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Sensor Products

Application Guide

VEEDER-ROOT

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Example Illustrations

Illustrations used in this guide for example sensor installations may contain components that are customer supplied and not included with the sensor. Please check with your Veeder-Root Distributor for recommended installation accessories.

Third Party Evaluations

Third party evaluations of the Veeder-Root sensors contained in this application guide can be found under the Veeder-Root vendor name on the National Work Group on Leak Detection Evaluations (NWGLDE) website:

http://www.nwglde.org

Figures

Tables

Sensor Application Matrix

			Where Used						Category						Product type											
Sensor Description	Form Number	Page #	Dispenser Pan	Spill Containment	STP	Annular Space	Monitoring Well	Oil/Water Seperator Tank	Discriminating	Non-Discriminating	Position Sensitive	Level Sensing	Static Testing	Hydrostatic	100% Gasoline	Diesel	Kerosene	Jet Fuel	Aviation Gas	E-15	E-85	Bio-Diesel 20	Bio-Diesel 100	Waste Oil	Motor Oil
DPS Standard Dispenser Pan	794380-322	2	x	x					x						x	x	x	x		x		x			x
CSS Standard Containment Sump	794380-352	2		x	x				x						x	x	x	x		x		x			x
DPO Optical Dispenser Pan	794380-320	2	x	x					x						x	x	x	x		x		x			x
CSO Optical Containment Sump	794380-350	2		x	x				x						x	x	x	x		x		x			x
MSS Mag Sump Sensor	857080-XXX	4	x	x	x				x		x	x	x		x	x	x	x		x		x	x		x
SSDP Solid State Dispenser Pan	794380-321	5	x	x						x					x	x	x	x		x		x	x		x
SSCS Solid State Containment Sump	794380-351	5		x	x					x					x	x	x	x		x		x	x		x
Piping Sump	794380-208	6	x	x	x					x					x	x	x	x		x		x			x
Position-Sensitive Pan/Sump	794380-323	8	x	x	x					x	x				x	x	x	x		x	x	x			x
Interstitial for Fiberglass Tanks, Discriminating	794380-343	9				x			x						x	x	x	x		x		x	x		x
Interstitial for Fiberglass Tanks	794380-409	10				x				x					x	x	x	x		x		x			x
Interstitial for Fiberglass Tanks, High Alcohol	794380-345	11				x				x					x	x	x	x		x	x	x	x		x
Interstitial for Steel Tanks	794380-4X0	12				x				x					x	x	x	x		x		x			x
Interstitial for Steel Tanks, Position Sensitive	794380-333	13				x					x				x	x	x	x		x	x	x	x		x
Interstitial for Steel Tanks, High Alcohol	794380-430	14				x				x					x	x	x	x		x	x	x	x		x
Interstitial for Steel Tanks, High Alcohol, small footprint	794380-344	15				x				x					x	x	x	x		x	x	x	x		x
Hydrostatic Reservoir (Dual Point)	794380-303	16				x								x	x	x	x	x		x		x			x
Single-Point Hydrostatic Sensor	794380-301	16				x								x	x	x	x	x		x		x			
Single Point Mini Hydrostatic Reservoir	794380-304	17				x								x	x	x	x	x		x		x	x		x
Vapor	794380-700	18					x								x	x	x	x		x		x			x
GroundWater	794380-62X	19					x								x	x	x	x		x		x			x
Oil / Water Separator	794690-XXX	B-1						x							x	x	x	x		x		x		x	x

Discriminating Dispenser Pan and Containment Sump Sensors

These discriminating sensors are installed in a dispenser pan or in a containment sump and will detect the presence of, and differentiate between, hydrocarbons and other liquids. Two types of discriminating sensors (Standard, and Optical) are discussed in this section. A third type, the Mag Sump sensor, is discussed on page 4.

Table 1. Discriminating Sensor Features and Console Compatibility

Item	STANDARD Dispenser Pan (DPS) and Containment Sump (CSS) Sensors	OPTICAL Dispenser Pan (DPO) and Containment Sump (CSO) Sensors
Form Number	794380-322 (DPS); 794380-352 (CSS)	794380-320 (DPO); 794380-350 (CSO)
Operating principle	Conductive elastomer, reed switch/float	Conductive elastomer/optical
Product activation height[1, 2]	DPS: Gasoline - 0.005" (0.127mm); Water - low 1.37" (3.4cm), High 7.66"(19.5cm) CSS: Gasoline - 0.005" (0.127mm); Water - low 1.35" (3.4cm), High 12.28" (31.2cm)	Gasoline - 1.34 inches (3.4cm)
Operating temperature:	32 to +140°F (0 to +60°C)	-40 to +140°F (-40 to +60°C)
Dimensions	11.6" (29.4cm) high, 2.2" (5.6cm) dia. (DPS); 22.1" (56.1cm) high, 2.2" (5.6cm) dia. (CSS)	11.6" (29.4cm) high, 2.2" (5.6cm) dia. (DPO); 22.1" (56.1cm) high, 2.2" (5.6cm) dia. (CSO)
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series
Console Interface Module	TLS-350 Series - Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001	TLS-350 Series - Type B Interface Module, 6 sensor input, P/N 329950-001
	TLS-450/8600 Series - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001	
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004	
Maximum number of sensors monitored per console	TLS-350 Series (64); TLS-350J (3)	TLS-350 Series(48)
	TLS-450/TLS-450PLUS (32)	
	TLS4/8601 Series (12)	
Compatible fuels	See "Sensor Application Matrix" on page 1.	

[1]For additional third party evaluation data of Standard Types see: http://www.nwglde.org/evals/veeder_root_o.html

[2]For additional third party evaluation data of Optical Types see: http://www.nwglde.org/evals/veeder_root_n.html

Miscellaneous

- An open sensor triggers a Sensor Out alarm
- Standard cable length: 12 feet (3.6m)
- Universal Sensor Mounting Kit, P/N 330020-012 (see Fig. 1)

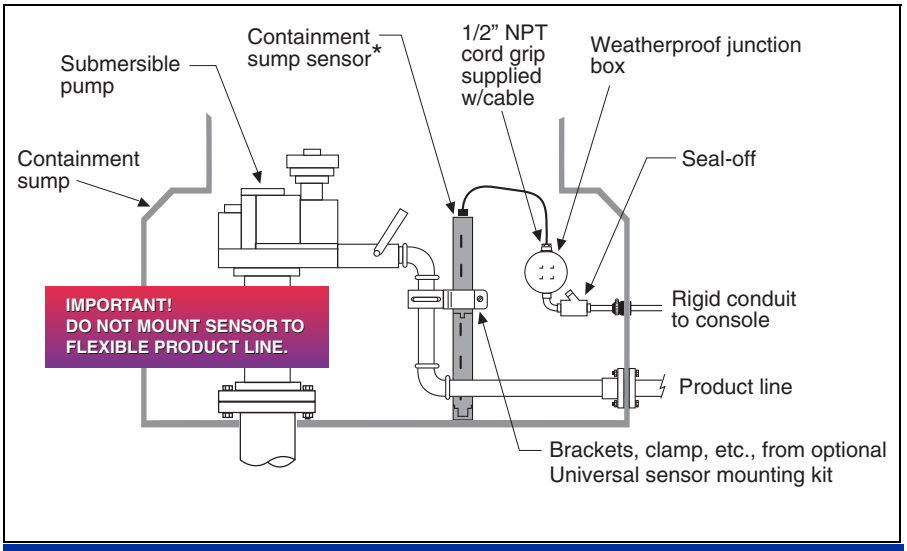


Fig. 1 Example Containment Sump Sensor Installation

Servicing Discriminating Dispenser Pan and Containment Sump Sensors

When replacing Dispenser Filters or servicing Dispensers

The sensor should be removed from the dispenser pan before replacing the filters. All fuel must be cleaned up in the dispenser pan prior to reinstalling the sensor. If the sensor is exposed to fuel during the filter replacement, the sensor may go into a fuel alarm. If this occurs the sensor must be removed from the dispenser pan and the sensor allowed to dry in a well ventilated area for up to 7 days. The recovery time will depend on how long the sensor was exposed to the fuel.

If the sensor has been exposed to diesel fuel or kerosene, it will be necessary to first soak the sensor in Coleman™ fuel for 30 minutes and then set aside to dry in a well ventilated area for up to 7 days. It is advisable that the affected sensor be replaced and taken to a location where the soaking and recovery process can be safely performed. The recovery time will depend on how long sensor was exposed to the diesel fuel or kerosene.

When Sensor is in alarm due to a spill or leak in the containment area

Remove the sensor from the containment area upon arrival at the location. Dry off the sensor and allow it to recover in a well ventilated area for up to 7 days. The recovery time will depend on how long the sensor was exposed to the fuel.

The sensor can be reinstalled in the containment area once the sensor has recovered and the source of the leak repaired. The containment area must be free of fuel.

