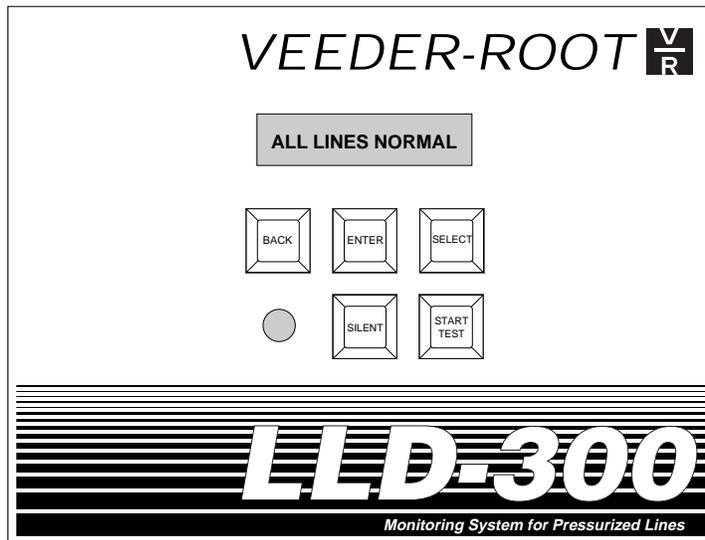


# LLD-300

## Installation & Operation Manual



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# Notice

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# Introduction

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This manual covers installation and operation instructions for Veeder-Root LLD-300 Stand-Alone Line Leak Detection Systems.

## Safety Symbols

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The following safety symbols may be 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. Always turn power off to the device and associated accessories when servicing the unit.



### **No Smoking**

Sparks and embers from burning cigarettes or pipes can ignite fuels and their vapors.



### **No Open Flames**

Open flames from matches, lighters, welding torches, etc. can ignite fuels and their vapors.



### **No Power Tools**

Sparks from power tools (such as drills) can ignite fuels and their vapors.



### **No Vehicles**

Moving vehicles in the area during service can create a potential for personal injury to you or others. Sparks from starting vehicles can ignite fuels and their vapors.

**No People in the Area**

Unauthorized people in the area during service can create a potential for personal injury to you and them.

**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.

**Wear Eye Protection**

Fuel spray from residual pressure in the lines can cause serious eye injuries. Always wear eye protection.

**Injury**

Careless or improper handling of materials can result in bodily 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.

## Warnings and Important Notes

 <b>WARNING</b>	
	<p>This product is to be installed in systems operating near locations where highly combustible fuels or vapors may be present.</p> <p>Fire or explosion resulting in serious injury or death could result if the equipment is improperly installed or modified. Serious contamination of the environment may also occur.</p> <ol style="list-style-type: none"><li>1. Read and follow all instructions in this manual, including all safety warnings.</li><li>2. Comply with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes.</li><li>3. Do not alter or modify any component or substitute components in this kit.</li><li>4. Do not use this component for other systems aside from the LLD-300. Install console only as described in this manual.</li><li>5. The LLD-300 must be installed and operated in an indoor location.</li></ol>

## Damage Claims

1. Thoroughly examine all components and units as soon as received. If damaged, write a complete and detailed description of the damage on the face of the freight bill. The carrier's agent *must* verify the inspection and sign the description.
2. Immediately notify the delivering carrier of damage or loss. This notification may be given either in person or by telephone. Written confirmation must be mailed within 48 hours. Railroads and motor carriers are reluctant to make adjustments for damaged merchandise unless inspected and reported promptly.
3. Risk of loss, or damage to merchandise remains with the buyer. It is the buyer's responsibility to file a claim with the carrier involved.
4. Immediately advise your Veeder-Root representative, distributor, or the factory so that we may assist you.

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## Return Shipping

---

All product returns, including warranty replacements, repairs, and core credits, must be returned on an RGA (Returned Goods Authorization) for proper processing. To return a product under this procedure:

1. Call Customer Service at (800) 873-3313 to obtain an RGA number.
2. Clearly print the RGA number on the packages being returned. No package can be received without this number.
3. All shipments of Veeder-Root products must be prepaid.
4. If the LLD-300 system is damaged, return it in the original shipping container with shock absorbing material provided. Veeder-Root will accept no liability for damage caused by improper packing.
5. Address the shipment to Veeder-Root Co., 6th Avenue at Burns Crossing, Altoona, Pennsylvania 16602.
6. All warranty returns must be in accordance with Veeder-Root warranty procedures. Problem description and corrective action must be filled out in detail.

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## System Description

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### LLD-300 System

The LLD-300 Line Leak Detection System consists of a compact LLD-300 Console and Veeder-Root's proven Wireless Pressure Line Leak Detection (WPLLD) sensors. These sensors are installed in the STP and are monitored by the console over the pump's existing ac wiring, eliminating the need for separate wiring runs. Depending on which LLD-300 Console you have, up to 3 or 4 individual pumps and their non-manifolded lines can be monitored.

All LLD-300 Consoles perform a 3. gph or "gross" line leak test during an idle period after every dispense. Optional features include:

- 0.2 gph leak testing (not available with Flex A - D lines)
- 0.1 gph leak testing (not available with Flex A - D lines)
- EIA-RS-232 serial interface

Twelve month records of the optional 0.2 gph and 0.1 gph leak tests are stored in battery backed Random Access Memory (RAM). The operator can display the last test, plus each of the last 12 test results for compliance purposes.

The LLD-300 is easily programmed via front panel buttons while monitoring the 16-character display. Setup programming is automatically stored in Programmable Read Only Memory (PROM) and will not be lost if a power outage occurs. In addition to the

front panel display, an internal audible beeper and front panel light alert the operator when an alarm occurs.

**Important** 

Do not install a TLS Console with WPLLD in a location that has an LLD-300 system installed. A TLS Console without WPLLD may be installed with an LLD-300, but if the TLS Console has the CSLD feature, the TLS Console must have a Pump Sense Module.

**Available LLD-300 Consoles**

Table 1 on page 6 compares the features of the six available LLD-300 Console models.

**Table 1.- LLD-300 Model Features**

LLD-300 Form No.	Leak Test Capability <sup>1</sup>	No. of Lines	Time/Date	Stored Leak Test Histories			Serial Interface <sup>5</sup>
				3 gph tests	0.2 gph tests <sup>2,3,4</sup>	0.1 gph tests <sup>2,3,4</sup>	
849590-001	3 gph	3	No	Last completed test. Format: Pass/Fail	Not Available	Not Available	Not Available
849590-002	3 gph	4	No	Last completed test. Format: Pass/Fail	Not Available	Not Available	Not Available
849590-003	3 & 0.2 gph	3	Yes	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	Not Available	EIA-RS-232 serial communication, DB-9 connector
849590-004	3 & 0.2 gph	4	Yes	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	Not Available	EIA-RS-232 serial communication, DB-9 connector
849590-005	3, 0.2, & 0.1 gph	3	Yes	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	List of last 12 completed tests. Format: MM/DD/YYYY P/F	EIA-RS-232 serial communication, DB-9 connector
849590-006	3, 0.2, & 0.1 gph	4	Yes	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	List of last 12 month's tests in which each test is the first test to pass for that month. Format: MM/DD/YYYY P/F	List of last 12 completed tests. Format: MM/DD/YYYY P/F	EIA-RS-232 serial communication, DB-9 connector

<sup>1</sup> 0.2 and 0.1 gph tests not available for Flex A-D lines.

