

**Magnetostrictive Probes
Installation Instructions**

**Part No. 501-000-7910
Issue 3 — November 1995**



Veeder–Root Authorised Representative is

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Contents

	Page
INTRODUCTION	1
GENERAL	1
HEALTH AND SAFETY	2
Danger Areas	2
Intrinsic Safety	3
DAMAGE CLAIMS	3
Return of Damaged or Incorrect Items	3
SITE PREPARATION	5
GENERAL	5
Ducting	5
Cable Specifications	5
FIELD WIRING	5
Probe to TLS Terminal Box	5
PROBE INSTALLATION	7
DETERMINING THE CORRECT PROBE FOR EACH TANK	7
PROBE PREPARATION	7
Probe Riser Adaptor Installation	7
Canister Sleeves	8
Water Float Ballast Rings	10
Probe and Float Assembly	11
IN-TANK INSTALLATION	13
"PTB" INSTALLATION	15
PRELIMINARY CHECKS	15
PROBE ASSEMBLY	15
IN-TANK INSTALLATION WITH "PTB" GLAND	17
SETTING THE PROBE HEIGHT	19
CABLE & SURGE ARRESTOR CONNECTIONS	19
FIELD CABLE CONNECTION	21
GENERAL INSTRUCTIONS	21
CONNECTION PROCEDURE	21
DUCTING SEALS	22

List of Illustrations

	Page
Fitting The Probe Riser Adapters	8
Fitting The Probe Canister Sleeves	9
Exploded view of the 50mm water float assembly	11
Probe assembly (50mm floats)	12
Probe assembly for liquids not requiring water level measurement (50mm floats)	12
The Veeder–Root Riser Cap Assembly and fitting tool.	14
Probe assembly for use with a “PTB Gland” and optional protective sleeve.	16
Detail of the PTB Gland and Surge Arrester fixings	18
Using the PTB Probe Height Setting tool	19
Completed PTB Probe and Gland Installation (Without protective sleeve).	20
Field Cable to Probe Leader Cable Encapsulated Connection	22

INTRODUCTION

1

GENERAL



This product will be operated near the highly combustible environment of a fuel storage tank. Failure to install this product according to the instructions contained in this manual may result in explosion, personal injury and severe environmental damage.

This manual describes the procedures for the installation of Magnetostrictive® In-tank measuring and sensing probes designed and manufactured by:

Veeder–Root Environmental Systems Limited,
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This manual is designed to be read in conjunction with the relevant Installation manual for the Veeder–Root TLS system; where the connection and commissioning of Magnetostrictive® probes to Veeder–Root System Consoles is covered.

Veeder–Root publications are available from the address above

Veeder–Root Environmental Systems Ltd. maintains a continuous process of product development and therefore product specifications may not be as described in this manual. Please contact Veeder–Root Customer Care at the above address for information on new or updated products. Changes will be reported in subsequent revisions of this manual.

MAGNETOSTRICTIVE PROBES

INSTALLATION INSTRUCTIONS

Veeder–Root Environmental Systems Ltd. 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.

Failure to install this product in accordance with the instructions and warnings found in this manual will result in the voiding of all warranties relating to the system.

HEALTH AND SAFETY

Every person working with Veeder–Root equipment is expected to take every safety precaution possible.

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.

A Field Safety Code of Practice (Part No. 000-000-7990) is available from Veeder–Root at the address on page 1.

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

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

Danger Areas

This product is to be installed and operated in the highly combustible environment of a petroleum storage tank. 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.



Ensure AC power to the system is OFF during installation.

Intrinsic Safety

The design of this product limits the power in the wiring to the fuel tanks and keeps this wiring physically separated from any other. It is the responsibility of the installer to maintain the effectiveness of these safety features by installing this product 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 a hazardous location. The probe and sensor wiring is intrinsically safe only when connected to a Veeder-Root Monitoring System console.



Substitution of components may impair intrinsic safety.

DAMAGE CLAIMS

Thoroughly examine all components and units as soon as received for any damage. Check the items supplied against the delivery note for shortages and incorrect items.

Immediately notify the Veeder-Root Account Administrator of any damage, loss or incorrectly supplied items.

Return of Damaged or Incorrect Items

Before returning any Veeder-Root equipment please request a returned goods authorisation from the Veeder-Root Account Administrator. They will provide information on the procedure for the return of goods.



Do not return any product without first obtaining authorisation.

MAGNETOSTRICTIVE PROBES
INSTALLATION INSTRUCTIONS

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SITE PREPARATION

2

GENERAL

Before the installation of Magnetostrictive® Probes the appropriate site preparation *must* have been completed in accordance with the specifications contained in the Veeder–Root publication: “TLS and ILS Monitoring Systems — Site Preparation Guide” Part number 539-000-7910 available from the address inside the front page.

Ducting



Intrinsically safe wiring must be contained in dedicated ducts

Where wiring has not been installed all ducting must be equipped with cable pull through ropes. Ensure that all visible ducting is properly fixed and finished off in a neat and tidy condition.

Cable Specifications

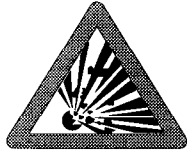
Detailed cable specifications together with recommended suppliers are contained in the Veeder–Root publication “TLS and ILS Monitoring Systems Site Preparation Guide” Part number 539-000-7910, available from the address on page 1.

