

Vacuum Sensor System for Dispenser/Vent Sump

Installation Guide

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Please see next page, iii.

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ILS-350 MONITORING SYSTEMS

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We shall not be responsible for any expenses incurred by the user.

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Introduction

This manual describes the installation of a Veeder-Root Vacuum Sensor System for double-wall Under Dispenser Containment (UDC) sumps and vent pipe sumps. The vacuum source for the system is a dedicated siphon port in one of the site's submersible turbine pumps (STPs). A site's UDC/vent sumps can be monitored in a single vacuum system, or in multiple vacuum systems, each of which requires a dedicated siphon port in a different STP. A Vacuum Liquid Sensor Kit must be connected to the siphon port of the STP used in each vacuum system.

Hardware Requirements

- TLS-350/350R console with version 24C or later software and at least one SmartSensor/Press Module (P/N 332250-001).
- Line leak (PLLD or WPLLD), or w/o line leak, a Pump Sense and a 4-Relay module is required for STP control
- STP siphon port (dedicated to Vacuum Sensor System)
- Siphon Check Valve (V-R P/N 188-241-5)
- Schraeder Fitting 576008-672 (optional)
- Siphon manifolded tank requirements:
 - The Red Jacket STP requires a secondary siphon assembly (V-R P/N 410071-002).
 - The Quantum STP comes with two siphons as standard equipment - no additional parts are required.
 - FE pumps require a secondary siphon kit (FE P/N 402-507-930).





Available Kits






The following kits are available for the Vacuum Sensor System for dispenser/vent sumps:


- 1 Vacuum Sensor kit is required for each UDC/vent sump - P/N 330020-508
- 1 Vacuum Liquid Sensor kit is required for each Vacuum Sensor System - P/N 330020-509





Safety Precautions

The following safety symbols are 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.

 WARNING Heed the adjacent instructions to avoid equipment damage or personal injury.	 INJURY Careless or improper handling of materials can result in bodily injury.
 WEAR EYE PROTECTION Wear eye protection when working with pressurized fuel lines or epoxy sealant to avoid possible eye injury.	 GLOVES Wear gloves to protect hands from irritation or injury.
 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**



This product operates in the highly combustible atmosphere of a gasoline storage tank. Failure to follow all instructions in proper order can cause personal injury or death.

1. To be installed in accordance with the National Electrical Code, NFPA 70 and the Automotive And Marine Service Station Code, NFPA 30A.
2. Turn off, tag, and lockout power to the STP before connecting or servicing wiring to the STP.
3. Substitution of components may impair intrinsic safety.
4. To protect yourself and others from serious injury, death, or substantial property damage, carefully read and follow all warnings and instructions in this manual.

Installation

Installation of Vacuum Source Line Liquid Sensor

1. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads of the 1/4" NPT fitting on the Vacuum Source Line Liquid Sensor and screw it into the STP siphon port's siphon check valve (see Figure 1).