<sup>2</sup> History data for both 0.2 and 0.1 gph tests will be stored in battery-backup RAM.

<sup>3</sup> The operator is allowed to change the system clock to switch to and from Daylight Savings Time. However, if the operator changes the system date, the next leak test run will be flagged with an asterisk (i.e., \*MM/DD/YYYY P or F (pass or fail)). Power outages will not affect the system clock since it has battery backup.

<sup>4</sup> P = Pass and F = Fail

<sup>5</sup> Settings fixed at 1200 baud, 7 data bits, odd parity, & 1 stop bit.

## Submersible Pump Compatibility

For proper system operation, the submersible pump must be a Red Jacket or FE Petro and must not exceed 1½ H.P. The LLD-300 system is *not* qualified for use with Red Jacket “Big Flo” submersible pumps (3-inch discharge) and FE Petro 550-3-S and 550-5-S (3-inch discharge) model pumps and/or with any Variable Speed Pumps at the site.

The Wireless PLLD system is approved for use with the following submersible pumps:

- Red Jacket Models P33R1, P75S1, P150S1, X3P150
- FE Petro Models STP33, STP75, STP150, STPR33, STPR75, STPR150, STPH150, STPHR150

## WPLLD Installation Kits Required For LLD-300 Systems

Three different WPLLD installation kits are available for use with LLD-300 Consoles. The kit choice depends on what model LLD-300 Console will be installed and the type of STP in which the WPLLD sensor will be installed. In some cases additional STP parts may be required.

Verify the LLD-300 model you are installing by checking the nameplate label on top of the LLD-300 Console.

Table 2 lists the WPLLD installation kits needed for various console and STP combinations:

**Table 2. WPLLD Installation Kits**

LLD-300 Form Number	STP Mfg.	V-R Install Kits	Parts List
All	FE Petro	849490-001	1
849590-001 & -002 (3 gph only)	Red Jacket	849490-003	2
849590-003,4,5,6 (0.2 gph & 0.1 gph)	Red Jacket	849490-002	3

## Parts List 1

### FE Petro Pump Installation Kits Used For All LLD-300 Models

The kits below contain the parts required to install one WPLLD line leak test system on one FE Petro submersible pump. You will need one set of these parts for each line monitored. These kits are for use only with the following FE Petro pumps; STP33, STP75, STP150, STPR33, STPR75, STPR150, STPH150, and STPHR150.

WPLLD Sensor Kit - Part No. 849490-001			Installation Kit - Part No. 330020-096		
Qty	Description	Part No.	Qty	Description	Part No.
1	WPLLD Sensor	330786-001	1	Connector	576008-056
1	Installation Manual	576013-923	1	Shield - Pump Cap Compartm	330804-001
1	Installation Kit	330020-096	1	Tank Port Fitting	514100-338
10	Warning Tag	329801-001	1	Sensing Line - FE Petro	330770-001
10	Wire Tie	514100-340	1	Cap Cover Bracket	330805-001
1	Nameplate	330780-001	2	Screw Taptime #6-32 x .375	510500-457
			1	O-Ring	512700-228
			1	Label Warning	331058-001

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### Additional Parts May Be Needed

When installing LLD-300 Consoles you must replace the FE Petro standard check valve with an adjustable check valve (FE Petro Model #2315 Part No. 400664912 [AG Part No. 400664913]) and you should replace the manifold cover's O-ring at the same time (FE Petro Part Nos. 400211238 or 400333238).

### Important Installation Notes



1. If you have the 0.2 gph or 0.1 gph option, and the precision check valve is not installed, the system will not detect leaks less than 3 gph. In this situation, the LLD-300 will always pass 0.2 gph and 0.1 gph tests, but the results will not be valid.
2. Ensure that the submersible pump is properly grounded per the manufacturer's instructions.
3. Ensure that there is at least 4 inches clearance above the submersible pump capacitor housing to allow room to install the WPLLD components.
4. Ensure that you have UL-classified non-toxic pipe sealant suitable for the fuel(s) involved.

## Parts List 2

### Red Jacket Pump Installation Kits - For LLD-300 Consoles Having Form Numbers 849590-001 And 849590-002

The kits below contain the parts required to install one WPLLD line leak test system on one Red Jacket submersible pump. You will need one set of these parts for each line monitored. These kits are for use only with the following Red Jacket pumps; P33R1, P75S1, P150S1, and X3P150.

WPLLD Sensor Kit - Part No. 849490-003			Installation Kit - Part No. 330020-279		
Qty	Description	Part No.	Qty	Description	Part No.
1	WPLLD Line Leak Sensor	330786-001	1	Connector	576008-056
1	Installation Manual	576013-923	1	Shield - Pump Cap Compartm	330804-001
1	Installation Kit	330020-279	1	Sensing Line - Red Jacket	331069-001
10	Warning Tag	329801-001	1	Cap Cover Bracket	330805-001
10	Wire Tie	514100-340	2	Screw Taptite #6-32 x .375	510500-457
1	Nameplate	330780-001	1	O-Ring	512700-225
			1	Label Warning	331058-001
			1	Tank Port Fitting	514100-338

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### Additional Parts Required

If you are installing LLD-300 Consoles form numbers 849590-001 or -002 (3 gph leak test capability ONLY) you must replace the Red Jacket pump's functional element with an adjustable functional element. Two types are available from Red Jacket:

- Red Jacket Standard Version - RJ Part No. 323-006-5 for use with gasoline, diesel, kerosene, gasoline with 10% methanol, and gasoline with 15% MTBE, or
- Red Jacket AG Version - RJ Part No. 323-007-5 for use with the standard version's fuels plus 100% ethanol, 100% methanol, any mixture of gasoline with ethanol, and any mixture of gasoline with methanol.

Also, the WPLLD sensor will not fit in the pump motor's capacitor storage well if the capacitor is the old style oval shape. You will need to replace the oval capacitor with one of the newer Red Jacket round capacitors: Red Jacket Part No. 111-092-5 (for 1/3 or 3/4 hp pumps), or Part No. 111-661-5 (for 1-1/2 hp pumps).

### Important Installation Notes



1. The adjustable functional element must be set to 21 - 22 psi for the WPLLD sensor to work properly. Refer to the manufacturer's documentation for instructions.
2. Ensure that the submersible pump is properly grounded per the manufacturer's instructions.
3. Ensure that there is at least 4 inches clearance above the submersible pump capacitor housing to allow room to install the WPLLD components.
4. Ensure that you have UL-classified non-toxic pipe sealant suitable for the fuel(s) involved.

## Parts List 3

### Red Jacket Pump Installation Kits For LLD-300 Consoles Having Form Numbers 849590-003 Through 849590-006

The kits below contain the parts required to install one WPLLD line leak test system on one Red Jacket submersible pump. You will need one set of these parts for each line monitored. These kits are for use only with the following Red Jacket pumps; P33R1, P75S1, P150S1, and X3P150.