FIELD WIRING

Probe to TLS Terminal Box

Pull one two core, colour coded Probeflex cable and one single core earth cable from the TLS Terminal Box location to the encapsulation tube position at each probe location.

MAGNETOSTRICTIVE PROBES INSTALLATION INSTRUCTIONS



**Explosion could occur if non-intrinsically safe circuits share TLS probe wire conduits or wiring troughs.
Conduits and wiring troughs from probes to the console must not contain any non-intrinsically safe circuits.**

Ensure that there is sufficient free cable at the probe location for the encapsulated connection to be made. All probe field wiring must be legibly and permanently labelled with the tank number.

If a TLS Terminal Box has been installed probe wiring must be connected to the terminals provided. Connections should be made in a logical order and **all** connections must be labelled with the tank number in the space provided on the terminal rail.



*If for any reason probe installation cannot be completed without interruption either the probe entry must be fitted with a threaded plug or the probe riser cap must be fitted.
This is to prevent the escape of explosive vapours or the ingress of water.*

PROBE INSTALLATION

3

DETERMINING THE CORRECT PROBE FOR EACH TANK

Magnetostrictive probes are supplied with an installation kit which comprises the floats, riser adapters, leader cable, probe boot and connection kit.

Refer to the site survey details to determine the correct probe length and installation kit for each tank.



Inaccurate readings will occur if the wrong installation kit is fitted or the probe is installed in the wrong tank.

PROBE PREPARATION

Probe Riser Adaptor Installation

Remove the probe from its box and place it on its side. Probes are susceptible to damage during transport and installation. Check that the probe is undamaged. Remove the probe riser adaptors from the Magnetostrictive Probe Installation Kit

Refer to Figure 1 on page 8. Place one riser adapter on top of the probe canister with its **bevelled edge down** (facing the probe foot) and its locking tabs aligned with the flats on the probe canister.

Press the adaptor onto the canister until the locking tabs are on the flats. Twist the adaptor until the three lugs are on the diameter of the canister and slide the adaptor to the bottom of the canister.

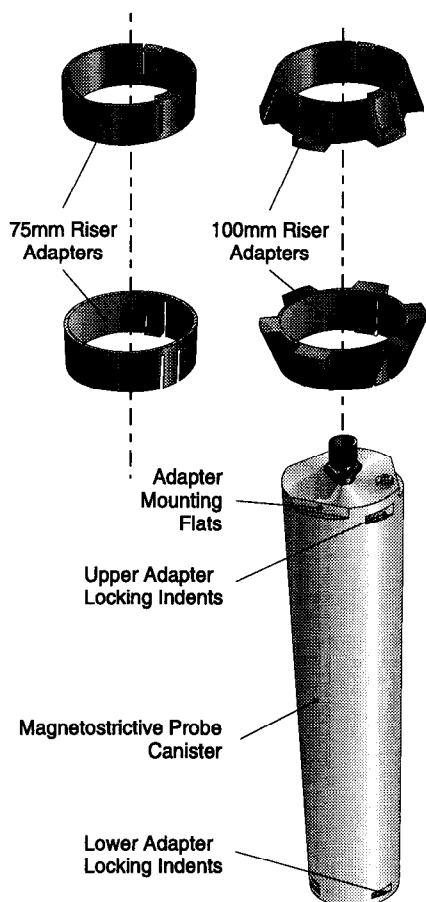
Once the adapter is at the bottom of the canister, twist the adaptor until the adapter lugs snap into the locking grooves.

Place the second adaptor on top of the probe canister with its **bevelled edge up** and the three lugs are aligned with the flats on the canister.

MAGNETOSTRICTIVE PROBES INSTALLATION INSTRUCTIONS

Press the adaptor onto the canister until the lugs are on the flats.
Twist the adaptor until the lugs snap into the locking grooves.

Figure 1 :— Fitting The Probe Riser Adapters

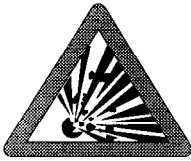


Canister Sleeves

Canister Sleeves are supplied with Magnetostrictive probes for special applications. Canister Sleeves can only be fitted in 75mm bore risers.