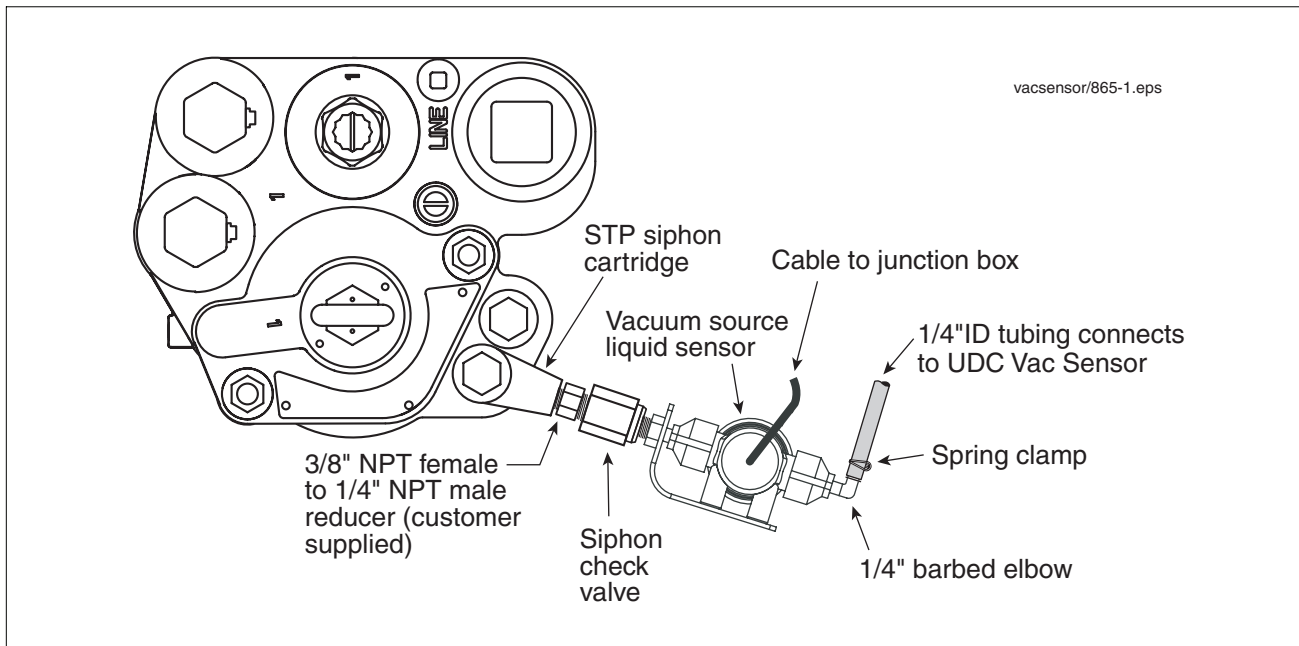


Figure 1. Attaching Vac Source Line Liquid Sensor to STP siphon port

2. Ensure that the Vacuum Source Line Liquid Sensor is tightened securely and orientated as shown in Figure 2.

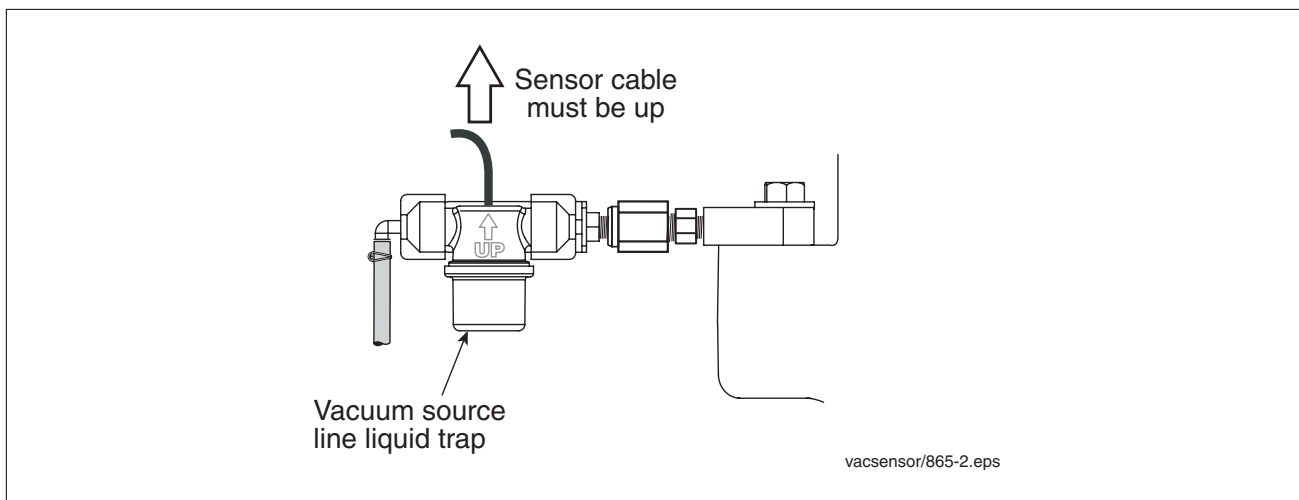


Figure 2. Orienting Vac Source Line Liquid Sensor

3. The Vac Sensor assembly that is installed in each dispenser/vent sump to be monitored is described in Figure 3.

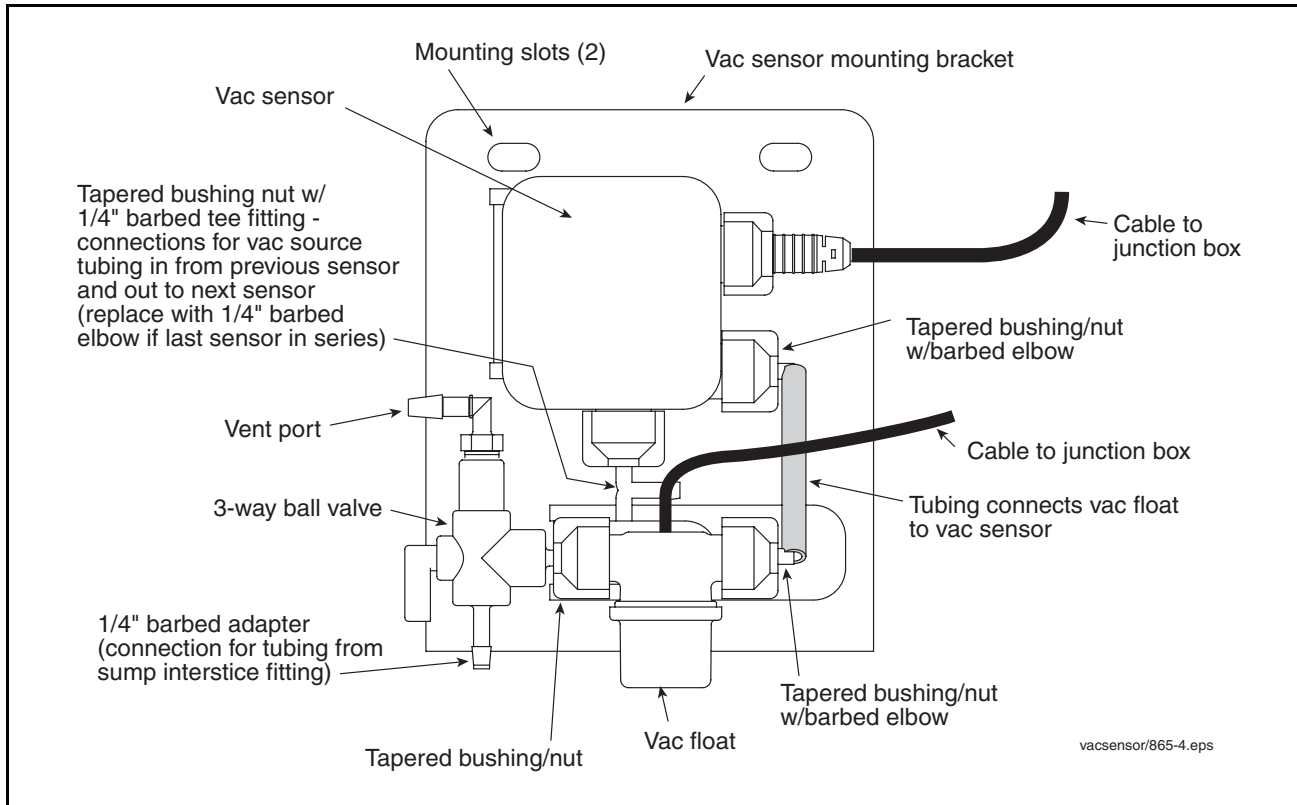


Figure 3. Vac Sensor description

4. Install a Vac Sensor assembly in each dispenser/vent sump to be monitored (see Figure 4).
5. Measure a length of 1/4" ID tubing that will connect at one end to the Vac Source Line Liquid Sensor in the STP sump (ref. Figure 1) and at the other end to Vac Sensor in the first dispenser/vent sump (see Figure 5). Plan enough tubing to avoid its having sharp bends or being stretched. You may choose to run the tubing within a protective conduit between sumps.
6. Figure 6 diagrams an example site layout. The overall vacuum source line is not to exceed 200 feet. Contact the Veeder-Root factory for sites with longer requirements.