If the sensor has been exposed to diesel fuel or kerosene, it will be necessary to first soak the sensor in Coleman™ fuel for 30 minutes and then set aside to dry in a well ventilated area for up to 7 days. It is advisable that the affected sensor be replaced and taken to a location where the soaking and recovery process can be safely performed. The recovery time will depend on how long sensor was exposed to the diesel fuel or kerosene.

Biodiesel Blend Limitations

Biodiesel blends that meet ASTM standards D6751 or D7467 are compatible with the respective sensors.

Mag Sump Sensor

The discriminating Mag Sump Sensor detects the presence and amount of water and/or fuel in the containment sump or dispenser pan. Using proven magnetostrictive technology, Veeder-Root's Mag Sump Sensor produces fast reaction and recovery times, which eliminates costly and unwarranted service calls and sensor replacements. And where it's allowed, stations can remain open when only water is detected.

Table 2. Mag Sump Sensor Features and Console Compatibility

Item	Description
Form Number	See Table 3 below
Operating principle	Magnetostrictive probe with dual floats
Product activation height[1]	1.368" (3.47cm), gasoline; 1.614" (4.1cm), water; 1.116" (2.83cm) gasoline on 7 " (17.8cm) of water (fuel alarm w/water present)
Operating temperature	-40 to +140°F (-40 to +60°C)
Dimensions	-111, -121, -211, -221 versions 22" (55.9cm) high, 2.2" (5.6cm) dia.; -112, -122, -212, -222 versions 34" (86.4cm) high, 2.2" (5.6cm) dia.
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series
Console Interface Module	TLS-350 Series - Smart Sensor Interface Module, 8 sensor input, -P/N 329356-004
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://www.nwglde.org/evals/veeder_root_x.html

Table 3. Mag Sump Sensor Form Numbers

Form Number	Product	Measurement Limit	Leak Detect	Fixed Threshold
857080-111	Gasoline & Diesel	12" (30.5cm)	No	No
857080-112		24" (61cm)	No	No
857080-121		12" (30.5cm)	No	Yes**
857080-122		24" (61cm)	No	Yes**
857080-211		12" (30.5cm)	Yes	No
857080-212		24" (61cm)	Yes	No
857080-221		12" (30.5cm)	Yes	Yes**
857080-222		24" (61cm)	Yes	Yes**

**This version has a fixed water warning of 1.7" (4.32cm), water alarm of 3.0" (7.6cm)and an alarm upgrade delay of 48 hours.

Miscellaneous

- Universal Sensor Mounting Kit (optional) - P/N 330020-012 (see Fig. 2)
- Standard cable length - 10 feet (3m)

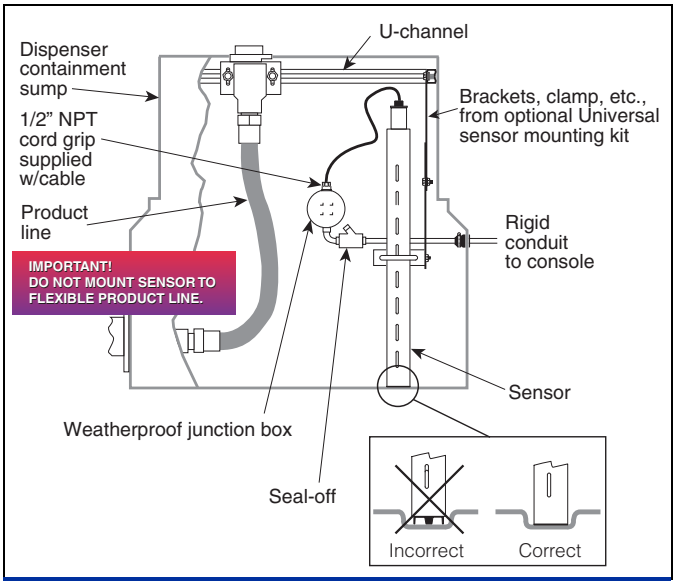


Fig. 2 Example Mag Sump Sensor Installation

Solid-State Dispenser Pan and Containment Sump Sensors

These solid-state, non-discriminating sensors are installed in a dispenser pan or in a containment sump and will detect the presence of a liquid. Optical liquid level sensing technology means no moving parts and a lower temperature operating limit.

Table 4. Non-Discriminating Sensor Features and Console Compatibility

Item	Description
Form Number	794380-321 (DP); 794380-351 (CS)
Operating principle	Optical
Product activation height[1]	Gasoline or Water - 1.02 inches (2.6cm)
Operating temperature:	-40 to +140°F (-40 to +60°C)
Dimensions	11.6" (29.4cm) high, 2.2" (5.6cm) dia. (DP); 22.1" (56.1cm) high, 2.2" (5.6cm) dia. (CS)
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series
Console Interface Module	TLS-350 Series - Type A Sensor Interface Module, 8 sensor input, P/N 329956-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-350 Series (64)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data of Standard Types see: http://www.nwglde.org/evals/veeder_root_r.html

Miscellaneous

- An open sensor triggers a Sensor Out alarm
- Standard cable length: 12 feet (3.66m)
- Universal Sensor Mounting Kit, P/N 330020-012 (see Fig. 1)

Piping Sump Sensor

The Piping Sump Sensor is installed in a tank piping sump and will detect the presence of a liquid. An open sensor triggers a Sensor Out alarm.

Table 5. Piping Sump Sensor Features and Console Compatibility

Item	Description
Form number[1]	794380-208
Operating principle	Float/magnetic reed switch
Product activation height[2]	Gasoline - 1.84 inch (4.67cm)
Operating temperature	32 to +140°F (0 to +60°C)
Dimensions	12" (30.5cm) high, 1.9" (4.8cm) diameter
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - No input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series, (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]Sensors 794380-208 and -209 are direct replacements for sump sensor 794380-206

[2]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_m.html

Miscellaneous

- Installation kit 330020-076 (see Fig. 3)
- Standard cable length: 12 feet (3.66m)

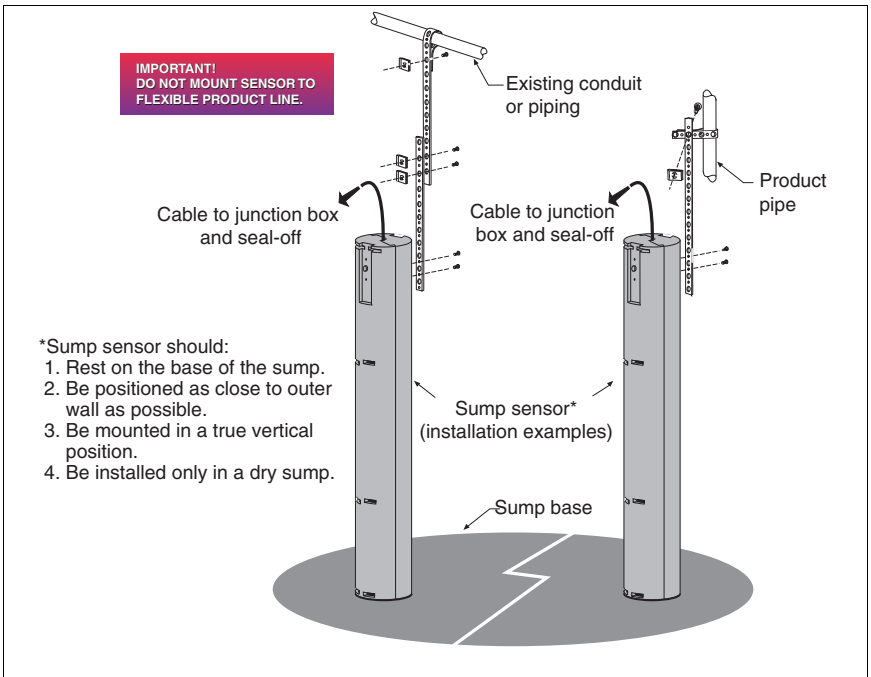


Fig. 3 Example Piping Sump Sensor Installation

Stand-Alone Dispenser Pan Sensors

The Stand-Alone Dispenser Pan Sensors immediately shut down AC power to the dispenser when fluid is detected in the dispenser pan. These sensors control and shut down power to the dispenser without the need for additional relays, circuitry, wiring, or consoles. The separate sensor control interface ensures intrinsically-safe integrity in a Class I Div. 1 Group D; Class I Zone 0 IIA hazardous area. Two models of Stand-Alone Dispenser Pan sensors are available.

Table 6. Stand-Alone Dispenser Pan Sensor Features and Console Compatibility

Item	Dispenser Pan Stand-Alone Sensor Non-Discriminating	Dispenser Pan Stand-Alone Sensor Discriminating
Form Number	847990-001	847990-002
Operating principle	Product permeable, reed switch/float	Product permeable, reed switch/float
Product activation height[1]	Gasoline - 1.71” (4.34cm); Water - 1.62” (4.11cm)	Gasoline - 0.03” (0.76mm); Water - 6.39” (16.23cm)
Operating temperature:	32 to +140°F (0 to +60°C) freezing liquids; -13 to +140°F (-25 to +60°C) for hydrocarbons	
Compatible fuels	See “Sensor Application Matrix” on page 1.	