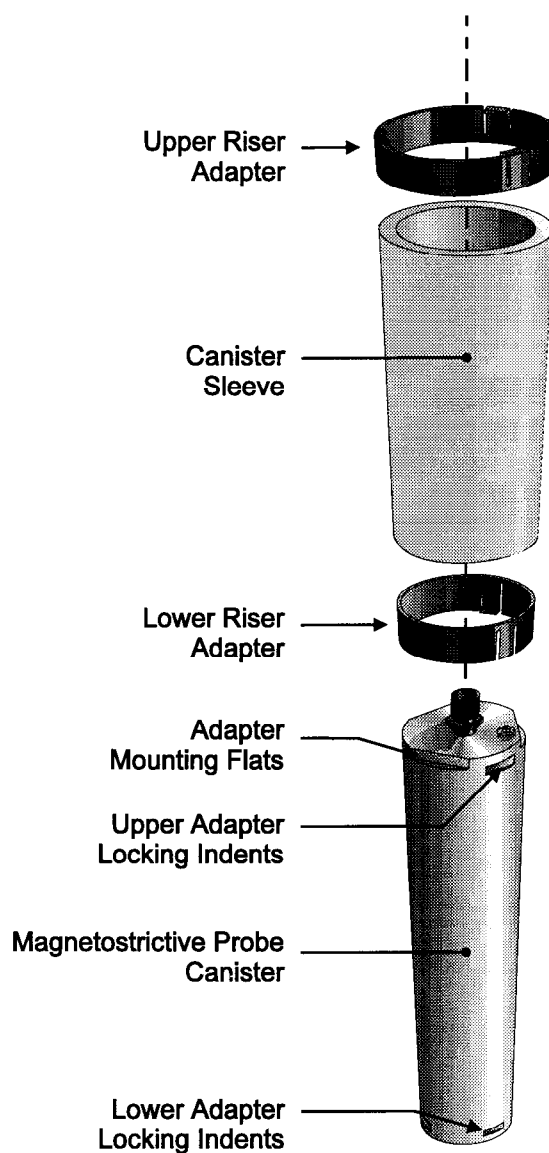
The sleeve is a sliding fit over the probe canister and is fitted between the two riser adapters which hold it in place. Ensure that both adapters are correctly located in their locking indents.

To prevent the build up of static electricity in the sleeve it must only be handled with bare hands. If the probe or the sleeve requires cleaning it must be done with a damp cotton cloth only.



Canister Sleeves must not be fitted or removed either in the presence of or close to flammable hydrocarbon vapours. Assemble all probes well away from petroleum tanks, dispensers and fill points.

Figure 2 :— Fitting The Probe Canister Sleeves



MAGNETOSTRICTIVE PROBES

INSTALLATION INSTRUCTIONS

Water Float Ballast Rings

Ballast rings must be added to the water float of magnetostrictive probes to ensure proper float action. The ring type varies with the fluid being measured. Float ballast rings are available for the following liquids:

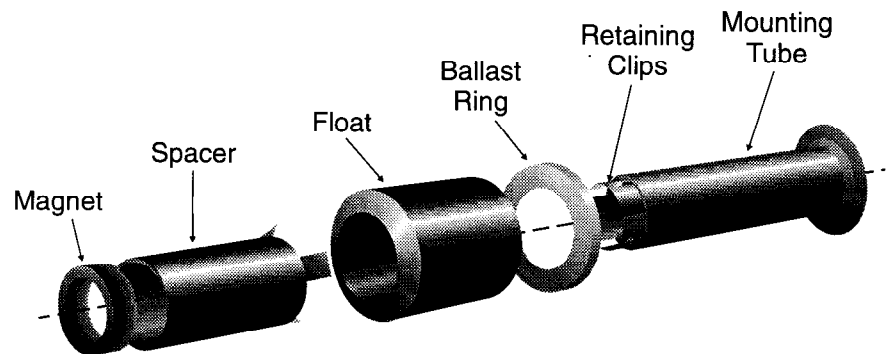
Ballast Ring Number	Measurable Liquids
G2	Aviation Petrol Regular Unleaded Petrol Super Unleaded Petrol Regular Leaded Petrol Super Leaded Petrol Gasohol
L2	Motor Oil Toluene Xylene Gear Oil 90W Automatic Transmission Fluid
D2	Jet Fuel Paraffin Diesel

The following liquids do not use a water float, as water is not measurable in the liquid: ethylene glycol (antifreeze), waste-water, windscreen washer fluid, waste oil, fuel oils with a specific gravity greater than 0.925.

If the ballast ring is supplied separately or requires changing carry out the following procedure:

Refer to Figure 3. Depress the three retaining clips on the water float mounting tube immediately above the water float, and remove the water float. Slide the correct ballast ring over the top of the water float mounting tube. Ensure that the ballast ring is placed over the locking collar with the Ballast Ring Number facing the bottom or flanged end of the tube.

Figure 3 :— *Exploded view of the 50mm water float assembly.*



Replace the water float over the top of the mounting tube and press until the tube lugs snap to secure the float.

Probe and Float Assembly

Connect a 4mm² probe earth cable (approx. 500mm long) to the top of the probe canister using the screw and crimp connection provided. Attach the probe leader cable plug to the socket on the top of the probe. Secure by hand tightening the locking ring.



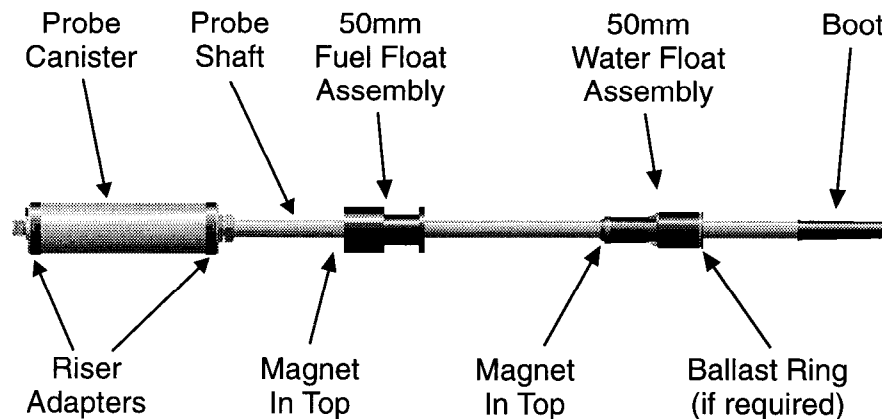
Ensure that the locking ring is tightened fully as the probe is lowered and removed by means of the probe leader cable.