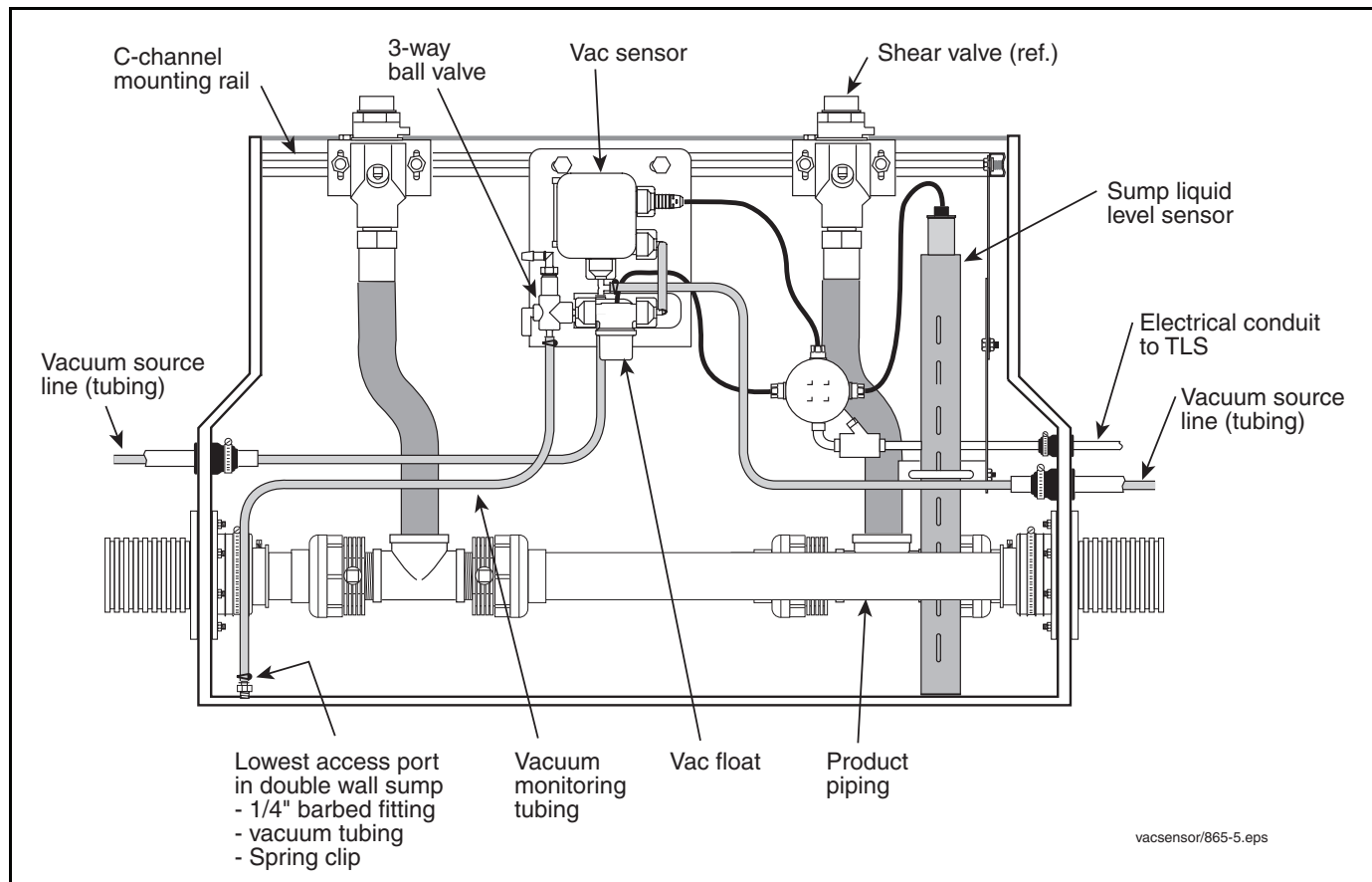


Figure 4. Example Vac Sensor sump installation

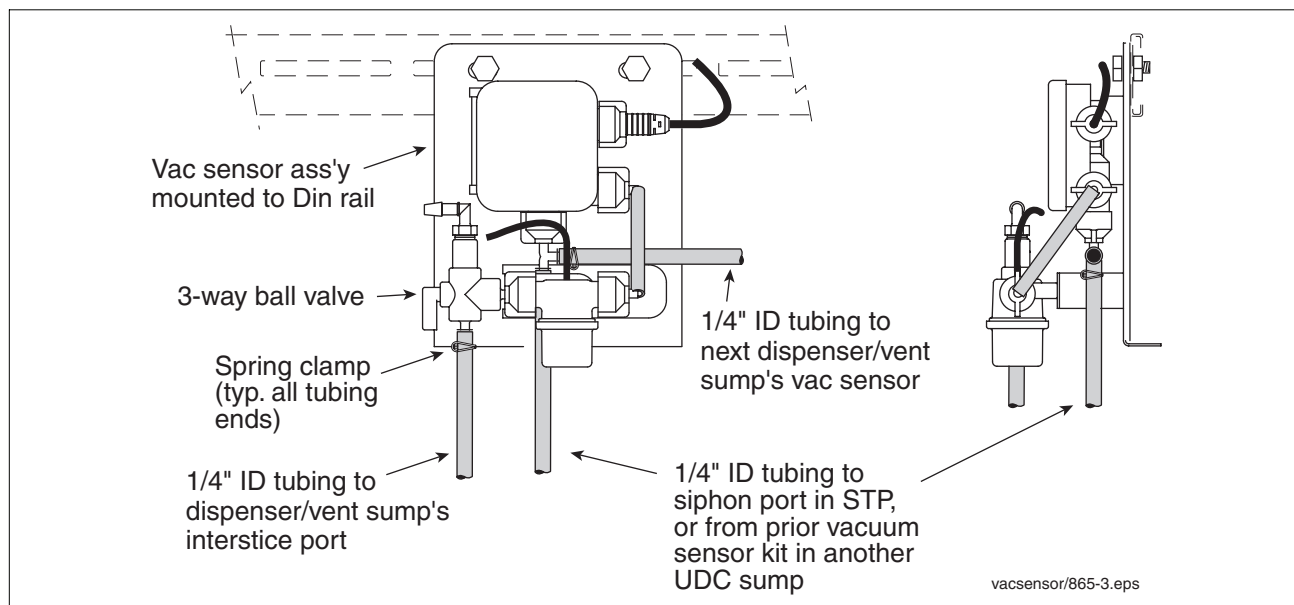


Figure 5. Connecting vacuum tubing to Vac Sensor barbed fittings

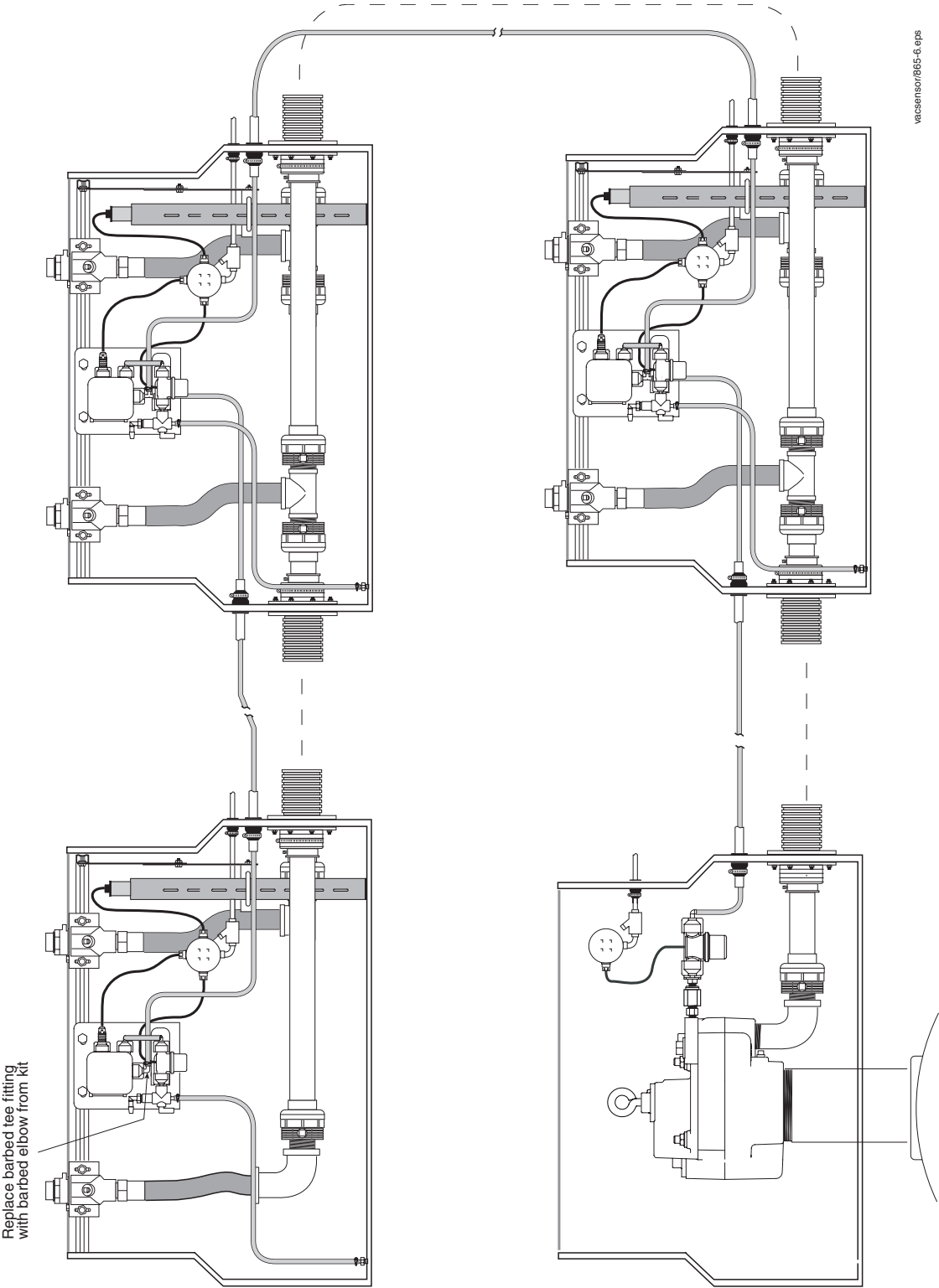


Figure 6. Example site layout diagram

Field Wiring Vac System Connections

1. Tie wrap the loose cable pairs into a bundle going from the Vac Sensor housing to the sump junction box(es).
2. Get necessary cord grip bushings from the kits - one for each Vac Sensor, Vac Float, and the Tank interstitial sensor cable that will enter the junction box(es) in the sump. Loosen the cord grips and screw each one into a junction box port.
3. Push the first Vac Sensor/Vac Float cable pair into adjacent cord grips (keep the pairs together as the two cables will typically be wired to one cable going to the TLS Console). Make sure all of the cables to the console are tagged (e.g., Tank 1 product line, Tank 1 vapor line) to facilitate TLS setup.
4. Strip back the leads of one of the cables from the TLS Console 3/8". Strip back the leads of the Vac Sensor/Vac Float pairs 3/8". Using wire nuts from the kits attach the wires as per the diagram in Figure 7. NOTE: the Vac Sensor cable has three wires and the Vac Float cable has two wires.

