Manual No: **577013-719** ● Revision: **G**

TLS-IB

Site Prep Manual

VEEDER-ROOT

Notice

Veeder-Root makes no warranty of any kind with regard to this publication, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Veeder-Root shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this publication.

Veeder-Root reserves the right to change system options or features, or the information contained in this publication.

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.

RETURN SHIPPING

For the parts return procedure, please follow the appropriate instructions in the "General Returned Goods Policy" and "Parts Return" pages in the "Policies and Literature" section of the Veeder-Root **North American Environmental Products** price list.

Introduction

Site Prep - International Installations

Site Prep - U.S and Canadian Installations

Connecting Wiring to the TLS-IB

Troubleshooting

TLS-IB Specifications

Figures

Tables

Introduction

This manual describes site preparation and installation procedures for the TLS-IB and Mag Probes. Site preparation is divided into International and U.S./Canadian installations. The sections that describe how to connect probe, IFSF, and Serial Comm wiring to the TLS-IB, and troubleshooting/maintenance procedures are common to all locations.

The TLS-IB is mounted in a non-hazardous area of the site and monitors up to eight in-tank Mag Probes located in the hazardous area of the site.

This manual assumes that you installing the TLS-IB in a new site (before pavement is put down and with no wiring runs in place). After the TLS-IB is installed, you should setup and configure the unit via the IFSF network.

Related Manuals

576013-635 Veeder-Root RS-232 Serial Interface Manual

576013-858 Direct Burial Cable Installation Instructions

577013-578 Contractor's Site Prep Guide

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.

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.
	**ELECTRICITY** High voltage exists in, and is supplied to, the device. A potential shock hazard exists.
	**TURN POWER OFF** Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.

	**WEAR EYE PROTECTION** Fuel spray from residual pressure in the lines can cause serious eye injuries. Always wear eye protection.		**INJURY** Careless or improper handling of materials can result in bodily injury.
	**GLOVES** Wear gloves to protect hands from irritation or injury.		**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.
	**WARNING** Heed the adjacent instructions to avoid equipment damage or personal injury.		**STATIC SENSITIVE COMPONENTS** Wear grounded anti-static wrist strap before handling a TLS-IB CPU board.

Control Drawing

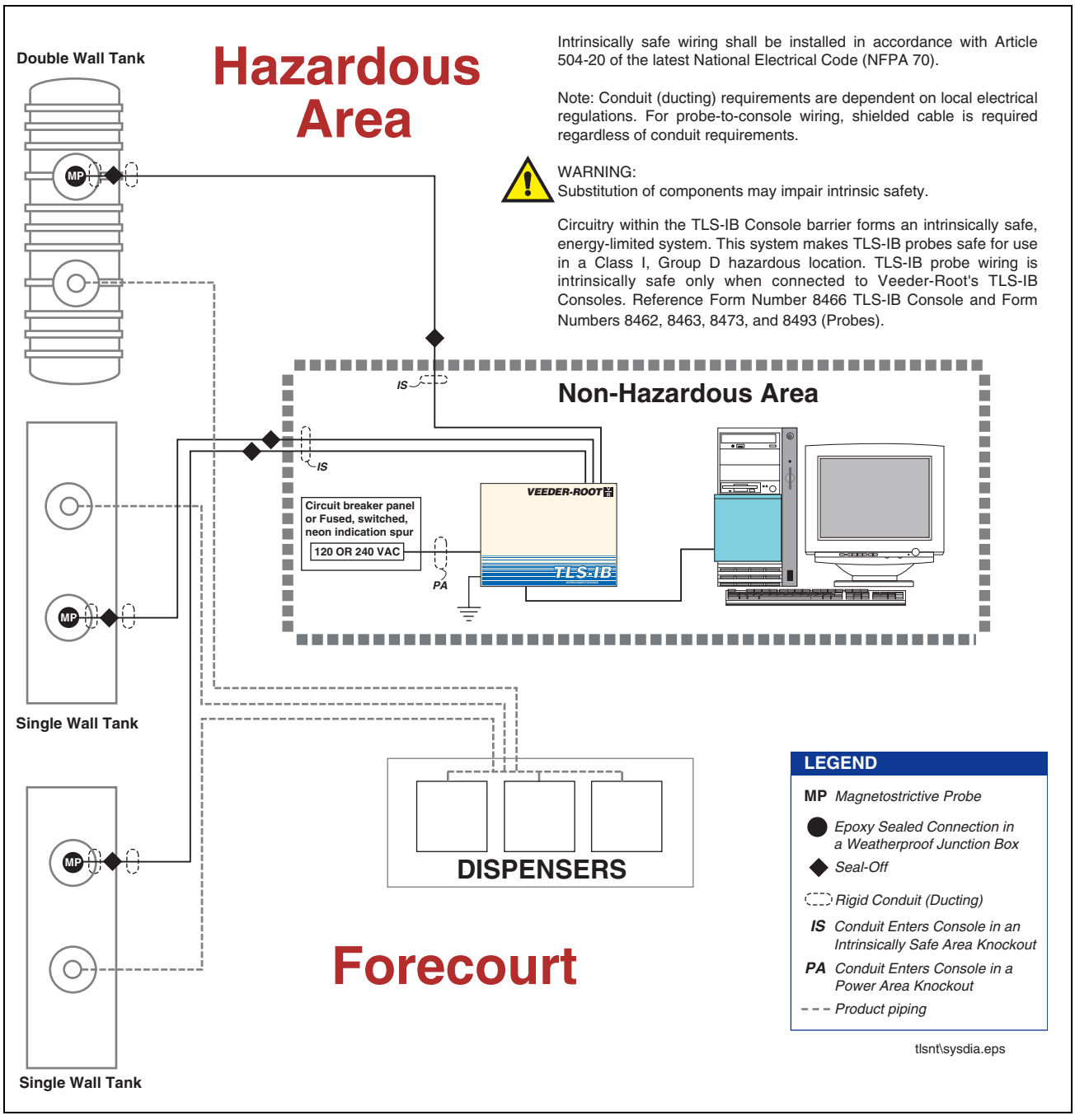


Figure 1. Control Drawing Showing an Example TLS-IB System Site Layout

Site Prep - International Installations

General

This document describes the procedures necessary to prepare the site, ready for the installation of the Veeder–Root TLS Series Underground Storage Tank Monitoring Systems.

This manual does *not* cover the site preparation necessary for the installation of Veeder–Root Delivery Information Systems (DIS). For information on these products please refer to the relevant manuals for DIS-500, DIS-100, DIS-50, and DIS-T systems.

Veeder–Root maintains a continuous process of product development and therefore product specifications may not be as described in this manual. Please contact the Veeder-Root office nearest you, or visit our website at *www.veeder.com* for information on new or updated products. Changes affecting products or procedures described in this manual will be reported in subsequent revisions. Veeder–Root has taken every care in the compilation of this manual; however it is the installers' responsibility to take every precaution to safeguard themselves and others.

Every person working with Veeder–Root equipment is expected to take every safety precaution possible and to have read this manual, particularly the sections referring to health and safety.

NOTE Deviation from the specifications contained in this manual can result in rework, delays in system installation and additional installation charges.

Contractors are advised to contact their nearest Veeder–Root office where local conditions may preclude using the specifications contained in this manual.

INSTALLATION LEVELS

Veeder–Root require that certain facilities are installed by contractors, nominated by the customer, prior to Veeder–Root attending the site for the installation of a TLS-IB system. These facilities vary dependent on the installation contract agreed between Veeder–Root and the customer. Two levels of site preparation exist and are described below:

Level 1 Installation

The customer or his elected contractor will supply (unless stated otherwise) and install the following:

Console power supply and earth.

External devices power supply and cabling.

Peripheral devices cabling.

Probe cable ducting

Probe field cables

Probe risers

The contractor will seal all ducting after system testing has been carried out.

Level 2 Installation

The contractor will install the following:

TLS-IB power supply and earth

External devices power supply and cabling

Probe cable ducting

The contractor will seal all ducting after system testing has been carried out.

IMPORTANT! Unless stated otherwise, instructions in this manual refer to both levels of site preparation.

IN–TANK PROBES

Magnetostrictive Probes are capable of performing precision tank testing as described by the United States Environmental Protection Agency [0.38 litres per hour (0.1 gph) and 0.76 litres per hour (0.2 gph)] when combined with the in-tank leak testing features of a TLS Console.

For further information on the performance and specification of in-tank probes, please contact your local Veeder-Root representative.

Health and Safety

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.
	**Read All Related Materials** 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.

GENERAL

Ensure that all local council, U.K. and E.C. laws and regulations are complied with. Also ensure that all recognised safety codes are followed.

Every person working with Veeder–Root equipment is expected to take every safety precaution possible in the installation of the TLS-IB and probes.

Contractors must ensure that supervisory personnel on the installation site are aware of their presence and requirements, especially the provision of safe working areas and isolation from AC electrical power.

Leaking underground tanks can create serious environmental and health hazards. It is the contractor's responsibility to comply with the instructions and warnings found in this manual.

Reference manual number 577013-578 for additional product safety information.

DANGER AREAS

⚠ WARNING

TLS System products will be operated near the highly combustible environment of a fuel storage tank.

Failure to install these products according to the instructions contained in this manual may result in explosion and personal injury.

It is essential that the warnings and instructions in this manual are carefully read and followed to protect both the installer and others from serious or fatal injury.

If the underground storage tank to be fitted with a TLS system either contains or at any time has contained petroleum products then the tank inspection chamber must be considered a hazardous environment as defined in IEC EN 60079-10 Classification of Hazardous Areas. Suitable working practices for this environment must be observed.

INTRINSIC SAFETY

The design of Veeder-Root products limits the power in the wiring to the in-tank probes and keeps this wiring physically separated from any other. It is the responsibility of the contractor to maintain the effectiveness of these safety features by preparing the installation site in accordance with the instructions and warnings which follow. Failure to do so could create danger to life and property.

Circuitry within the probe and console barrier forms an intrinsically safe, energy limited system. This system makes the probes suitable for use in hazardous locations. Probe wiring is intrinsically safe only when connected to the TLS-IB unit.

IMPORTANT! Substitution of specified components may impair intrinsic safety.

All probe wiring must be contained in dedicated ducts.

⚠ WARNING

An explosion could occur if other wires share ducts with intrinsically safe probe wiring. Ducting from probes must not contain any other wiring circuits. Failure to comply with this warning could result in explosion, death, serious personal injury, property loss or equipment damage.

Tank Lid Access Chambers

ACCESS CHAMBER INSTALLATION

The installation of the tank access chamber is the responsibility of the customer or their local site contractor and not that of Veeder-Root Environmental Systems Limited. However, there are certain requirements which need to be met to allow the correct installation of Veeder-Root in–tank monitoring probes. A typical installation is illustrated in Figure 2.

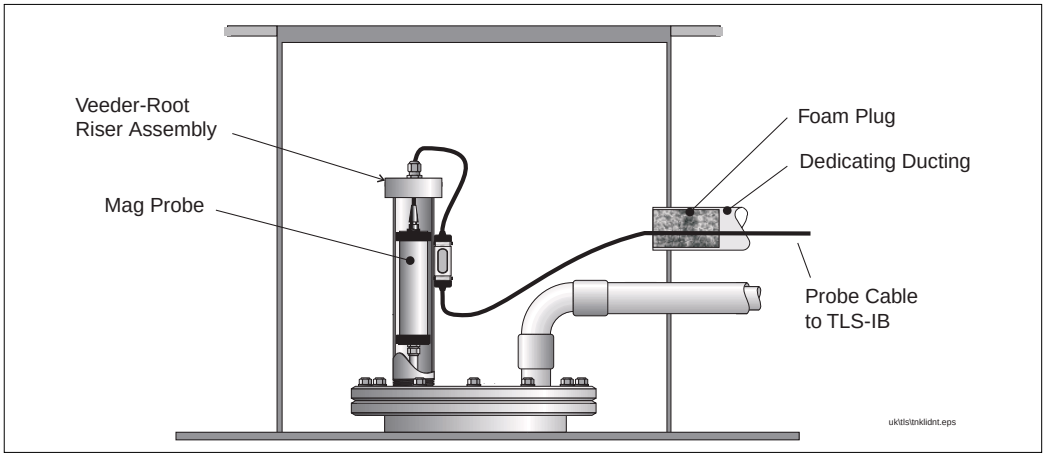


Figure 2. Typical Tank Lid Access Chamber Installation

IMPORTANT! To allow adequate space for probe installation and servicing, it is recommended that the access chamber is a minimum 750 mm deep and 600 mm wide at the base (see Figure 3 on page 7).

Veeder–Root are able to make special provision for tank lid access chambers of restricted depth. Contact your Veeder–Root Account Administrator at the address given on page 4.

PROVISION FOR PROBE RISERS

A dedicated Probe tapping of either 2-inch BSP, 3-inch BSP (preferred) or 4-inch BSP must be provided. For maximum height–to–volume accuracy, the probe socket must be as close as possible to the longitudinal axis of the tank.

IMPORTANT! The probe entry must not be obstructed by other pipe work. A free area above the probe socket of at least 100 mm radius from its centre must be provided. For Level 2 Installations probe entry plugs must be loosened and readily removable. Failure to provide sufficient access or to loosen plugs will cause delays in system installation and could result in additional charges.

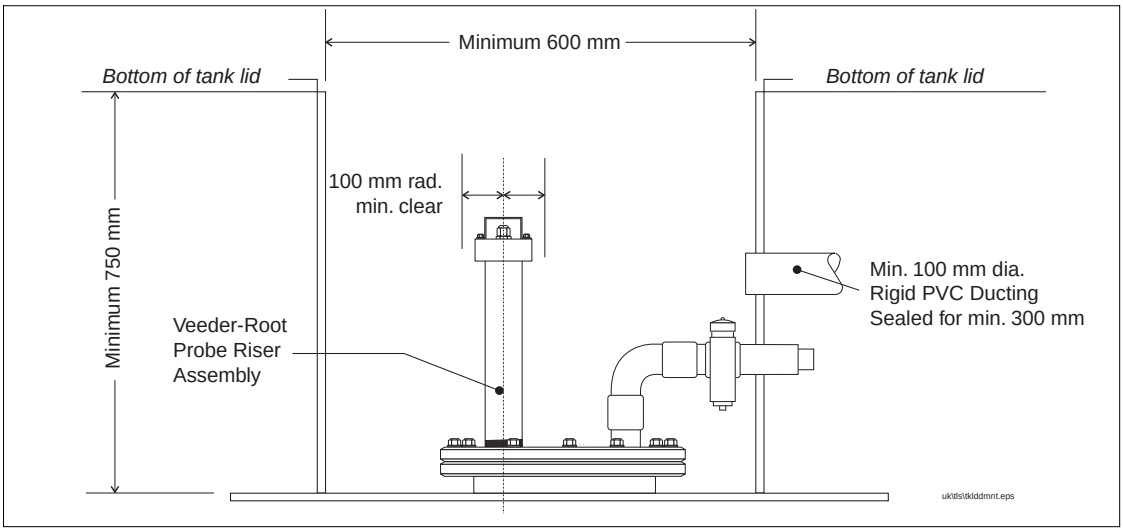


Figure 3. Tank Lid Access Chamber — Critical Dimensions

Where mechanical overfill prevention devices are installed, contractors *must* ensure that no part of these devices will be obstructed when the probe and riser assembly is installed. Failure to comply with this warning may result in the overfill prevention device not operating correctly.