Gently slide the fuel float onto the probe shaft, magnet-side-up (The magnet is in the narrow cylindrical end of the fuel float). The float must move freely on the probe shaft.

Refer to Figure 4 on page 12. Gently slide the water float assembly onto the probe shaft, magnet end first, ballast-end last. The float must move freely on the probe shaft.

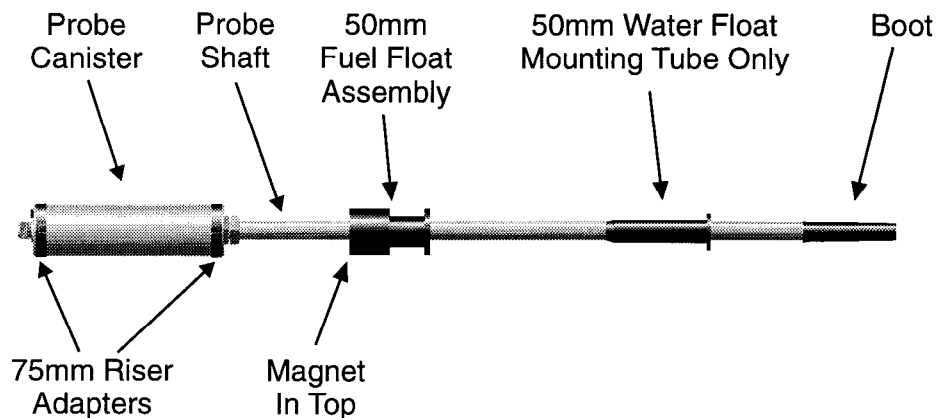
MAGNETOSTRICTIVE PROBES INSTALLATION INSTRUCTIONS

Figure 4 :— *Probe assembly (50mm floats)*



For liquids that do not use a water float detach the water float from the mounting tube and fit only the mounting tube to the probe; See figures 3 and 5

Figure 5 :— *Probe assembly for liquids not requiring water level measurement (50mm floats)*



When sliding the float onto the probe shaft, be careful not to break the magnet retention fingers. This could result in improper movement of the float and inaccurate readings

Slide the boot onto the end of the probe and twist until the boot's bosses snap into the probe detents. Ensure the boot is correctly fastened to the probe as failure to secure will result in the loss of the boot and floats inside the tank.

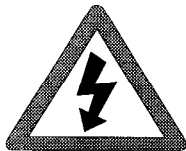
Gently slide the floats to the bottom of the probe shaft before standing it upright. The floats must be at the bottom of the probe shaft when the probe is installed.



The floats must not be allowed to fall freely down the probe shaft during installation as significant float damage will occur.

IN-TANK INSTALLATION

Turn off power to the TLS system.



Make sure that the AC power to the TLS Console is OFF and the working area is blocked off to vehicles and members of the public during installation.

Ensure any liquid other than the product to be measured/dispensed has been pumped out of the tank.



*Do not install the probe if any liquid other than the product to be measured/dispensed is in the tank.
Failure to comply can result in equipment damage, inaccurate inventory, or undetected potential environmental and health hazards.*

Ensure that there is no sludge in the bottom of the tank. Sludge can interfere with the correct operation of the probe.

Ensure that the floats are at the bottom of the probe and carefully lower the probe into the riser pipe until the probe rests on the bottom of the tank.



*Do not allow the probe to drop or impact the bottom of the tank.
Shock to the probe foot will severely damage the probe.*



Where mechanical overfill devices are installed ensure that no part of these devices is obstructed when the probe is installed. Failure to comply with this instruction may result in failure of the overfill prevention device.

MAGNETOSTRICTIVE PROBES INSTALLATION INSTRUCTIONS

Refer to Figure 6 and feed the probe cable through the gland in the riser cap top plate. Ensure that there is sufficient slack in the probe cable to allow the probe to rest on the bottom of the tank.

Crimp the probe earth wire to the terminal on the underside of the riser top plate. Ensure the securing nut is tight.

Ensuring that both the "O" ring and the groove are free of debris or contaminants, place the "O" ring in its groove on the riser flange. Ensure that neither the probe leader cable nor the probe earth cable are trapped by the top plate. Fit the riser cap top plate and tighten the six captive bolts.