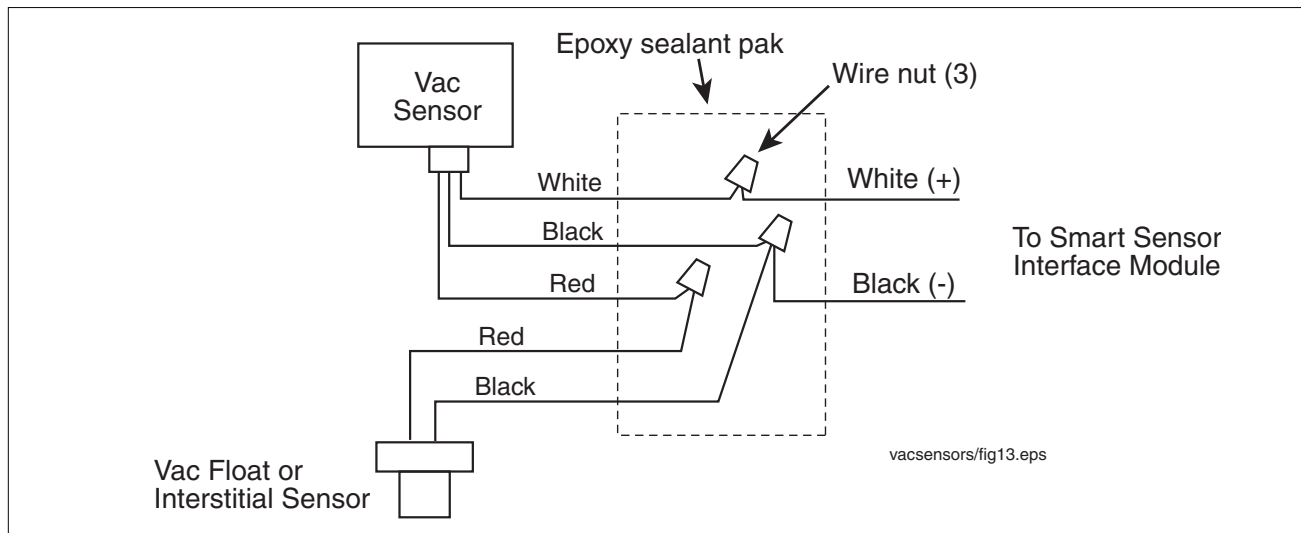


Figure 7. Field wiring connections

5. Seal wire nuts with epoxy sealant following the instructions in Figure 8. Note: the illustration shows only two cables in the pak, but in this case, all three cables must be submerged as per the illustration.
6. Connect the remaining Vac Sensor/Vac Float pairs and the Vac Sensor/Tank Float pair as discussed above, sealing each set of wires in epoxy sealant packs.



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.

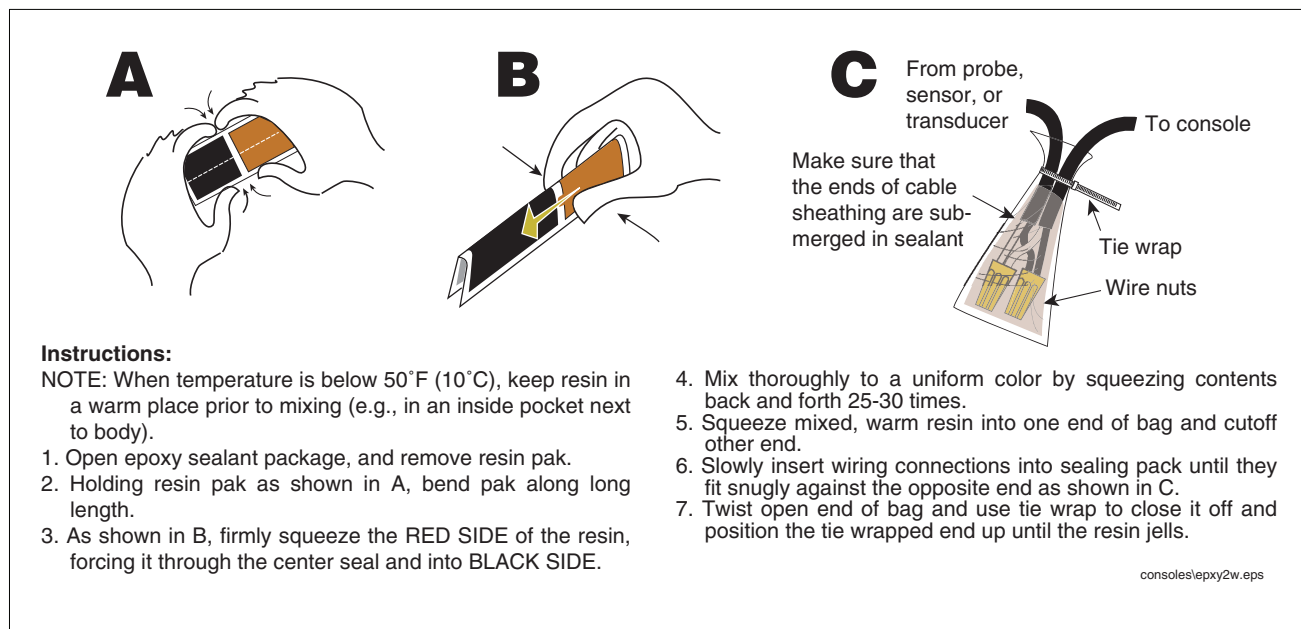


Figure 8. Epoxy sealing wiring connections

Connecting Vac System Field Wiring to TLS Console

1. Connect each Vac Sensor/Vac Float pair and the Vac Sensor/ Tank Interstitial Float pair cables to either a Smart Sensor/Press module or a Smart Sensor Interface module as shown in Figure 9. Note: at least one Smart Sensor/Press module must be installed in the console for proper Vac Sensor operation.
2. System programming of the Vacuum Sensor System is performed following instructions in the TLS-3XX System Setup Manual.

