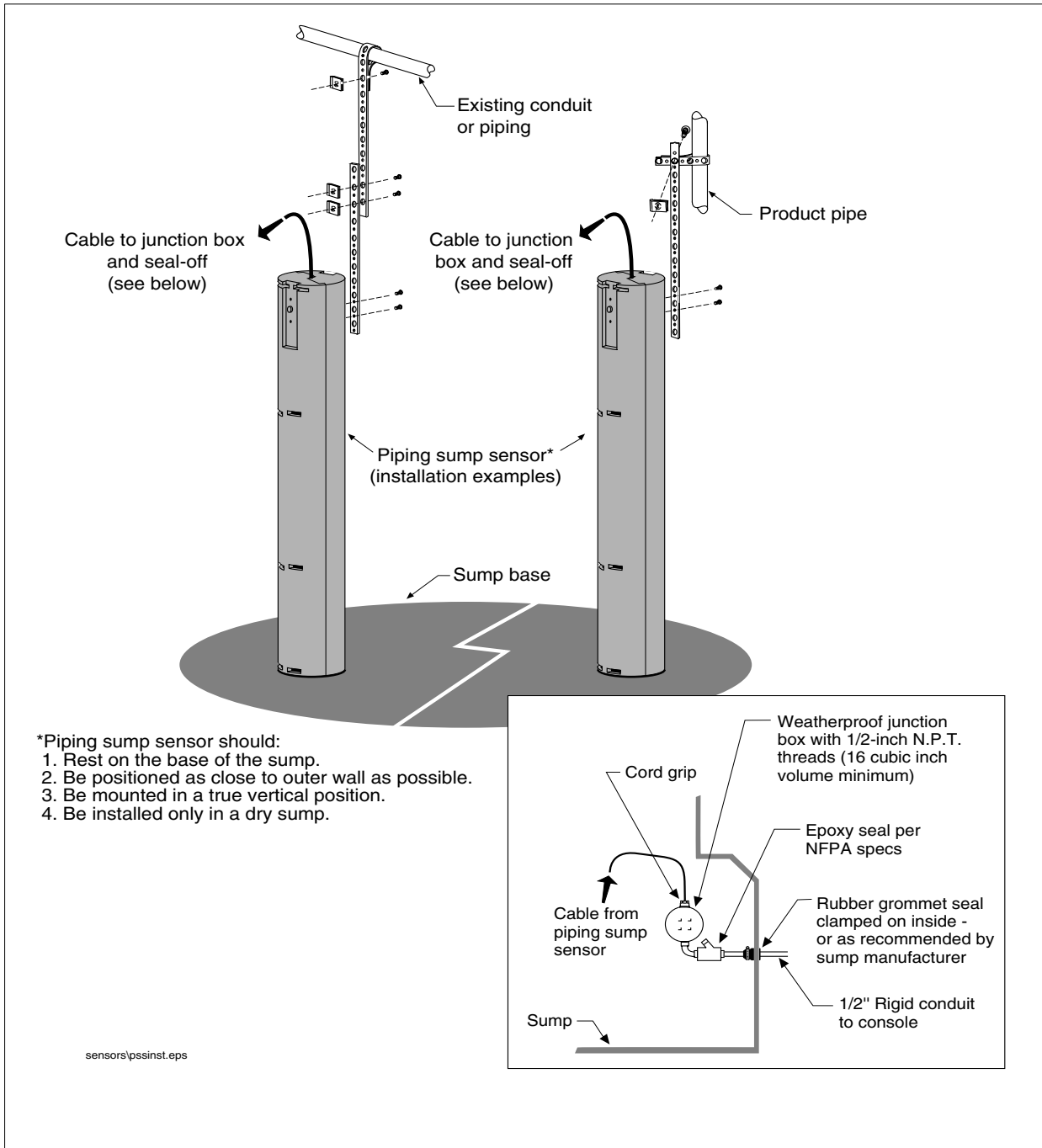






Figure 20. Example Piping Sump Sensor Installations in Piping Sump

Installing Probe/Sensor Wiring Conduits

 WARNING	
  	<p>While probe and sensor wiring is intrinsically safe, power wiring is not intrinsically safe.</p> <p>Explosion or fire, resulting in personal injury or death, property damage, and/or equipment damage could occur if the Guardian AST Console is not properly wired.</p> <p>To ensure safe and proper conduit and wiring installation:</p> <ol style="list-style-type: none"> 1. Read and follow all instructions in this manual, including all safety warnings, during conduit installation. 2. Ensure that conduits and wiring troughs from GuardianAST Console probes and sensors do not contain any other wires. Specifically, do not share power wiring conduit for the Guardian AST Console with wiring from intrinsically safe devices such as probes and sensors. 3. Ensure that conduit enters the Guardian AST Console through the proper preformed knockouts.

Conduit Requirements

Important ⚠ Intrinsicly safe circuitry of the Guardian AST Console limits electrical power to the probes and sensors so that there is insufficient energy to ignite fuel. To maintain this safety feature, install Guardian AST Console probe and sensor wires in conduits separate from all other wiring. Wiring from separate probes and sensors may be run in the same conduits or troughs providing they are powered by the same console.

Installing Conduits

1. Run conduit from all probe and sensor locations to the Guardian AST Console location.
2. Conduit layout must conform to federal, state, and local codes.
3. Knockouts for 3/4-inch or 1-inch I.P.S. conduit are provided in the intrinsically safe area of the console. When deciding on the size and number of conduits required for probe and sensor wiring, conform to the National Electrical Code and state and local codes.
4. Seal the conduit in accordance with the National Electrical Codes and the Automotive and Marine Service Station Codes since they pass from a Class I, Division I or Division II area into a nonhazardous area.

Installing Junction Boxes

1. Install a weatherproof electrical junction box with gasketed cover on the end of each probe and sensor conduit run near the probe riser or monitoring well location. A separate junction box is not required for the Hi-Lo sensor.
2. Use gasketing or sealing compound at each entry to the junction box to ensure a waterproof assembly.

Direct Burial Cable

An alternative to trenching through existing pavement is to grind a shallow groove in the pavement for direct burial cable. Before considering the direct burial method, check to be sure that direct burial practices are acceptable at this location. When using direct burial cable for probe- or sensor-to-console wiring runs, the sealing materials and procedure are completely different. The direct burial method is illustrated in Figure 21.



If you decide upon the direct burial method, consult the Direct Burial Cable Installation Manual for detailed safety precautions and installation instructions [Veeder-Root No. 576013-858].