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_p.html

Miscellaneous

- Latching alarm circuitry ensures dispenser can’t be restarted until hazardous condition has been corrected.
- Connects directly to dispenser wiring.
- Controls most manufacturer’s dispensers.
- Cable length: 5 feet (1.5m).
- Sensor dimensions: 11.6” (29.5cm) high, 2.2” (5.6cm) dia.
- Control Interface dimensions: 9.4” (23.9cm) high, 2.2” (5.6cm) dia.

Installation Accessories

- Universal Sensor Mounting Kit, P/N 330020-012, contains sensor mounting brackets and screws (see Fig. 4).

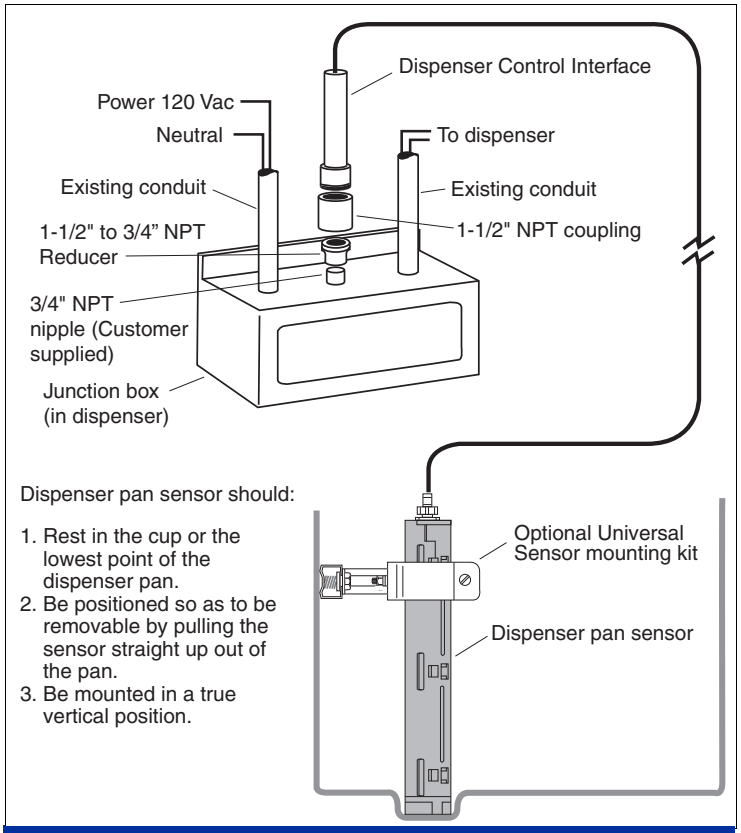


Fig. 4 Example Stand-Alone Sensor Installation

Position-Sensitive Sensor

Compatible with fuel blends up to 85%Ethanol!

The Position-Sensitive Sensor is installed in a pan/sump and incorporates a float switch to detect water and/or hydrocarbons. A Sensor Out alarm is triggered when sensor is moved off bottom of the pan/sump.

Table 7. Position-Sensitive Sensor Features and Console Compatibility

Item	Description
Form number	794380-323
Operating principle	Float switch
Product activation height[1]	1.52" (3.86cm)
Operating temperature	32 to +140°F (0 to +60°C)
Dimensions	12" (30.5cm) high, 2.2" (5.6cm) diameter
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - No input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://www.nwglde.org/evals/veeder_root_w.html

Miscellaneous

- Universal Sensor Mounting Kit (optional) - P/N 330020-012 (see Fig. 5)
- Standard cable length: 12 feet (3.66m)

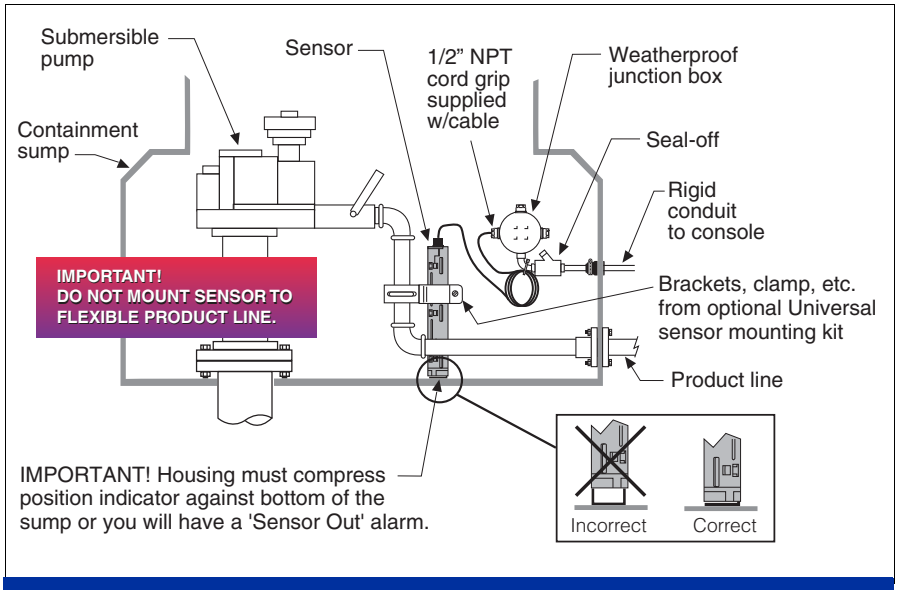


Fig. 5 Example Position-Sensitive Sensor Installation

Discriminating Interstitial Sensor for Double-Wall Fiberglass Tanks

The Discriminating Interstitial Sensor for double-wall fiberglass tanks uses solid-state liquid level sensing technology to detect liquid in the interstitial space of the tank. The sensor can differentiate between hydrocarbons and other liquids. An open sensor triggers a Sensor Out alarm.

Table 8. Discriminating Interstitial Sensor for Double-Wall Fiberglass Tanks Features and Console Compatibility

Item	Description
Form Number	794380-343 (includes 25 ft [7.6m] cable; for 4 - 10 ft [1.2 to 3m] I.D. fiberglass tanks)
Operating principle	Optical sensor and conductivity
Product activation height[1]	Gasoline <0.1 inch (0.25cm); Water <0.1 inch
Operating temperature:	14 to +140°F (-10 to +60°C)
Dimensions	4.3" (11cm) length, 1.5" (3.8cm) width, 0.5" (1.3cm) thick
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series
Console Interface Module	TLS-350 Series - Type A Sensor Interface Module, 8 sensor input, P/N 329956-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-350 Series (64)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data of Standard Types see: http://nwglde.org/evals/veeder_root_u.html

Miscellaneous

- Installation example (see Fig. 6)

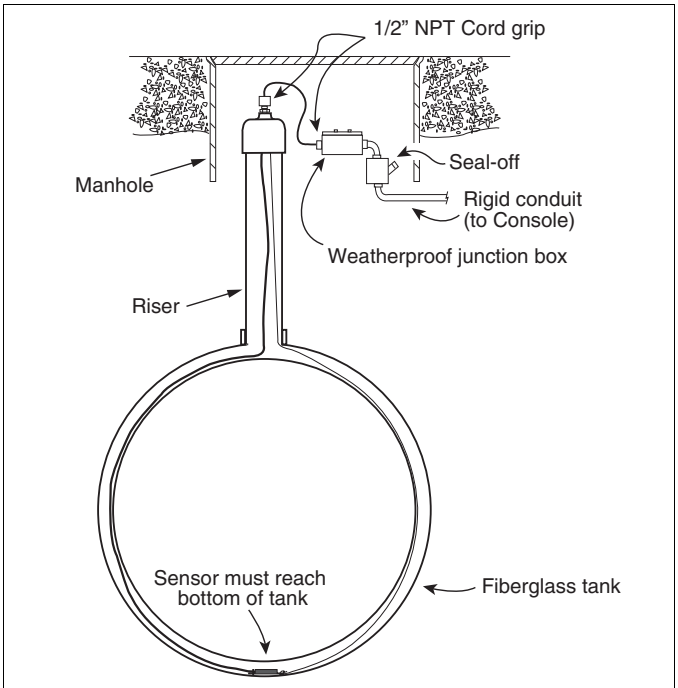


Fig. 6 Example Interstitial Sensor Installation - Fiberglass Tank

Interstitial Sensors for Double-Wall Fiberglass Tanks

The non-discriminating interstitial sensor for fiberglass tanks detects the presence of liquid in the interstitial space of the tank. An open sensor triggers a Sensor Out alarm.

