

ISD Balance Vapor Flow Meter

Installation Guide



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INSTALLATION IN THE STATE OF CALIFORNIA

Please refer to the California Air Resources Board Vapor Recover Certification Phase II EVR Executive Order web site (www.arb.ca.gov/vapor/eo-evrphasell.htm) for the latest manual revisions pertaining to VR 204 (VST Phase II EVR System Including ISD System).

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ISD Vapor Flow Meter Installation

This manual contains instructions to install a Veeder-Root ISD (In-Station Diagnostic) Vapor Flow Meter in a dispenser's vapor return line in balance systems.

This manual assumes all preliminary site preparation is completed, and that wiring from the console to the Vapor Flow Meter junction box is in place and meets the requirements set out in the TLS-3XX Series Site Prep and/or TLS RF Wireless 2 system (W2) installation manuals.

Contractor Certification Requirements

Veeder-Root Contractor Certification Requirements	Installer Certification ⁶	ATG Technician Certification ⁷	VR Vapor Products Certification ⁸
Install ¹ ISD	X	X	X
Install PMC	X	X	X
Install CCVP	X	X	X
Install Wireless ISD/PMC	X	X	X
Installation Checkout ²		X	X
ATG Startup ³ / Training ⁴ / Service ⁵		X	X
ISD Startup / Training / Service			X
PMC Startup / Training / Service			X
CCVP Startup / Training / Service			X
Wireless ISD/PMC Startup / Training / Service			X
Install Pressure Sensor (ATG)	X	X	X
Maintain Pressure Sensor (ATG)		X	X
Calibrate Pressure Sensor (ATG)		X	X
Clear ATG Pressure Sensor Alarm (ATG)		X	X
Clear ISD/PMC Alarms (ISD/PMC)			X
¹ Perform wiring and conduit routing; equipment mounting ² Inspect wiring and conduit routing; equipment mounting ³ Turn power on, program and test the systems ⁴ Provide supervised field experience in service techniques and operations ⁵ Troubleshoot and provide routing maintenance		⁶ UST Monitoring Systems – Installer (Level 1) ⁷ Certified UST Monitoring Technician ⁸ VR Vapor Products	

Warranty Registrations may only be submitted by selected Distributors. Certified installers are required to provide the GDF operator with the completed Equipment Warranty Notice, form 577013-868, for their records.

Product Marking Information

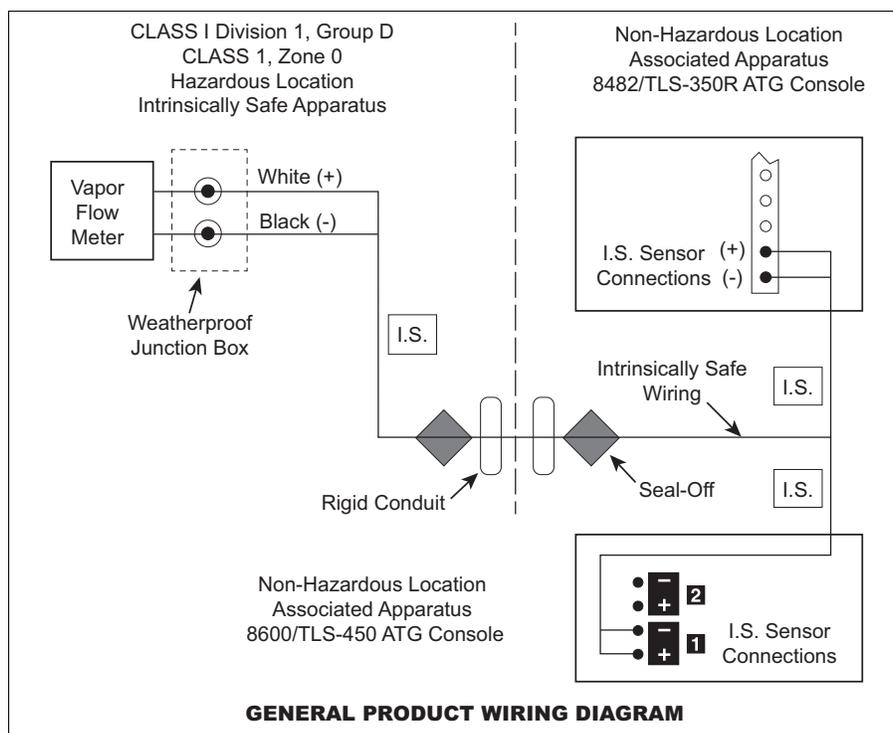
RELATED DOCUMENTS

Documents Required to Install Equipment

This intrinsically safe apparatus is only for use as part of a Veeder-Root Automatic Tank Gauging System (ATG Console with probes and sensors). To install intrinsically safe apparatus, use the specific control drawing that appears on the nameplate of the applicable associated apparatus (ATG Console):