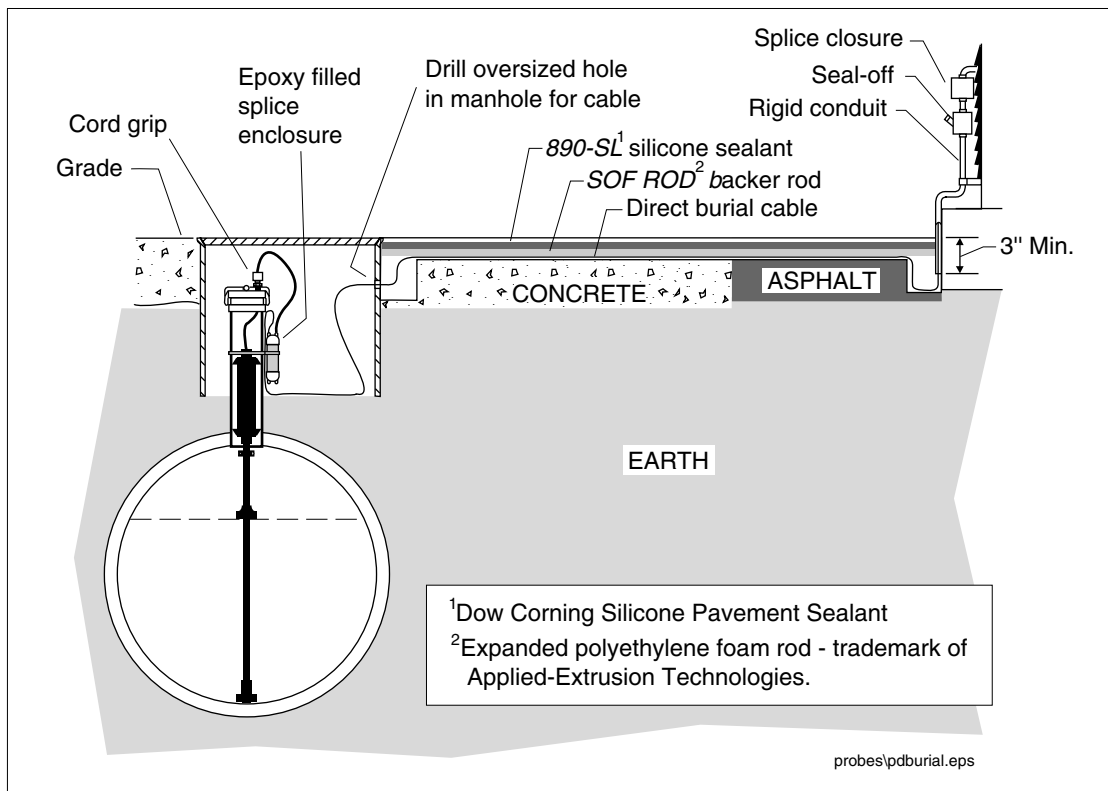


Figure 21. Example of Direct Burial Cable Installation

Probe and Sensor Field Wiring

Figure 22 diagrams probe and sensor connections in the field junction boxes to the wiring from the console. You must observe polarity when connecting the probe wiring.

