ISD Balance Vapor Flow Meter

Installation Guide
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Veeder-Root must be notified of any damages and/or shortages within 30 days of receipt of the shipment, as stated in our Terms and Conditions.

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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.

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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 and/or TLS RF Wireless 2 system (W2) installation manuals.

**Contractor Certification Requirements**

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

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

**TLS-350 (Level 2/3 or 4) Technician Certification:** Contractors holding valid TLS-350 Technician Certifications are approved to perform installation checkout, startup, programming and operations training, troubleshooting and servicing for all Veeder-Root TLS-300 or TLS-350 Series Tank Monitoring Systems, including Line Leak Detection and associated accessories.

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

**Related Documents**

- 576013-879  TLS-3XX Series Consoles Site Prep Manual
- VST-IOM / Section 16 / VR-204  In-Station Diagnostics Install, Setup & Operation Manual
- 331940-012  TLS-RF System Control Drawing
- 577013-964  TLS RF Wireless 2 System (W2) Installation and Maintenance Guide
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>EXPLOSIVE</th>
<th>FLAMMABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuels and their vapors are extremely explosive if ignited.</td>
<td>Fuels and their vapors are extremely flammable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ELECTRICITY</th>
<th>TURN POWER OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>READ ALL RELATED MANUALS</th>
<th>USE SAFETY BARRICADES</th>
</tr>
</thead>
<tbody>
<tr>
<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>
<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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
<th>WEAR EYE PROTECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heed the adjacent instructions to avoid damage to equipment, property, environment or personal injury.</td>
<td>Wear eye protection when working with pressurized fuel lines or epoxy sealant to avoid possible eye injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INJURY</th>
<th>GLOVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Careless or improper handling of materials can result in bodily injury.</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.
- 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)

<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” NPT threaded hole</td>
<td>332091-001</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5/16-18 UNC-2B x 3/4” 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” 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 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.

To function:
- Install with arrow stamped in end pointing down
- Mating fitting (customer supplied)
- 1-11.5" NPT x 2" steel nipple
- Flange with 1" NPT threaded inlet (typ.)
- 10.8" (Approx.)
- ISD Vapor Flow Meter
- 5/16 x 3/4" hex bolts w/lock washers (typ.)
- 1" NPT threaded pipe
- Vapor return line from hose manifold
- Mating fitting (customer supplied)
- 1-11.5" NPT x 2" steel nipple
- 1-11.5" NPT x 2" steel nipple
- Mating fitting (customer supplied)
- Outlet O-ring
- Outlet O-ring
- To a junction box (customer supplied) or to a TLS RF transmitter (W2)
- To a junction box (customer supplied) or to a TLS RF transmitter (W2)
- Cable
- Cord grip
- Seal off (customer supplied)
- Conduit to TLS Console
- Threaded pipe outlet option
- (see inlet detail above)
- Vapor return line shear valve installed as per local code requirements.
- Vapor return line from hose manifold
- Base of dispenser cabinet
- Mating fitting (customer supplied)
- 1-11.5" NPT x 2" steel nipple
- Flange with 1" NPT threaded inlet (typ.)
- Inlet O-ring
- Inlet O-ring
- Outlet O-ring
- Outlet O-ring
- Test port is required for introducing liquid during TP-201.4 dynamic backpressure test.

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) - 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

Top of pedestal island

Base of dispenser cabinet

Vapor return line shear valve

Vapor return line shear valve installed as per local code requirements.

INLET

5/16 x 3/4" hex bolts w/ lock washers (typ.)

1" NPT threaded pipe

Mating fitting (customer supplied)

1-11.5" NPT x 2" steel nipple

Flange with 1" NPT threaded inlet (typ.)

ISD Vapor Flow Meter

10.8" (Approx.)

OUTLET

6.8"

6"

To a junction box (customer supplied) or to a TLS RF transmitter (W2)

Inlet O-ring

Outlet O-ring

Cable

Seal off (customer supplied)

Conduit to TLS Console

Threaded pipe outlet option (see inlet detail above)

Required 'Y' fitting for introducing liquid during TP-201.4 dynamic backpressure test.

Vapor return line

End view

Install with arrow stamped in end pointing down
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 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 5. Epoxy sealing field wiring](image)

**Instructions:**

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.

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