WPLLD Sensor Kit - Part No. 849490-002			Installation Kit - Part No. 330020-099		
Qty	Description	Part No.	Qty	Description	Part No.
1	WPLLD Line Leak Sensor	330786-001	1	Connector	576008-056
1	WPLLD Swiftcheck	330773-001	1	Shield - Pump Cap Compartm	330804-001
1	Installation Manual	576013-923	1	Sensing Line - Red Jacket	330772-001
1	Installation Kit	330020-099	1	Cap Cover Bracket	330805-001
10	Warning Tag	329801-001	2	Screw Taptite #6-32 x .375	510500-457
10	Wire Tie	514100-340	1	O-Ring	512700-225
1	Nameplate	330780-001	1	Label Warning	331058-001

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### Additional Parts May Be Needed

When in the installation procedure, you remove the piston and spring from the Red Jacket functional element, you may need to replace the rubber diaphragm if it is cracked or badly worn. If so, order Red Jacket Part No. 017-167-5.

Also, the WPLLD sensor will not fit in the pump motor's capacitor storage well if the capacitor is the old style oval shape. You will need to replace the oval capacitor with one of the newer Red Jacket round capacitors: Red Jacket Part No. 111-092-5 (for 1/3 or 3/4 hp pumps), or Part No. 111-661-5 (for 1-1/2 hp pumps).

### Important Installation Notes



1. Ensure that the submersible pump is properly grounded per the manufacturer's instructions.



2. Ensure that there is at least 4 inches clearance above the submersible pump capacitor housing to allow room to install the WPLLD components.

3. Ensure that you have UL-classified non-toxic pipe sealant suitable for the fuel(s) involved.

# Site Considerations

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## Applications Not Approved for the LLD-300

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- Variable speed pumps
- Mechanical blenders
- Manifolder fuel lines (product is supplied from more than one pump)

**Important** ☞ *Fuel lines that use electronic blending, can be equipped with an LLD-300. Any system reporting blend errors must be corrected prior to installing the LLD-300, because blend errors will appear as leaks.*

## Mini-Jet Vapor Recovery Systems

---

Sites equipped with Mini-Jet vapor recovery systems, must be installed according to the instructions provided by:

**Healy Systems Inc.**  
17 Hampshire Drive  
Hudson, NH 03051  
Tel: (603) 882-2472, Fax: (603) 882-5189

In a recovery system with a dedicated vacuum source, Healy specifies the use of relay part number 1005W, and in systems without a dedicated vacuum source, Healy specifies relay part number 939. Substituting for either relay may result in equipment malfunction. Only install an LLD-300 in a site equipped with the correct relay from Healy.

## Approved Piping Runs

---

**Important** ☞ *Where piping runs have been installed for future use, but are connected to the active piping system, isolate the inactive lines from the active lines using a shutoff valve. Failure to do so may cause inaccurate leak test results or false alarms.*

- Steel piping from 30 to 499 feet
- Fiberglass, FLEX-A, FLEX-B, FLEX-C, and FLEX-D piping from 10 to 499 feet  
(Note: 0.2 and 0.1 gph tests cannot be run on FLEX type piping.)

## Ball Valves

---

For a WPLLD installation, a ball valve located between the STP and piping to the dispensers is recommended to minimize spillage during service and to aid in verification of system leaks.

## Existing Check Valves

You must ensure that there are no existing check valves already installed in the pipeline. The presence of any check valve (other than the one used with the WPLLD System) can prevent the WPLLD System from detecting line leaks in the area of the pipeline downstream from the check valve.

## Pump Power

In order for WPLLD to function reliably, each submersible pump must use the **same** phase of 240 VAC power. If pumps are using different phases, they **MUST** be rewired to use the **same** phase.

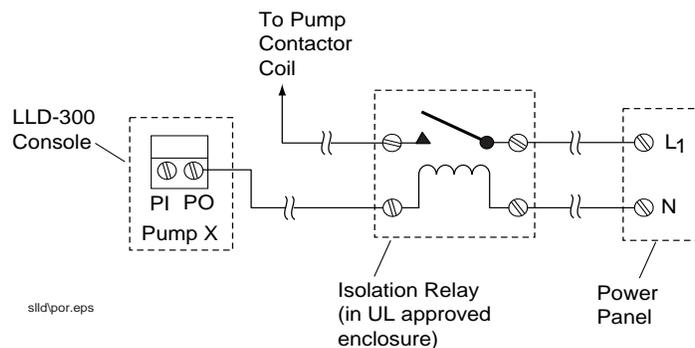
## Product Compatibility

The WPLLD system is approved for use in gasoline, ethanol and methanol gasoline blends up to 20%, 10-20% MTBE/gasoline blends, diesel fuel, and kerosene.

## Pump Output Rating

The nominal rating for the pump output circuit is 0.40 amperes at 120 Vac. Pump contactors, with a dc coil resistance of less than 275 ohms, can not be directly connected to the pump output circuit of the LLD-300 (see Figure 1).

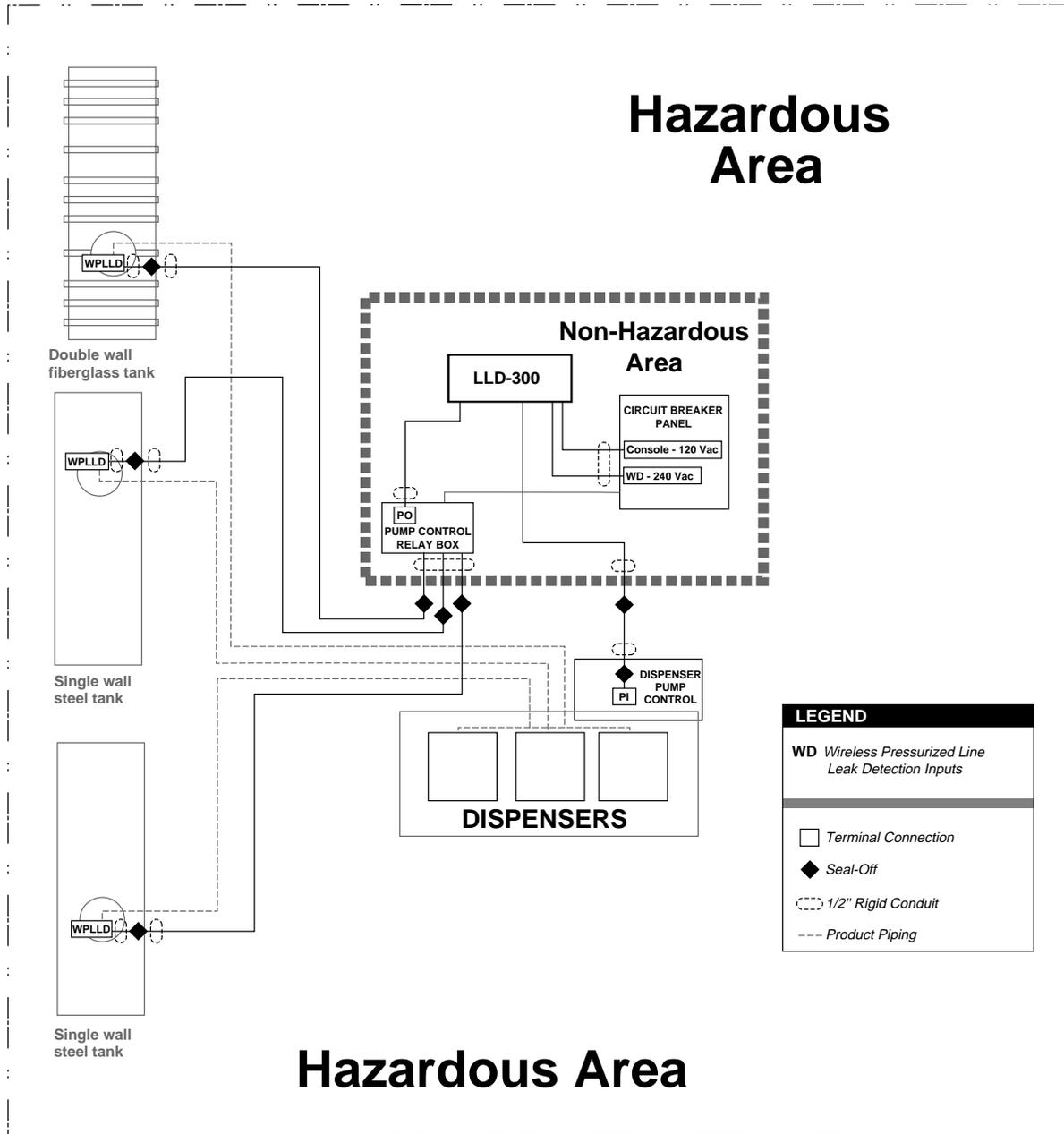
**CAUTION:** Pump contactors with coil resistance less than 275 ohms must be driven by an isolation relay. Failure to do so will result in damage to the LLD-300.