Table 9. Interstitial Sensor for Double-Wall Fiberglass Tanks Features and Console Compatibility

Item	Description
Form number	794380-409 (includes 25 ft [7.6m] cable; for 4 - 12 ft [1.2 to 3.6m] I.D. fiberglass tanks)
Operating principle	Float switch
Product activation height[1]	0.72 inches (1.84 cm)
Operating temperature	-4 to +140°F (-20 to +60°C)
Dimensions	2.2" (5.6cm) length, 1.3"(3.3cm) width, 0.6" (1.5cm) thick
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - No input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_m.html

Miscellaneous

- Installation example (see Fig. 6)

Interstitial High Alcohol Sensor for Double-Wall Fiberglass Tanks

Compatible with fuel blends up to 85%Ethanol!

The interstitial sensor for double-wall fiberglass tanks with high alcohol product uses solid-state liquid level sensing technology to detect liquid in the interstitial space of the tank. An open sensor triggers a Sensor Out Alarm.

Table 10. Interstitial High Alcohol Sensor for Double-Wall Fiberglass Tanks Features and Console Compatibility

Item	Description
Form Number	794380-345 (includes 25 ft [7.6m] cable; for 4 - 10 ft [1.2 to 3m] I.D. fiberglass tanks)
Operating principle	Optical sensor
Product activation height[1]	Gasoline <0.2" (0.5cm); Water <0.2 inch
Operating temperature:	14 to +140°F (-10 to +60°C)
Dimensions	4.3" (11cm) length, 1.5" (3.8cm) width, 0.5" (1.3cm) thick
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series
Console Interface Module	TLS-350 Series - Type A Sensor Interface Module, 8 sensor input, P/N 329956-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-350 Series (64)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data of Standard Types see: http://nwglde.org/evals/veeder_root_zd.html

Miscellaneous

- Installation example (see Fig. 6)

Interstitial Sensors for Steel Tanks

The Interstitial Sensor for steel tanks detects the presence of liquid between the double walls of the tank. An open sensor triggers a Sensor Out alarm.

Table 11. Interstitial Sensor for Steel Tanks Features and Console Compatibility

Item	Description
Form number	794380-420 (16 foot [4.9m] cable); 794380-460 (30 foot [9.1m] cable)
Operating principle	Float switch
Product activation height[1]	1.59 inches (4.05 cm)
Operating temperature	-4 to +140°F (-20 to +60°C)
Dimensions	2.5" (6.4cm) high, 1.5" (3.8cm) diameter
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - No input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_m.html

Miscellaneous

- Riser cap and adapter kit (2") - P/N 312020-928
- Installation example (see Fig. 7)

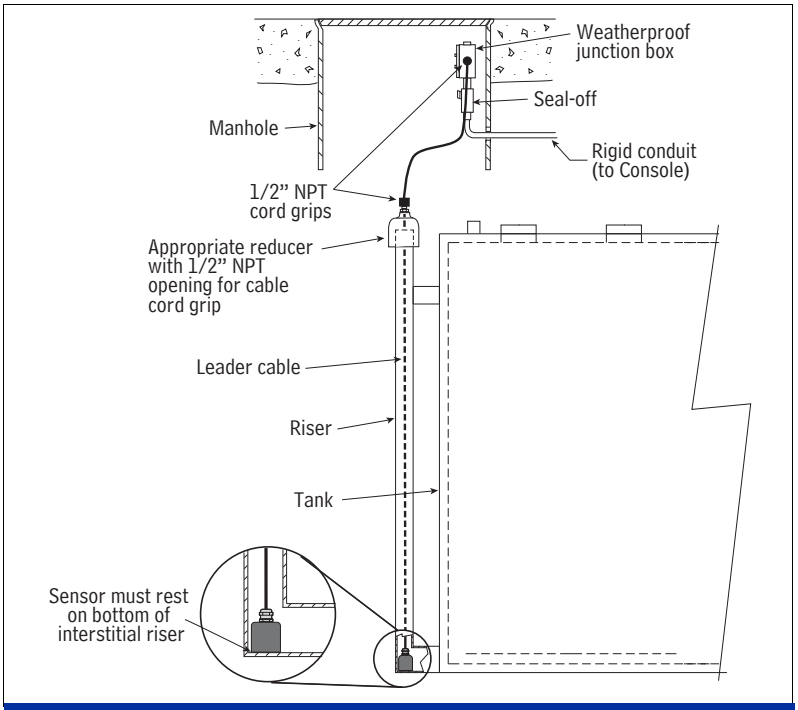


Fig. 7 Example Interstitial Sensor Installation - Steel Tank

Position Sensitive Interstitial Sensor for Steel Tanks

Compatible with fuel blends up to 85%Ethanol!

The sensor for steel tanks detects the presence of liquid between the double walls of the tank. In addition, it provides an alarm when the sensor is not positioned correctly on the bottom of the interstitial space.

Table 12. Position Sensitive Interstitial Sensor for Steel Tanks Features and Console Compatibility

Item	Description
Form number	794380-333 (15 Foot cable [4.6m])
Operating principle	Float switch
Product activation height	1.25" (3.2cm)
Operating temperature	-4 to +140°F (-20°C to +60°C) (hydrocarbons, non-freezing water)
Dimensions	3.5" (8.9cm) High, 1.75" (4.4cm) Diameter
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - No input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12), AC or DC versions of TLS4b only monitor a maximum of (6)
Compatible fuels	See "Sensor Application Matrix" on page 1.

Miscellaneous

- Riser cap and adapter kit (2" [50mm]) - P/N 312020-928
- Installation example (see Fig. 8) and control drawing 577014-041

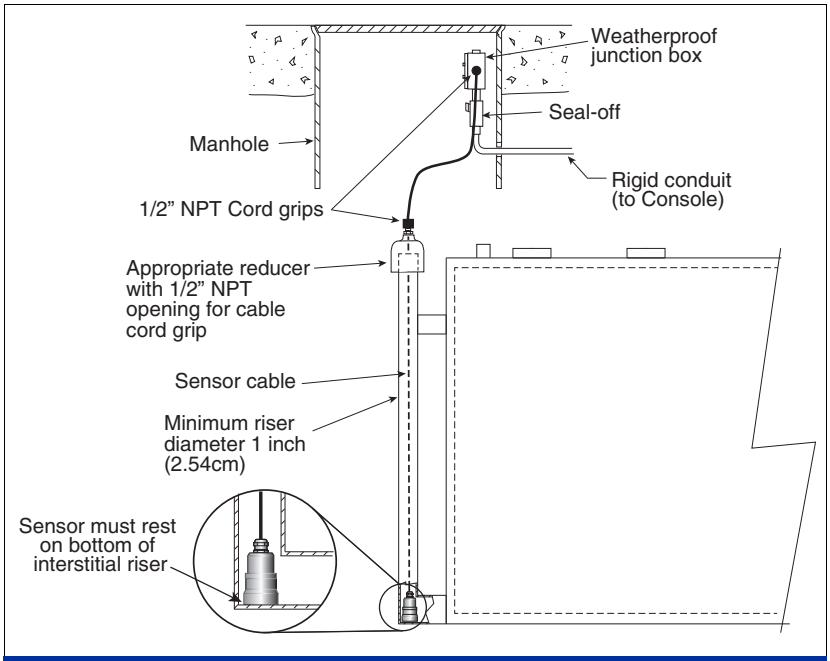


Fig. 8 Example Position Sensitive Interstitial Sensor for Steel Tanks

Interstitial High Alcohol Sensors for Steel Tanks

Compatible with fuel blends up to 85%Ethanol!

The Interstitial Sensor for steel tanks with high alcohol product detects the presence of liquid between the double walls of the tank. An open sensor triggers a Sensor Out alarm.

Table 13. Interstitial High Alcohol Sensors for Steel Tanks Features and Console Compatibility

Item	Description
Form number	794380-430 (15 foot [4.6m] cable)
Operating principle	Float switch
Product activation height[1]	0.95" (2.4cm)
Operating temperature	-4 to +140°F (-20 to +60°C)
Dimensions	2.5" (6.4cm) high, 1.5" (3.8cm) diameter
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - No input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_zb.html

Miscellaneous

- Riser cap and adapter kit (2" [50mm]) - P/N 312020-928
- Installation example (see Fig. 9)

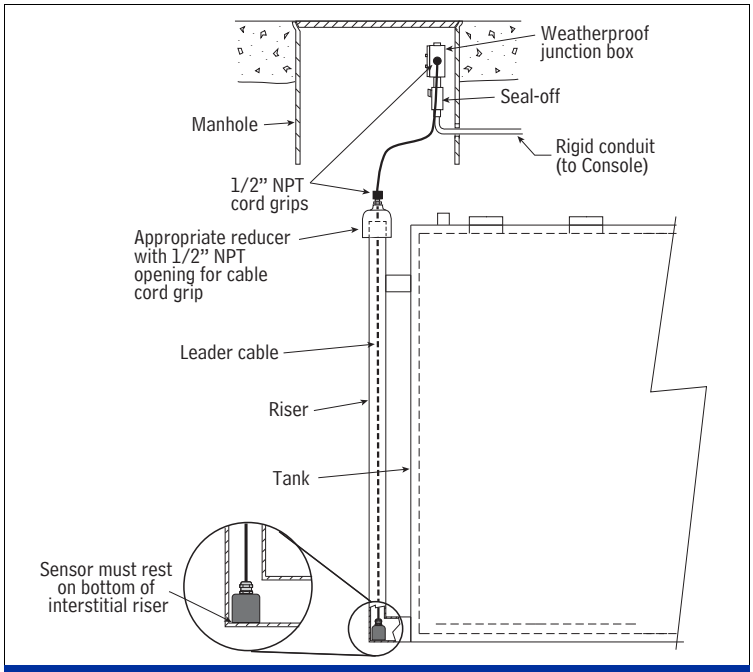


Fig. 9 Example Interstitial High Alcohol Sensors for Steel Tanks

MicroSensor

Compatible with fuel blends up to 85%Ethanol!