Equipment	UL/cUL Control Drawing Document No.
Associated Apparatus	
TLS-450/8600	331940-008
TLS-350, TLS-350R	331940-011
Intrinsically Safe Apparatus for Wireless Applications	
Tank Gauge Accessories	331940-012

The control drawings contain information related to the correct installation of the overall intrinsically Safe System. This includes information such as maximum number of apparatus, specific apparatus allowed in the system, maximum cable lengths, references to codes, proper grounding and so on. Control drawings can be found on the accompanying Compact Disk (TECH DOCS CD) or on the internet at veeder.com under SUPPORT; VR TECHNICAL DOCUMENTS; DRAWINGS.



Product Label Contents

	I.S. CIRCUIT FOR HAZLOC SENSOR	
	F/N 332374-XXX	
CL I, DIV. 1, GP.D		S/N XXXXXX
CL I, ZONE 0		
AEx ia IIA	-40°C ≤ Ta ≤ +60°C	
Ex ia IIA	MANUAL NO. 577013-916	
TC=T4		
SECURITE INTRINSEQUE		

Safety Warnings

To protect yourself and your equipment, observe the following warnings and important information:

⚠ WARNING	
	<p>This product is to be installed in systems operating near locations where highly combustible fuels or vapors may be present.</p> <p>FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.</p> <ol style="list-style-type: none"> 1. Read and follow all instructions in this manual, including all safety warnings to protect yourself and others from serious injury, explosion, or electrical shock. 2. Comply with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes. 3. To protect yourself and others from being struck by vehicles, block off your work area during installation or service. 4. Do not alter or modify any component or substitute components in this kit. 5. Warning! Substitution of components may impair intrinsic safety. 6. Field wiring to the Flow Meter must not share a conduit with any non-intrinsically safe device's wiring 7. Warning! To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing. 8. Materials used in the construction of this device contain aluminum. Care must be taken to avoid ignition hazards due to impact or friction. 9. Before installing or taking the unit into a hazardous area, earth the unit in a safe area to remove any static charge. Then immediately transport the unit to the installation site. Do not rub or clean the unit prior to installation. Cleaning is not required under normal service conditions. Do not rub or clean the unit after installation. If the unit is not fixed to a known earth point when installed, ensure that a separate earth connection is made to prevent the potential of a static discharge. When fitting or removing the unit, use of anti-static footwear or clothing is required.

NOTE *Failure to install this product in accordance with its instructions and warnings will result in voiding of all warranties with this product.*

Safety Precautions

The following safety symbols may be used throughout this manual to alert you to important safety hazards and precautions.

 <p>EXPLOSIVE Fuels and their vapors are extremely explosive if ignited.</p>	 <p>FLAMMABLE Fuels and their vapors are extremely flammable.</p>
 <p>ELECTRICITY High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>	 <p>TURN POWER OFF Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.</p>
 <p>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.</p>	 <p>USE SAFETY BARRICADES Unauthorized people or vehicles in the work area are dangerous. Always use safety cones or barricades, safety tape, and your vehicle to block the work area.</p>
 <p>WARNING Heed the adjacent instructions to avoid damage to equipment, property, environment or personal injury.</p>	 <p>WEAR EYE PROTECTION Wear eye protection when working with pressurized fuel lines or epoxy sealant to avoid possible eye injury.</p>
 <p>INJURY Careless or improper handling of materials can result in bodily injury.</p>	 <p>GLOVES Wear gloves to protect hands from irritation or injury.</p>

Reference Manuals

576013-879	TLS-3XX Series Consoles Site Prep Manual
VR-204 Sec 12	In-Station Diagnostics Install, Setup & Operation Manual
331940-012	TLS-RF System Control Drawing
VR-203 and VR-204 Sec 19	TLS RF Wireless 2 System (W2) Installation and Maintenance Guide

Before You Begin

- A level 1 or higher certified Veeder-Root Technician must be available (on site) to assist in this type of installation.
- Comply with all recommended safety practices identified by OSHA (Occupational Safety and Health Administration) and your employer.
- Follow all installation requirements as per NFPA (National Fire Protection Association) 30, 30A, and 70.
- Review and comply with all the safety warnings in the installation manuals and any other national, State or Local requirements.