European Probe and Riser Installation Criteria (Non-PTB)

All Mag Probes require installation using a 3-inch riser, regardless of tank entry size. All entry sizes, other than 3 inches, must be adapted to 3 inches with suitable fittings. The minimum probe entry size that can be used is 2 inches.

Where possible, the canister of the probe should be completely contained within the 3-inch riser. In all cases, the probe must rest on the bottom of the tank (see Figure 4).

IMPORTANT! Incorrect readings will result if the probe is not resting on the bottom of the tank.

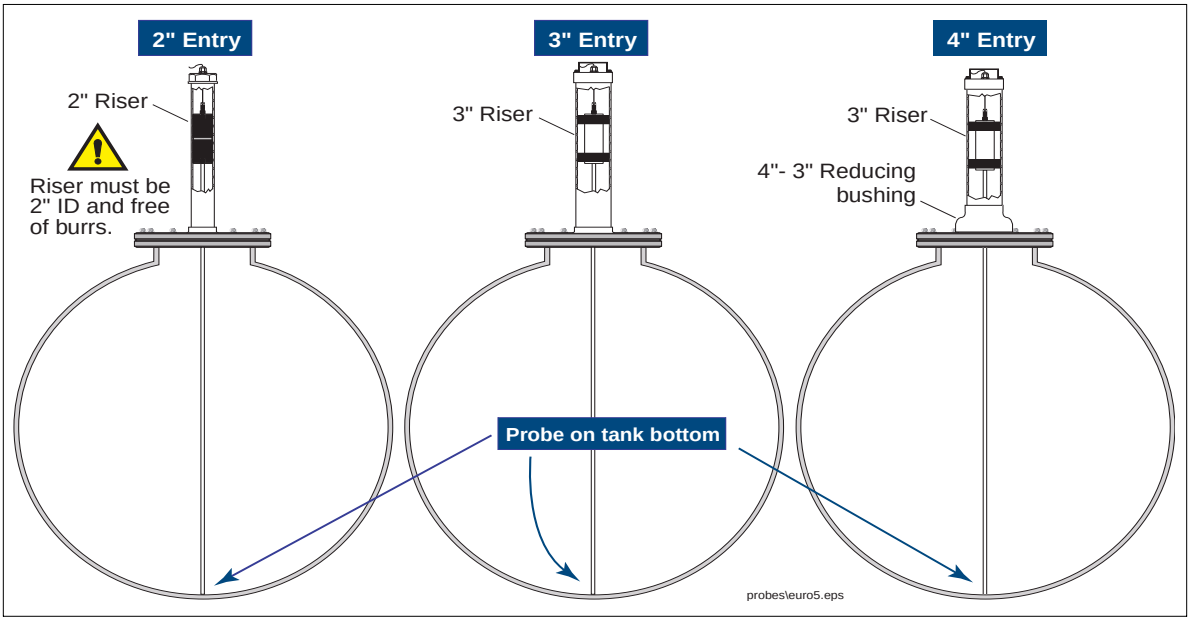


Figure 4. Typical Probe Installations

GENERAL NOTES

- 3-inch risers, when fitted, should be a minimum of 100 mm above the probe canister (see Figure 5).

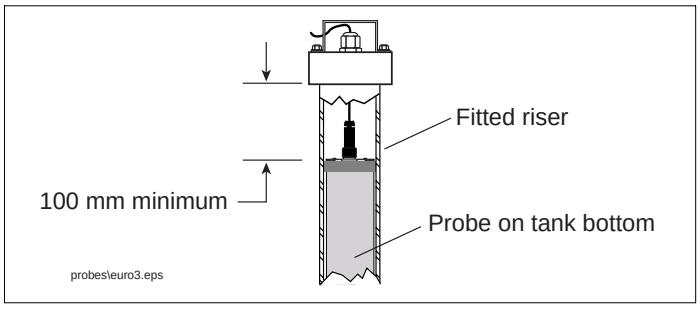


Figure 5. Minimum clearance above probe canister

- Wherever possible, the probe canister should be completely contained within the 3-inch riser. If this is not possible, a probe sleeve kit must be used. Probe sleeve kits provide both electrical insulation and lateral stability for the probe (see Figure 6).

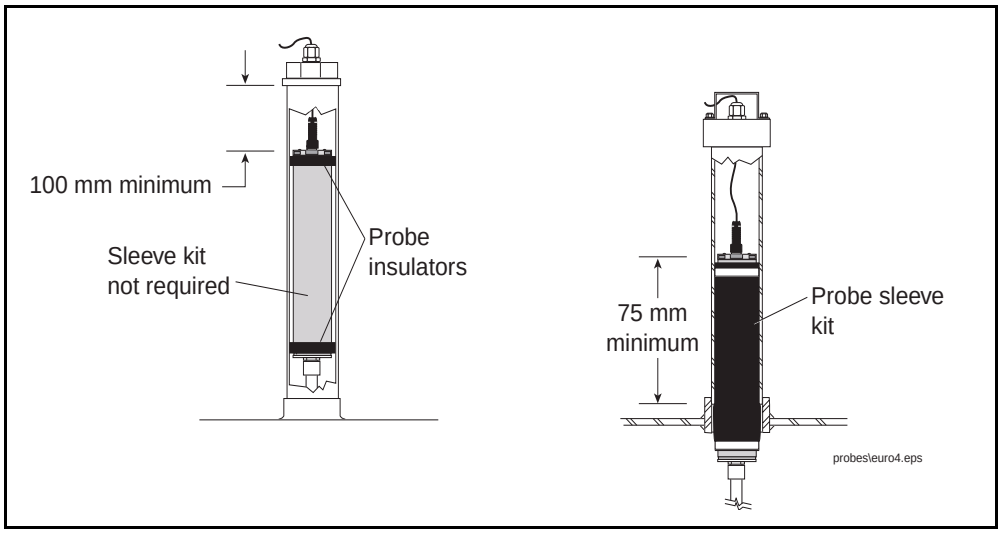


Figure 6. Probe canister sleeve kit installation

IMPORTANT! When using probe sleeve kits, a minimum length of 75 mm of probe canister must be contained within the 3-inch riser. Check also that the full safe working capacity of the tank can be measured by the probe chosen.

- Probes specified for tanks with entries smaller than 3 inches must always be long enough to rest on the tank bottom and not 'hang' in the riser adaptor (see Figure 7).

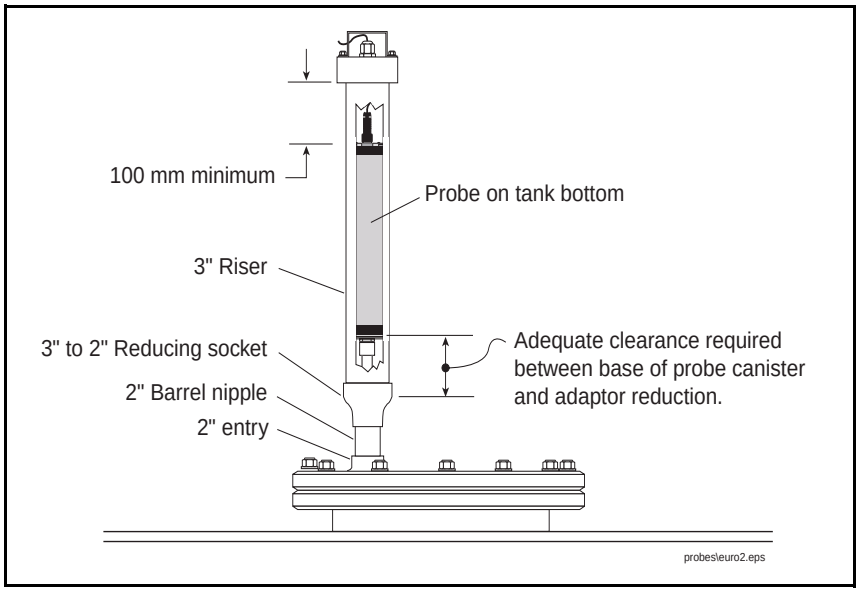


Figure 7. Canister clearance for 2-inch entries

- Veeder-Root make special provision for tank lid access chambers of restricted depth. Contact Veeder-Root Technical Support or your Sales Administrator for details on custom length Mag Probes and low profile riser kits, having the dimensions listed in Figure 8 available.

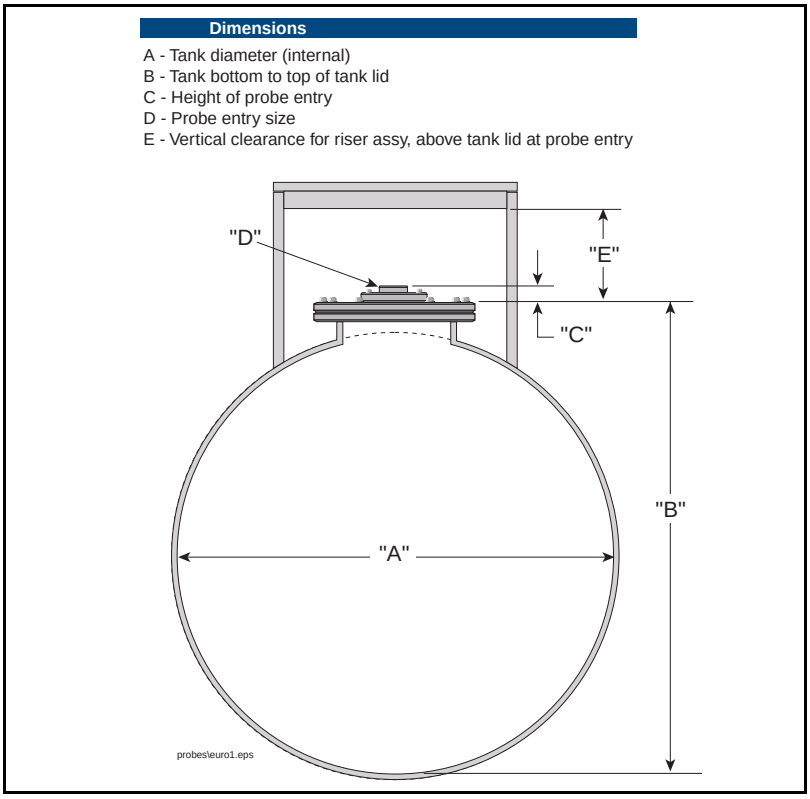


Figure 8. Dimensions needed to calculate custom probes and risers

Probe Riser Pipe Installation *(Level 1 Installation Only)*

A Veeder-Root riser kit (see Figure 9) consisting of a riser and a cap assembly, designed specifically for the efficient installation of Veeder-Root Magnetostrictive Probes, is available (Part No 705-100-1204). The riser cap assembly is normally fitted at the time of probe installation by Veeder-Root authorised engineers. An optional cable shield is available, if required (Part No 705-100-4115).

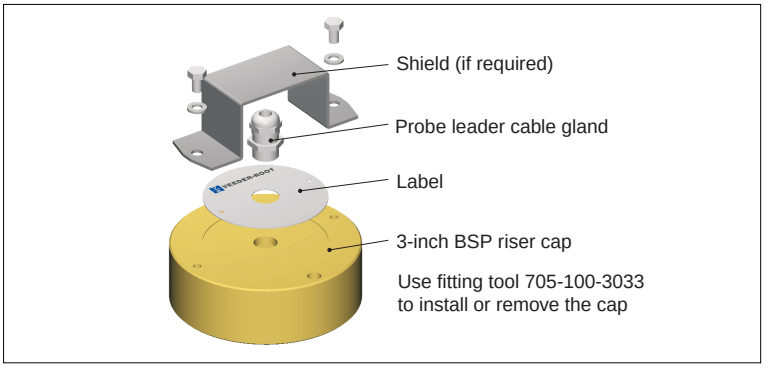


Figure 9. The Veeder-Root Riser Cap Assembly and Fitting Tool

IMPORTANT! Veeder–Root strongly recommend the use of this riser assembly.

Non–standard risers may be made from 3-inch nominal bore galvanised steel pipe threaded 3-inch BSPT at each end.

Remove the plug from the tank socket. Install a 3-inch (80 mm nominal bore) riser using an appropriate thread sealing compound. Reducers are available for 4-inch (110 mm nominal bore) and 2-inch (50 mm nominal bore) sockets. If the probes are not to be installed immediately, cap the riser.

PTB Compliant Installation

Applicable only where Physicalisch–Technishe Bundesanstalt (PTB) regulations are in force.

PROBE ENTRY

Certain markets require a modified probe fixing arrangement consisting of a gland mounted directly to the tank lid. Either a dedicated tapping or a suitable flange tapped G2inch 11tpi to DIN 2999 (BS2779) must be provided. The probe installation arrangement is illustrated in Figure 10. Veeder-Root recommend the use of a riser to provide protection to the Mag Probe Canister.

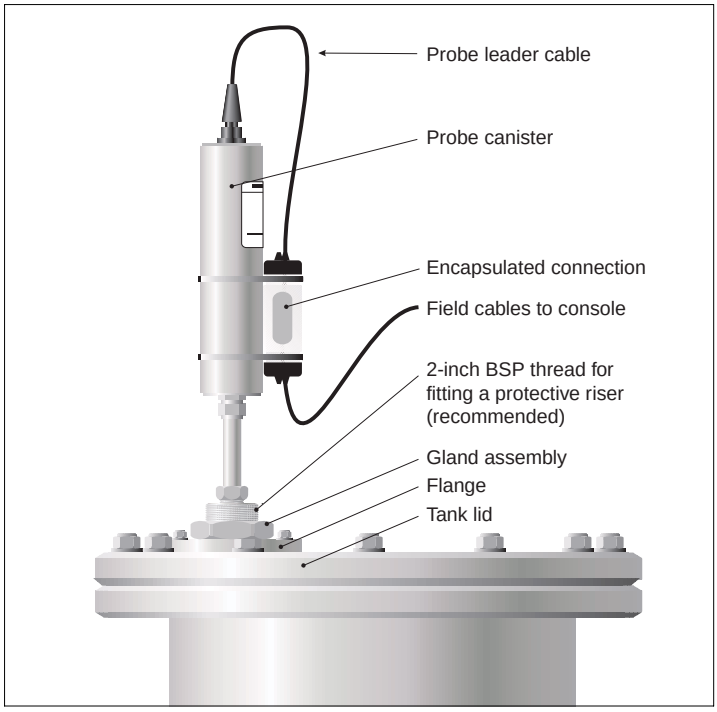


Figure 10. PTB Compliant Installation of a Mag Probe

DETERMINING THE CORRECT PROBE LENGTH

Refer to Figure 8 on page 10 and carry out the following procedure.

1. Enter dimensions A, B, C, and E in Table 1 below.
2. Add dimensions B + C and enter this in column “F”.
3. Add a 50mm allowance for the PTB gland to the dimension in column “F” and enter the result in column “G”.
4. Select a standard probe length that is equal to or greater than the dimension in column “G”.
5. Enter the Standard Probe Length in column “H”.