**Figure 1.** Example pump contactor coil isolation relay installation

## Site Configuration

Figure 2 diagrams an example site layout of an LLD-300 Console monitoring 3 lines.



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Figure 2. Example LLD-300 System Site Layout

---

## National Electrical Code Compliance

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Throughout this planning process and in the actual installation, you must follow all National Electric Codes, Federal, state, and local codes, regarding conduit type, sealing, grounding, wire capacities, etc.

The following information is for general reference and is not intended to replace recommended National Electric Code (NEC) procedures. It is important for the installer to understand that electrical equipment and wiring located in Class I, Division 1 and 2 installations shall comply with the appropriate articles found in the latest National Electric Code (NFPA 70) and Automotive and Marine Service Station Code (NFPA 30A).

### Console Power And Signal Wiring

- Wires carrying 115 VAC and 240 VAC from the power panel to the LLD-300 Console should be color-coded #14 AWG copper wire.
- Wires connecting the LLD-300 Console to the pump control relay should be color-coded #14 AWG copper wire.

---

## RS-232 Peripheral Equipment Requirements

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Any peripheral equipment connected to an RS-232 serial port must meet the following criteria:

1. Peripheral equipment must be UL listed.
2. The equipment must have an EIA standard RS-232C or RS-232D communications protocol.
3. The equipment must NOT be installed over or in a hazardous location.
4. RS-232 cables are limited to 50 feet in length and should be shielded.
5. For a list of the RS-232 serial commands used with the LLD-300, refer to the LLD-300 Troubleshooting Manual (V-R no. 577013-602).

---

## Installation Test Requirement

---

After the LLD-300 is installed and programmed, a 3 gph test must be started manually. Pumping cannot begin until a manually initiated 3 gph test has passed.

**Important**  For 0.2, or 0.2 & 0.1 models, the LLD-300 will attempt to run a 0.2 gph test every time a manually initiated 3 gph test has passed - EXCEPT - when any FLEX type line was selected in setup.

# Installing The LLD-300 Console

## **WARNING**



This equipment uses lethal voltages and attaches to accessory components which operate in areas where flammable liquids and vapors may be present.

Serious injury or death from shock, explosion, or fire may result if power is on during installation and the device is improperly installed.

When installing this product:

1. Read and understand all instructions.
2. Turn off power to the console and submersible pumps during installation.
3. Use only Veeder-Root supplied service parts to avoid compromising safety.
4. Insure that any assembled conduit only enters the console through the properly designated knockouts.
5. Wiring must comply with all applicable requirements of the National Electrical Code; federal, state, and local codes; and any other safety codes.
6. To protect yourself and others from being struck by vehicles, block off your work area during installation or service.

## Selecting A Console Mounting Location

 <b>WARNING</b>	
	<p><b>The console is not designed to operate in a volatile, combustible, or explosive (Class I, Division 1 or 2) atmosphere.</b></p> <p><b>Failure to comply with these warnings could result in death, serious personal injury, property loss, and equipment damage.</b></p> <p><b>Do not install this console in a location where volatile, combustible, or explosive vapors may be present or occur.</b></p>

Select a mounting location on the inside of any building. The console must be protected from severe vibration, extremes in temperature and humidity, rain, and other conditions that could harm computerized electronic equipment. The console's operating temperature range is 32 to 113°F (0 to 45°C) and its storage temperature range is 15 to 113°F (-10 to 45°C).

The mounting surface and method of attachment should be strong enough to support the console's weight which is about 4 pounds.

Provide enough horizontal wall space for the console with its front panel door opened (12.5"), and vertical wall space for the console (6.5") itself and for power and sensor conduit entry.

## Mounting The Console

The console enclosure has four mounting holes on a pattern of 6.7 by 5.7 inches [Figure 3]. Mounting screws should be #10 (0.190" dia.) or smaller. Figure 3 also shows designated knockouts and additional dimensions of the LLD-300 Console.



After mounting the console to the mounting surface install rigid metal conduit (1/2", 3/4", or 1" I.P.S.) between the console and the power panel, and between the console and the pump control relay box.