- When direct wiring to a TLS console, a 2-conductor, 18 AWG shielded cable must be installed in intrinsically safe conduit from each dispenser to the intrinsically safe wiring compartment of the TLS console.
- Debris from plumbing modifications should be flushed through the piping system prior to installing the ISD Vapor Flow Meter.
- Use only UL recognized Gas/TFE yellow teflon tape on all fittings. Do not use pipe dope to seal pipe threads or fittings in and out of the ISD Vapor Flow Meter.

Veeder-Root Parts

- Sensor Installation Kit, see Table 1.

Table 1. Vapor Flow Meter Installation Kit (P/N 330020-585)

Item	Qty.	Description	P/N
1	1	ISD Vapor Flow Meter	332374-002
2	2	Flange with 1" NPT threaded hole	332091-001
3	4	5/16-18 UNC-2B x 3/4" hex head bolt	514100-426
4	2	1-11.5 NPT x 2 " male to male threaded steel nipple	576008-655
5	2	O-ring (Parker size # 2-218, Nitrile)	512700-258
6	1	Cord grip group	331028-001
7	1	Sealing pack	514100-304
8	2	Wire nut	576008-461
9	2	Tie wrap	510901-337
10	4	5/16" Lock washer	514100-436

Tools Required

- Pipe wrench suitable for tightening 1-inch NPT pipe.
- 1/2" socket wrench to install Vapor Flow Meter flange bolts.
- Necessary pipe fitter's equipment and a non-hazardous work space suitable to modify dispenser vapor line for Vapor Flow Meter installation, when necessary.

Installation Steps - Balance Systems Above Shear Valve



1. Before installing this device, turn off, tag/lock out power to the system, including console and submersible pumps.
2. Remove the dispenser's lower sheet metal doors to access the vapor plumbing.
3. Loosen any factory installed mounts and/or brackets in order to provide room to disconnect any factory installed vapor return plumbing from the shear valve.
4. Disconnect the factory installed vapor return plumbing from the vapor shear valve (see Figure 1).
5. Remove any unneeded field installed plumbing above the vapor shear valve. The Vapor Flow Meter with flanges attached can be used for sizing the required head space of approximately 8 inches. Approximately 3 inches of clearance is required on both sides of the piping to accommodate the width of the meter body.
6. Thread one of the flanges (two provided in installation kit) onto the dispenser vapor return piping.

Note: Prior to modifying any piping in the dispenser, consult the dispenser manufacturer to determine if ISD ready retrofit kits are available. Any factory installed plumbing that must be modified in order to install the vapor flow meter, must be removed to a non hazardous work area before any cutting or threading takes place. After modifications to any plumbing, it must be reinstalled in accordance with the dispenser manufacturers installation guidelines.

7. Install any necessary plumbing and the lower flange above the vapor shear valve.

Note: The use of 90° elbows should be kept to a minimum to minimize pressure drop, maximize vapor collection efficiency and to prevent liquid traps. All horizontal plumbing must pitch to drain.



IMPORTANT: Upper and lower flanges must align to within 1/16" center-to-center before installing flow meter. If piping is improperly aligned, torque could damage the flow meter and result in vapor leakage.

8. Clean all debris around the inlet and outlet plumbing prior to installing the Vapor Flow Meter. Do not blow compressed air through the Vapor Flow Meter to prevent damaging the internal screens.
9. Install the o-ring into the lower mounting flange.
10. Taking care that foreign material (chips, debris, sealant, etc.) does not enter the open piping or Vapor Flow Meter, carefully insert the o-ring and then connect the Vapor Flow Meter to the upper flange. Note that the flow arrow on the side of the meter body must point down.
11. Connect the lower flange to the Vapor Flow Meter.
12. Tighten any loose fittings and hardware
13. Route the wiring to the TLS RF transmitter (W2) or into the junction box via the supplied cord grip assembly when direct wiring to a TLS console.
14. Connect the wires from the Vapor Flow Meter to the field wiring from the console and cap with wire nuts (see Figure 2). Not required when connecting to the TLS RF transmitter (W2).
15. After all other ISD Vapor Flow Meters and the ISD Pressure Sensor are installed, pressurize the tank ullage space and vapor piping to at least 2 inches WC and test for leaks using leak detection solution.