The non-discriminating small, easy to install solid-state MicroSensor is designed detect liquid in the interstitial space of a steel tank or a fill riser containment. An open sensor triggers a Sensor Out alarm.

Table 14. MicroSensor Features and Console Compatibility

Item	Description
Form number	794380-344 (25 foot [7.6m] cable)
Operating principle	Optical
Product activation height[1]	0.95" (2.4cm)
Operating temperature	-25.6 to +140°F (-32 to +60°C)
Dimensions	0.63" (16mm) max. diameter, 2" (51mm) long
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series
Console Interface Module	TLS-350 Series, Type A Sensor Interface Module, 8 sensor input, P/N 329956-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_u.html

Miscellaneous

- Installation examples Fig. 10 and Fig. 11.

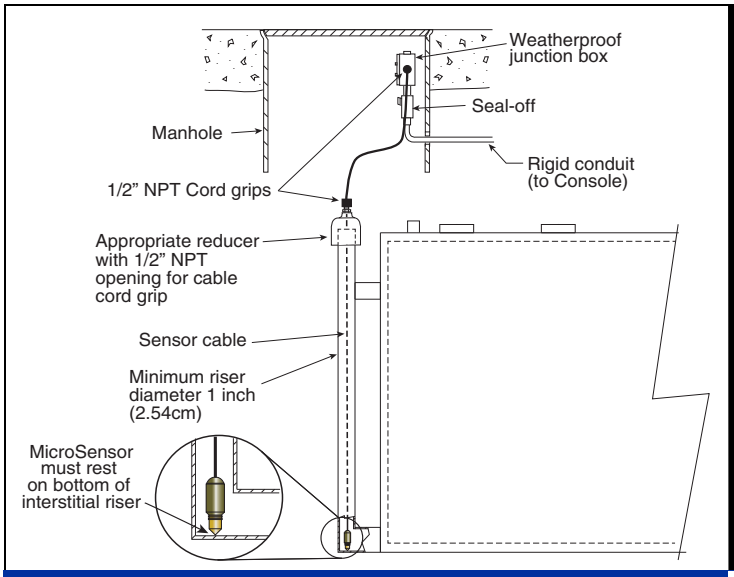


Fig. 10 Example Interstitial MicroSensor Installation - Steel Tank

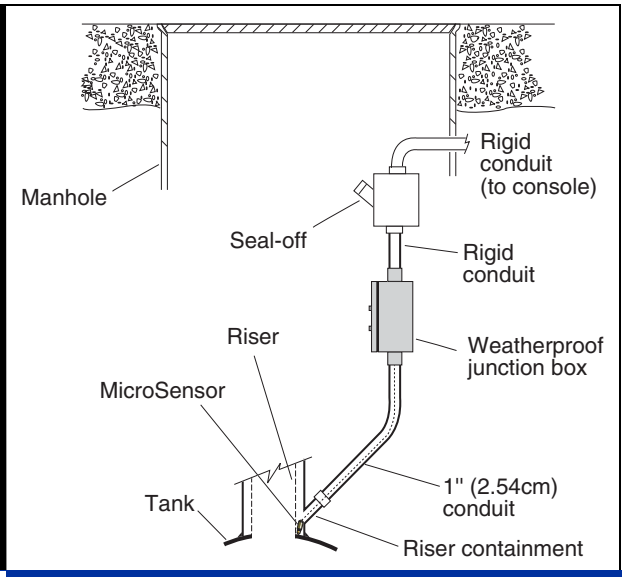


Fig. 11 Example MicroSensor Installation - Riser

Hydrostatic Reservoir Sensor

The Hydrostatic Reservoir Sensor accurately detects fluid level change in the reservoir and interstice of a double-wall storage tank. This sensor is available in a dual-point or single-point configuration. The Dual-Point version is ideal for high groundwater areas, and can differentiate between a high level alarm condition and a low level alarm condition. If an inner-wall leak occurs, the brine seeps into the tank triggering a low level alarm, if an outer wall leak occurs, fluid seeps into the interstice triggering a high level alarm. The Single-Point version can be used in low groundwater locations. If an inner-wall leak occurs, the brine seeps into the tank triggering a fuel alarm, or if the outer wall leaks, the brine seeps out of the tank interstice triggering a fuel alarm.

Table 15. Hydrostatic Reservoir Sensor Features and Console Compatibility

Item	Description
Form number	794380-301 Single-Point (12 foot [3.7m] cable); 794380-303 Dual-Point (12 foot [3.7m] cable)
Operating principle	Float switch
Product activation height[1]	1.74" (4.4cm) Single-Point; Low 1.2" (3cm), High 13.13" (33.4cm) Dual-Point
Reservoir solutions	Up to 50% ethylene glycol in water; up to 50% propylene glycol in water; salt brine solution of up to 30% CaCl
Operating temperature	-13 to +122°F (-25 to +50°C)
Dimensions	6" (15cm) high, 2.5" (6.4cm) dia. Single-Point; 17.3" (44cm) high, 2.5" (6.4cm) dia. Dual-Point
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - no input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_q.html

Miscellaneous

- Interstitial sensor riser cap and adapter kit, 2" P/N 312020-928
- Sensor, fiberglass interstitial sensor installation kit P/N 330020-436
- Installation example (see Fig. 12)

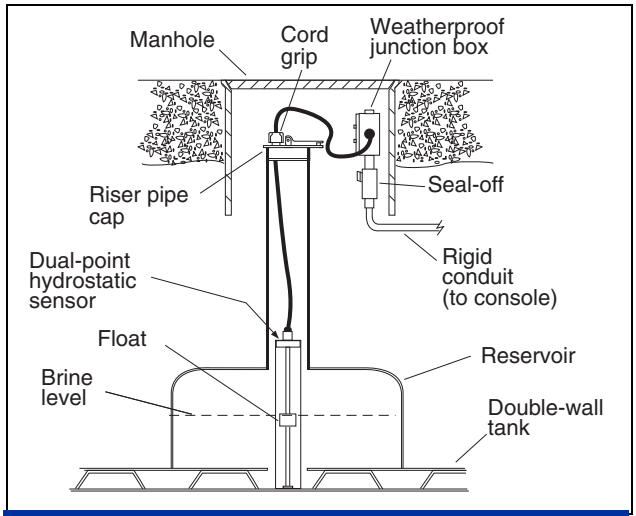


Fig. 12 Example Hydrostatic Dual-Point Sensor Installation

Single-Point Mini Hydrostatic Sensor for Double Wall Sumps

The Single-Point Mini Hydrostatic sensor accurately detects fluid level change in the interstice reservoir of a double-wall sump. If a leak occurs in the sump interstice, the brine seeps out of the reservoir triggering a low level alarm. An open sensor triggers a Sensor Out alarm.

