ISD Balance Vapor Flow Meter

Installation Guide
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Contact TLS Systems Technical Support for additional troubleshooting information at 800-323-1799.

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Thoroughly examine all components and units as soon as they are received. If any cartons are damaged or missing, write a complete and detailed description of the damage or shortage on the face of the freight bill. The carrier’s agent must verify the inspection and sign the description. Refuse only the damaged product, not the entire shipment.

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2. Fax signed Bill of Lading (BOL) to Veeder-Root Customer Service at 800-234-5350.
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For the parts return procedure, please follow the appropriate instructions in the "General Returned Goods Policy" pages in the "Policies and Literature" section of the Veeder-Root North American Environmental Products price list. Veeder-Root will not accept any return product without a Return Goods Authorization (RGA) number clearly printed on the outside of the package.

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.

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ISD Vapor Flow Meter Installation

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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 manual.

**Contractor Certification Requirements**

Veeder-Root requires the following minimum training certifications for contractors who will install and setup the
equipment discussed in this manual:

**Level 1** Contractors holding valid Level 1 Certification are approved to perform wiring and conduit
routing, equipment mounting, probe and sensor installation, tank and line preparation, and line
leak detector installation.

**Level 2/3 or 4** Contractors holding valid Level 2, 3, or 4 Certifications are approved to perform installation
checkout, startup, programming and operations training, troubleshooting and servicing for all
Veeder-Root Tank Monitoring Systems, including Line Leak Detection and associated
accessories.

**Warranty Registrations** may only be submitted by selected Distributors.

**Related Manuals**

576013-879 TLS-3XX Series Consoles Site Prep Manual
577013-937 In-Station Diagnostics Install, Setup & Operation Manual
Safety Precautions

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Explosive" /></td>
<td>Fuels and their vapors are extremely explosive if ignited.</td>
</tr>
<tr>
<td><img src="image" alt="Flammable" /></td>
<td>Fuels and their vapors are extremely flammable.</td>
</tr>
<tr>
<td><img src="image" alt="Electricity" /></td>
<td>High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</td>
</tr>
<tr>
<td><img src="image" alt="Turn Power Off" /></td>
<td>Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.</td>
</tr>
<tr>
<td><img src="image" alt="Read All Related Manuals" /></td>
<td>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.</td>
</tr>
<tr>
<td><img src="image" alt="Use Safety Barricades" /></td>
<td>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.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td>Heed the adjacent instructions to avoid damage to equipment, property, environment or personal injury.</td>
</tr>
<tr>
<td><img src="image" alt="Wear Eye Protection" /></td>
<td>Wear eye protection when working with pressurized fuel lines or epoxy sealant to avoid possible eye injury.</td>
</tr>
<tr>
<td><img src="image" alt="Injury" /></td>
<td>Careless or improper handling of materials can result in bodily injury.</td>
</tr>
<tr>
<td><img src="image" alt="Gloves" /></td>
<td>Wear gloves to protect hands from irritation or injury.</td>
</tr>
</tbody>
</table>

**WARNING**

This product is to be installed and operated in the highly combustible environment of a gasoline dispenser where flammable liquids and explosive vapors may be present. Improper installation could cause damage to property, environment, resulting in serious injury or death.

The following hazards exist:

1. Electrical shock resulting in serious injury or death may result if power is on during installation and the device is improperly installed.
2. Product leakage could cause severe environmental damage or explosion resulting in death, serious personal injury, property loss and equipment damage.

Observe the following precautions:

1. Read and follow all instructions in this manual, including all safety warnings.
2. Comply with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes.
3. Before installing this device, turn Off, tag/lock out power to the system, including console and submersible pumps.
4. To protect yourself and others from being struck by vehicles, block off your work area during installation or service.
5. Substitution of components may impair intrinsic safety.
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.
- 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)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Description</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>ISD Vapor Flow Meter</td>
<td>332374-002</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Flange with 1&quot; NPT threaded hole</td>
<td>332091-001</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5/16-18 UNC-28 x 3/4&quot; hex head bolt</td>
<td>514100-426</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1-11.5 NPT x 2” male to male threaded steel nipple</td>
<td>576008-655</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>O-ring (Parker size # 2-218, Nitrile)</td>
<td>512700-258</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Cord grip group</td>
<td>331028-001</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Sealing pack</td>
<td>514100-304</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Wire nut</td>
<td>576008-461</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>Tie wrap</td>
<td>510901-337</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>5/16&quot; Lock washer</td>
<td>514100-436</td>
</tr>
</tbody>
</table>

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 into the junction box via the supplied cord grip assembly.
14. Connect the wires from the Vapor Flow Meter to the field wiring from the console and cap with wire nuts (see Figure 2).
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
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).

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.
Seal and Connect Field Wiring

1. Seal wire nuts with epoxy sealant following the instructions in Figure 5.

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.

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).

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 5. Epoxy sealing field wiring

Instructions:

NOTE: When temperature is below 50°F (10°C), keep resin in a warm place prior to mixing (e.g., in an inside pocket next to body).

1. Open epoxy sealant package, and remove resin pak.
2. Holding resin pak as shown in A, bend pak along long length.
3. As shown in B, firmly squeeze the RED SIDE of the resin, forcing it through the center seal and into BLACK SIDE.
4. Mix thoroughly to a uniform color by squeezing contents back and forth 25-30 times.
5. Squeeze mixed, warm resin into one end of bag and cutoff other end.
6. Slowly insert wiring connections into sealing pack until they fit snugly against the opposite end as shown in C.
7. Twist open end of bag and use tie wrap to close it off and position the tie wrapped end up until the resin jells.
Figure 6. Connecting Vapor Flow Meter to Smart Sensor Interface Module

- Attach Cable Shields to Ground Lug Closest to Conduit Entry
- Rigid Conduit (enters Console through an I.S. Bay knockout)
- ISD Flowmeter #1
- ISD Flowmeters and Pressure Sensor (8 total)
- Console
- SMART SENSOR INTERFACE MODULE
- SMART SENSOR
- MAXIMUM OUTPUT RATINGS
  - 13 VDC
  - 0.2 AMP

ISD Vapor Flow Meter Installation
Seal and Connect Field Wiring