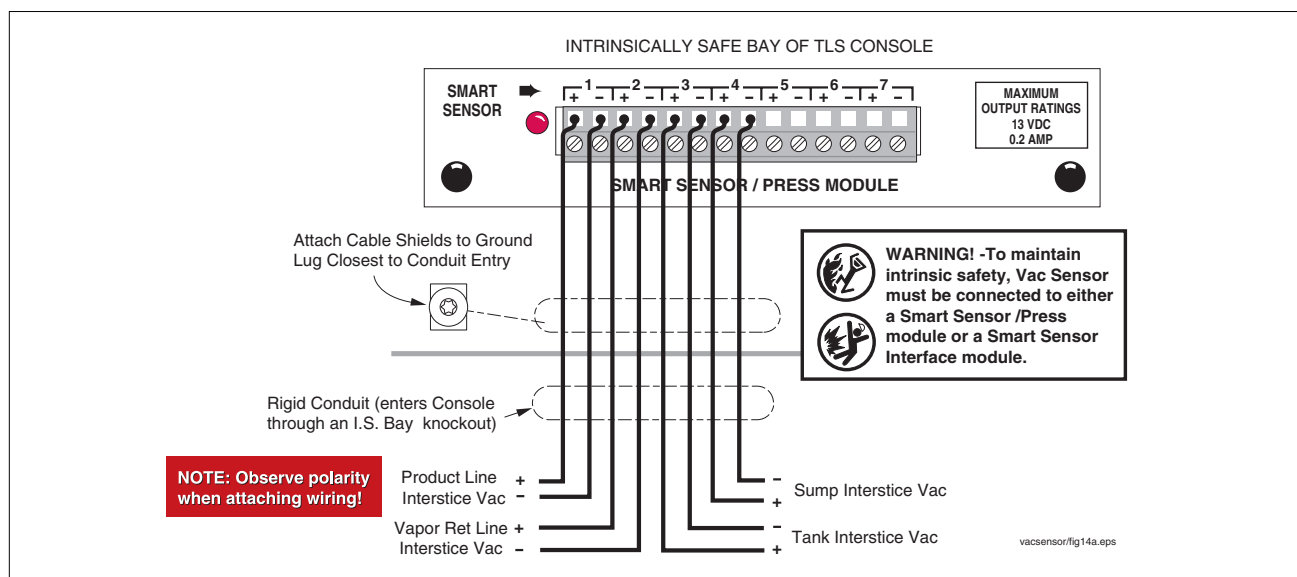


Figure 9. Attaching Vac Sensors to Smart Sensor / Press Module

Connecting Pump Control Field Wiring to TLS Console

For Sites with PLLD or WPLLD Leak Detection

Pump control for Vac Sensors is shared with the line leak system. Connecting PLLD/WPLLD leak detection as per the instructions provided with those systems is all that is required.

For Sites without PLLD or WPLLD Leak Detection

A Pump Sense module and a 4-Relay module are required in the TLS Console for Vac Sensor pump control.

Field Wiring:

- For module connections with Red Jacket pumps see Figure 10. For module connections with non-Red Jacket pumps see Figure 11.

TLS Setup:

- Pump Sense setup - assign each tank to Pump Sense device
- Output Relay setup - select 'Pump Control Output'