IMPORTANT: Upper and lower flanges must align to within 1/16" center-to-center before installing flow meter. If piping is improperly aligned, torque could damage the flow meter and result in vapor leakage.

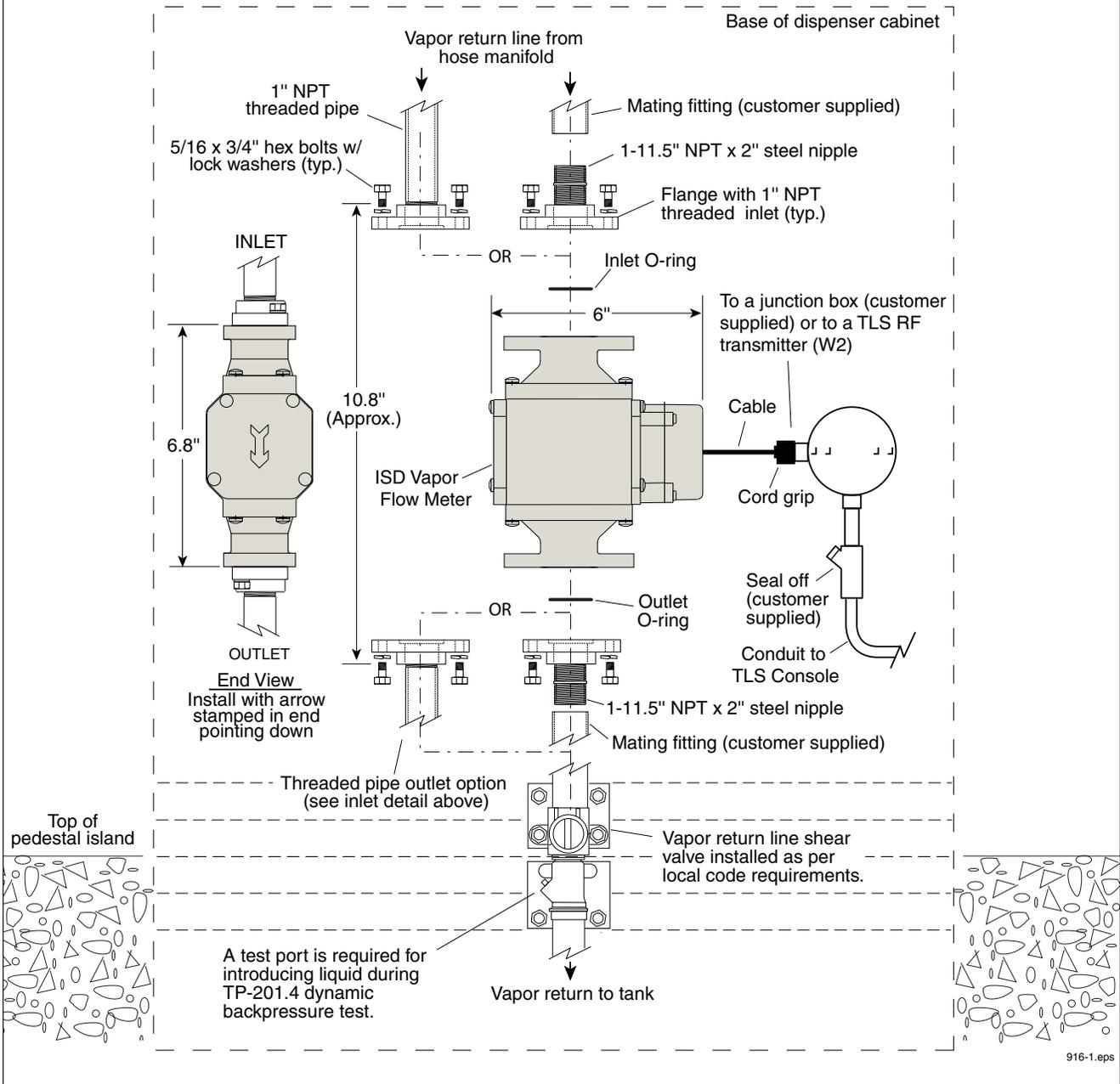


Figure 1. Example Vapor Flow Meter Installation Above Shear Valve

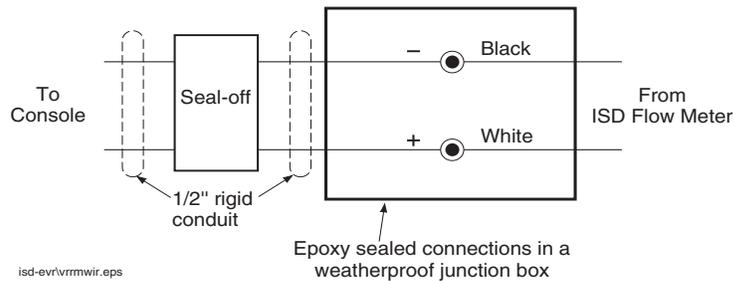


Figure 2. Field wiring Vapor Flow Meter - Observe Polarity

Installation Steps - Balance Systems Below Shear Valve



1. Before installing this device, turn Off, tag/lock out power to the system, including console and submersible pumps.
2. Remove the dispenser's lower sheet metal doors to access the vapor plumbing, if necessary.
3. Remove any unneeded field installed plumbing between the vapor shear valve and the vapor return line fitting. Figure 3 shows two example installations of the Vapor Flow Meter with the required lateral or wye fitting for running the TP-201.4 back-pressure test. Approximately 3 inches of clearance is required on both sides of the piping to accommodate the width of the meter body.



IMPORTANT: Upper and lower flanges must align to within 1/16" center-to-center before installing flow meter. If piping is improperly aligned, torque could damage the flow meter and result in vapor leakage.

4. Connect the lower flange to the pipe that is connected to the lateral or wye access fitting (see Figure 4).
5. Install the Vapor Flow Meter over the lower flange.
6. Connect the upper flange with o-ring above the Vapor Flow Meter.
7. Using a close nipple, thread the shear valve into the upper flange.
8. Using nipples, unions, and other plumbing as required, connect the plumbing outlet to the shear valve.
9. Route the wiring into the junction box via the supplied cord grip assembly. Connect the wires from the Vapor Flow Meter to the field wiring from the console and cap with wire nuts (see Figure 2) - OR - connect the wires to the TLS RF transmitter (W2).
10. After all other ISD Vapor Flow Meters and the ISD Pressure Sensor are installed, pressurize the tank ullage space and vapor piping to at least 2 inches WC and test for leaks using leak detection solution.