DETERMINING THE MINIMUM ACCESS CHAMBER DEPTH

The minimum access chamber depth, is calculated as follows:

1. To the chosen Standard Probe Length (“H”), add 450mm, this is the overall probe length, enter this in column “I”.
2. From the Overall Probe Length subtract dimension “B + C” (bottom of tank to top of probe flange); the result is the minimum access chamber depth. Enter in column “J”.
3. Calculate the actual access chamber depth, Dimension “E” minus dimension “C” and enter in column “K”.
4. Calculate the probe clearance (“K” – “J”) and enter in column “L”.

IMPORTANT! Column “L” must be zero or a positive number. If the result is a negative number contact your Veeder–Root Account Administrator.

Table 1. “PTB” Compliant Installation — Calculation sheet for determining the correct probe length

TANK No.	A	B	C	E	F Bottom of Tank to Top of Probe Entry “B”+“C”	G Probe Minimum Active Length “F”+50mm	H Standard Probe Length	I Overall Probe Length “H”+450mm	J Minimum Access Chamber Depth “I”-”F”	K Actual Access Chamber Depth “E”-”C”	L Probe Clearance “K”-”J”
1											
2											
3											
4											
5											
6											
7											
8											

TLS-IB Location

The TLS-IB should be located on an inside wall of the forecourt building Be sure the console will be protected from vibration, extremes in temperature and humidity, rain and other conditions that could cause equipment malfunction.

The equipment is designed to operate safely under the following range of conditions:

- Altitude up to 2000 m.
- Temperature range of 0 to 40°C.
- A maximum relative humidity of 95% RH (non-condensing) at temperatures up to 40°C.
- Main supply voltage fluctuations not exceeding +/- 10%
- Pollution Degree Category 2 Installation Category II

IMPORTANT! The TLS-IB unit must be installed within the interior of buildings.This unit is not suitable for any external location.

Ensure that the TLS-IB is located where neither it nor its associated cabling will be damaged by doors, furniture, barrows, etc. Consider the ease of routing wiring, ducting and probe cables to the unit.

Overall dimensions and weight of the TLS-IB are: height - 163 mm, width - 188 mm, depth - 50 mm, weight - 1.8 kg.

To allow for maintenance ensure that the console is in an accessible area, even when the console doors are open.

IMPORTANT! If the unit requires cleaning, do not use any liquid materials (e.g. cleaning solvents). It is recommended that the unit be wiped with a clean dry cloth when necessary.

Ensure that all relevant subcontractors and other personnel are aware of the selected location.

The TLS-IB is installed by Veeder–Root authorised engineers.

TLS-IB power must come from a dedicated circuit via a fused, switched, neon indication spur within 1 metre of the console position. The spur must be clearly marked to identify it as the means for disconnecting the console. Input power must be a 24-hour clean supply. A typical installation is shown in Figure 11.

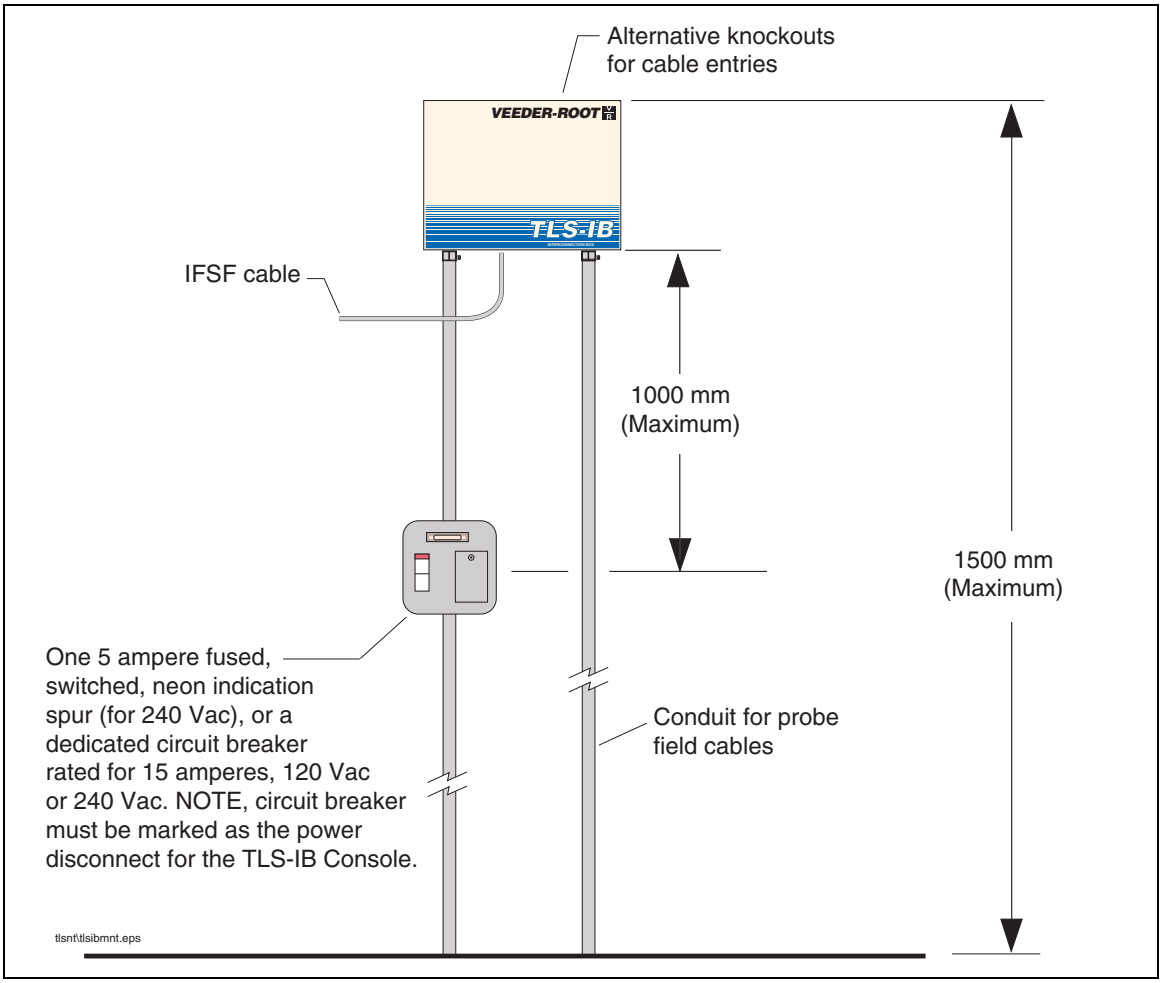


Figure 11. Typical TLS-IB Installation

Mounting the TLS-IB

Install the TLS-IB fastening devices to the mounting surface using the hole pattern 170 x 145mm (6.7 x 5.7 inches) shown in Figure 12. Mounting screws up to 4.7mm (3/16-inch) diameter may be used.

Mount the TLS-IB to the mounting surface using the four mounting flanges on the back of the unit. Install ducting or conduit between the TLS-IB and the power panel. Figure 12 shows the three designated knockouts (one each on top, left side, and bottom) through which power wiring can safely enter the TLS-IB.

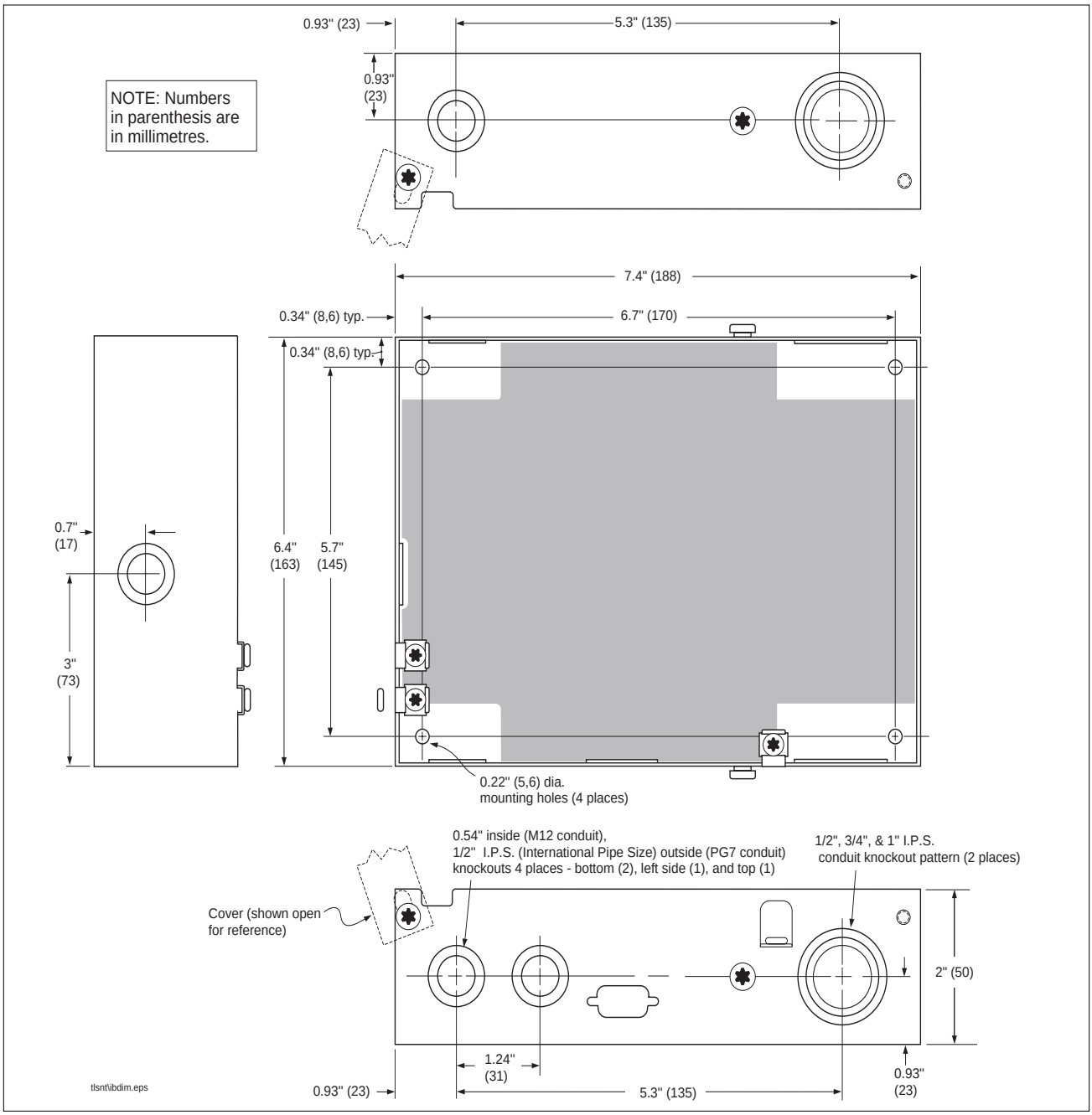


Figure 12. TLS-IB Dimensions and Designated Conduit Knockouts

Cable Specifications

The cable type tables listed below form part of the individual system ATEX approval. Substitution of cable may impair intrinsic safety and may invalidate system approval.

All specifications are in free air at +30°C:

Table 2. Probe Cable Specification (V-R P/N 222–001–0029) - Maximum of 305 metres per probe

Number of Cores	2
Conductors	Bare copper, 24/0.20mm, diameter 1.1mm
Insulation	PVC R2 to CEI 20-11, colour black 1/black 2, radial thickness 0.54mm, twisting 1x 2, lay pitch 76mm
Shielding	Aluminium polyester tape, tinned copper drain wire 7/0.30mm
Sheath	PVC RZ FR hydrocarbon resistant, colour blue, radial thickness 0.80mm
Diameter	6.10mm
Conductor Resistance	25 ohm/km
Drain Wire Resistance	15 ohm/km
Capacitance	0.14 μF/km (140 pF/m)
Inductance	0.65 mH/km (0.65 μH/m)
LR Ratio	17 μH/ohm
Insulation Resistance	1050 Mohm/km
Voltage Core to Core	500
Voltage Core to Screen	500
Voltage Earth to Screen	500
Voltage Test	1kV/1 minute
Standard	IEC 227-74

Table 3. Data Transmission Cable Specification (V-R P/N 4034-0147)

Cable Type	2 x twisted pair, PVC insulated, foil wrapped, common drain
Conductor Stranding	7/0.25mm
Characteristic Impedance	58 ohms
Capacitance	203 pF per metre
Attenuation	5.6 dB per 100 m
Operating Temp. Range	–30°C to +70°C
Insulation	PVC
Sheath	Polyethylene

Table 3. Data Transmission Cable Specification (V-R P/N 4034-0147)

Cable Type	2 x twisted pair, PVC insulated, foil wrapped, common drain
Sheath Colour	Grey
Core Colours	Black, red, green, white
Nominal Outside Diameter	4.2 mm
Recommended UK Supplier:	RS Components Ltd., Stock number (500metre drum) 368–312

Field Wiring

PROBE TO TLS-IB LOCATION *(LEVEL 1 INSTALLATIONS ONLY)*

Pull one two core, Probeflex cable from the TLS-IB location to each probe location.

Explosion could occur if other, non–intrinsically safe wires share TLS intrinsically safe wire conduits or wiring troughs. Conduits and wiring troughs from probes and sensors to the console must not contain any other wires.

IMPORTANT! At least 2 metres of free cable must be left for connection at both the TLS-IB and the probe locations.

Ensure that **all** cables are correctly identified. All probe field wiring **must** be legibly and permanently labelled with the tank number.

IMPORTANT! Failure to correctly mark probe field wiring may lead to rework, delays in system installation and additional charges.

MAXIMUM CABLE LENGTHS

A maximum of 305 metres of cable length per sensor or probe must be observed.

DUCTING ENTRY TO TLS-IB LOCATION

Connection to the TLS-IB may only be made by a Veeder–Root authorised engineer.

The cable route from the ducting entry to the TLS-IB must be clearly defined and all necessary preliminary work undertaken. All necessary holes must be drilled through walls, counters, etc.; cable trays fitted, ducting with draw cords installed and adequate access for the installation of the cable provided.

Equipment Connected To The RS-232 Port

Any equipment such as a pump controller or point–of–sale terminal connected to the RS-232 port must meet the following criteria:

- 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.

The RS-232 Interface can be used for direct local attachment of terminals if the cable run is no more than 15 metres. Veeder-Root do not guarantee proper equipment operation if RS-232 cable runs exceed 15 metres.

IMPORTANT! RS-232 cable runs longer than 15 metres could result in data errors.

Run cable from the peripheral equipment location to the system console location. At least 1 metre of free cable must be left for subsequent connection at both ends.

Site Prep - U.S and Canadian Installations

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-TO-CONSOLE WIRING

Wire Type

To ensure the best operating systems available, Veeder-Root **REQUIRES** the use of shielded cable for all probes 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, or 8770.

Note: Throughout this manual, when mentioning any cable or wire being used for probe-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-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 probe junction box and the console. Each splice degrades signal strength and could result in poor system performance.

Wire Gauges - Color coded

- Shielded cable must be used in all installations. Wires should be #14-#18 AWG stranded copper wire and installed as a Class 1 circuit. As a alternate method when approved by the local authority having jurisdiction, 22 AWG wire such as Belden 88761 may be suitable in installations with the following provisions:
  - Wire run is less than 750 feet
  - Capacitance does not exceed 100 pF/foot
  - Inductance does not exceed 0.2 µH/foot
- Total cable length per installation 22,000 feet.