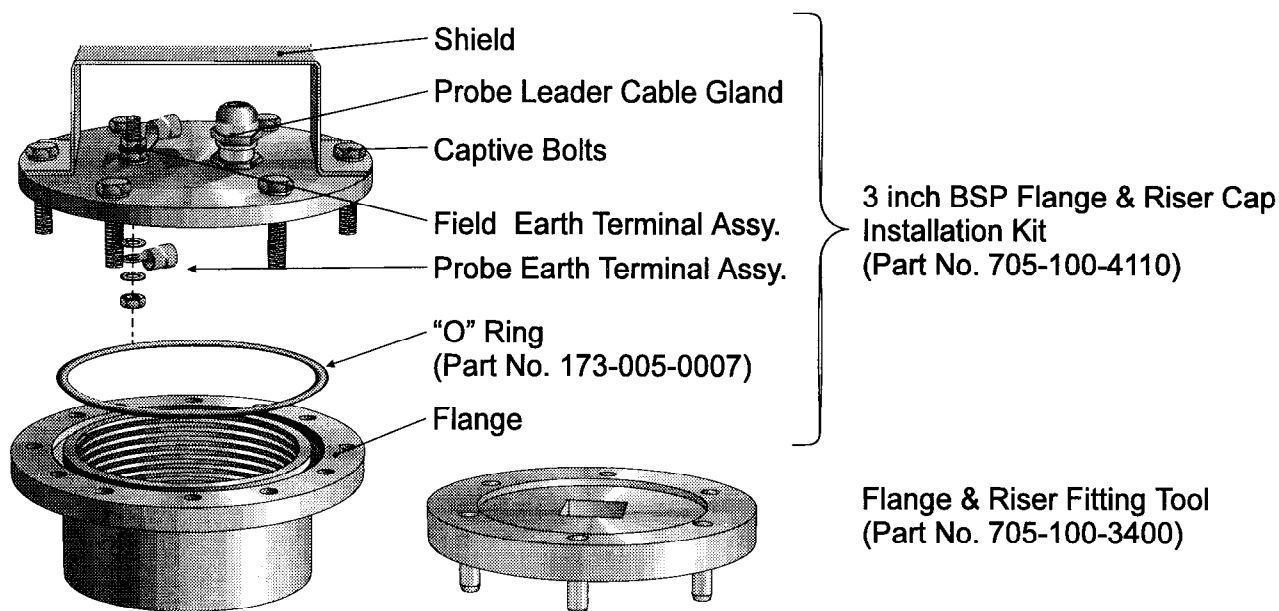


Riser cap "O" rings can be used once only. Always use a new "O" ring to ensure a vapour tight seal.

Crimp the Field Earth cable to the insulated earth connection on the riser top plate and tighten the securing nut.

Tighten the cable gland to ensure a vapour tight seal

Figure 6 :— *The Veeder-Root Riser Cap Assembly and fitting tool..*



"PTB" INSTALLATION

4

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

PRELIMINARY CHECKS

Ensure that stainless steel probes have been supplied. Two types of gland assembly are available;

- Insulated Gland and Surge Arrestor Assembly (Part No. 501-000-1205)
- Non Insulated Gland (Part No. 501-000-1204)

Ensure that the correct assembly has been supplied.

The gland assemblies have provision for a protective sleeve to be installed to prevent accidental damage to the probe head. The protective sleeve may be assembled from a 3inch to 2inch BSP reducing socket and a length of 75mm diameter pipe externally threaded 3 inch BSP at one end. The pipe length must be accurately determined as electrical connections to the probe head may have to be made after fitting the sleeve.

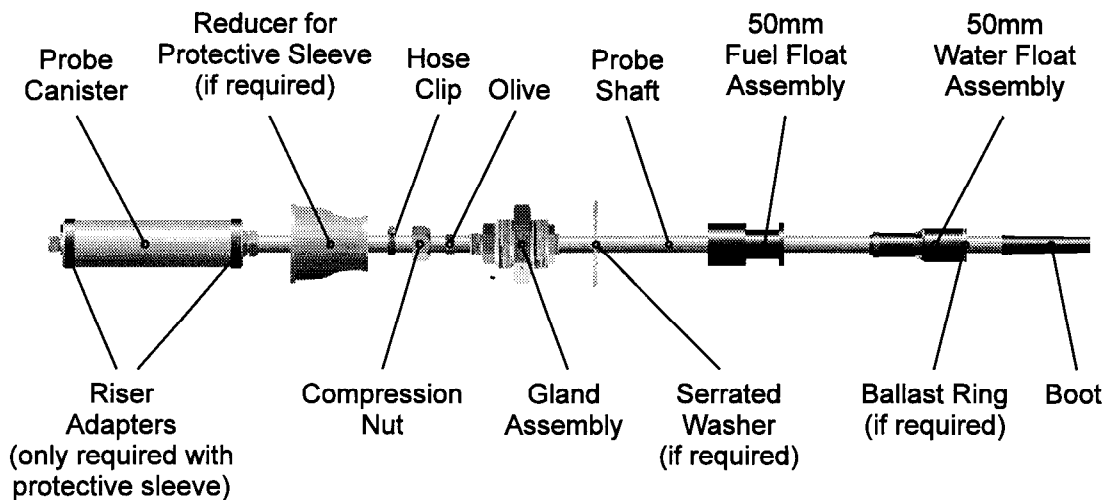
PROBE ASSEMBLY

If a protective sleeve is to be fitted follow the instructions for fitting the probe adapter rings given in "Probe Riser Adaptor Installation" on page 7.