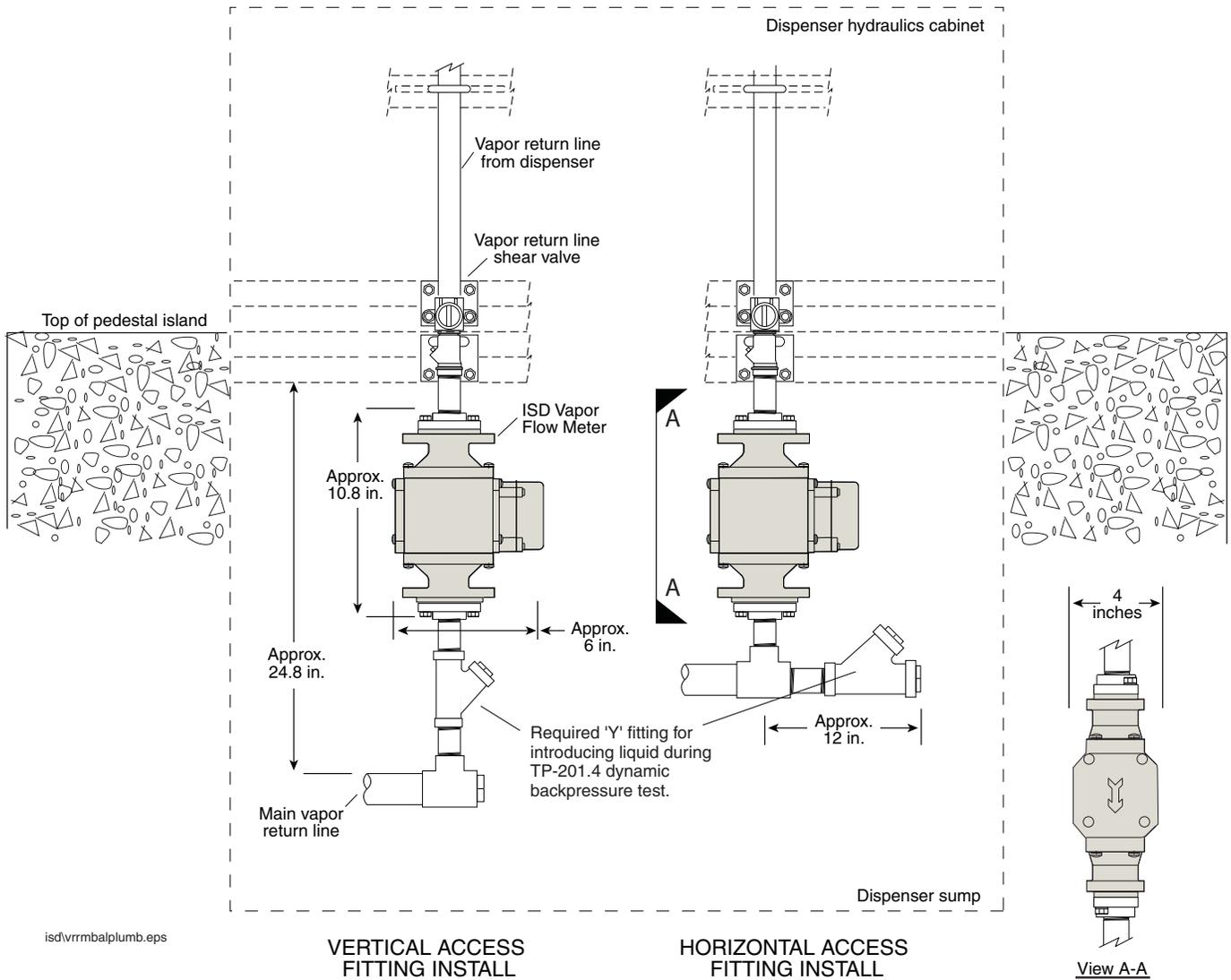


Figure 3. Example flow meter installations with approximate clearances



IMPORTANT: Upper and lower flanges must align to within 1/16" center-to-center before installing flow meter. If piping is improperly aligned, torque could damage the flow meter and result in vapor leakage.