Table 16. Mini Hydrostatic Reservoir Sensor Features and Console Compatibility

Item	Description
Form number	794380-304 (8 foot [2.4m] cable)
Operating principle	Float switch
Product activation height[1]	0.793" (2cm)
Reservoir solutions	Up to 50% ethylene glycol in water; up to 50% propylene glycol in water; salt brine solution of up to 30% CaCl
Operating temperature	-13 to +122°F (-25 to +50°C)
Dimensions	2.5" (6.4cm) high, 1.5" (3.8cm) dia.
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series, TLS-300 Series
Console Interface Module	TLS-300 Series - no input module required
	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-300 Series (8)
	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_za.html

Miscellaneous

- Installation example (see Fig. 13)

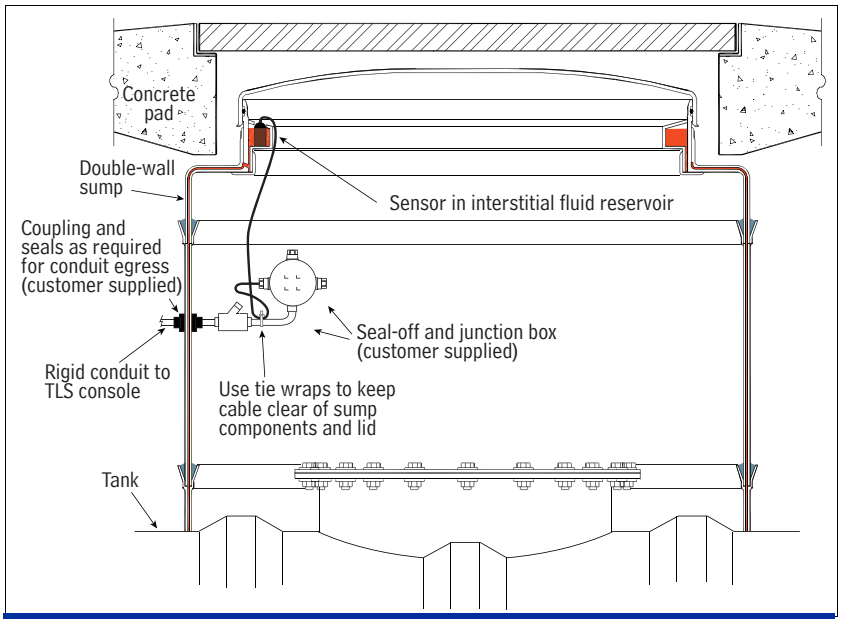


Fig. 13 Example Single-Point Mini-Hydrostatic Sensor Installation

Vapor Sensor

The Vapor Sensor detects hydrocarbon vapor exceeding the programmed threshold limit in the monitoring well. An open sensor triggers a Sensor Out alarm.

Table 17. Vapor Sensor Features and Console Compatibility

Item	Description
Form number	794390-700
Operating principle	Adsistor
Product activation[1]	500 ppm
Operating temperature	-4 to +140° (-20 to +60°C)
Dimensions	4.9" (12.4cm) long, 1.1" (2.8cm) dia.
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series,
Console Interface Module	TLS-350 Series, Vapor Sensor Interface Module, 5 sensor input, P/N 329357-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-350 Series (30)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_t.html

Miscellaneous

- 4-inch (100mm) cap and adapter kit - P/N 312020-939
- Installation example (see Fig. 14)

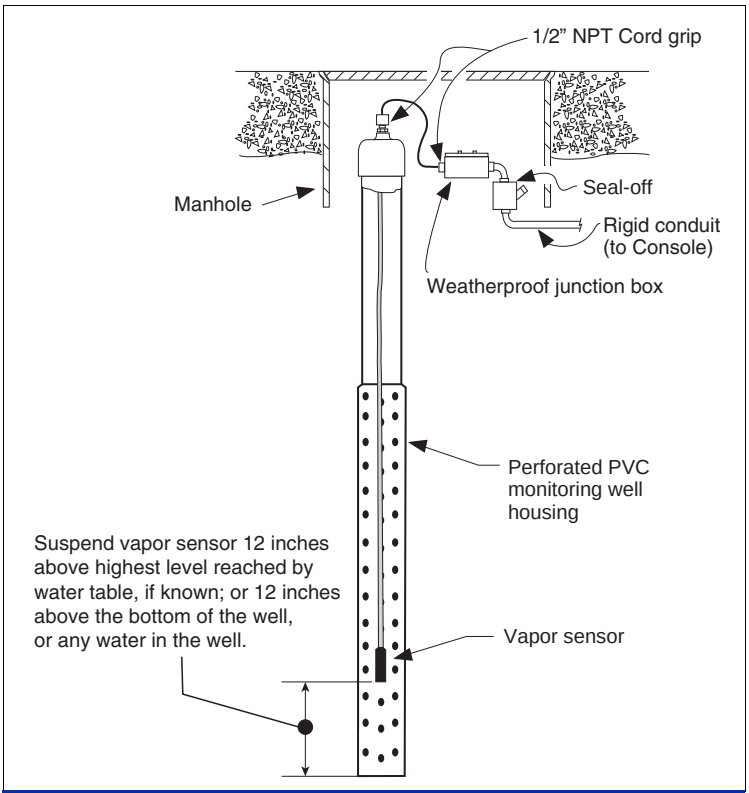


Fig. 14 Example Vapor Sensor Installation

Groundwater Sensor

The Groundwater Sensor detects free hydrocarbon product on the water table in up to 20 feet deep monitoring wells. Hydrocarbons in the C_5 to C_{16} range trigger a Fuel alarm. Water table dropping below sensor triggers a Water Out alarm. An open sensor triggers a Sensor Out alarm.

Table 18. Groundwater Sensor Features and Console Compatibility

Item	Description
Form number	794380-621 (7 - 10 foot [2 - 3m] wells); 794380-622 (10 - 15 foot [3 - 4.5m] wells); 794380-624 (15 - 20 foot [4.5 - 6m] wells);
Operating principle	Electrical conductivity
Product activation height[1]	0.02" (.05cm)
Operating temperature	32 to +104°F (0 to +40°C)
Dimensions	4.9" (12.4cm) long, 1.1" (2.8cm) dia.
Compatible consoles	TLS-450/TLS-450PLUS, TLS4/8601 Series, TLS-350 Series,
Console Interface Module	TLS-350 Series, Interstitial/Liquid Sensor Interface Module, 8 sensor input, P/N 329358-001
	TLS-450/TLS-450PLUS - Universal Sensor Module (USM), 16 sensor input, P/N 332812-001
	TLS4/8601 Series - Universal Sensor Input Output Module (USIOM) (AC ver.), 12 sensor input, P/N 333238-001; (AC ver.), 6 sensor input, P/N 333238-002; (DC ver.), 12 sensor input, P/N 333238-003; (DC ver.), 6 sensor input, P/N 333238-004
Maximum number of sensors monitored per console	TLS-350 Series (48)
	TLS-450/TLS-450PLUS (32)
	TLS4/8601 Series (12)
Compatible fuels	See "Sensor Application Matrix" on page 1.

[1]For additional third party evaluation data see: http://nwglde.org/evals/veeder_root_s.html

Miscellaneous

- 4-inch (100mm) cap and adapter kit - P/N 312020-939
- Installation example (see Fig. 15)

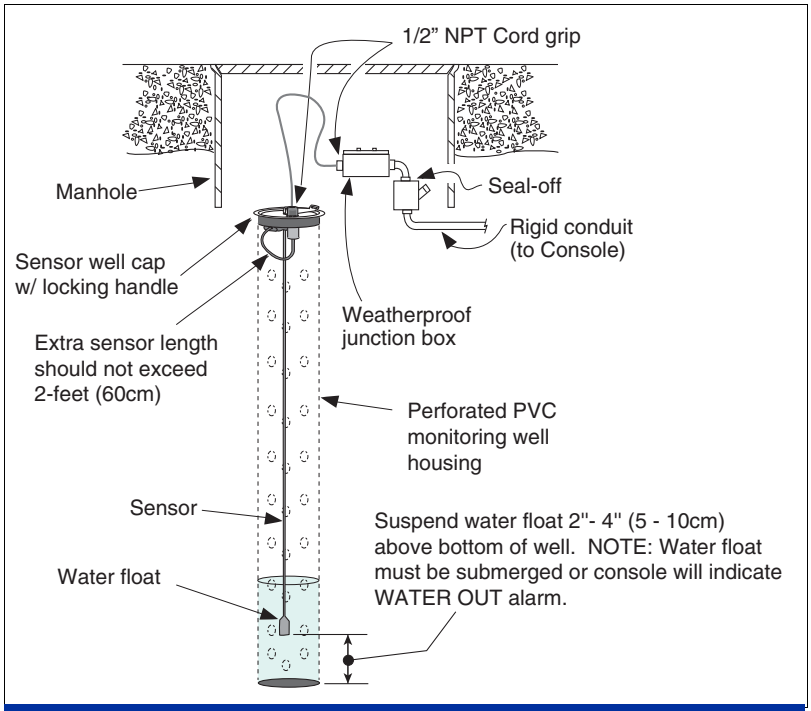


Fig. 15 Example Groundwater Sensor Installation

Direct Burial Cable

The Veeder-Root direct burial cable system provides everything needed for an alternative wiring installation method for use with our probes and sensors. Installation of buried cable should only be done in those locations where existing conduit is not available, and where local codes permit the use of buried cable instead of conduit, and epoxy splices instead of junction boxes. Before considering buried cable runs, check with the local authority having jurisdiction to be sure that direct burial practices are acceptable at your location.

If you are unfamiliar with direct burial techniques, you should consider either of two Veeder-Root kits:

- Direct Burial Cable Site Preparation kit (P/N 848100-500) which contains the Direct Burial Installation Manual, a splice kit installation manual and the 890-SL joint sealant instruction guide.
- Direct Burial Cable Site Demonstration kit (P/N 848100-502) which contains one splice kit with installation instructions, a 890-SL joint sealant instruction guide, a 6-inch piece of 2 conductor direct burial wire.

After reviewing the contents of these kits, and after verifying local code requirements, you should be much more informed as to the applicability of this wiring method for your site.