POWER WIRING

Wires carrying 120 or 240 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.

PROBE JUNCTION BOXES

Weatherproof electrical junction boxes with a gasketed cover are required on the end of each probe conduit run at the manhole or monitoring well location. 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.

Probe Wiring Safety Issues

⚠ WARNING

Probes operate in areas where flammable liquids and explosive vapors may be present.

Improper installation may result in fire or explosion causing serious injury or death.

1. **Read thoroughly and follow the instructions shipped with each probe.**
2. **Probe wiring must enter the TLS-IB only through their designated areas.**
3. **Power wires and conduit must not enter the intrinsically safe compartment of the TLS-IB.**

Wiring between the TLS-IB and the probes is of limited electrical power so that there is insufficient energy to ignite fuel. In the TLS-IB, the low power probe wiring is considered intrinsically safe because it is physically isolated from all high power wiring. To maintain the integrity of this safety feature probe wiring can not share the same conduit with power wiring. In addition, probe cables can only enter the TLS-IB through the designated intrinsically safe area knockouts.

If the TLS-IB is being retrofitted into a paved site, you can cut grooves in the pavement, run direct burial cable to the probes, and then seal over the cable grooves.

Before trenching, you should diagram all conduit runs between the TLS-IB's intended location and its deployed probes. Your site diagram will help you calculate conduit and wiring lengths, and necessary quantities of junction boxes, sealing boxes, clamps, brackets, etc.

Throughout this planning process and in the actual installation, you must follow all latest National Electric Codes, and applicable federal, state, and local codes as regards conduit type, depth below grade, sealing, grounding, wire capacities, direct burial (if permitted), etc.

Probe Manhole Installation

At each underground probe location, install a 14-inch minimum diameter approved manhole according to the manufacturer's instructions (Note: probes should be located at least 24 inches from the submersible pump to avoid erroneous probe readings when the pump is running).

Position the manhole so that there is necessary clearance for junction box installation and wiring.

Various Mag Probe Kits are required to install Mag probes in a dedicated riser of an underground (UST) or above ground (AST) tank. Verify that you have the necessary kits for your application, and that you have all of the listed components, before beginning the Mag probe installation.

Determining Length of Probe When Used in a Dedicated Riser

Perform the following procedure to ensure that probes are installed in the proper tanks [Figure 13]. Inaccurate readings will result if probes are not the correct length for the given tank diameter. If tank diameter is unknown, perform the following procedure:

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 highest inch and order this length probe.
4. Refer to the Standard and custom Mag Probe lengths shown in Figure 14 on page 19. Custom Mag Probe lengths are available at extra cost.

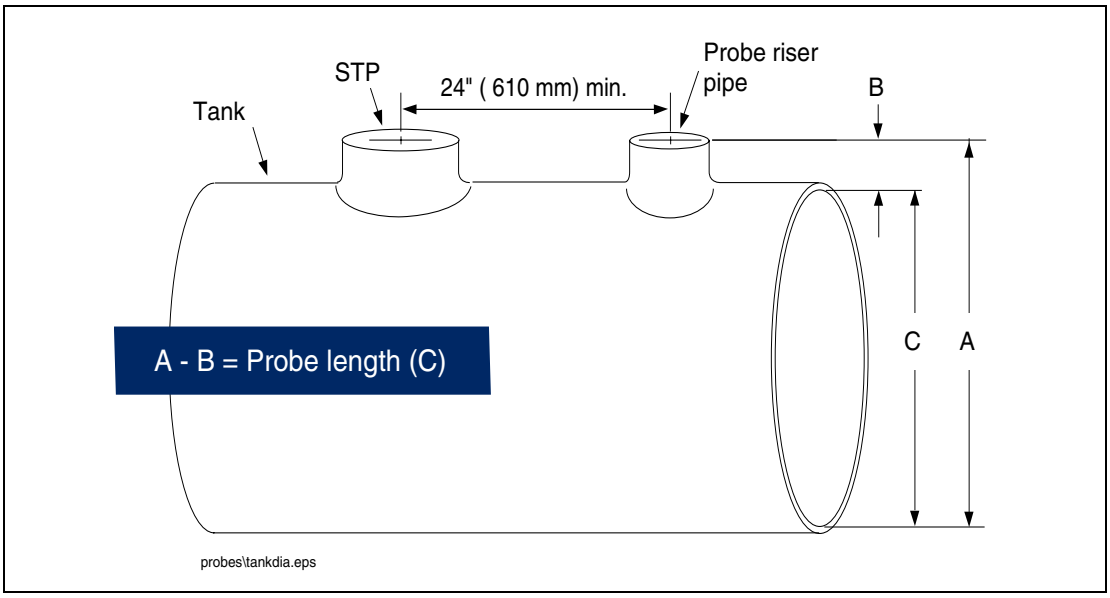


Figure 13. Calculating the Correct Mag Probe Length

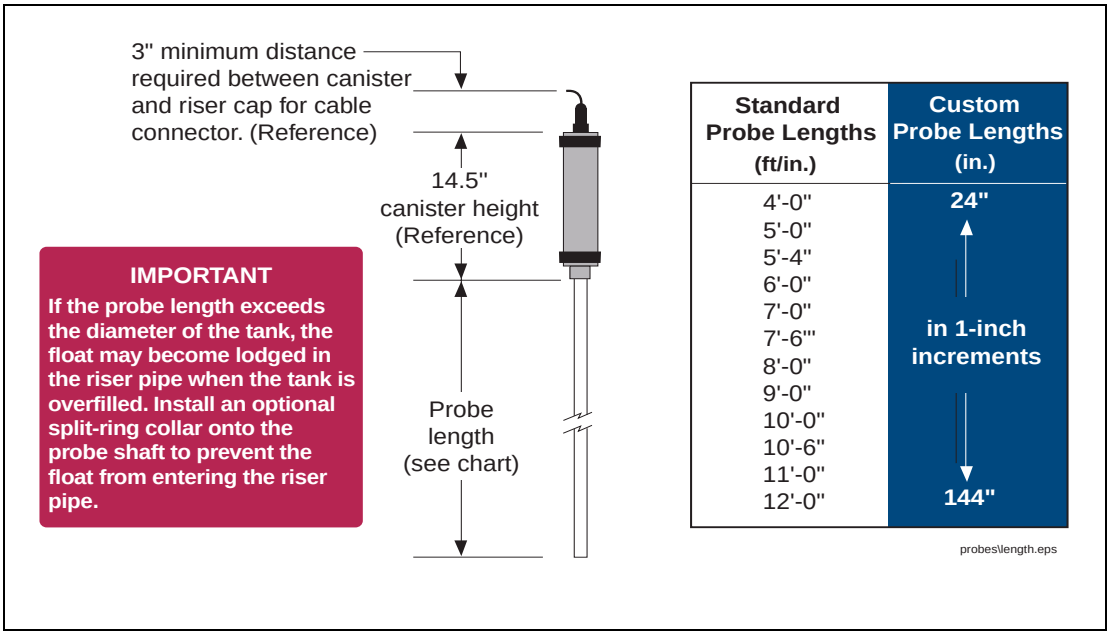


Figure 14. Standard and Custom Mag Probe Lengths

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 (V-R Part No. 576008-617) onto the probe shaft to prevent the float from entering the riser pipe.

Optional Kits for Series Mag Probe Installations

KIT REQUIRED FOR AN AST INSTALLATION

An additional kit is needed to install Mag probes into an above ground storage tank (AST). This kit contains a length of flexible conduit, connectors, etc., for easier probe access. The kit contents are listed in Table 4 and shown in Figure 15 below.

Table 4. Mag Probe AST Installation Kit (Part No. 312020-984)

Quantity	Description	Part Number
1	3/8” Flexible Conduit, 5 feet long	576008-294
1	3/8” Adaptor Nut	329972-002
2	3/8” Straight Liquidtite Connectors and related parts	576008-295
1	Cord Grip Group	331028-001

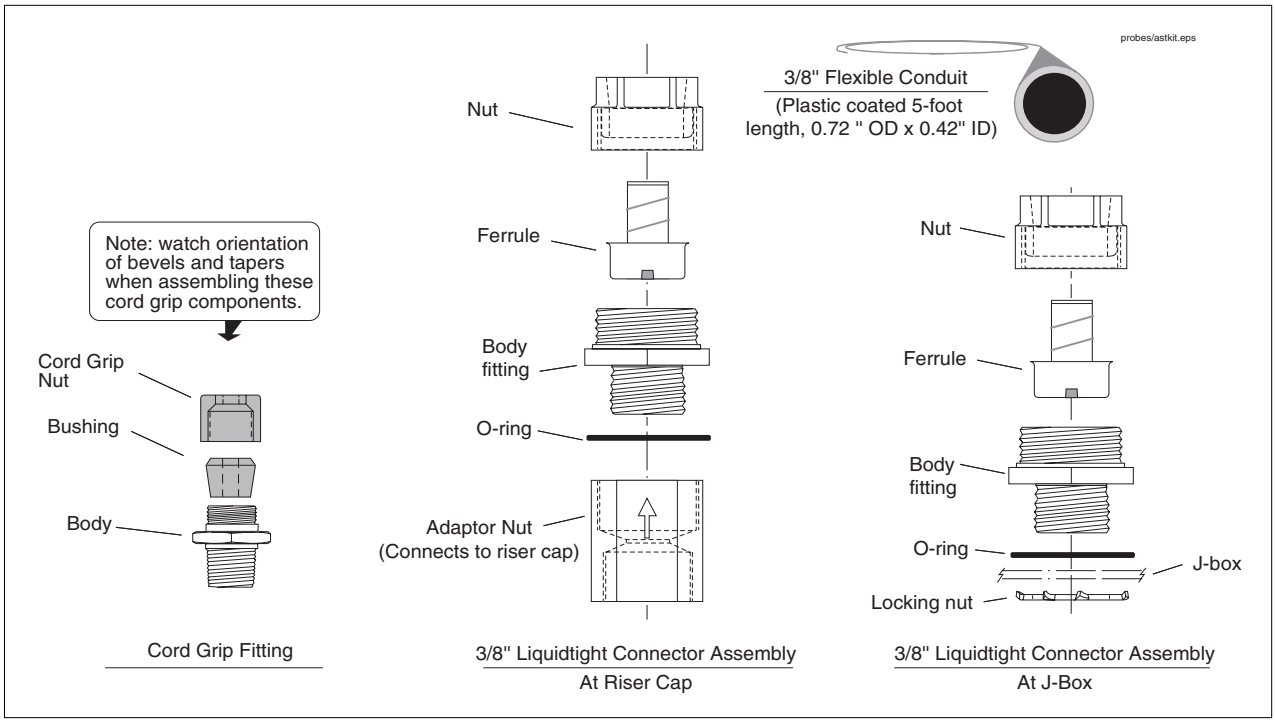


Figure 15. Mag Probe AST Installation Kit

Riser Cap Kit for Mag Probe Installations

The riser in which the Mag Probe is installed must be modified to allow the Mag Probe's cable to exit the riser. This cap does not support the Mag Probe itself, which rests on the tank bottom, but it does seal the riser pipe while allowing the Mag Probe cable to pass through. Veeder-Root offers two Riser Cap kits, or you can modify the existing riser cap.

CAP AND CORD GRIP KIT

This Riser Cap kit (Table 5) contains a non-metallic cap which screws onto the 4-inch NPT riser (Figure 16) and which is drilled and tapped for an included cord grip.

Table 5. Cord Grip and Cap 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

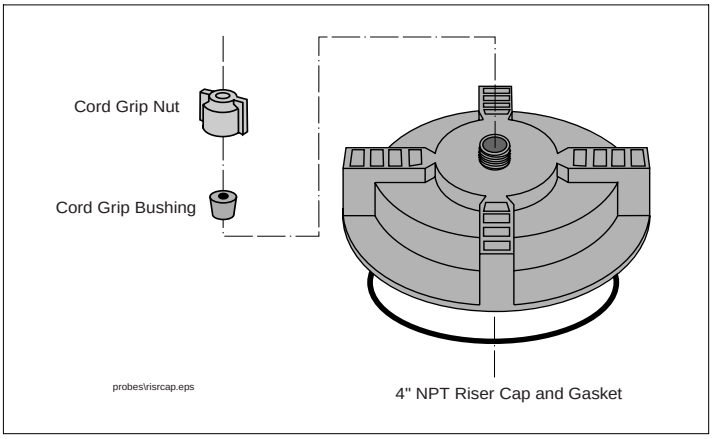


Figure 16. Cap and Cord Grip Kit

METAL CAP AND RING KIT

This riser cap kit contains a metal ring which screws onto the 4-inch NPT riser and a quick-release metal cap which clamps onto the ring (Table 6). The cap is drilled and tapped for a cord grip fitting.

Table 6. 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

Table 6. Metal Cap and Ring Kit (Part No. 312020-952)

Quantity	Description	Part Number
1	Group Cord Grip	331028-001

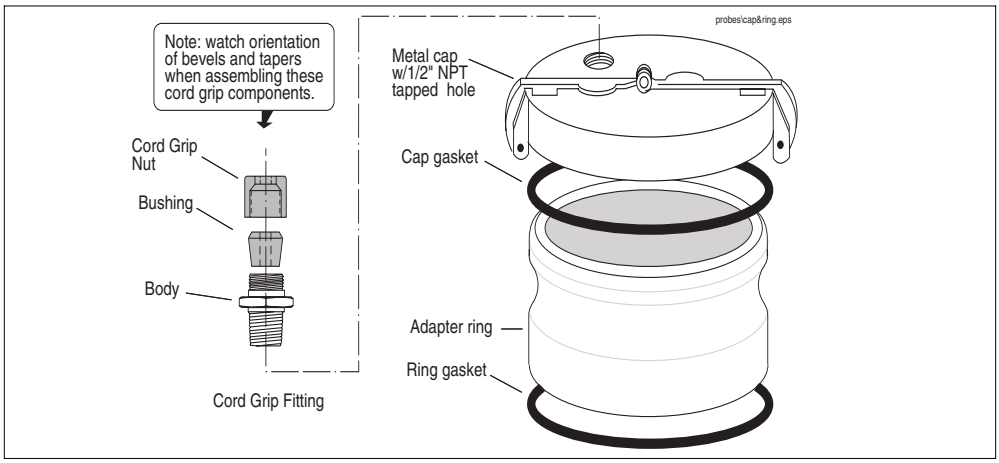


Figure 17. Metal Cap and Ring Kit

Modifying an Existing Metal Cap and Ring

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 cap, you must modify it as follows:

1. Use a standard riser cap.
2. Remove the cap to a non-hazardous location and drill and tap the cap for a 1/2”-14 NPT cord grip fitting thread [Figure 18].
3. Using UL-classified pipe sealant (suitable for the fuels involved) to ensure watertightness, screw a watertight riser cap cord grip fitting (V-R Part No. 331028-001) into the tapped hole.