If a protective sleeve is to be fitted, slide the reducer over the probe shaft. It is recommended that the reducer is securely tied to the probe head to ensure that it does not interfere with later installation procedures.

MAGNETOSTRICTIVE PROBES INSTALLATION INSTRUCTIONS

Figure 7 :— *Probe assembly for use with a “PTB Gland” and optional protective sleeve.*



Slide the hose clip provided with the PTB installation kit onto the probe shaft. Remove the compression nut and olive from the gland assembly. Gently slide the compression nut, olive and gland assembly onto the probe shaft. For insulated glands fitted directly to the tank lid the serrated washer *must* be used. Slide this over the probe shaft.

Gently slide the fuel float onto the probe shaft, magnet-side-up (The magnet is in the narrow cylindrical end of the fuel float). The float should move freely on the probe shaft. *Gently* slide the water float assembly onto the probe shaft, magnet end first, ballast-end last. The float should move freely on the probe shaft.

For liquids that do not use a water float detach the water float from the mounting tube and fit only the mounting tube to the probe. See Figure 5 on page 12.



When sliding the water float onto the probe shaft, be careful not to break the magnet retention fingers. This could result in improper movement of the float and inaccurate readings

Slide the boot onto the end of the probe and twist until the boot's bosses snap into the probe detents. Ensure the boot is correctly fastened to the probe as failure to secure will result in the loss of the boot and floats inside the tank.

BEFORE STANDING THE PROBE UPRIGHT:—

Gently slide the floats to the bottom of the probe shaft. The floats must be at the bottom of the probe shaft when the probe is installed.

"PTB" INSTALLATION IN-TANK INSTALLATION WITH "PTB" GLAND

Gently slide the PTB gland assembly to the top of the probe shaft.

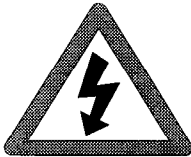
Hold the gland assembly and stand the probe upright



Neither the gland assembly nor the floats must be allowed to fall freely down the probe shaft during installation as significant float damage will occur.

IN-TANK INSTALLATION WITH "PTB" GLAND

Make sure that the AC power to the TLS System is OFF and the working area is blocked off to vehicles and members of the public during installation.



Ensure power to the TLS system is OFF.

Ensure any liquid other than the product to be measured has been pumped out of the tank.



Do not install the probe if any liquid other than the product to be measured/dispensed is in the tank. Failure to comply can result in equipment damage, inaccurate inventory, or undetected potential environmental and health hazards.

Ensure that there is no sludge in the bottom of the tank. Sludge will interfere with the correct operation of the probe.

Ensure that the floats are at the bottom of the probe and, holding the probe by the gland assembly, carefully lower the probe into the tank until the probe boot rests on the bottom of the tank. Slide the gland assembly, and reducer if fitted, down the probe shaft to rest on the tank lid.