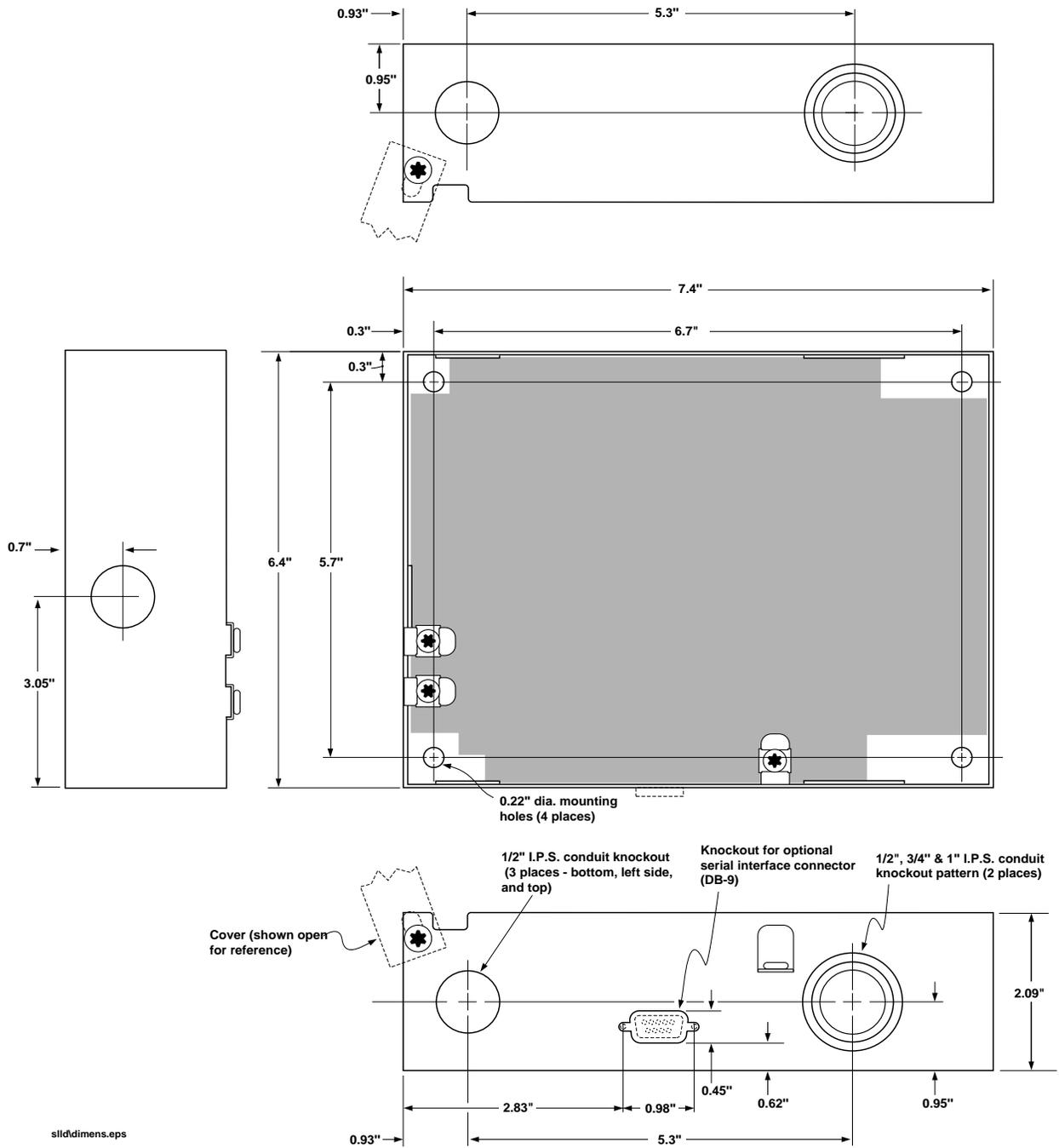


Figure 3. Console Dimensions And Designated Conduit Knockouts

## Wiring The Console

 <b>WARNING</b>	
 	<p><b>This device operates using potentially lethal voltages. Improper wiring or wiring to live circuits can result in electrical shock causing serious injury or death.</b></p> <p><b>Do not wire the unit to a live circuit.</b></p> <p><b>Attach conduits from the circuit breaker panel and pump control box to the consoles knockouts only (2 on top and bottom, ref. Figure 3)</b></p>

1. Pull five #14 AWG or larger color-coded wires between the power panel and the console; three wires for console power (120 Vac line, neutral, and ground), and two wires for sensor data (240 Vac L1 and L2). Verify submersible pumps are using the **same** phase of 240 Vac power. If necessary, rewire them to the **same** phase.
2. Connect the five power wires to the console as diagrammed in Figure 4 on page 19.

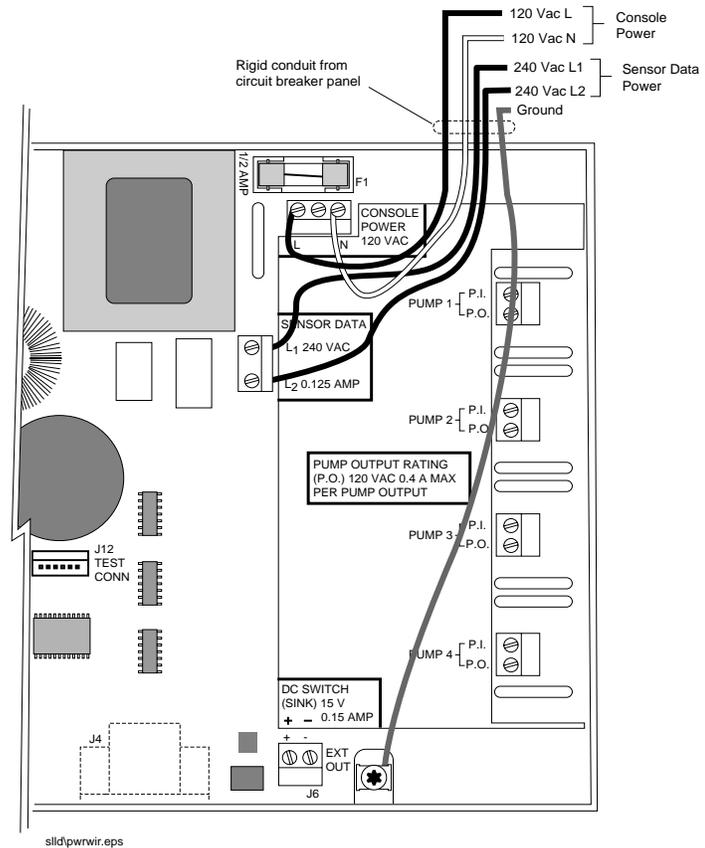


Figure 4. Wiring AC Power To The Console

3. At the circuit breaker panel, connect the three color-coded console power lines to 120 Vac line, neutral and ground.
4. At the circuit breaker panel, connect the two color-coded sensor data power lines to 240 Vac L1 and L2. The circuit must be non-isolated (i.e. not separated from main power by a transformer or other device) and not supplying power to a STP (see note below). Affix the warning label provided in the installation kit to the circuit breaker to indicate that WPLLD is using this circuit.

**Important** 

*We strongly recommend that you use a separate dedicated 2-pole circuit breaker for the 240 Vac sensor data power source (size in accordance with NEC requirements). If you use a circuit breaker which is also supplying power to a particular STP, any time the power to that STP is disabled it will shutdown all STPs which have WPLLD sensors installed.*

# Installing The WPLLD Sensors

This section is divided into two separate parts - WPLLD sensor installation for Red Jacket pumps [page 21] and for FE Petro pumps [page 30]. Install the WPLLD sensor following instructions for your pump type.

 <b>WARNING</b>	
	<p><b>This equipment uses lethal voltages and attaches to accessory components which operate in areas where flammable liquids and vapors may be present.</b></p> <p><b>Serious injury or death from shock, explosion, or fire may result if power is on during installation and the device is improperly installed.</b></p> <p><b>When installing this product:</b></p> <ol style="list-style-type: none"><li>1. Read and understand all instructions.</li><li>2. Turn off power to the console and submersible pumps during installation.</li><li>3. Use only Veeder-Root supplied service parts to avoid compromising safety.</li><li>4. Wiring must comply with all applicable requirements of the National Electrical Code; federal, state, and local codes; and any other safety codes.</li><li>5. To protect yourself and others from being struck by vehicles, block off your work area during installation or service.</li></ol>
	
	
	

## Red Jacket Pumps

 <b>WARNING</b>	
    	<p><b>This system contains hazardous fuels.</b></p> <p><b>If the functional element leaks, serious injury or death from fire or explosion, or environmental contamination may result.</b></p> <p><b>Before proceeding</b></p> <ol style="list-style-type: none"> <li>1. <b>Follow instructions completely.</b></li> <li>2. <b>Turn off power to the Console and the submersible pumps during installing.</b></li> <li>3. <b>Use only Veeder-Root supplied or designated service parts to avoid compromising safety.</b></li> </ol> <p><b>When reinstalling:</b></p> <ol style="list-style-type: none"> <li>1. <b>Follow instructions completely.</b></li> <li>2. <b>Check for leaks after the system is pressurized.</b></li> </ol>