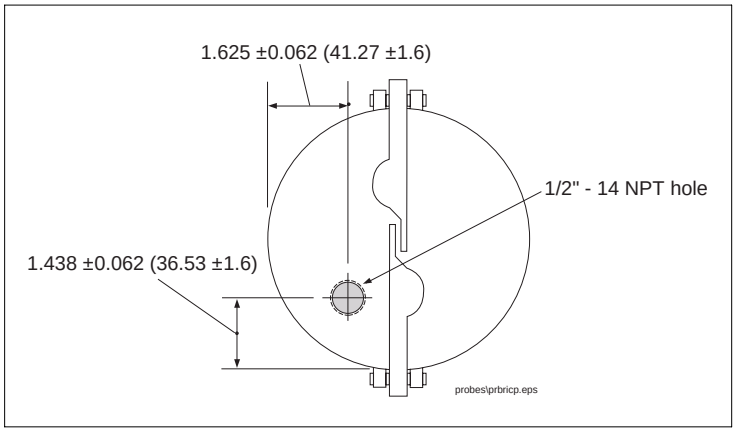


Figure 18. Modifying an existing metal riser cap

Mag Probe Installation

NOTE Reference manual number 577013-578 for additional installation instructions specific to ATEX requirements.

Each probe supplied by Veeder-Root is accompanied by a Mag Probe Assembly Guide. This assembly guide is used to ready the Mag Probe for installation into the tank. Once you have assembled floats, spacer rings, and attached the probe cable, install the Mag Probe. Figure 19 (UST tanks) and Figure 20 (AST tanks) illustrate Mag Probe tank installations.

SPECIAL INSTRUCTIONS FOR UST'S WITH METAL RISER CAPS

If you are installing the metal cap and adapter ring, 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. Push the cable through the metal cap and cord grip, then clamp the cap onto the ring.

At sites that require installation of a riser adaptor (Phil-Tite M/F 4X4 or equivalent) at the top of the riser, do so following the manufacturer's instructions. Next screw the adapter ring from the Veeder-Root kit (P/N 312020-952) onto the riser adaptor by hand until the gasket contacts the sealing surface. Then use a torque wrench attached to an appropriate strap wrench (K-D Specialty tools nylon strap oil filter wrench, or equivalent) and tighten the ring to 35 - 45 ft-lbs. Loosen the cord grip nut and push the cable through the metal cap and cord grip, then clamp the cap onto the ring (see Figure 21).

Make sure there is a minimal amount of slack between the probe and cap, then tighten the cord grip nut until the cable is held firmly. Push the end of the cable through the field J-box cord grip, then tighten that cord grip nut as well. Splice and seal the wires in the J-box as shown in Figure 24 on page 27.

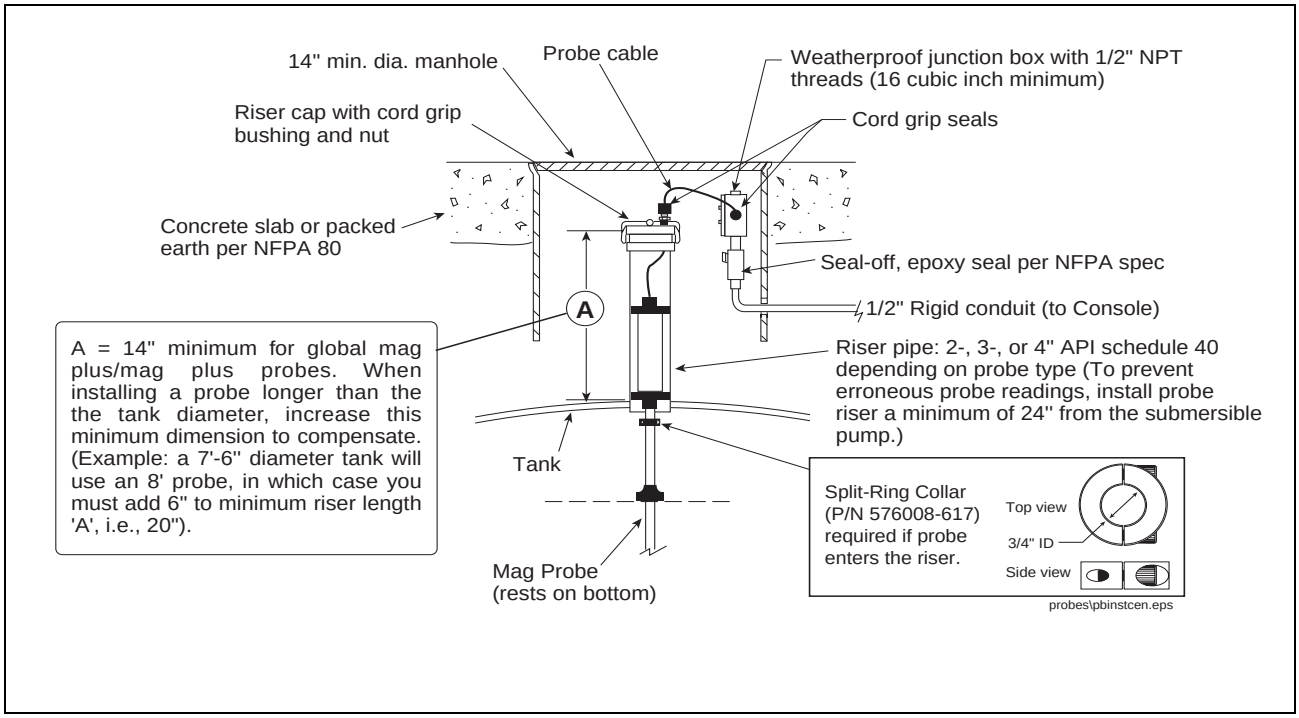


Figure 19. Mag Probe UST Example Installation

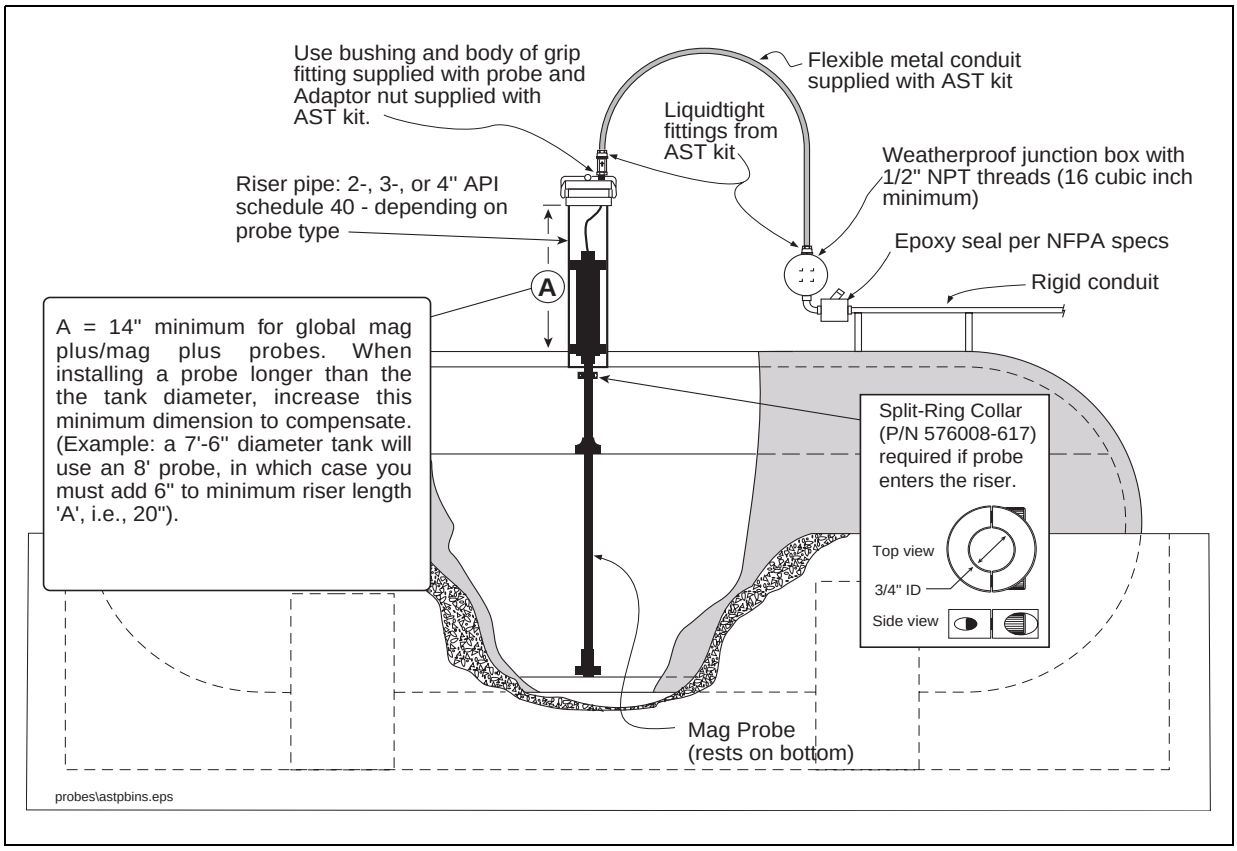


Figure 20. Mag Probe AST Example Installation

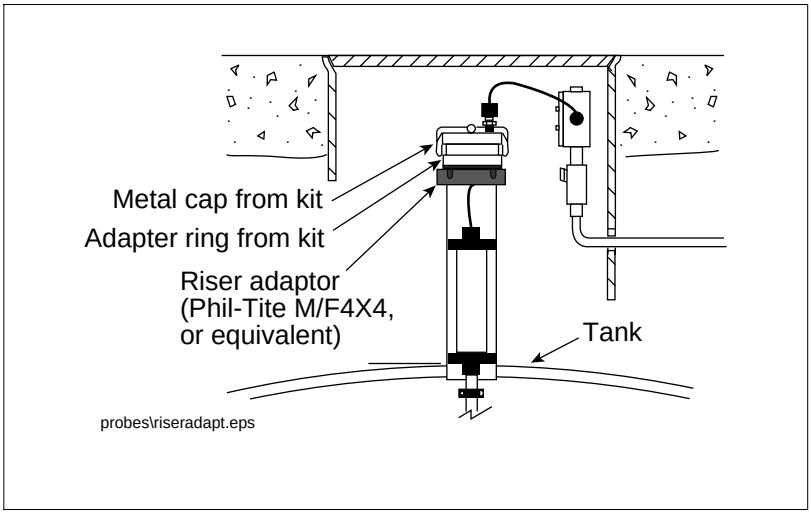


Figure 21. Installing a riser adaptor beneath the metal cap and adapter ring

Probe Conduit Installation

⚠ WARNING

Probes operate in areas where flammable liquids and explosive vapors may be present.

Improper installation may result in fire or explosion causing serious injury or death.

1. **Read thoroughly and follow the instructions shipped with each probe.**
2. **Probe wiring conduit must not contain any other wires.**
3. **Probe wiring and conduits must enter the TLS-IB only through their designated areas (see Figure 12).**
4. **Power and communication wires and conduit must not enter the intrinsically safe compartment of the TLS-IB.**

Buried Rigid Conduit

The preferred method of installing probe-to-console wiring, especially in new sites before station surfaces are paved, is to pull probe wiring through buried 1/2" rigid conduit [Figure 22].

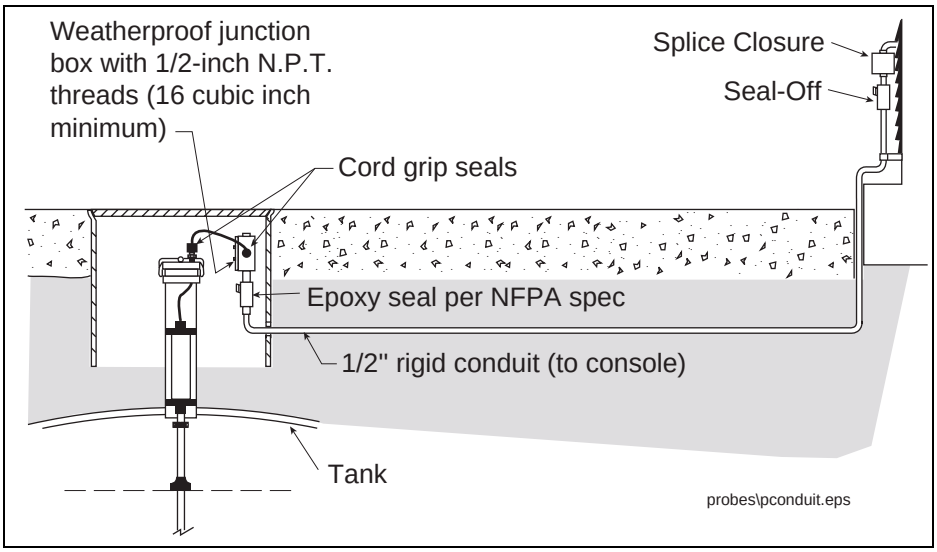


Figure 22. Example Probe Wiring Run in Buried Rigid Conduit

PULLING WIRES FOR PROBES

Pull recommended shielded cable between the TLS-IB and the junction box at each probe location .

REMINDER: Since wires for multiple probes may enter the TLS-IB through a single conduit, it is recommended that you use a different color-code for each wire or individually mark each wire to identify probe inputs.

IMPORTANT! Also, if the intrinsically safe wires enter the building in a wiring trough, only intrinsically safe wires (from TLS-IB probes) can be in the trough. Keep all low power (intrinsically safe) wiring physically isolated from high power wires in all wiring troughs per the NEC.

Probe Field Wiring

Figure 23 diagrams a typical probe wiring connection in the junction box at the manhole.

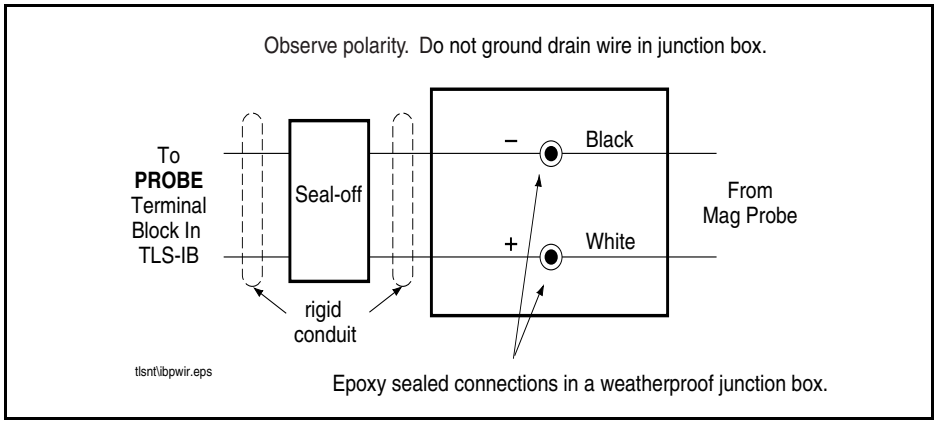


Figure 23. Field Wiring probes to TLS-IB Cables

Sealing Field Connections

WIRING RUN THROUGH RIGID CONDUIT

1. Pull the wires from the probe canister into the junction box. Pull two wires from the TLS-IB through the seal-off box and into the junction box.
2. Using wire nuts, connect the two wires from the probe to the two wires coming from the TLS-IB. Be sure to observe color codes or tags when making these connections to maintain polarity.
3. Do NOT terminate drain wire at this location, ground drain wire at TLS-IB only.
4. Seal wire nuts with epoxy sealant following the instructions in Figure 24.