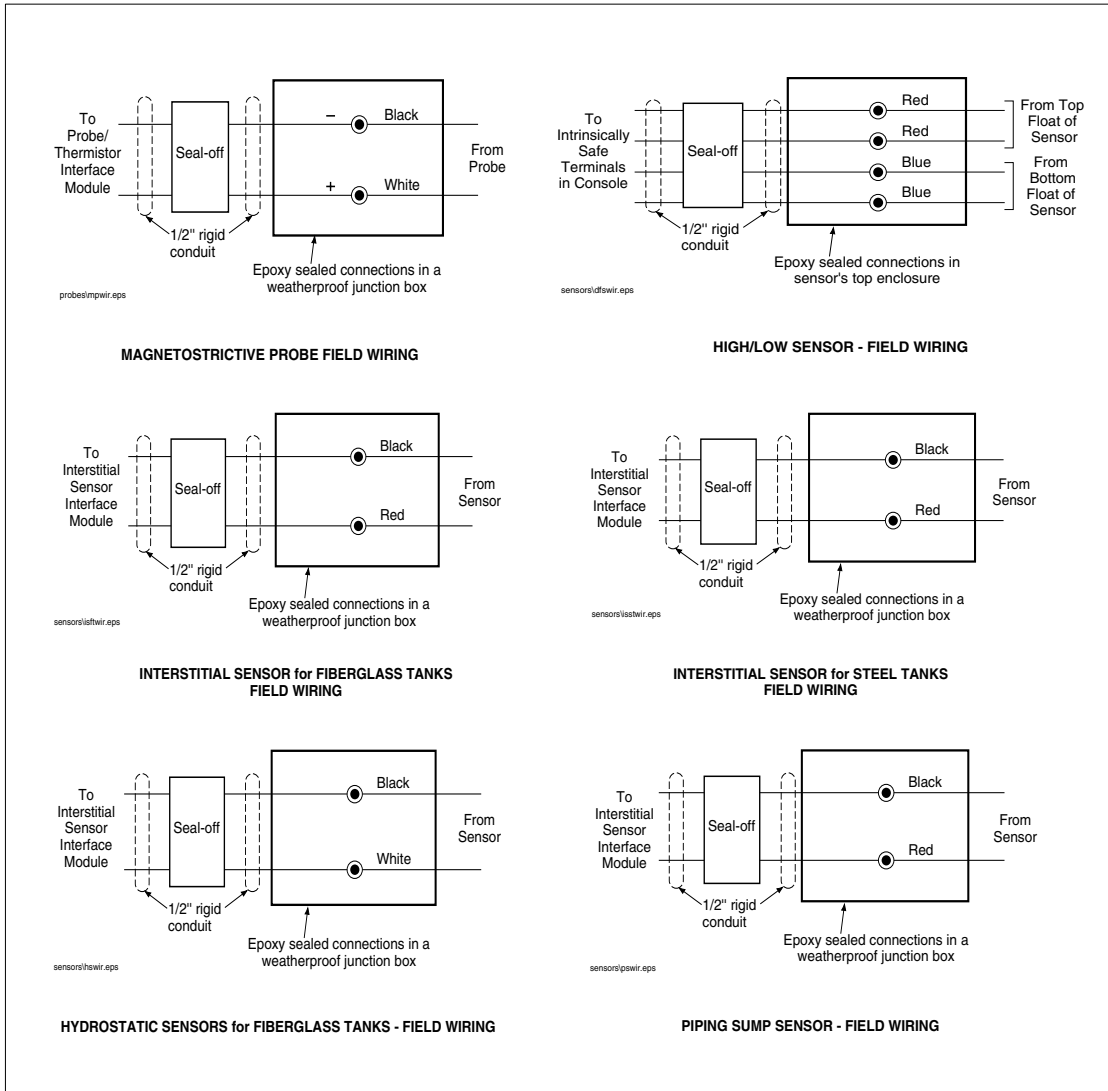


Figure 22. Field Wiring Probes and Sensors to Console Cables

Sealing Field Connections

Wiring Run Through Rigid Conduit

1. Pull the wires from the probe or sensor into the junction box. Pull the necessary sets of wires from the console through the seal-off box, the conduit attaching the junction box to the seal-off box and into the junction box.
2. Using wire nuts, connect the wires from the probe (observe polarity) or sensor to the wires coming from the console. Be sure to observe color codes or tags when making these connections so that the sensor or probe outputs are attached to the correct terminals in the console.
3. Seal wire nuts with epoxy sealant following the instructions in Figure 23. For Hi-Lo sensors with dual floats, use one epoxy bag for the top float's wiring connections and a second epoxy bag for the bottom float's wiring connections.

CAUTION: Epoxy sealant may be irritating to eyes and skin. May cause skin sensitization in susceptible individuals. May be absorbed through the skin. Epoxy sealant contains epoxy resin and vinyl cyclohexane dioxide. Vinyl cyclohexane dioxide has caused skin cancer in animal tests. Avoid eye and skin contact. Wear chemically resistant gloves and safety glasses. Use only in well ventilated areas.

4. Do NOT terminate shield or drain wire at this location, ground shield and drain wires at console only.
5. Push the tie-wrapped, epoxy sealed bag into the junction box. Replace and tighten the junction box cover.