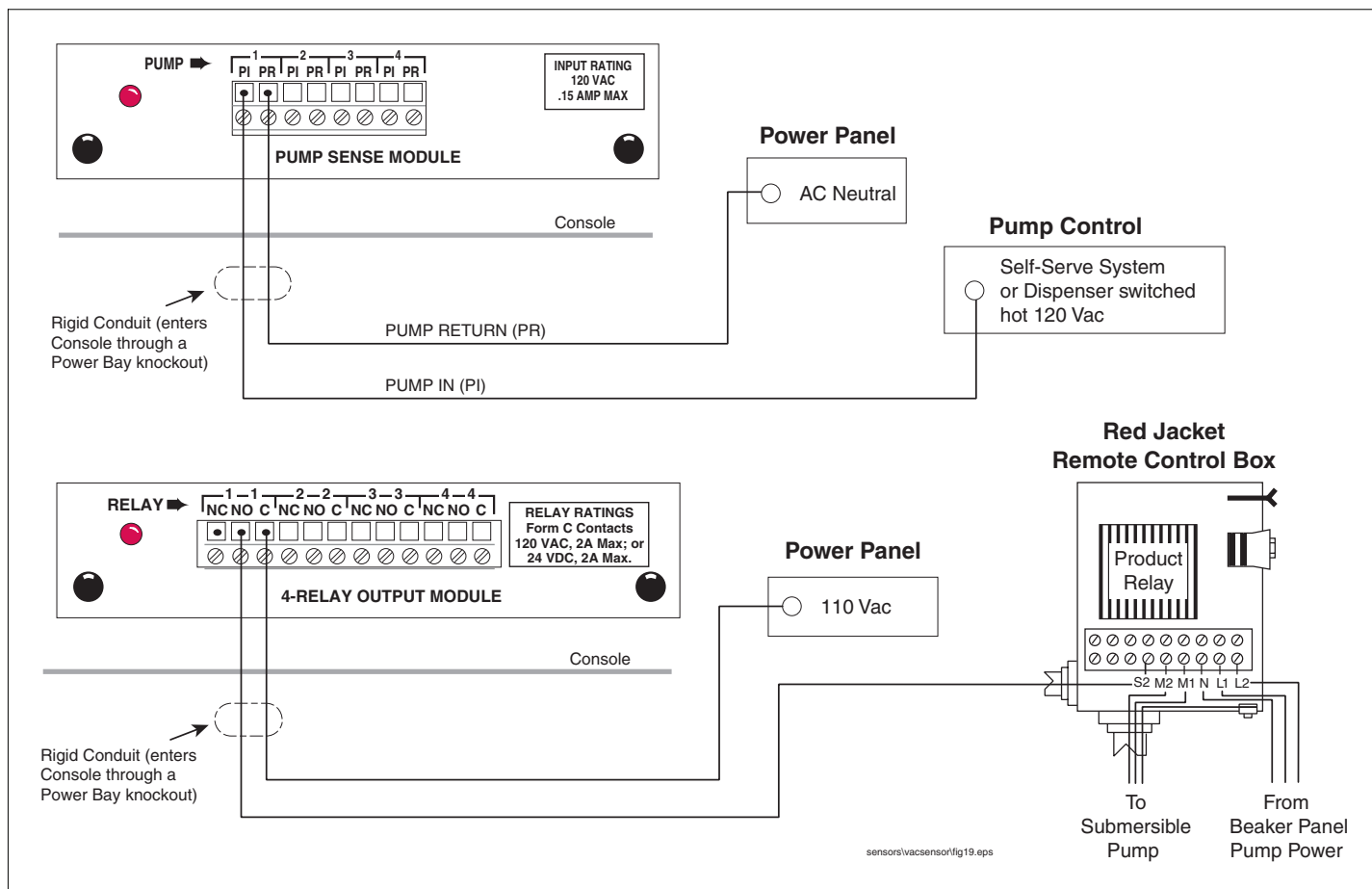


Figure 10. Connecting Pump Sense & 4-Relay Modules - Red Jacket Pumps

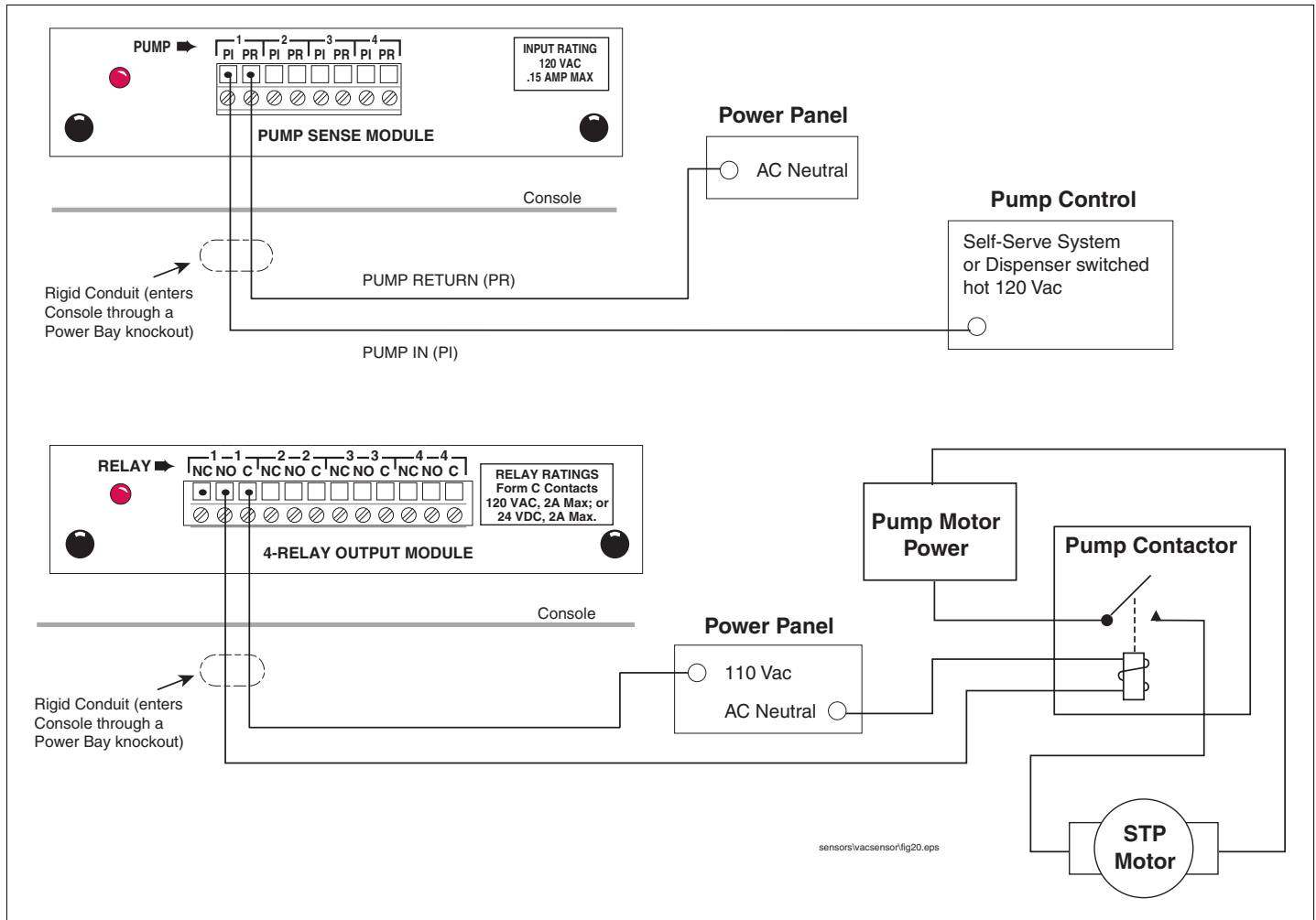


Figure 11. Connecting Pump Sense & 4-Relay Modules - Non-Red Jacket Pumps

Disable Extended Run Feature in the Pump Controller



IMPORTANT! Certain pump controllers may be programmed to turn off the pump after an extended run period and post an ER (Extended Run) error in the controller. Because the Vac Sensor System may require the pumps to run for several hours and possibly triggering this error, you must disable this ER feature in the pump controller. Refer to the Pump Controller's documentation for instructions on how to disable the Extended Run feature.

Vac System Testing

This section describes a sequence of procedures and tests necessary to complete the Vac Sensor installation:

1. ATM Pressure Sensor setup
2. Vac Sensor setup
3. Vacuum integrity test prior to filling tank*
4. Manual test*
5. Operability test

*NOTE: Only one of these two tests is required to complete the installation.

ATM Pressure Sensor Setup

The ATM Pressure Sensor is factory installed in the SmartSensor / Press module and preassigned to channel 8. At least one SmartSensor / Press module, which contains the ATM Pressure Sensor, must be installed in the console. You must configure at least one ATM Pressure Sensor for use by the Vac Sensor System or a Setup Data Warning will occur. NOTE: if more than one SmartSensor / Press module is installed, only one ATM Pressure Sensor needs to be configured.

Look in console and note the slot position of the SmartSensor / Press module. Enter the Setup Mode and press the FUNCTION key until you see the message:

```
SMARTSENSOR SETUP  
PRESS <STEP> TO CONTINUE
```

Press STEP until you see the message:

```
SS CONFIG - MODULE n  
SLOT x - X X X X X X X
```

Where *x* is the slot number containing the SmartSensor / Press module. Press the → key to move the cursor to the last (8th) X. Press CHANGE and the message below should appear:

```
SLOT x - X X X X X X X 8  
PRESS <STEP> TO CONTINUE
```

Press STEP:

```
ENTER SMARTSENSOR LABEL  
s 8:
```

NOTE: In the example above, the ATM P sensor position is 8 but it could be 16, 32, or 40 depending on the SmartSensor's module number.

Press CHANGE and enter a label:

```
ENTER SMARTSENSOR LABEL  
s 8: (ATMP Sensor Label)
```

Press ENTER to accept your label:

s 8: (ATMP Sensor Label)
PRESS <STEP> TO CONTINUE

Press STEP:

s 8: SELECT SS CATEGORY
UNKNOWN

Press CHANGE until you see the message:

s 8: SELECT SS CATEGORY
ATM P SENSOR

Press ENTER to accept the category. Press STEP, then BACKUP to return to the configuration display for Smart Sensor module 1:

SS CONFIG - MODULE 1
SLOT x - X X X X X X X

This completes the ATM Pressure Sensor configuration.

Vac Sensor Setup

Identifying Vac Sensor Zones

Before configuring the Vac Sensors, enter the Monitored Zone, SmartSensor module number, and channel number for each Vac Sensor attached to the console in the worksheet in Table 1 below. NOTE: The Vac Sensor Zone Worksheet and the Secondary Containment Volumes By Manufacturer index are both included in the installation kit (P/N 577013-849). Use the Containment Volume index to calculate a zone's interstice volume in gallons. For example, if Tank 1's double wall product piping uses 100 feet of Ameron Dualoy 3000/L piping, you would multiply 0.2186 (from the Secondary Containment Volume index) x 100 feet = 21.86 gallons. For the Tank 1 product piping zone you would enter 21.9 (round to nearest tenth of a gallon) as the calculated zone volume. If the Tank 1 sump is a Containment Solutions 42" Double wall tank sump, you would multiply 0.8216 (from the Secondary Containment Volume index) x 3.5 feet = 2.88 gallons as the calculated zone volume

Table 1. Vac Sensor Zone Worksheet

Vac Sensor Monitored Zone	SS Module Number	SS Module Channel Number	Calculated Zone Volume (Gallons)
	1	1	
	1	2	
	1	3	
	1	4	
	1	5	
	1	6	
	1	7	

Table 1. Vac Sensor Zone Worksheet

Vac Sensor Monitored Zone	SS Module Number	SS Module Channel Number	Calculated Zone Volume (Gallons)
	1	8	
	2	9	
	2	10	
	2	11	
	2	12	
	2	13	
	2	14	
	2	15	
	2	16	
	3	17	
	3	18	
	3	19	
	3	20	
	3	21	
	3	22	
	3	23	
	3	24	
	4	25	
	4	26	
	4	27	
	4	28	
	4	29	
	4	30	
	4	31	
	4	32	
	5	33	
	5	34	
	5	35	
	5	36	
	5	37	
	5	38	
	5	39	
	5	40	

Performing Vac Sensor Setup

After filling in the Vac Sensor Zone Worksheet, enter the Setup Mode and press the FUNCTION key until you see the message:

**SMARTSENSOR SETUP
PRESS <STEP> TO CONTINUE**

Press STEP until you see the message:

**SS CONFIG - MODULE 1
SLOT x - X X X X X X X**

Following the completed Vac Sensor Zone Worksheet, configure each Vac Sensor channel for all SmartSensor modules. NOTE: Once the console communicates with a Vac Sensor (approximately 2 minutes after configuration), it automatically selects the Vac Sensor SS Category for that sensor.

When all Vac Sensors have been configured, if necessary, press Tank/Sensor until you see the message:

**s 1: VAC SENSOR SETUP
PRESS <ENTER>**

Press ENTER:

**s 1: SELECT PUMP #
NONE**

You must select the pump that will provide the source of vacuum for this Vac Sensor or a Setup Data Warning will be posted for this Vac Sensor. If necessary, press CHANGE until the correct pump's control device displays [QX (PLLD), WX (WPLLD), or RX (Output Relay)]. NOTE: an Output Relay must be set to Pump Control Output to be assigned as a pump. If the selected pump output relay is not assigned to a pump sense device, a Setup Data Warning for this Vac Sensor will be posted.