CAUTION: Epoxy sealant is irritating to eyes, respiratory system, and skin. Can cause allergic skin reaction. **Contains:** epoxy resin and Cycloaliphatic epoxycarboxylate. **Precautions:** Wear suitable protective clothing, gloves, eye, and face protection. Use only in well ventilated areas. Wash thoroughly before eating, drinking, or smoking.

5. Push the epoxy sealed bag into the junction box. Replace and tighten the junction box cover.

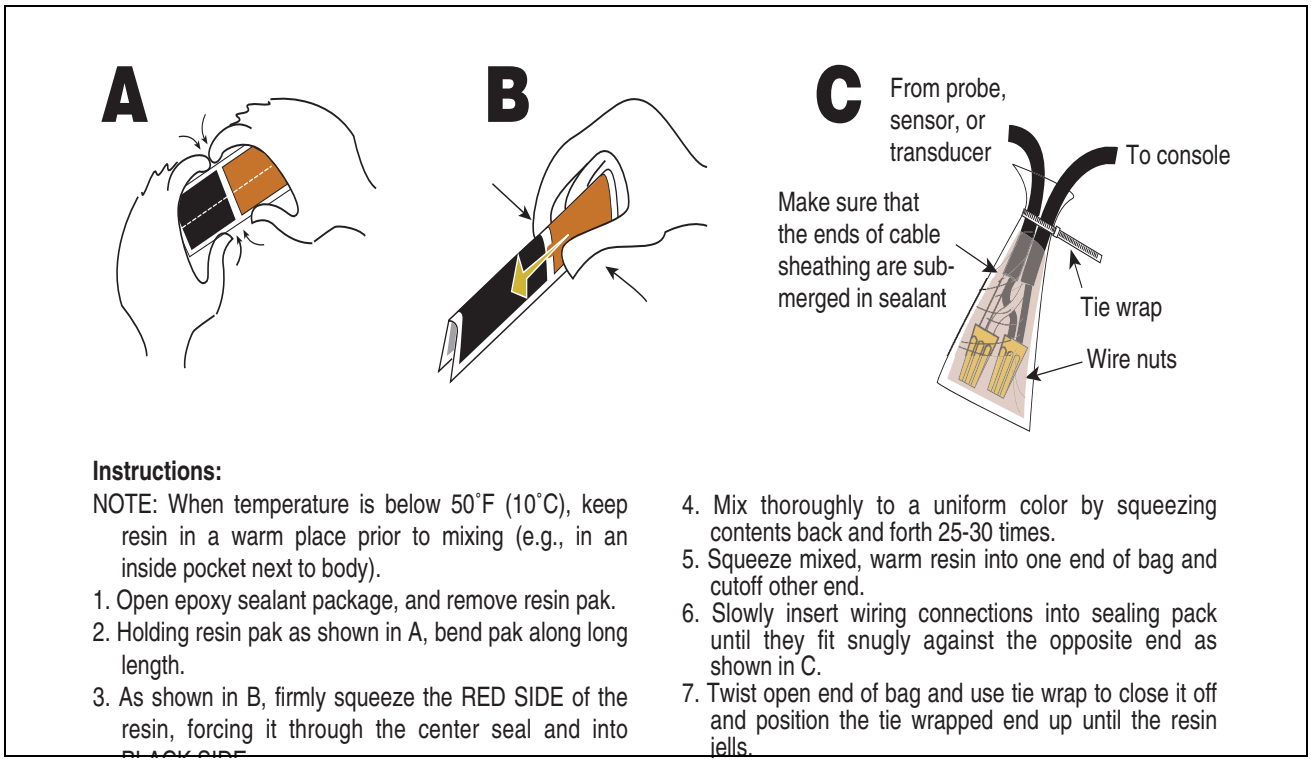


Figure 24. Epoxy Sealing probe Field Connections

Mounting the TLS-IB

Figure 12 illustrates recommended TLS-IB mounting. Install the TLS-IB fastening devices to the mounting surface using the hole pattern (6.7 x 5.7 inches) shown in Figure 12 on page 14. Mounting screws up to 3/16-inch diameter may be used.

Mount the TLS-IB to the mounting surface using the four mounting flanges on the back of the unit. Install ducting or conduit between the TLS-IB and the power panel. Figure 12 shows the three designated knockouts (one each on top, left side, and bottom) through which power wiring can safely enter the TLS-IB.

Connecting Wiring to the TLS-IB

⚠ WARNING

The equipment is used in location where lethal voltages and explosive vapors or flammable fuels may be present.

Care must be taken when installing, servicing or replacing parts in the system or serious injury or death from explosion, fire or shock may occur.

For this system:

1. **Comply with the latest National Electric Code, federal, state, and local codes, and any other applicable safety codes. In addition, take necessary precautions during installation, service, and repair to prevent personal injury, property loss and equipment damage.**
2. **Refer servicing to trained and qualified personnel only.**
3. **Substitution of components may impair intrinsic safety.**
4. **Be sure AC power is "Off" before opening the TLS-IB cover and connecting probe wires. Do not short any voltage across any barrier terminal including probes.**

Probe Wiring Precautions

To The Installer! You Must Read And Understand This Information. Reference manual number 577013-578 for additional safety related information.

PROBE WIRING POSITIONS AND LABELING

In all cases, the devices wired to the TLS-IB's input terminal blocks must be recorded to prevent improper replacement during installation or service.

Wiring Assignments

1. Identify all probe wires according to their terminal block location using the self-adhesive numbering labels furnished. Accurately record on the circuit directory label (top of I.S. compartment cover plate - see Figure 25), the tank number of each probe **as you attach wires** to the probe input terminal block.
2. IMPORTANT! Once a device has been wired to certain terminals and the system has been programmed, the wires from that device may not be relocated to other terminals without reprogramming the system.

Connecting Probes to the TLS-IB

Connect the two color-coded/marked wires from each probe to the appropriate connectors (e.g., Probe 1) of the Probe Terminal Block as shown in Figure 25.

IMPORTANT! Observe polarity when connecting probe wires!

Connect probe cable shields and drain wires to ground in the TLS-IB only, not at the field junction boxes. Do not ground both ends of the shield.

AUTO PROBE CONFIGURATION

During a cold boot, the TLS-IB will automatically configure connected probes - **CAUTION!** For auto configuration to occur, probes must be connected in sequence, starting at the Probe 1 input and continuing with no skipped inputs. For example, if you have 4 probes and you connect them to Probe inputs 1, 2, 3, and 4, auto configuration works fine. But if you connect them to Probe 1, 3, 5, and 7 auto configuration doesn't work, resulting in probe out alarms. Also, the skipped inputs will be unusable.

MANUAL PROBE CONFIGURATION

If you connect probes after the system has been powered they must be manually configured. To configure probes for the TLS-IB, use either the IFSF command "Nb-Tanks" (No. 1 [seeTable 10 on page 41]); or the RS-232 "Set Tank Configuration" command (No. 601 [Table 9 on page 40]).

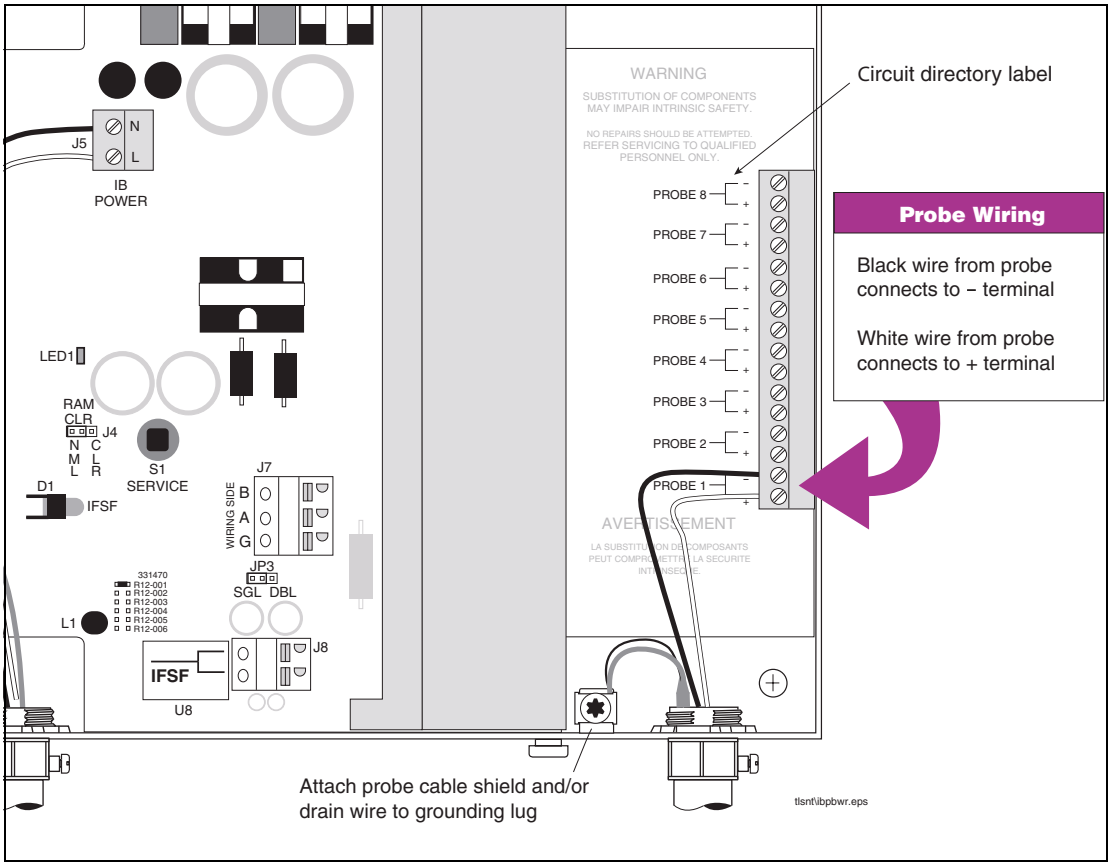


Figure 25. Connecting Mag Probe wiring to TLS-IB

Connecting IFSF Wiring to TLS-IB

⚠ WARNING

The TLS-IB's circuit boards have lethal voltages present.

Care must be taken when installing, servicing or replacing parts in the system or serious injury or death shock may occur.

For this system:

1. **Comply with the latest National Electric Code, federal, state, and local codes, and any other applicable safety codes. In addition, take necessary precautions during installation, service, and repair to prevent personal injury, property loss and equipment damage.**
2. **Refer servicing to trained and qualified personnel only.**
3. **Substitution of components may impair intrinsic safety.**
4. **Be sure AC power is "Off" before opening the TLS-IB cover and connecting wiring.**

1. With AC power switched Off, connect the IFSF network wires to J8 in the TLS-IB as shown in Figure 26 below:

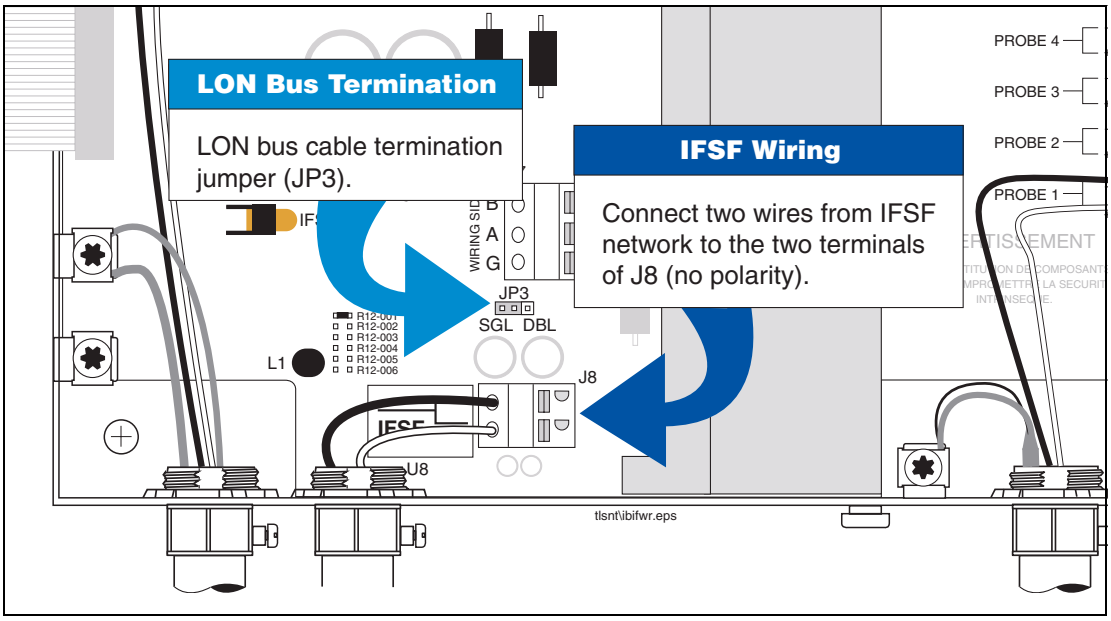


Figure 26. Connecting IFSF Network wiring to TLS-IB

2. The LON cable termination jumper (JP3 in Figure 26) is shown in the single position (SGL). The single position is used when the TLS-IB is a Free Topology Segment in the LON network and only one termination is required. The double position (DGL) is used when the TLS-IB is a Doubly Terminated Bus Topology Segment in the LON network and two terminations are required. To set the jumper in the DGL position, move it to the right (jumper over the middle and right pins).

IMPORTANT! If the TLS-IB is not a terminating device on the IFSF network, you must remove the LON cable termination jumper (JP3) from the board. Failure to do so will result in improper operation.

3. Set the IFSF Node Address DIP switches on the CPU board (S1 in Figure 29 on page 34) to the desired Node Address using the table below (U = switch open [up], D= set switch to closed position [down]). For example, to enter a IFSF node address of 06, set switches 2 and 4 up, and switches 1 and 3 down.

Table 7. TLS-IB Serial Communication / IFSF Node Address Selections

IFSF Address	Dip Switch Setting			
	1	2	3	4
01	U	U	U	U
02	D	U	U	U
03	U	D	U	U
04	D	D	U	U
05	U	U	D	U
06	D	U	D	U
07	U	D	D	U
08	D	D	D	U
09	U	U	U	D
0A	D	U	U	D
0B	U	D	U	D
0C	D	D	U	D
0D	U	U	D	D
0E	D	U	D	D
0F	U	D	D	D
10	D	D	D	D

Connecting Serial Communication Wiring to the TLS-IB

With AC power switched Off, connect the serial communication wiring to J7 in the TLS-IB as shown in Figure 27.