### 3 GPH-Only Models

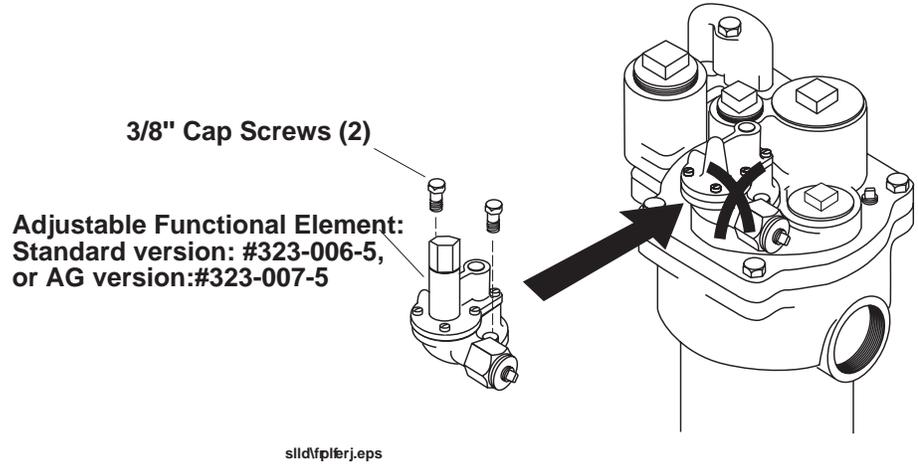
#### Replacing The Functional Element

For LLD-300 Consoles that perform 3 gph (gross) tests ONLY, You *must* replace the functional element with an adjustable functional element as part of the WPLLD system installation.

**Important**  *Newer Red Jacket pumps are shipped with adjustable functional elements installed. If the pump in which you are installing the WPLLD sensor has an adjustable functional element, you can ignore these replacement instructions and proceed to the next step. However, you must check to see that the already installed adjustable function element's relief pressure is set to 20-25 psi for proper WPLLD operation. Follow Red Jacket's recommended procedure to check and/or reset this relief pressure.*

1. To remove the functional element, unscrew and remove the two 3/8-inch cap screws from the functional element [Figure 5].
2. Replace the functional element following the instructions that came with the adjustable functional element. Be sure that all gasketed surfaces are clean when

reinstalling. The adjustable functional element part numbers shown in the figure below are factory set to the required relief pressure (20-25 psi).



**Figure 5.** Replacing The Functional Element With Adjustable Type

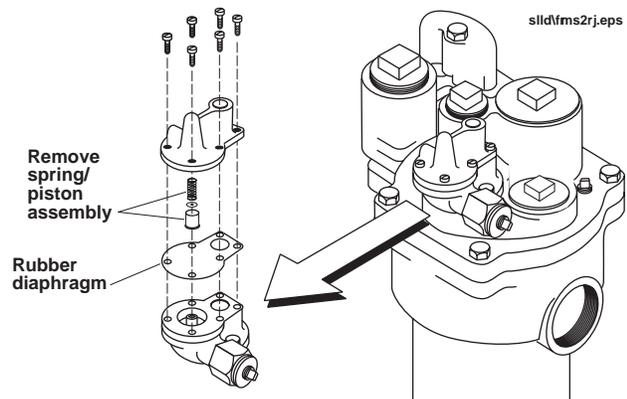
3. After installing the adjustable functional element go to the section entitled "WPLLD Sensor Installation" on page 33.

## 0.2 GPH And 0.1 GPH Models

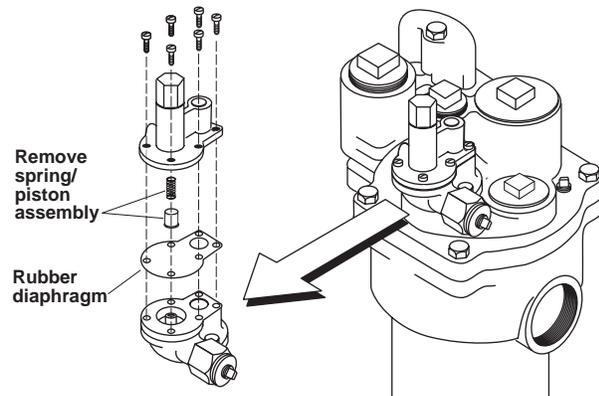
### Disabling The Pump's Functional Element

For LLD-300 Consoles that perform 0.2 gph or 0.1 gph leak tests (steel and fiberglass lines only), You *must* disable the functional element as part of the WPLLD system installation.

1. Remove the six slot-head screws from the functional element [Figure 6].
2. Remove the functional element spring and piston assembly.
3. Carefully reassemble the functional element using a new diaphragm if the existing one is badly worn or cracked (Red Jacket part no. 017-165-5). Be sure that all gasketed surfaces are clean when reinstalling.



Red Jacket Pump With Older Functional Element



Red Jacket Pump With Adjustable Functional Element

**Figure 6.** Disabling The Functional Element

### SwiftCheck Valve Installation

The SwiftCheck™ valve mounts directly into the mechanical line leak detector (LLD) port of the pump. It eliminates the need to break product lines for installation and service. It also provides a means of precision testing on the packer discharge O-ring and threaded discharge.

Since the SwiftCheck valve replaces the existing mechanical device, it is suitable in applications where there is no sump sensor (except with installations containing Healy Mini-Jet Stage II recovery systems).

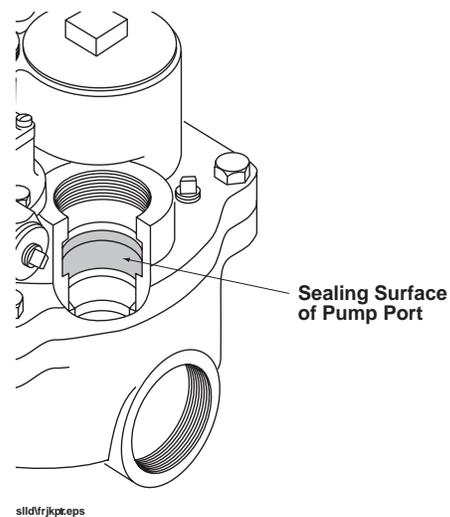
Follow these steps to install a SwiftCheck valve:



1. Turn off power to the STP.
2. If the STP is equipped with a mechanical LLD, remove the mechanical unit and any related tubing and fittings. Plug any tubing openings using appropriate fittings and seal using a UL-classified sealant suitable for the fuel involved.
3. If the STP is *not* equipped with a mechanical LLD, remove the 2-inch mechanical LLD port plug.
4. Ensure that the sealing surface for the SwiftCheck valve's external O-ring is smooth and relatively free from corrosion, pitting, and any material build-up [Figure 7]. Failure to ensure a smooth sealing surface may result in leak alarms.



5. Catch all fuel drainage in an approved container and return to the tank. Do not contaminate the environment.



**Figure 7.**Checking The Pump Port Sealing Surface

6. Lubricate the external O-ring on the SwiftCheck valve using mineral oil or other suitable lubricant.

7. Install the SwiftCheck valve [Figure 8] in the mechanical LLD pump port. Seal the NPT threads only with a UL-classified nontoxic pipe sealant suitable for the fuel involved. Do not overtighten the SwiftCheck valve when installing into the pump. Overtightening the valve can cause it to stick resulting in a flow restriction in the line.