Press ENTER to confirm your entry.

Press STEP to continue.:

**s 1: (Vacuum Label)
VOLUME: 501**

Referring to your previously completed volume worksheet, enter the volume in gallons of the interstitial space being monitored by this Vac Sensor. The permitted range is 0.1 to 500 gallons. Default is 501. A Setup Data Warning alarm will activate if a volume between 0.1 and 500 is not entered.

Press CHANGE and enter the interstitial space volume. Press ENTER to confirm your entry.

Press STEP to continue.:

**s 1: (Vacuum Label)
RELIEF VALVE: NO**

For all Vac Sensors except the one monitoring a fiberglass tank's interstitial space, a relief valve is usually not needed. For Vac Sensors not requiring a relief valve press STEP to accept the default NO. Press Tank/Sensor to setup another Vac Sensor.

For the Vac Sensor that monitors a fiberglass tank's interstitial space, a relief valve is required to prevent excess vacuum from damaging the tank. Press CHANGE and select YES. Press ENTER to confirm your entry.

Press STEP to continue.:

s 1: (Vacuum Label)
RELIEF VALVE PRESSURE: -9.0

Enter the pressure at which the installed Relief Valve is rated to open (the vent pressure is stamped on the body of the V-R Relief Valve). The permitted range is -5 to -9 psi. Default vent pressure is -9 psi. Press ENTER to confirm your entry. Press Tank/Sensor to setup another Vac Sensor.

Running a Manual Test

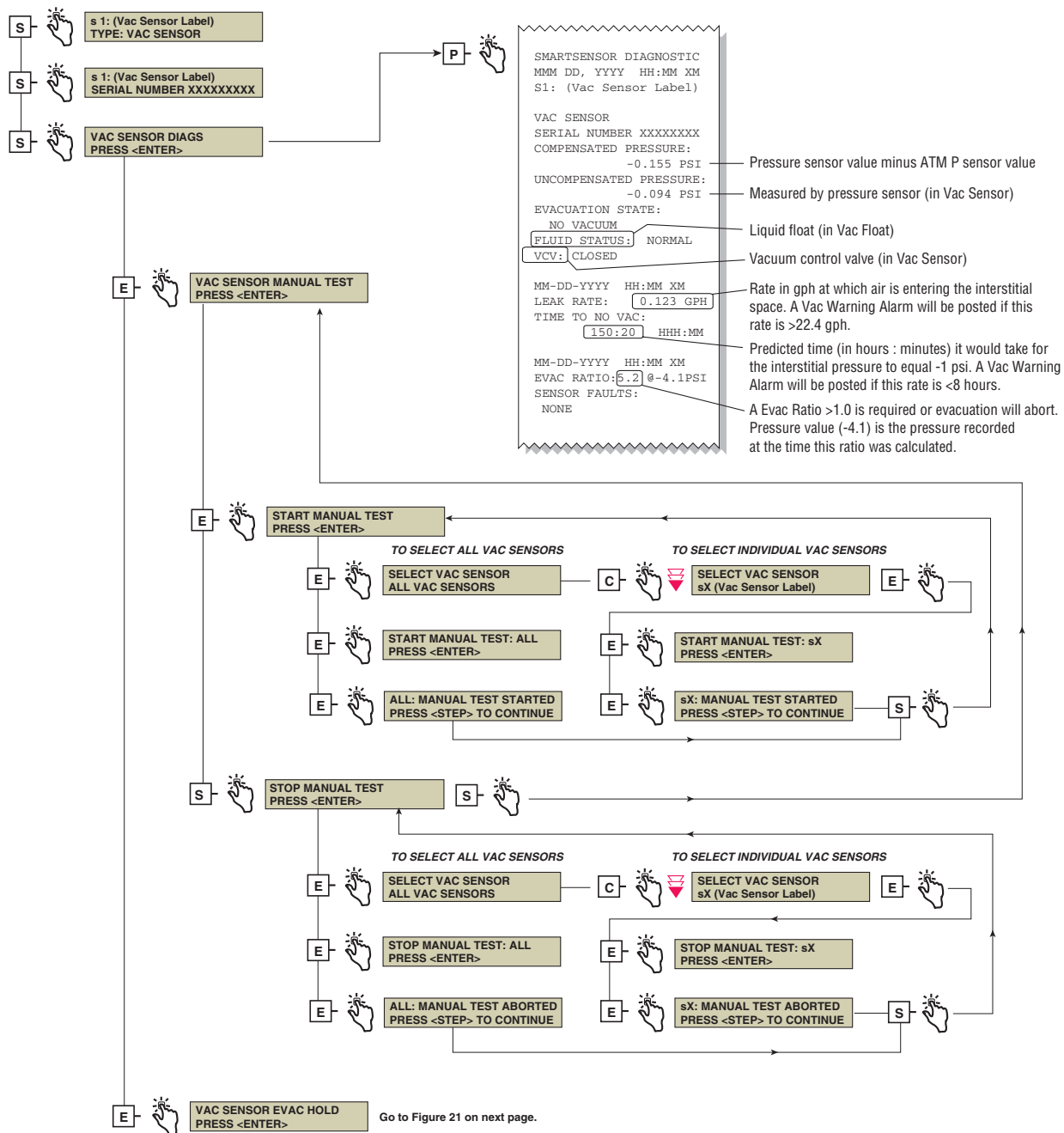
Perform the Manual Test for Each Vac Sensor

You enter the DIAG MODE of the TLS Console by pressing the MODE key until its display appears. Press the FUNCTION key to select diagnostic functions and the STEP key to view each of the Function's displays. Where you can enter changes to displayed data, you do so with the same front keys used enter to system programming selections (i.e., ENTER, CHANGE, etc.).

Figure 12 displays the Vac Sensor Manual Test procedure steps and Figure 13 displays the Vac Sensor Evac Hold procedure steps.

Vacuum Sensor Operability Test - Required for Each Sensor Prior to Startup

1. Vacuum leak test: Turn the 3-way ball valve (connected to the interstice being monitored) from the 'normal' position to the 'test' position. This should vent the vacuum sensor to atmosphere while maintaining vacuum in the interstice.
2. Wait at least 1 minute at the console for the system to produce a 'No Vac' alarm. Press the console's Alarm/Test key to silence the beeper and acknowledge the alarm.
3. Turn the 3-way ball valve back to the 'normal' position.
4. At the console enter the DIAG MODE and initiate a manual test that will clear the 'No Vac' alarm (Refer to Figure 12 for Manual Test instructions).
5. Vac Float Liquid Sensor (in sump) test: This test is performed using water, gasoline, or other appropriate test liquid for systems with the float housing in the sump. Unscrew the lower float bowl (about a 1/4 turn) from the Vac Float body and fill the bowl with the test liquid. Screw the filled bowl back onto the Vac Float body and a Liquid Alarm will be generated. At the console press the Alarm/Test key to silence the beeper and acknowledge the alarm. Again unscrew the bowl to clear the alarm. Empty the bowl, wipe it clean, then screw it onto the Vac Float body.
6. Print the test history and console status for your records. This completes the test procedure. Report any performance concerns to Veeder-Root while on site.