Direct Burial Cable Specifications

2-CONDUCTOR, SHIELDED CABLE		3-CONDUCTOR, SHIELDED CABLE	
Item	**Description**	**Item**	**Description**
Primaries		**Primaries**	
Conductor	#18 AWG (19/30) tinned copper	Conductor	#18 AWG (19/30) tinned copper
Insulation Type	Fluoropolymer	Insulation Type	Fluoropolymer
Primary O.D.	0.063” (1.6mm) nominal	Primary O.D.	0.063” (1.6mm) nominal
Drain	#20 AWG (7/28) tinned copper, located under the tape	Drain	#20 AWG (7/28) tinned copper, located under the tape
Jacket		**Jacket**	
Insulation type	Fluoropolymer	Insulation type	Fluoropolymer
Final O.D.	0.161” (4.1mm)	Final O.D.	0.171”(4.34mm)
Color	Red tint	Color	blue tint
UL temp rating	257°F (125°C)	UL temp rating	392°F (200°C)

Direct Burial Cable Components

Order equal lengths of filler rod and either type cable. Refer to V-R manual 576013-858 to estimate length.

- Filler rod - P/N 848100-1XX (lengths of 100 to 2000 feet [30.5 to 610m], in increments of 100 feet [30.5m])
- Filler rod installation tool P/N 848100-904 (adjusts to 1/8” [0.32cm], 1/4” [6.4mm], 3/8” [9.5mm], or 1/2” [12.7mm] saw cuts)
- 2-conductor cable - P/N 848100-2XX (lengths of 100 to 2000 feet (30.5 to 610m), in increments of 100 feet)
- 3-conductor cable - P/N 848100-3XX (lengths of 100 to 2000 feet, in increments of 100 feet)
- Cartridge of 890-SL sealant P/N 848100-800 (60 linear feet [18m] in 1/4” [6.4mm] wide cut)
- 4.5 gallon (17 liter) can of 890-SL sealant P/N 848100-805 (1200 linear feet [365m] in 1/4” [6.4mm] wide cut)
- Sealant cartridge gun, manual driven - P/N 8481021 (for use with P/N 848100-800 cartridge)
- Sealant bulk gun, air driven - P/N 848100-903 (for use with P/N 848100-805 4.5 gallon (17 liter) can)

Direct Burial Cable Installation Example

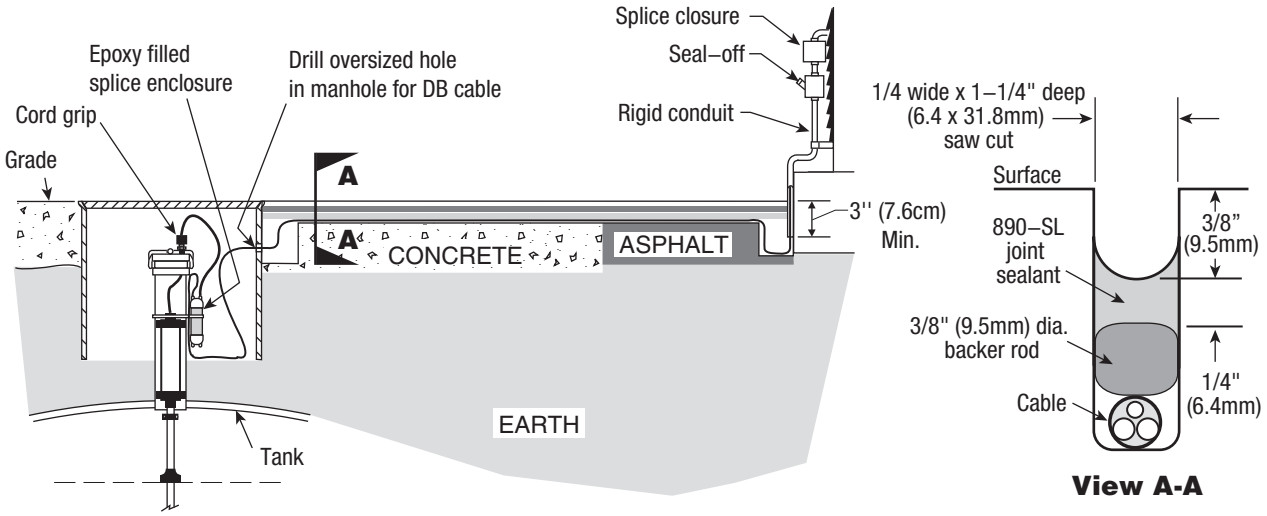


Fig. 16 Example Direct Burial Cable Installation

Appendix A - Sensor Type Programming Table

The table below is helpful when selecting Sensor Type (for TLS-3XX Series consoles) or Sensor Model (for TLS4/8601 and TLS-450 and TLS-450PLUS consoles) during sensor setup.

Sensor Type Programming Table for TLS Consoles

Sensor	Form Number	Sensor Category (Location)	TLS-3XX Series Sensor Type	TLS4/8601 Series TLS-450 and TLS-450PLUS Sensor Model
Discriminating Dispenser Pan and Sump Sensors - Standard	794380-322 (DPS), 794380-352 (CSS)	Sump/Pan	Liquid Sensor Setup: Sensor Type - Dual Float Discriminating	Device Setup Liquid Sensor: Model - Dual Float Discriminating
Discriminating Dispenser Pan and Sump Sensors - Optical	794380-320 (DPO), 794380-350 (CSO)	Sump/Pan	3-Wire C.L. Setup: Sensor Mode - Standard	Device Setup Type B Sensor: Model - Ultra/Z-1 (Standard)
Mag Sump Sensor	857080-XXX	Sump/Pan	Smart Sensor Setup: Sensor Category- Mag Sensor	Device Setup MAG Sensor
Solid-State Dispenser Pan and Containment Sump	794380-321 (DP); 794380-351 (CS)	Sump/Pan	2-Wire C.L. Setup: Sensor Type - Discrim Interstitial	Device Setup Type A Sensor: Model - Discrim. Interstitial
Piping Sump	794380-208	Sump/Pan	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
Position-Sensitive Sensor **High Alcohol Compatible!**	794380-323	Sump/Pan	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
Discriminating Interstitial Sensor for Double-Wall Fiberglass Tanks	794380-343	Annular Space	2-Wire C.L. Setup: Sensor Type - Discrim Interstitial	Device Setup Type A Sensor: Model - Discrim. Interstitial
Interstitial Sensors for Double-Wall Fiberglass Tanks	794380-409	Annular Space	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
Interstitial High Alcohol Sensor for Double-Wall Fiberglass Tanks **High Alcohol Compatible!**	794380-345	Annular Space	2-Wire C.L. Setup: Sensor Type - Ultra 2	Device Setup Type A Sensor: Model - Ultra 2
Interstitial Sensors for Steel Tanks	794380-4X0	Annular Space	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
Position Sensitive Interstitial Sensor for Steel Tanks **High Alcohol Compatible!**	794380-333	Annular Space	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
Interstitial High Alcohol Sensors for Steel Tanks **High Alcohol Compatible!**	794380-430	Annular Space	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
MicroSensor **High Alcohol Compatible!**	794380-344	Annular Space	2-Wire C.L. Setup: Sensor Type - Discrim Interstitial	Device Setup Type A Sensor: Model - Discrim Interstitial
Hydrostatic Reservoir	794380-301 (1 float)	Annular Space	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
	794380-303 (2 float)	Annular Space	Liquid Sensor Setup: Sensor Type - Dual Float Hydrostatic	Device Setup Liquid Sensor: Model - Dual Float Hydrostatic
Single-Point Mini Hydrostatic Sensor for Double Wall Sumps	794380-304	Annular Space	Liquid Sensor Setup: Sensor Type - Tri-State Liquid	Device Setup Liquid Sensor: Model - Tri-State
Vapor	794390-700	Monitor Well	Vapor Sensor Setup	Device Setup Vapor Sensor
Groundwater	794380-62X	Monitor Well	Groundwater Sensor Setup	Device Setup Groundwater Sensor
Oil/Water Separator	794690-XXX	Oil/Water Separator Tank	Liquid Sensor Setup: Sensor Type - Dual Float Discriminating	Device Setup Liquid Sensor: Model -Dual Float Discriminating

Appendix B - How To Order An Oil/Water Separator Sensor (OWSS)

Sensor Sizing

To determine the correct sensor length for the oil/water separator tank application use the manufacturer's tank chart to determine height - to - volume thresholds for warning and alarm conditions and make three measurements, including verifying fluid depths on the manufacturer's tank chart.

1. **Determining The Lowest Point Of The Bottom (Alarm) Float**
   Measure and record the distance from inside the top of the tank to the maximum depth of waste oil/water interface in the tank as recommended by the tank's manufacturer (Fig.B-1). Subtract 3 inches from this measurement to determine the lowest permissible point in the tank for the centerline of the sensor's bottom (alarm) float and **note this measurement as D1**.