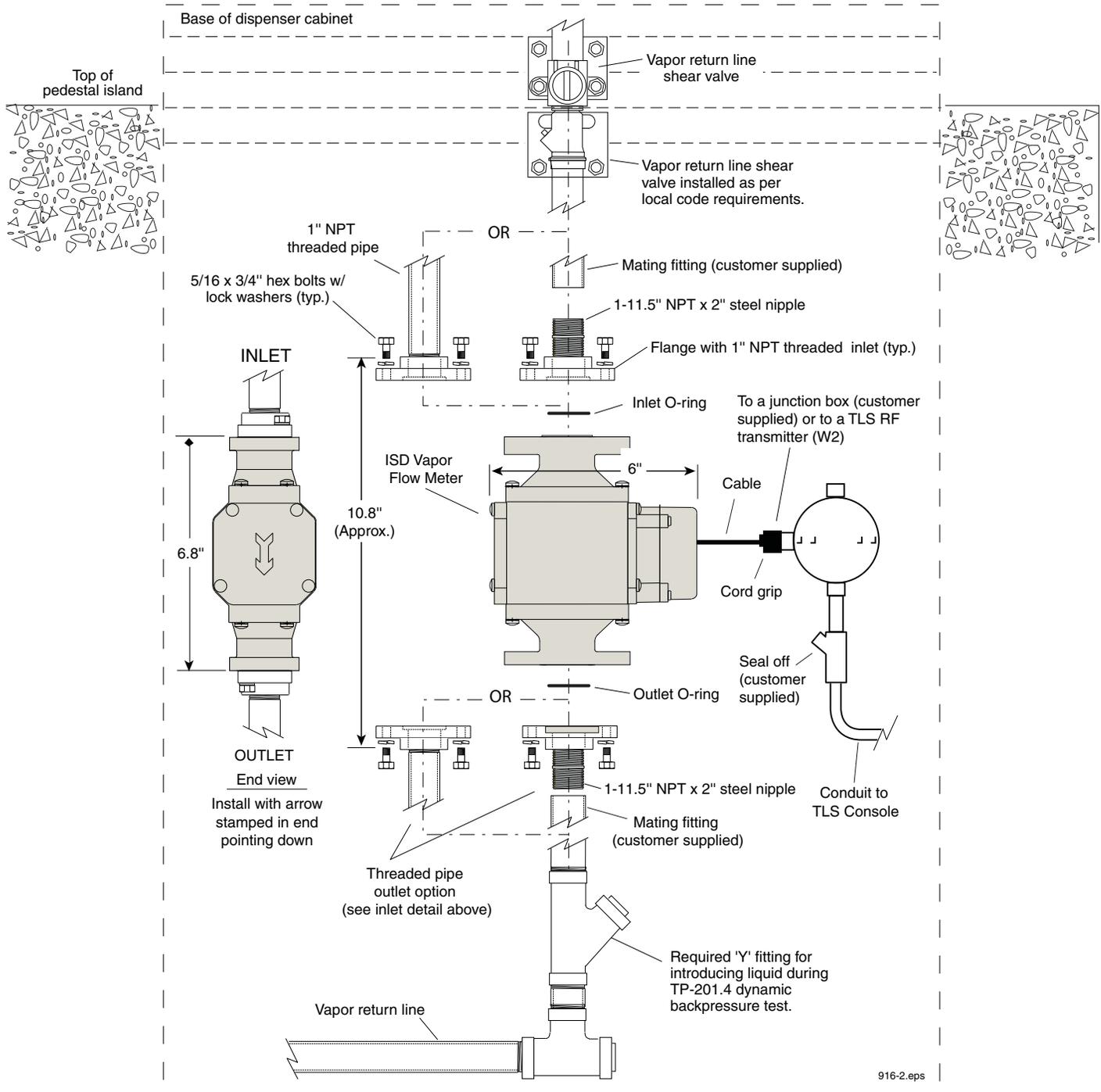


Figure 4. Example Vapor Flow Meter Installation Below Shear Valve

Seal and Connect Field Wiring

1. Seal wire nuts with epoxy sealant following the instructions in Figure 5. Note - wire sealing is not required for installations using a wireless interface.