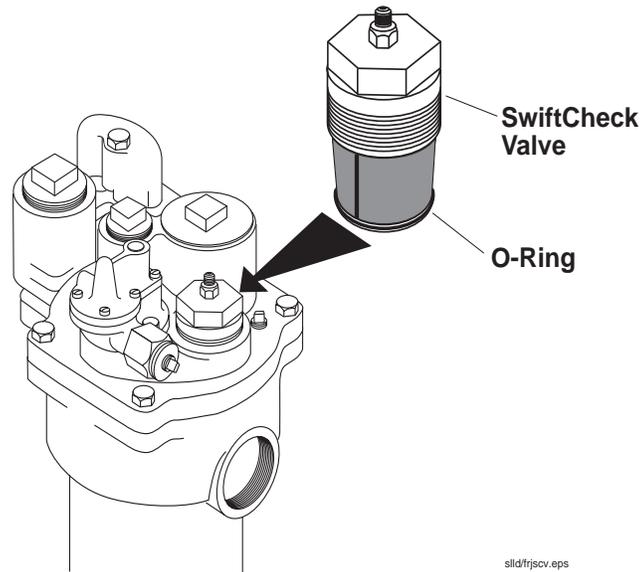


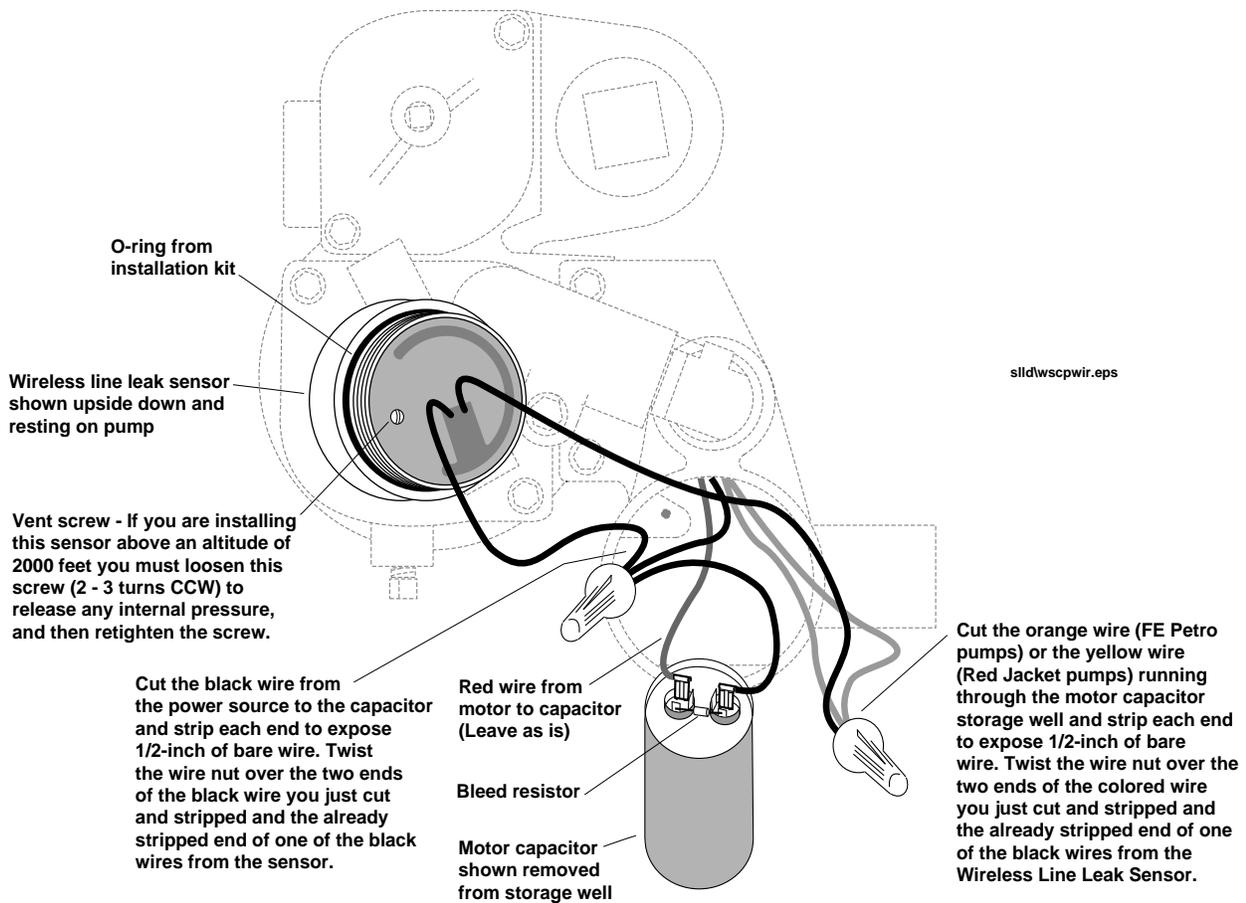
Figure 8. SwiftCheck Valve Installation

### WPLLD Sensor Installation - All Models

1. Install the O-ring from the installation kit onto WPLLD sensor by carefully pushing it over the external threads and into the groove above the threads. Then remove the protective plastic cap from the WPLLD sensor.
2. WPLLD sensors are equipped with a vent screw to equalize internal pressure. If the sensor is being installed at altitudes above 2,000 feet, open the vent screw at least two turns, but not more than three turns to vent any internal pressure. Then retighten the vent screw securely to prevent water from entering. Failure to release internal pressure in the WPLLD sensor at altitudes above 2,000 feet could cause inaccurate pressure readings and false line leak alarms.
3. Remove the capacitor cover from the pump head and place the protective plastic cap (removed from the WPLLD sensor) over the threads.

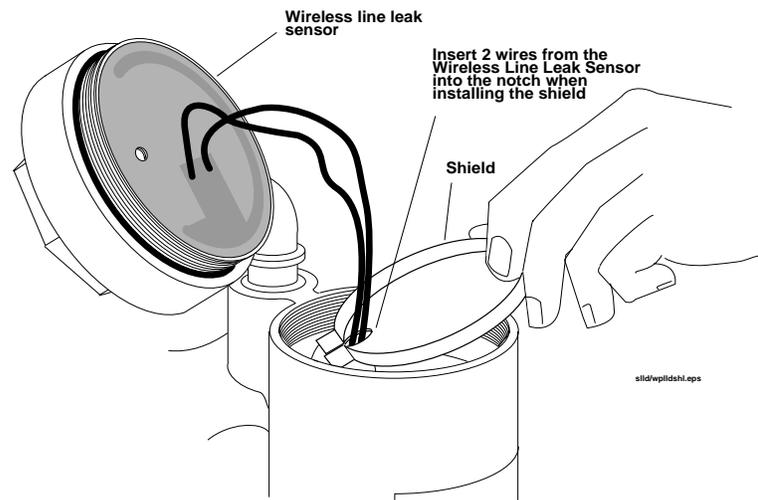
**Important**  *The capacitor cover must remain with the pump because it contains important safety and manufacturers information. Put the cover aside for now. If fuel is present in the pump capacitor housing, you must identify and correct the source of the leak before proceeding.*

4. Follow the instructions in Figure 9 to connect the WPLLD sensor to the motor pump. Some older Red Jacket pumps may have oval-style caps. These caps are taller and will not allow for WPLLD Line Leak Sensor to be installed. Cap should be replaced with Red Jacket nos. 111-661-5 (1-1/2 HP pumps) or 111-092-5 (1/3 or 3/4 HP pumps).