sensors/vacsensor/fig21.eps

Figure 12. TLS Console Vac Sensor Manual Test

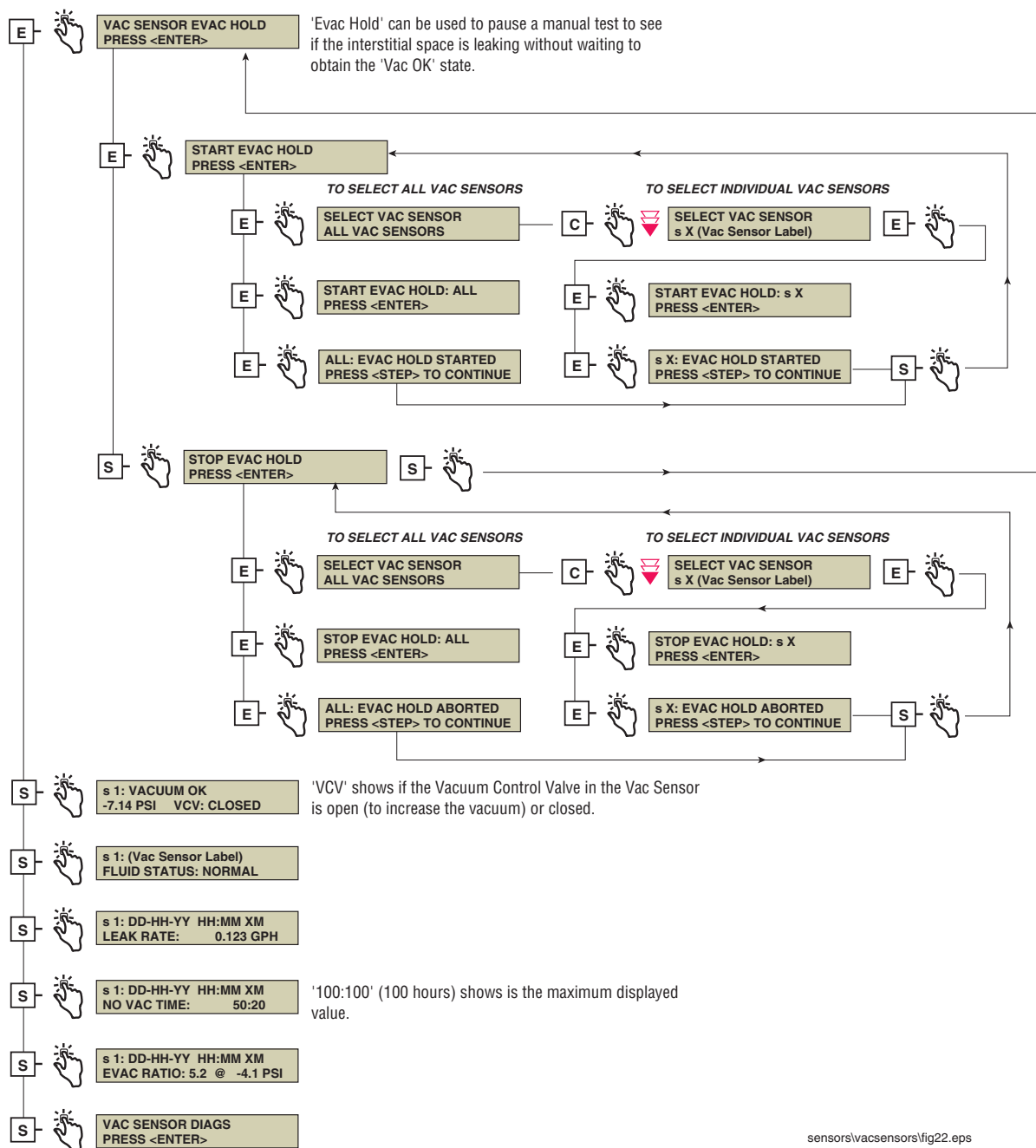


Figure 13. TLS Console Vac Sensor Evac Hold Procedure

Appendix A: Vac Sensor Test Values Record

The leak rate for each interstice will affect the 'Time to No Vac', which is the time it would take for the vacuum to be lost if the STP did not turn on to replenish it. However, the smaller the volume, the greater the impact of a small leak on the 'Time to No Vac'. A general guideline is to eliminate any leaks so that the 'Time to No Vac' reads 100 hours, which is the maximum displayed value.

Use the chart below to record Vac Sensor system test values.

VAC SENSOR	LEAK RATE (gph)	TIME TO NO VAC (hr)
Disp./Vent Sump 1		
Disp./Vent Sump 2		
Disp./Vent Sump 3		
Disp./Vent Sump 4		
Disp./Vent Sump 5		
Disp./Vent Sump 6		
Disp./Vent Sump 7		
Disp./Vent Sump 8		
Disp./Vent Sump 1		
Disp./Vent Sump 2		
Disp./Vent Sump 3		
Disp./Vent Sump 4		
Disp./Vent Sump 5		
Disp./Vent Sump 6		
Disp./Vent Sump 7		
Disp./Vent Sump 8		
Disp./Vent Sump 1		
Disp./Vent Sump 2		
Disp./Vent Sump 3		
Disp./Vent Sump 4		
Disp./Vent Sump 5		
Disp./Vent Sump 6		
Disp./Vent Sump 7		
Disp./Vent Sump 8		
Disp./Vent Sump 1		
Disp./Vent Sump 2		
Disp./Vent Sump 3		
Disp./Vent Sump 4		
Disp./Vent Sump 5		
Disp./Vent Sump 6		
Disp./Vent Sump 7		
Disp./Vent Sump 8		

**Veeder-Root has
sales offices
around the world
to serve you**



Headquarters

125 Powder Forest Drive
Simsbury, CT 06070-7684
Tel: (860) 651-2700
Fax: (860) 651-2719
Email: marketing@veeder.com

Australia

20 Highgate Street
Auburn, NSW, 2144
Tel: +61 (0)2 8737 7777
Fax: +61 (0)2 9737 9332
Email: sales.oz@gilbarco.com

Brasil

Rua ado Benatti, 92
Sao Paulo - SP 05037-904
Tel: +55 (0) 11 3879 6600
Fax: +55 (0) 11 3611 1982
Email: clopez@veeder.com

Canada

Eastern Canada
Tel: (519) 925-9899
Western Canada
Tel: (604) 576-4469
Email: marketing@veeder.com

China

Room 2202, Scitech Tower
No. 22 Jian Guomen
Wai DaJie
Beijing 100004
Tel: +86 10 6512 8081
Fax: +86 10 6522 0887
Email: lu ying@veeder.com

England

Hydrex House, Garden Road
Richmond, Surrey TW9 4NR
Tel: +44 (0) 20 8392 1355
Fax: +44 (0) 20 8878 6642
Email: sales@veeder.co.uk

France

94, rue Blaise Pascal, ZI des Mardelles
93600 Aulnay-Sous-Bois
Tel: +33 (0) 1 48 79 55 90
Fax: +33 (0) 1 48 68 39 00
Email: sales@veeder.co.uk

Germany

Ferdinand-Henze-Straße 9, D-33154 Salzkotten
Tel: +49 (0)52 58 130
Fax: +49 (0)52 58 131 07
Email: sales@veeder.co.uk

Italy

Via de'Cattani, 220/G, 50145 Firenze
Tel: +39 (0)55 30941
Fax: +39 (0)55 318603
Email: sales@veeder.co.uk

Mexico

Sagitario #4529-3
Col. La Calma C.P. 45070
Zapopan, Jalisco
Tel: (523) 632 3482
Fax: (523) 133 3219
Email: jmartinez@veeder.com

Poland

01-517 Warszawa ul. Mickiewicza 18/12
Tel/Fax: +48 (0)22 839 0847
Email: sales@veeder.co.uk

Singapore

246 MacPherson Road
#08-01 Betime Building
348578
Tel: +65 (0) 6745 9265
Fax: +65 (0) 6745 1791
Email: francis.yap@veeder.com