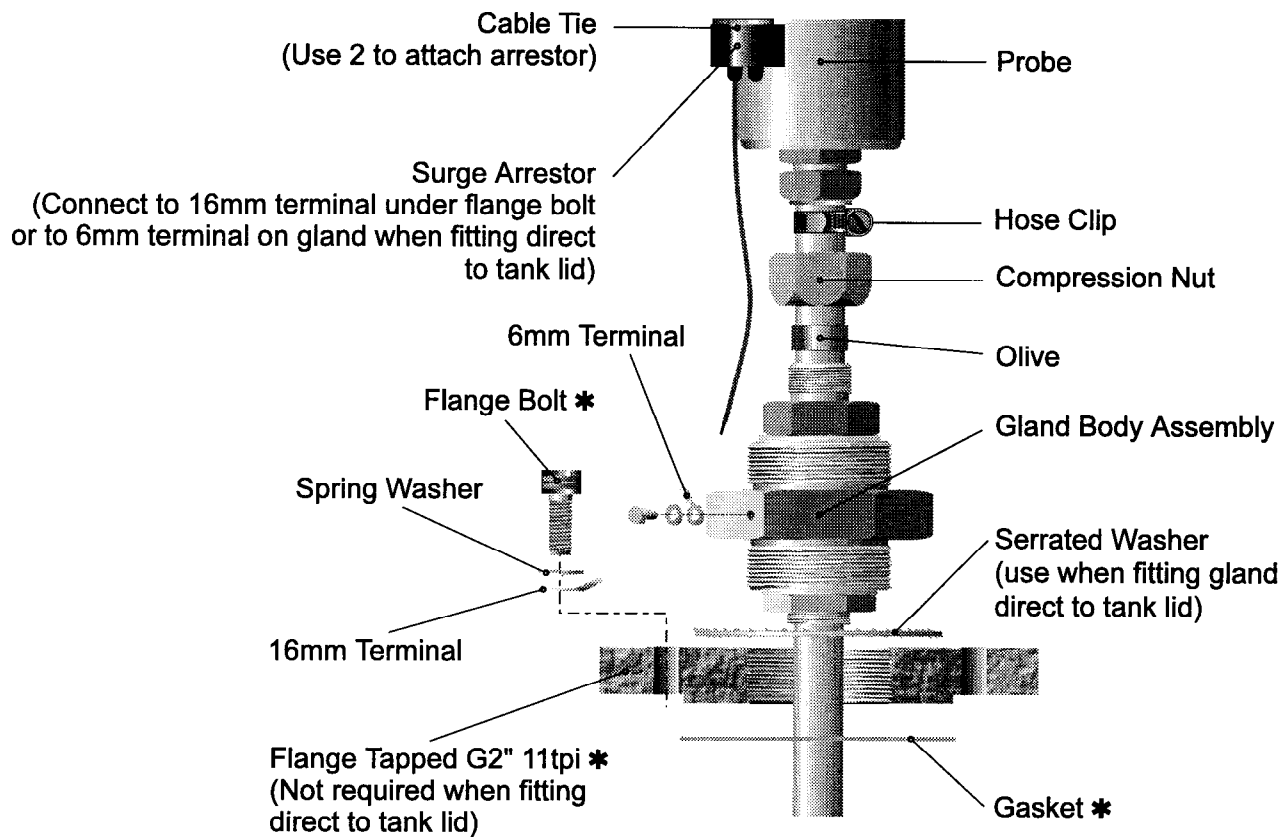


Do not allow the probe to drop or impact the bottom of the tank. This will severely damage the probe.

Refer to Figure 8. Using a suitable thread sealing compound screw the gland assembly to the tank lid or flange and tighten fully.

MAGNETOSTRICTIVE PROBES INSTALLATION INSTRUCTIONS

Figure 8 :— Detail of the PTB Gland and Surge Arrestor fixings



Note that in Figure 8 items marked with an Q are not supplied by Veeder-Root.

Engage the olive in its seat at the top of the gland assembly and fit the compression nut; hand tighten only. Ensure the hose clip abuts the gland assembly and tighten the hose clip.



The hose clip must be tightened sufficiently to prevent the probe sliding down through it. Do not overtighten as damage to the probe will occur.

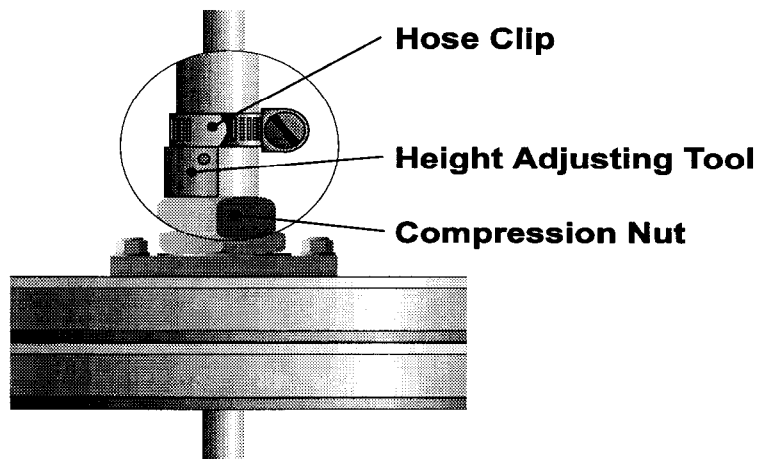
SETTING THE PROBE HEIGHT

Refer to Figure 9. Lift the probe and place the height adjusting tool between the hose clip and the top face of the compression nut, ensuring that it closely abuts the probe shaft.

Tighten the Gland compression nut to a torque of 30 N/m to provide a vapour tight seal.

Remove the height adjusting tool. A completed installation is illustrated in Figure 10 on page 20.

Figure 9 :— *Using the PTB Probe Height Setting tool*



CABLE & SURGE ARRESTOR CONNECTIONS

If fitted, slide the reducer down the probe shaft and screw onto the gland assembly.

Connect the field earth wire to the connector on the top of the probe head. Attach the probe leader cable plug to the socket on the top of the probe. Secure by hand tightening the locking ring.

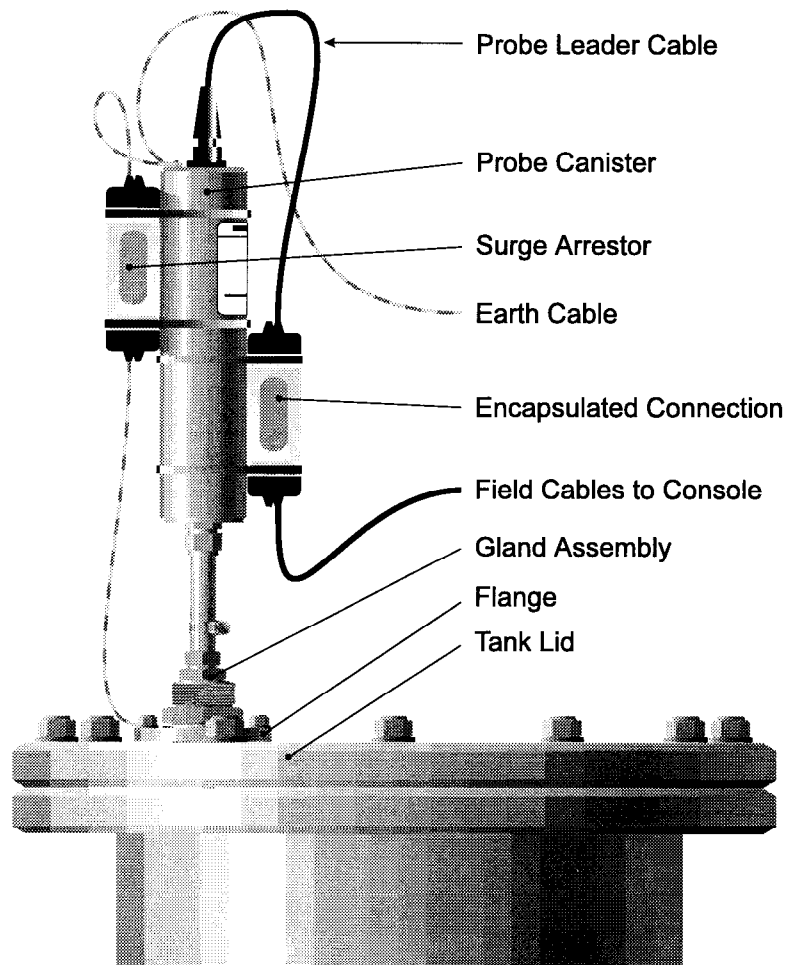
If an insulated gland assembly has been installed, fit one lead of the surge arrester to the earth terminal on the probe head.