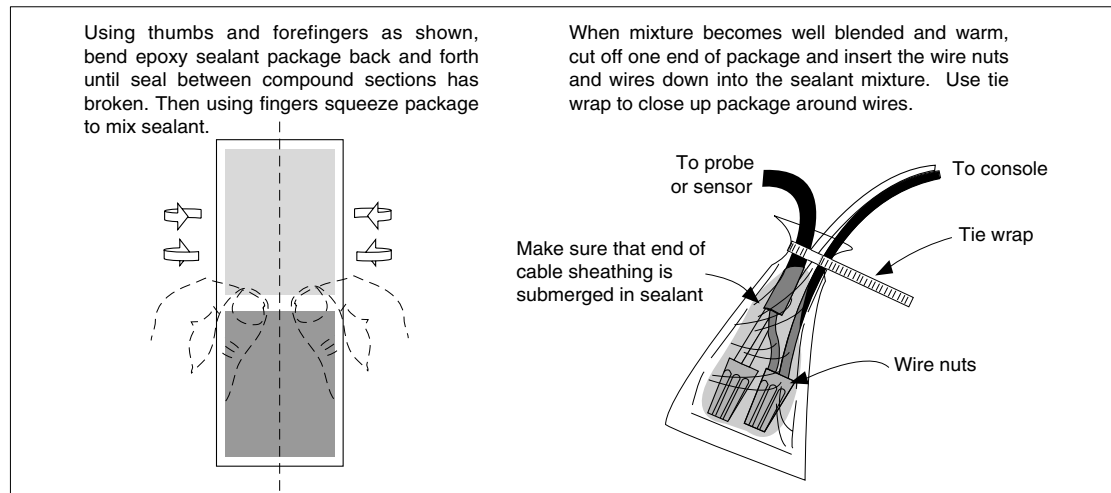


Figure 23. Epoxy Sealing Probe and Sensor Field Connections

Direct Burial Cable

When using direct burial cable for probe- or sensor-to-console wiring runs, the sealing materials and procedure are completely different.

If you are using Direct Burial Cable you must follow the sealing instructions in the Direct Burial Cable Installation Manual.



Connecting Intrinsically Safe Wiring

WARNING

	<p>While probe and sensor wiring is intrinsically safe, power wiring is not intrinsically safe.</p> <p>Explosion or fire, resulting in personal injury or death, property damage, and/or equipment damage could occur if the Guardian AST Console is not properly wired.</p> <p>To ensure safe and proper conduit and wiring installation:</p> <ol style="list-style-type: none"> 1. Read and follow all instructions in this manual, including all safety warnings, during intrinsically safe wire installation. 2. Ensure that conduits and wiring troughs from Guardian AST Console probes and sensors do not contain any other wires. Specifically, do not share power wiring conduit for the Guardian AST Console with wiring from intrinsically safe devices such as probes, sensors, and thermistors.
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Wiring Record

Wiring records [Figure 24] are for the installer’s use to record the wiring scheme and identify wiring from each probe and sensor. Information should be recorded on the Circuit Directory label within the console.

Important ☞ It is critical that you identify and maintain the relationship of probe and sensor locations and their wires to their positions on the probe or sensor connectors. Failure to do so could result in the improper identification of a leak location or leak type.

POWER AREA

GROUND

RELAY 3
Connected to:

RELAY 2
Connected to:

RELAY 1
Connected to:

GROUND

AC POWER G
N
L1

INTRINSICALLY SAFE AREA

PROBE LOCATIONS
2
1

SENSOR LOCATIONS
6
5
4
3
2
1

Figure 24. Circuit Directory

Sensor and Probe Connections

Sensors and probes are connected to the console in the intrinsically safe module area behind the cover containing the label with the circuit directory. Never remove the intrinsically safe cover from the console.

Wires for multiple probes and sensors may enter the Guardian AST Console through a single conduit. Use a different color code for each wire or individually mark each wire.

Important ⚠ Once a probe or sensor has been wired to certain terminals and the system has been programmed, the wires from that probe or sensor may not be relocated to other terminals without reprogramming the system.

Record the color or marking that identified each wire running from the probe or sensor to the Guardian AST Console.

Connecting Two-Wire Probes

1. Connect the two color-coded or marked wires from the probe to the Probe terminals [Figure 25].

Note: Be sure to observe proper polarity.

Connecting Two-Wire Sensors

1. Connect the two color-coded or marked wires from the sensor to the Sensor terminals [Figure 25].

Note: Since the leak sensors are contact switches, polarity is not a consideration when connecting field wires to the Sensor terminals.