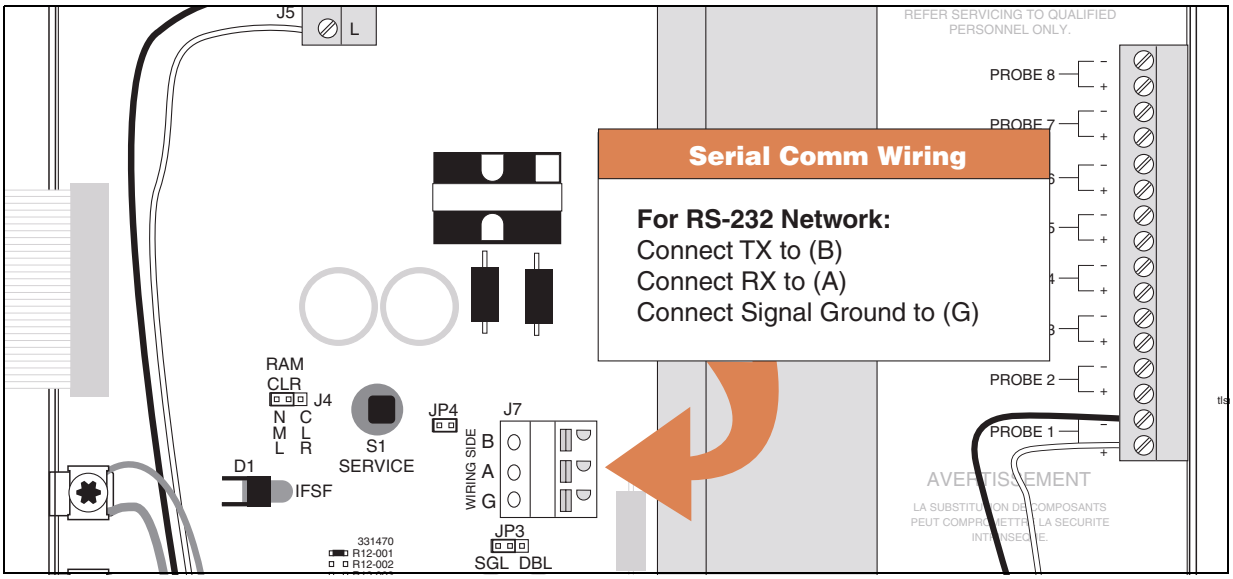
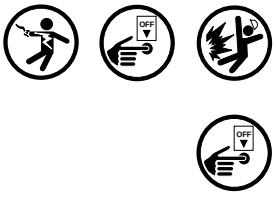


Figure 27. Connecting serial communication wiring to TLS-IB

Connecting Power Wiring to TLS-IB

⚠ WARNING



The TLS-IB contains voltages which can be lethal. It is connected to devices that must be intrinsically safe.

Connecting power wires to a live circuit can cause electrical shock that may result in serious injury or death.

1. **Turn power Off at the circuit breaker connecting the power supply wires.**
2. **Attach conduit from the power panel to the TLS-IB's Power Area knockouts only (1 on top and 2 on bottom, ref. Figure 12 on page 14).**

1. Pull four wires between the power panel and the TLS-IB; three #14 AWG or larger diameter color-coded wires for AC line (L), AC neutral (N) and chassis ground; and one #12 AWG (4 mm^2 cross-sectional area) green and yellow wire for barrier ground.

   For international applications, console power should come from a dedicated circuit via a fused, switched, neon indication spur within one metre of the console position. From an independent 24 hour supply at the distribution panel, run three 2.5 mm^2 (minimum) standard colour coded wires, live, neutral and earth, to the fused spur. Run three similar wires from the spur to the console location. Run one 4mm^2 wire, colour coded green/yellow, from the earth bus bar at the distribution panel direct to the console location. Leave at least 1 metre of free cable for connection to the console.

   IMPORTANT! Use an ohmmeter to check the electrical resistance between the console's metal case and the earthing ground wire's connection at the "known good earth ground" (copper rod driven into ground, etc.). It should read less than 1 ohm.

2. Open the door of the TLS-IB and connect the four power/ground wires as shown in [Figure 28]. Do not connect the power wires to breaker panel at this time.

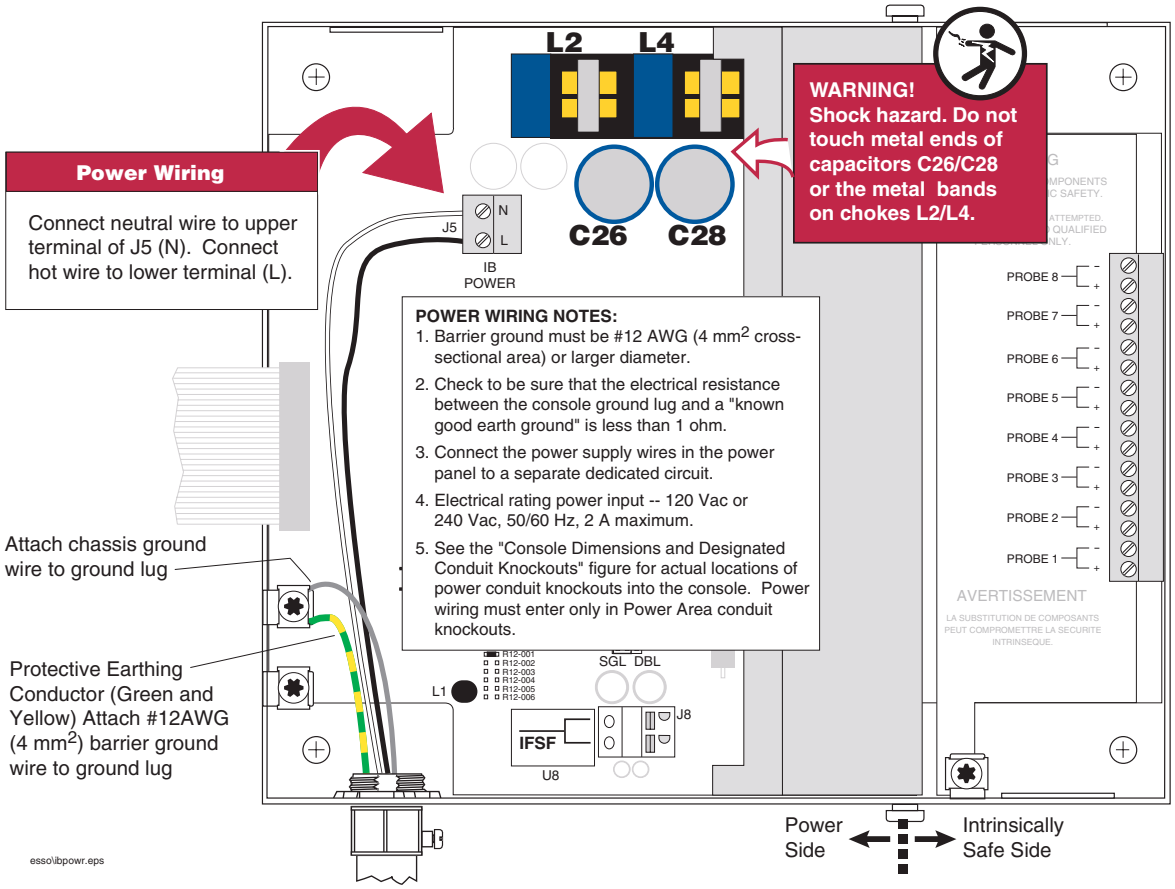


Figure 28. Wiring AC Power to the TLS-IB

Troubleshooting

This section contains information to help you diagnose system problems. Instructions are included for replacing CPU and Power Supply boards in the event of a hardware failure and for installing a software upgrade. Also, the location and use of the neuron service switch is discussed.

At the end of this section you will find a list of specifications for the TLS-IB.

Replacing the CPU Board

The CPU board must be replaced if the TLS-IB fails to communicate. Check the voltage between the GND and 5V test points [Figure 29] on the back of the CPU board. This voltage should be between 4.75 - 5.25 Vdc; if not, replace CPU board as follows.

1. Turn Off power to the system. Attach the anti-static strap to your wrist and to a good ground.
2. Disconnect the CPU cable from the Power Supply board. The CPU board snaps securely into place in the door of the TLS-IB without the use of screws. There are two tabs on the top of the board that fit into two slots in the top edge of the door. The bottom of the CPU board snaps in place between two pairs of detents protruding from the bottom edge of the door. The CPU board is removed by inserting a straight-slot screwdriver into one of the two indents on the bottom of the board and then gently prying against the door until the board clears the upper detents, then rotating the board up slightly and toward you to clear the top tabs from the slots in the door.
3. Replace the CPU board reversing the above steps.

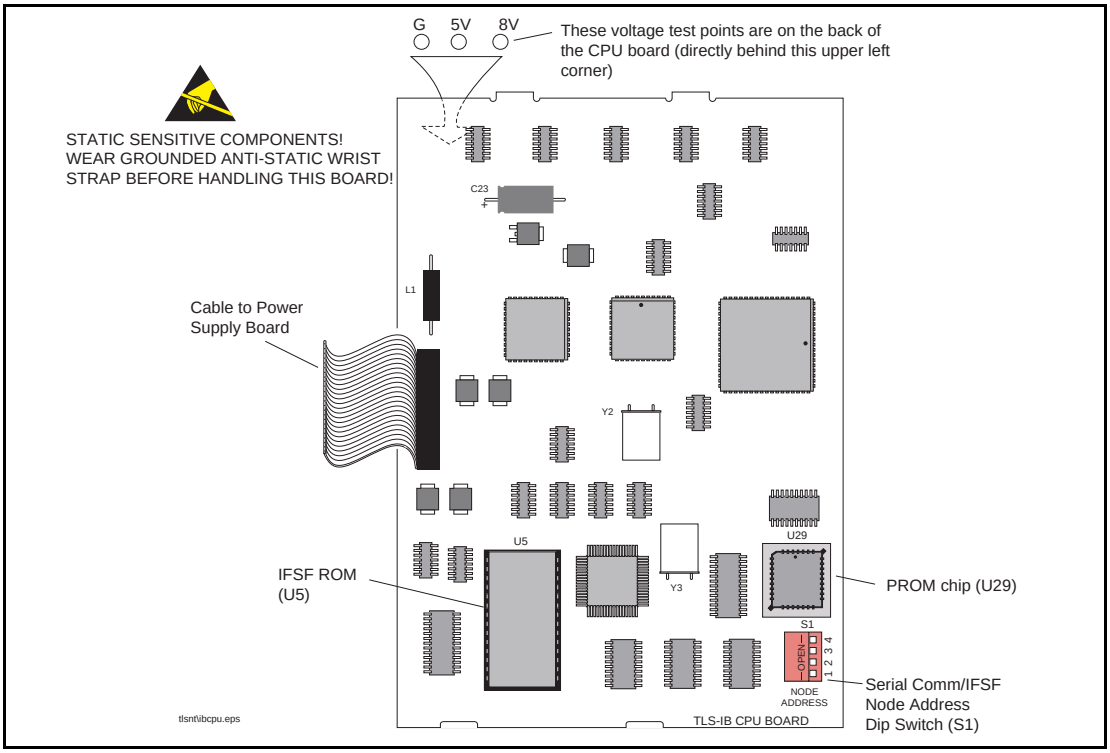


Figure 29. TLS-IB CPU board

PROM Chip Replacement (Software Upgrade)

The PROM chip (U29) is replaced when a software upgrade is installed. This procedure requires that you perform a RAM clear.

1. If possible, record the current setup information. Switch Off power to the system.
2. Open the front door of the TLS-IB. The CPU board is installed in the door.
3. Attach an anti-static strap to your wrist and to a good ground.
4. Move RAM clear jumper from NML to CLR position (Figure 30). Switch On power to TLS-IB and wait 30 seconds, then switch Off power to TLS-IB. Move the RAM clear jumper back to NML position.
5. Disconnect the ribbon cable connector from the CPU board. Remove the CPU board following the instructions in "Replacing the CPU Board" on page 34.
6. Locate the PROM chip on the board [Figure 29].
7. Remove the PROM chip following instructions in Figure 31.
8. Replace the PROM chip following instructions in Figure 32.
9. Replace the CPU board in the front door of the TLS-IB. Connect the CPU board cable to the Power Supply board.
10. Switch On power to the TLS-IB and check your system configuration for proper setup.