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

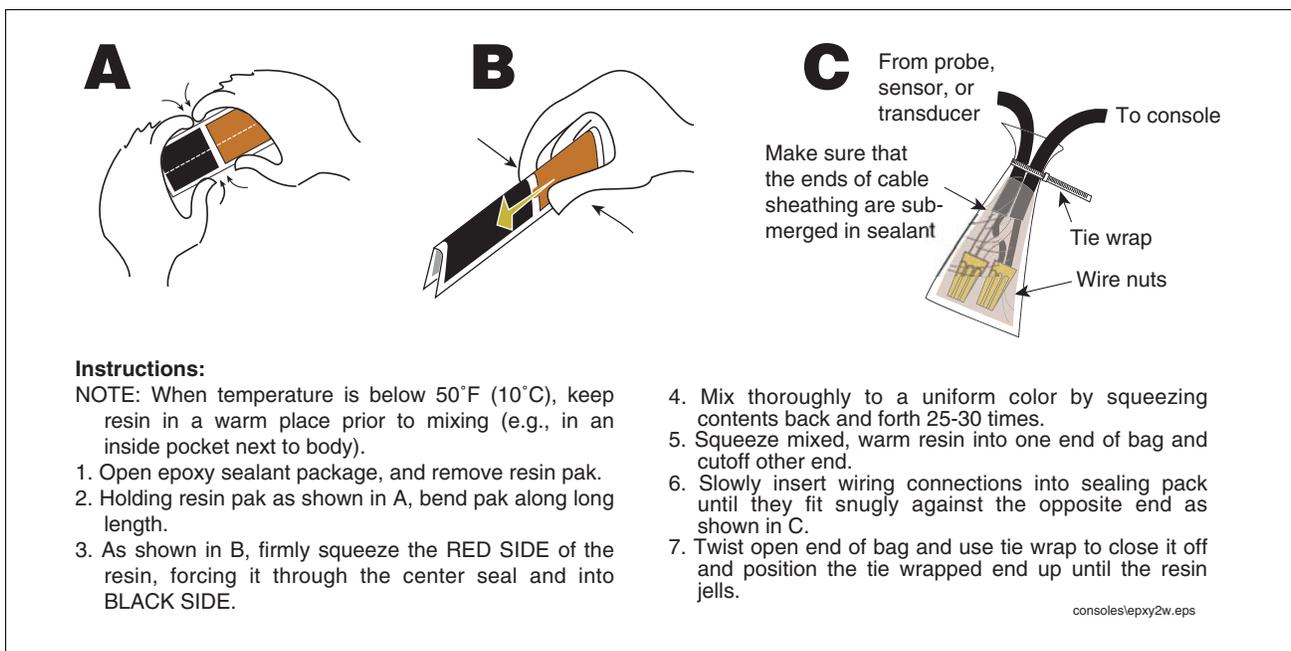


Figure 5. Epoxy sealing field wiring

2. Push the epoxy sealed bag into the junction box. Replace and tighten the junction box cover.
3. Terminate field wiring into TLS Console and connect to Smart Sensor Module located in the intrinsically safe wiring compartment of the TLS as shown in Figure 6. Note: you must observe polarity! Also, the cable length between the console and sensor must not exceed the distance stated in the TLS-3XX Site Prep manual (P/N 576013-879). For the wireless version, terminate the wires in the TLS RF transmitter (W2).
4. Replace the lower sheet metal doors in the dispenser.

Note: Intrinsically safe devices must be installed in accordance with Article 504 of the National Electrical Code, ANSI/NFPA 70, for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.

This intrinsically safe vapor flow meter P/N 332374-002, has only been evaluated for connection to a UL listed TLS-350 Series Liquid Level Gauge / Leak Detector.

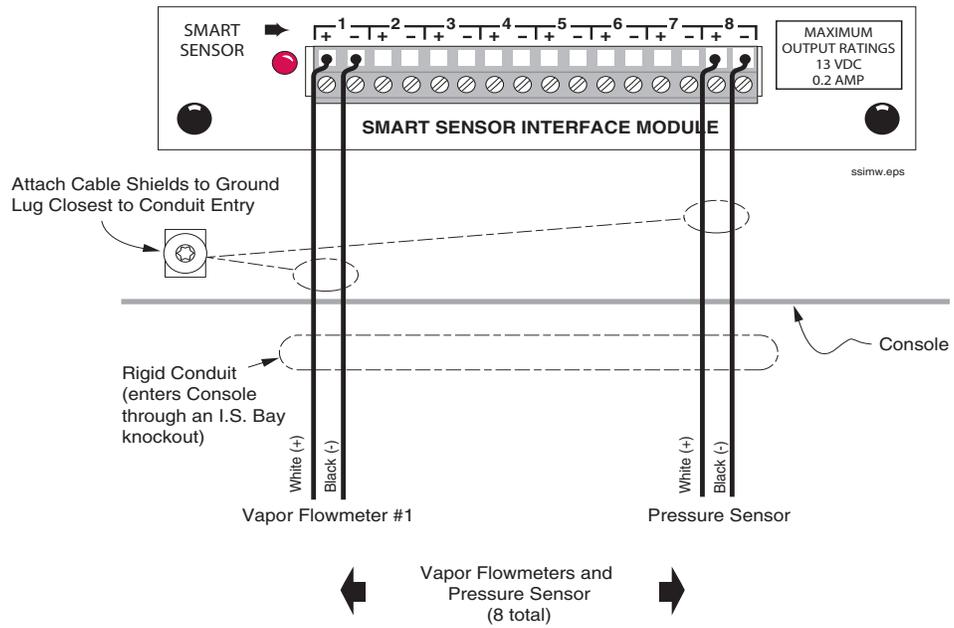


Figure 6. Direct Wiring Vapor Flow Meter to Smart Sensor Interface Module



NOTE! For wireless configurations, see TLS RF System Control Drawing 331940-012.