If required slide the protective sleeve over the probe head and gland assembly and screw into the reducer.

MAGNETOSTRICTIVE PROBES INSTALLATION INSTRUCTIONS

If the gland has been installed directly in the tank lid the second lead of the surge arrester is attached to the earth screw located on an hexagonal face of the gland body using the 6mm terminal provided. If the gland has been installed in a bolted flange then the second lead of the surge arrester is attached to a flange bolt using the 16mm terminal provided. See Figure 8 on page 18.

Figure 10 :— *Completed PTB Probe and Gland Installation (Without protective sleeve).*



FIELD CABLE CONNECTION

5

GENERAL INSTRUCTIONS

Veeder-Root recommend that probe leader to field cable connections are made using a Veeder-Root Encapsulation Kit (Part No. 345-000-0001)

The encapsulation fluid may cause an allergic skin response in certain individuals. Encapsulation fluid vapour may cause respiratory system irritation and breathing difficulty and may cause asthma like symptoms in certain individuals at very low concentrations. Encapsulation fluid and vapour may cause eye and skin irritation.



Avoid prolonged or repeated breathing of the encapsulation fluid vapour. Use only in well ventilated areas and avoid contact with skin and eyes. Launder contaminated clothing.

CONNECTION PROCEDURE

Connect the Field Earth cable to the insulated earth connection on the riser top plate and tighten the securing nut.

Refer to Figure 11 on page 22. Take the rubber caps off the encapsulation tube, make a hole in a nipple of one cap and feed the two-wire probe leader cable through the nipple.

Similarly feed the two field wires leading to the System Console through a nipple of the other rubber cap.

Feed one set of wires through the two encapsulation tubes. Crimp the two sets of wires to their respective pairs after checking that all wires are labelled correctly and have a corresponding colour combination.

MAGNETOSTRICTIVE PROBES

INSTALLATION INSTRUCTIONS

Replace the caps on the ends of the tube with the wires inside. Rotate the outer tube until there is an opening allowing access to the wires inside.

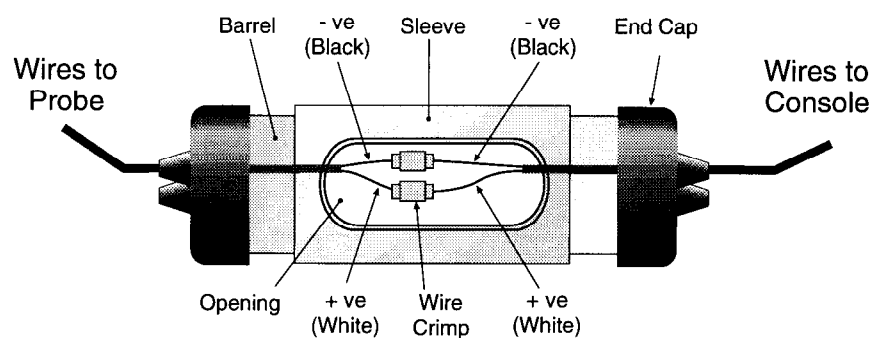
Remove the encapsulation compound container from the envelope. Firmly grasp each flat side of the bag near the centre barrier, at the same time pull the sides of the barrier apart and break the barrier all the way across the bag.

Mix the compound by squeezing alternate ends of the bag forcing the compound rapidly back and forth. Mix until the compound has a uniform colour. If the ambient temperature is below 16°C mix until the temperature of the mixed compound begins to rise. This decreases the viscosity of the compound and aids the filling of the encapsulation tube.

Clip off a corner of the bag and completely fill the encapsulation tube. Rotate the outer tube round the inner tube to close the opening.

Allow the encapsulating compound to cure completely before applying power to the probes.

Figure 11 :— *Field Cable to Probe Leader Cable Encapsulated Connection*



DUCTING SEALS

If not already carried out by the site electrical contractor, a foam plug with a minimum depth of 300mm must be inserted in each end of all probe and sensor cable ducting.