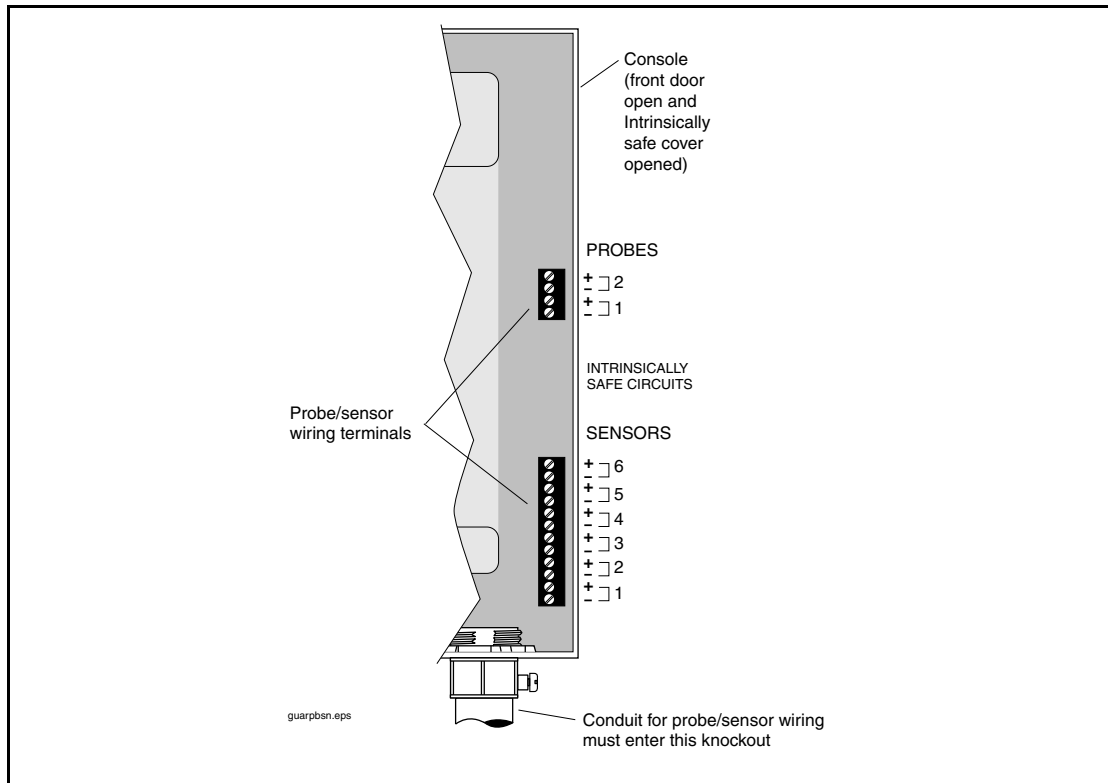


Figure 25. Probe and Sensor Wiring Terminals

RS-232 Interface

RS-232 Interface Module provides a 25-pin female D-connector for data access—direct via a user supplied null modem cable, or remote via a user supplied external modem and over phone lines—to a computer or point-of-sale terminal.

Important 🗨️ RS-232 cable runs longer than 50 feet could result in data errors, component damage, or both.

Cable Runs

An RS-232 Interface can be used for direct local attachment of terminals if the cable run is no more than 50 feet. In practice, runs longer than 50 feet have performed satisfactorily. Since the RS-232 specification restricts operation to up to 50 feet, direct-connect cable runs greater than 50 feet are not warranted for proper operation.

Peripheral Equipment Requirements

Any peripheral equipment connected to an RS-232 serial port must meet these criteria:

- Peripheral equipment must be UL listed.
- The equipment must have an EIA standard RS-232C or RS-232D communications protocol.
- The equipment must NOT be installed over or in a hazardous location.

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