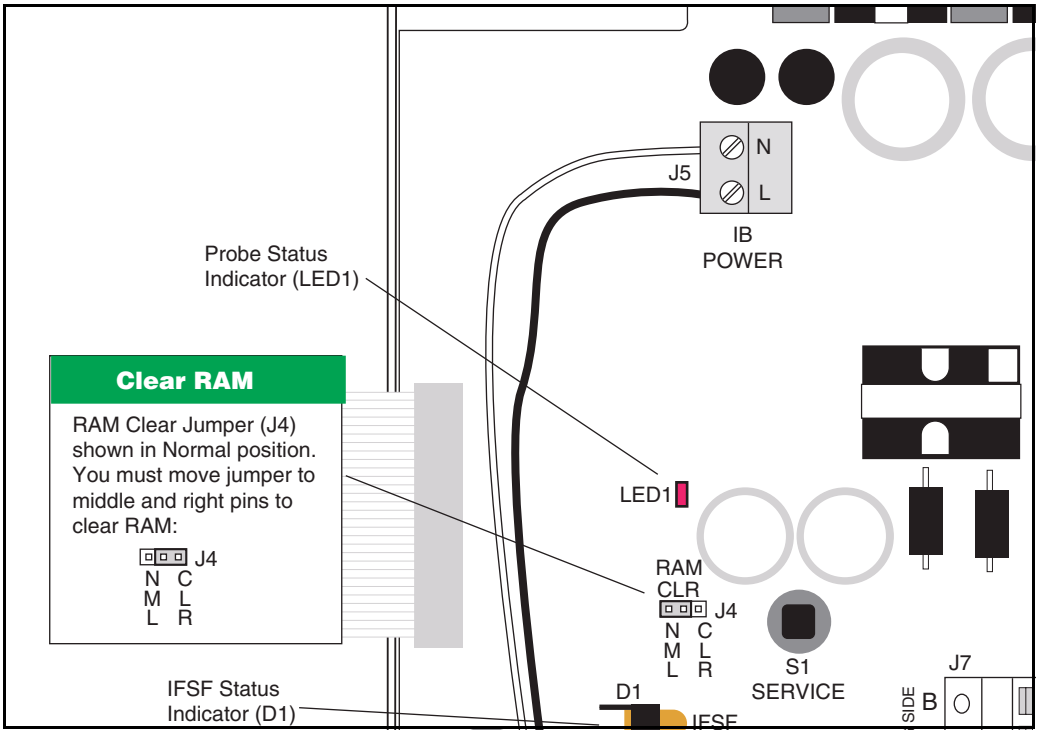


Figure 30. Clearing RAM

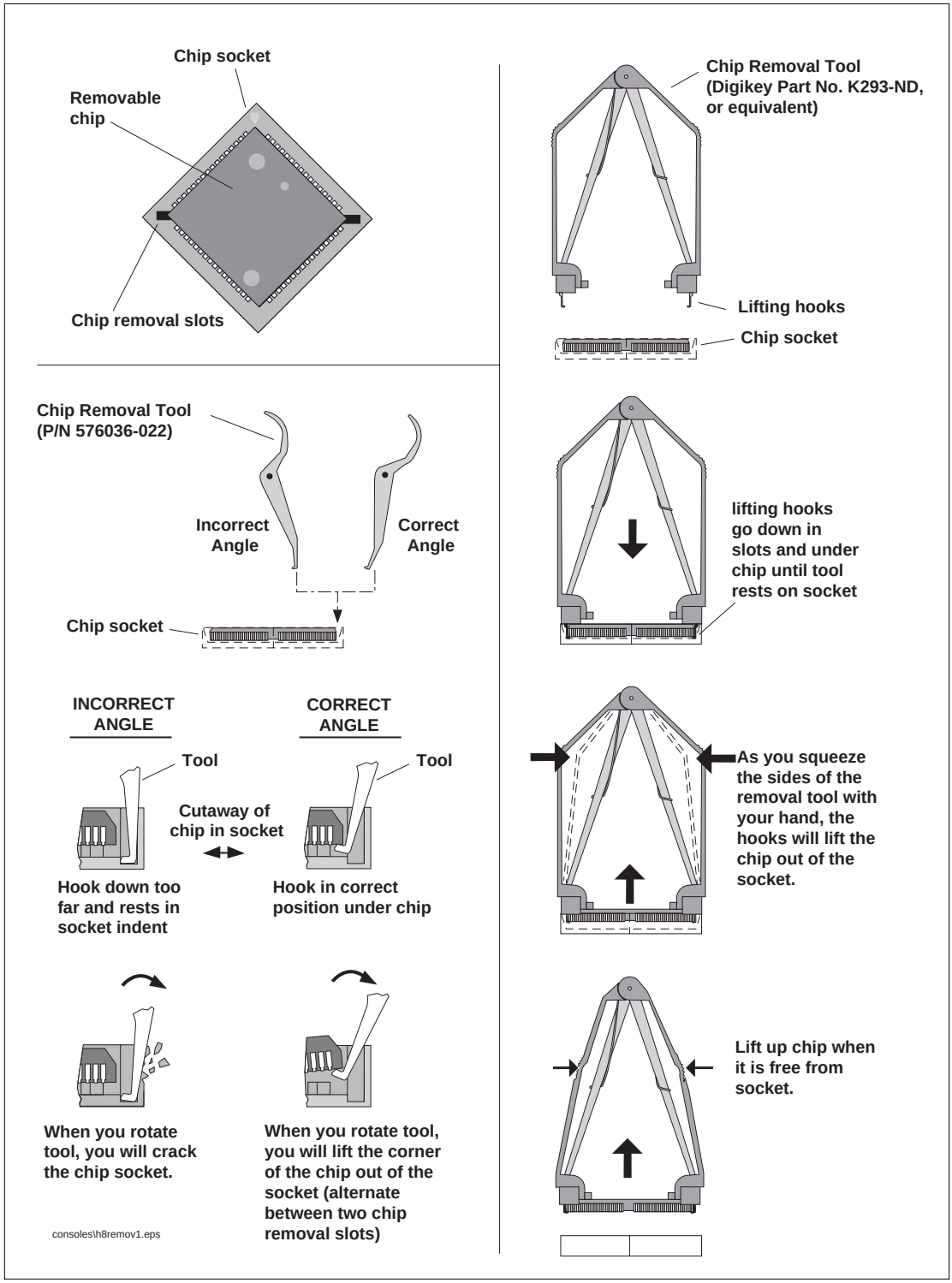


Figure 31. Removing PROM Chip

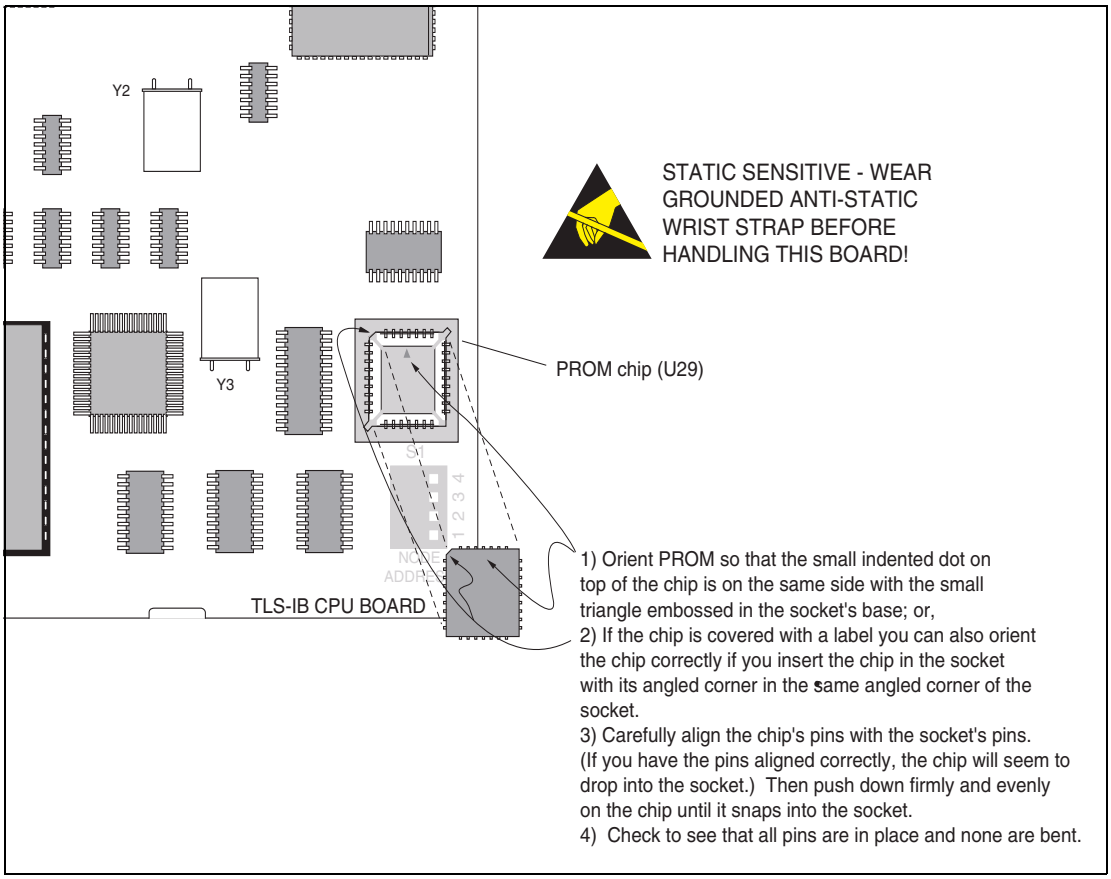


Figure 32. Replacing PROM Chip

Replacing the Power Supply Board

WHEN TO REPLACE THE POWER SUPPLY BOARD

The Power Supply board must be replaced either when:

- Probe data is not being processed. (You can check the Probe Status Indicator [LED1 - see Figure 30 on page 35] to verify that the probe is communicating with the TLS-IB. If LED1 is flashing, the CPU is acquiring valid probe data), or,
- The voltage between the GND and 8V test points (Figure 29 on page 34) on the back of the CPU board is less than 7 Vdc.

HOW TO REPLACE THE POWER SUPPLY BOARD

1. To replace the Power Supply board, turn Off power to the system.
2. Disconnect the CPU cable from the Power Supply board.
3. Tag and disconnect probe, power, and overfill alarm relay wiring to the Power Supply board.

4. The Power Supply board is secured by two T-15 Torx screws in the top of the board. After removing the Torx screws, slowly lift up on the board until the lower tabs on the board clear the slots in the bottom of the TLS-IB, then continue to lift the board out.
5. Replace the board by reversing the above steps.
6. Switch On power to the TLS-IB and check your system configuration for proper setup.

Neuron Service Switch

To manually transmit the TLS-IB neuron ID, press S1 (service switch) shown in Figure 33. The figure also locates the IFSF LED (D1) which indicates if the neuron application is, or is not, running. If the IFSF status indication LED (D1) remains lit, replace the CPU board (see "Replacing the CPU Board" on page 34).

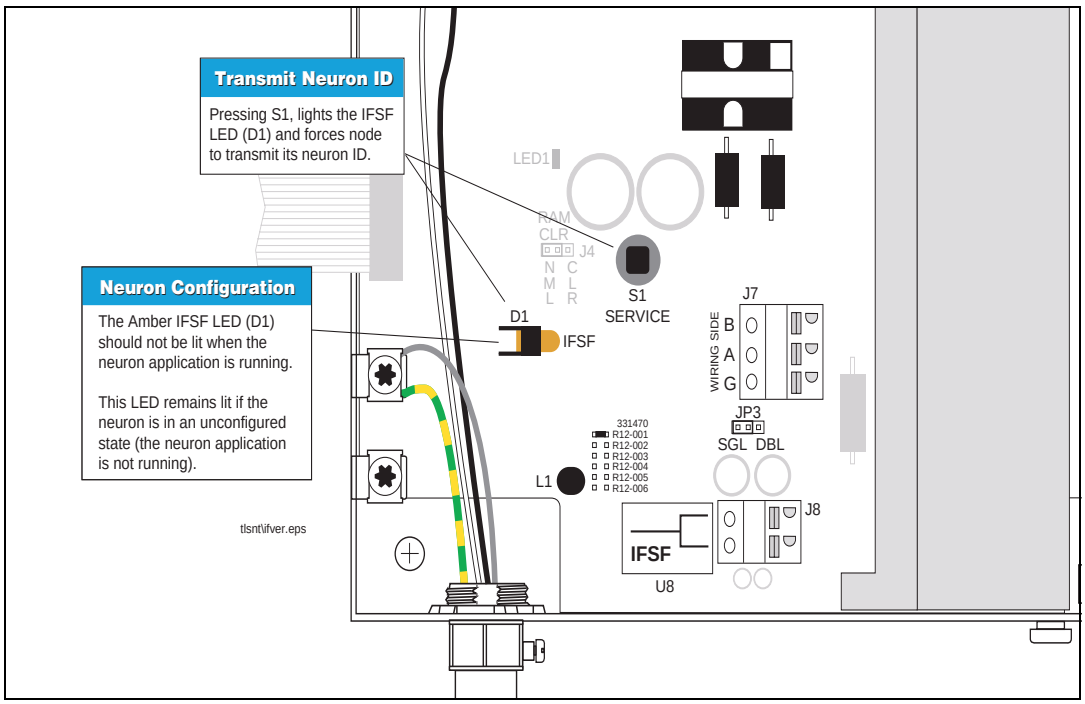


Figure 33. Manually transmitting neuron ID

TLS-IB Specifications

Physical Specifications

- Width w/door closed: 188 mm (7.6”) - Width w/door open: 235 mm (9.6”).
- Height: 163 mm (6.7”).
- Depth w/door closed: 50 mm (2.6”), Depth w/door open: 228 mm (9”).
- Weight: 1.8 kg (3.5 lbs).
- The TLS-IB unit contains two PC boards: CPU (in door) and Power Supply (in unit).
- Removable plug type connections.
- Conduit knockouts for intrinsically-safe wiring: 1/2”, 3/4”, and 1” I.P.S. (2 places).

Environmental Specifications

- TLS-IB storage and operation: indoor, climate controlled.
- Operating temperature range: 0 to +40°C.
- Storage temperature range: -40 to +74°C.
- LVD and EMC compliant.
- UL/cUL approved and ATEX approved.

Electrical Specifications

- TLS-IB operating voltage: 120/240 Vac, 2 A max.
- The Power Supply board fuses F1 and F2 are **NOT** field replaceable. The rating for both fuses is 2 A, Type T (Time Lag).
- Intrinsically-safe circuit for scanning Mag Probes.

Software Specifications

- Two system interface modes: Serial and IFSF interface.
- System, test, and alarm messages are transmitted through both the IFSF and the Serial interfaces.
- System setup information is stored in EEPROM.
- System software is contained in a snap-in PROM integrated circuit.
- RAM clear jumper.
- Factory boot-up mode for self testing.
- Optional tank volume reports.

IFSF Interface

- International forecourt Standards Forum - The protocol for tank level gauge applications, Part III.3.

- System hardware includes: 3150 Neuron, FTT-10 Free Topology Transceiver, 32K PROM, 32K SRAM, dip-switch selectable node address.
- Neuron controller software is contained in a PROM integrated circuit.

Optional RS-232 Serial Interface

- Baud rate options: 300, 600, 1200, 2400, 4800, 9600; default 2400.
- Parity options: None, Odd, Even; default Even.
- Data length options: 8 or 7; default 7.
- Number of stop bits options: 1 or 2; default 1.
- No RS-232 hardware handshaking options; RX, TX, and Signal Ground. The TLS-IB serial interface connections to J7 (on TLS-IB Power Supply Board, see Figure 27 on page 32) are shown in Table 8.

Table 8. TLS-IB Serial Interface Connections

J7 Connections	Computer Terminal (DB-25 Connector)
A (receive)	TXD (pin 2)
B (transmit)	RXD (pin 3)
G (signal ground)	GND (pin 7)

- Veeder-Root RS-232 command protocol format applies. Table 9 lists serial commands recognized by the TLS-IB:

Table 9. TLS-IB Serial Commands

Command	Description
001	System Reset
002	Clear Power Reset Flag
003	Remote Alarm Reset
201	In-Tank Inventory Report (height, water, and temp only)
205	In-Tank Status Report
517	Set System Type & Language Flags (ext. lang. set)
601	Set Tank Configuration
62F	Set Mag Probe Float Size
881	Set Communication Port Data
882	Initialize Communication Port Data
902	System Revision Level Report
A01	Probe Type and Serial Number
A02	Probe Factory Dry Calibration Values
A10	Probe Last Sample Buffers

Table 9. TLS-IB Serial Commands

Command	Description
A11	Probe Fast Average Buffers
A12	Probe Standard Average Buffers

Signal Input Specifications

- Up to 8 Veeder-Root Magnetostrictive probes can be monitored.
- Probe data: 0.2 A at 13 volts.

TLS-IB IFSF Commands

The IFSF commands recognized by the TLS-IB are divided into 5 databases; Tank Level Gauge Database (Table 10), Tank Level Gauge Error Code Database (Table 11), Tank Probe Database (Table 12), Tank Temperature Table Database (Table 13), and Tank Probe Error Code Database (Table 14).

Table 10. Tank Level Gauge Database

Data Identification	Data Element Name
1	Nb_Tanks
3	TLG_Measurement_Units
6	Country_Code
7	Maint_Password
50	TLG_Manufacturer_Id
51	TLG_Model
52	TLG_Type
53	TLG_Serial_Nb
54	TLG_Appl_Software_Ver
58	IFSF_Protocol_Ver
61	SW_Checksum
70	Enter_Maint_Mode
71	Exit_Maint_Mode
255	V-R protocol pass through

Table 11. Tank Level Gauge Error Code Database

Data Identification	Data Element Name
1	TLG_Error_Type
3	TLG_Error_Total

Table 11. Tank Level Gauge Error Code Database

Data Identification	Data Element Name
100	TLG_Error_Type_Mes

Table 12. Tank Probe Database

Data Identification	Data Element Name
1	TP_Manufacturer_Id
2	TP_Type
3	TP_Serial_Nb
4	TP_Model
5	TP_Appl_Software_Ver
32	TP_Status
33	TP_Alarm
64	Product_Level
68	Water_Level
100	TP_Status_Message

Table 13. Tank Temperature Table Database

Data Identification	Data Element Name
1	Temp_height
2	Temp_value

Table 14. Tank Probe Error Code Database

Data Identification	Data Element Name
1	TP_Error_Type
3	TP_Error_Total
5	TP_Error_Status
100	TP_Error_Type_Mes

VEEDER-ROOT

For technical support, sales or other assistance, please visit:
www.veeder.com