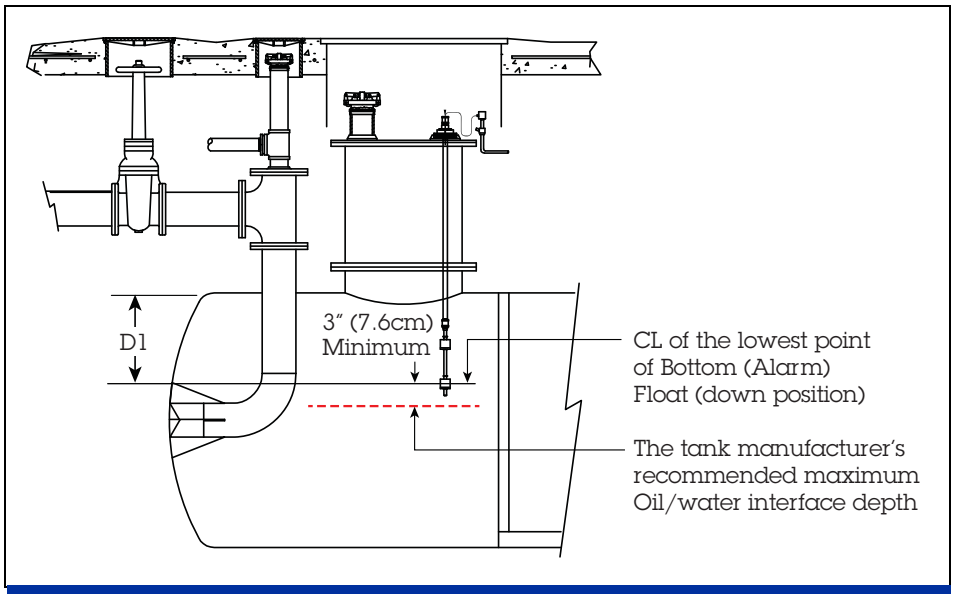
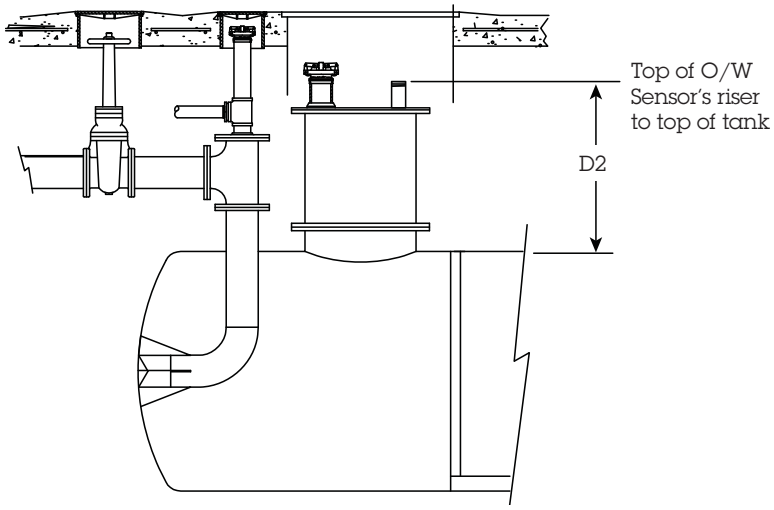


Fig. B-1.- Determining Lowest Point For O/W Sensor's Bottom Float

2. **Determining Distance From Top Of Riser To Top Of Tank**
   Measure from the top of the riser down to the top of the tank and if using the riser reducing 4x2 fitting **note this measurement as D2**, OR, If using the riser reducing 4x2 coupling add 3" to the measured distance and **note this measurement as D2** (Fig.B-2



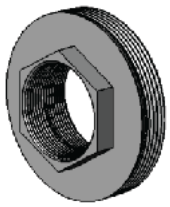
If using a 4" to 2" reducing fitting riser adapter (example at right) no height adjustment is needed to measurement D2.	
If using a 4" to 2" reducing coupling riser adapter (example at right) **add 3 inches to the results of measurement D2.**	

Fig. B-2.- Determining Distance D2

3. **Determining The Top (Warning) Float Position**
Consult the tank chart to determine the height of the top warning level (centerline of the top float). Measure the distance from the top of the tank to the centerline of the top float (Fig.B-3). **Note this measurement as D3.**

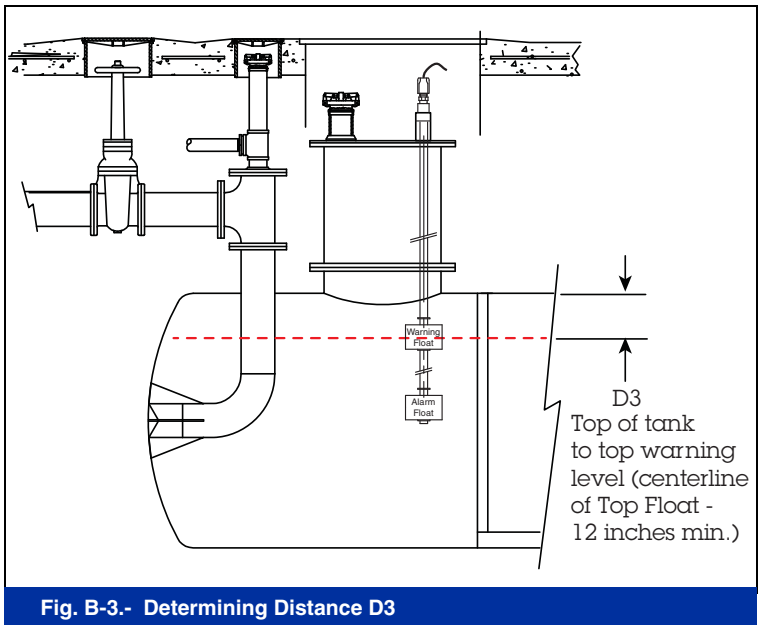


Fig. B-3.- Determining Distance D3

4. **Determining Correct Sensor To Order**
Use the D1, D2 and D3 measurements made in Steps 1 - 3 to determine the part number of the sensor from the V-R Oil/Water Separator Sensor matrix shown in Fig.B-4.

For example: D1 = 33”, D2 = 24.5, D3 = 13”
D2 + D3 = Top float position, i.e., 24.5 + 13 = 37.5” (Dimension A in the V-R P/N matrix)
D1 - D3 = Bottom float position, i.e., 33 - 13 = 20” (Dimension B in the V-R P/N matrix)

Using the OWSS float positions calculated in the example above, the top float (Warning) would activate at 13 inches below the top of the tank and the bottom float (Alarm) would activate at 33” below the top of the tank. The correct part number for these example float positions would be 764690-053.

Round dimension A or B down to the nearest available option if necessary. Note: doing so will impact the float Warnings and Alarms generated on the TLS system.

Alarm Conditions

Alarm Type	Alarm Condition
Liquid Warning	Oil present in tank
Liquid Alarm	Oil has reached its maximum volume, remove from tank
Sensor Out Alarm	No communication to ATG
Normal	Tank is properly setup with liquid

Order OWSS part number 764690-XXX, where XXX equals the three digits where Dimensions A and B intersect in the part number matrix:

DIMENSION "B"

DIMENSION "A"	5"	10"	15"	20"	25"	30"	35"	40"	45"	50"
18"	-010	-011	-012	-013	-014	-015	-016	-017	-018	-019
22"	-020	-021	-022	-023	-024	-025	-026	-027	-028	-029
26"	-030	-031	-032	-033	-034	-035	-036	-037	-038	-039
30"	-040	-041	-042	-043	-044	-045	-046	-047	-048	-049
34"	-050	-051	-052	-053	-054	-055	-056	-057	-058	-059
38"	-060	-061	-062	-063	-064	-065	-066	-067	-068	-069
42"	-070	-071	-072	-073	-074	-075	-076	-077	-078	-079
46"	-080	-081	-082	-083	-084	-085	-086	-087	-088	-089
50"	-090	-091	-092	-093	-094	-095	-096	-097	-098	-099
54"	-100	-101	-102	-103	-104	-105	-106	-107	-108	-109
58"	-110	-111	-112	-113	-114	-115	-116	-117	-118	-119
62"	-120	-121	-122	-123	-124	-125	-126	-127	-128	-129
66"	-130	-131	-132	-133	-134	-135	-136	-137	-138	-139
70"	-140	-141	-142	-143	-144	-145	-146	-147	-148	-149
74"	-150	-151	-152	-153	-154	-155	-156	-157	-158	-159
78"	-160	-161	-162	-163	-164	-165	-166	-167	-168	-169
82"	-170	-171	-172	-173	-174	-175	-176	-177	-178	-179
86"	-180	-181	-182	-183	-184	-185	-186	-187	-188	-189
90"	-190	-191	-192	-193	-194	-195	-196	-197	-198	-199

Fig. B-4.- Oil/Water Separator Sensor Part Number Matrix

VEEDER-ROOT

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