**Figure 9.** Connecting WPLLD Sensor To Pump

5. Place the shield (from the installation kit) into the capacitor housing with open side up [Figure 10 on page 27]. Hold the shield at an angle and place notched tab into the compartment first. Guide the two wires from the WPLLD sensor into the notch on the shield, leaving as much slack in the wires as possible above the shield (this will prevent stressing them when the transducer is threaded into the pump).



**Figure 10.**Placing Shield Into Capacitor Housing

6. Lightly lubricate the O-ring with mineral oil or other suitable lubricant.
7. Rotate the sensor about three turns counterclockwise, then screw the Wireless Line Leak Sensor into the pump compartment and tighten it securely.
8. **For The 3.0 Gph-Only Model**, connect the Sensing Line to the WPLLD sensor. Remove the small pressure port plug [Figure 5] and attach the other end of the Sensing Line to this port [Figure 11]. Tighten connections and attach one of the “WARNING” tags to the Sensing Line. With the two 6-32 x 0.375” screws provided, attach the capacitor cover bracket to the top of the WPLLD sensor. Snap the capacitor cover into the storage bracket.
9. **For The 0.2 Gph And 0.1 Gph Models** (steel and fiberglass lines only), install one end of the Sensing Line from the installation kit to the WPLLD sensor and the other end to the SwiftCheck valve [Figure 12]. With the two 6-32 x 0.375” screws provided, attach the capacitor cover bracket to the top of the WPLLD sensor. Snap the capacitor cover into the storage bracket. Attach one “WARNING” tag to the sensing line.

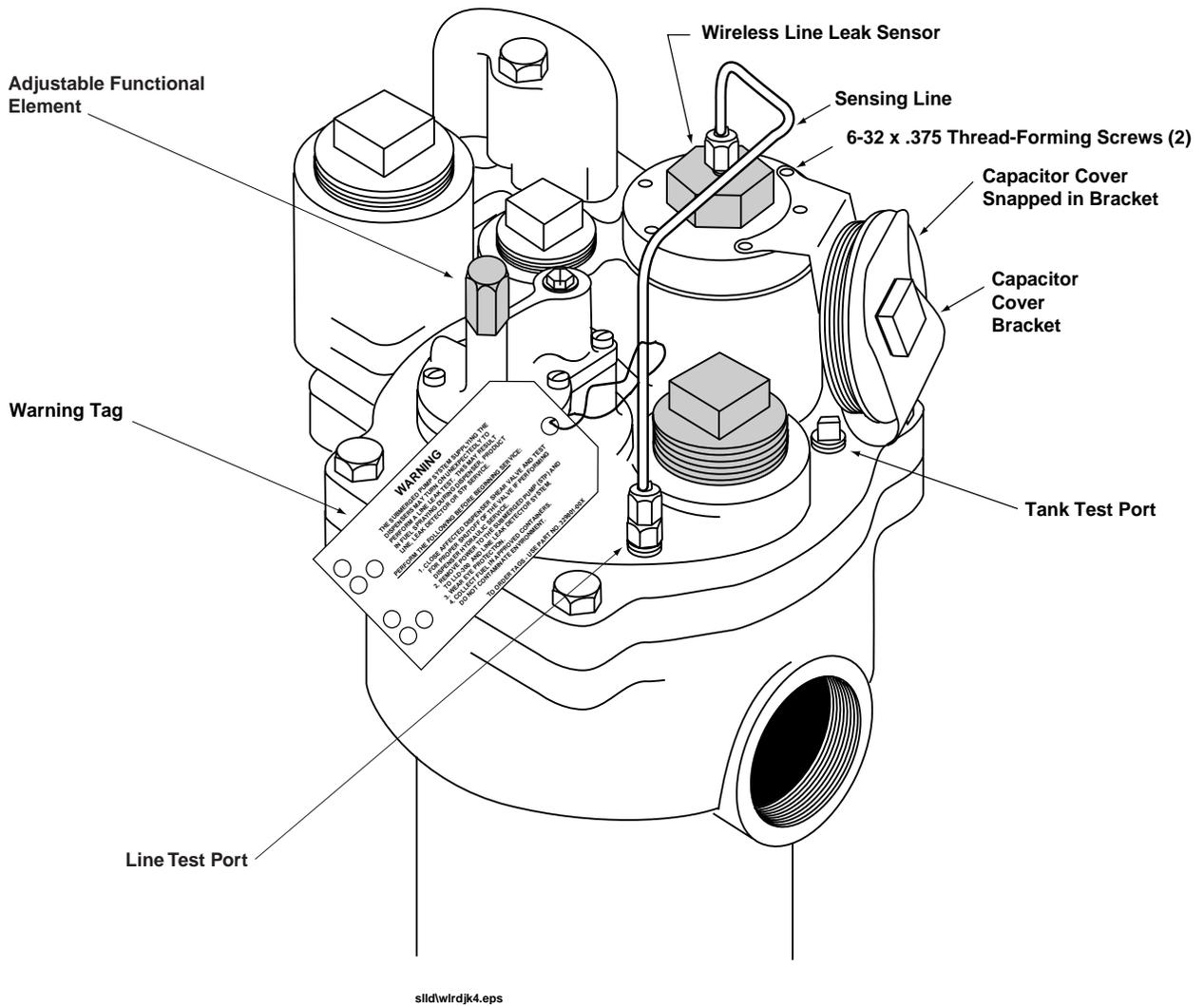


Figure 11. Completed WPLLD Sensor Installation for 3.0 gph Models - Red Jacket Pump



## FE Petro Pumps

 <b>WARNING</b>	
	<p><b>This system contains hazardous fuels.</b></p> <p><b>If the manifold cover leaks, serious injury or death from fire or explosion, or environmental contamination may result.</b></p> <p><b>Before proceeding</b></p> <ol style="list-style-type: none"> <li>1. <b>Follow instructions completely.</b></li> <li>2. <b>Turn off power to the Console and the submersible pumps during installing.</b></li> <li>3. <b>Use only Veeder-Root supplied or designated service parts to avoid compromising safety.</b></li> </ol> <p><b>When reinstalling:</b></p> <ol style="list-style-type: none"> <li>1. <b>Follow instructions completely.</b></li> <li>2. <b>Check for leaks after the system is pressurized.</b></li> </ol>

### 3 GPH-Only Models

Proceed to “WPLLD Sensor Installation” on page 33.

### 0.2 GPH and 0.1 GPH Models (Steel And Fiberglass Lines Only)

#### Installing A Precision Check Valve

To perform 0.1 gph tests the FE Petro pump check valve must be an adjustable check valve (FE Petro Part No. 400664912) or a precision check valve.

You can identify the difference between a regular check valve and the precision check valve by comparing the underside of the valves [Figure 13].

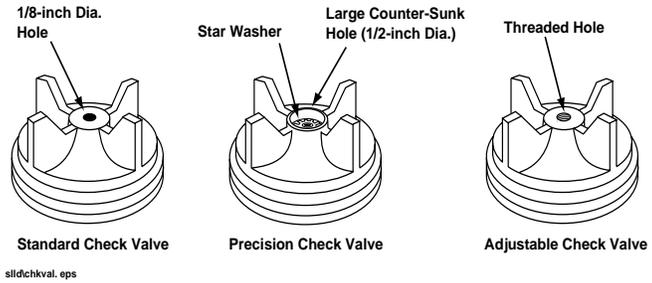
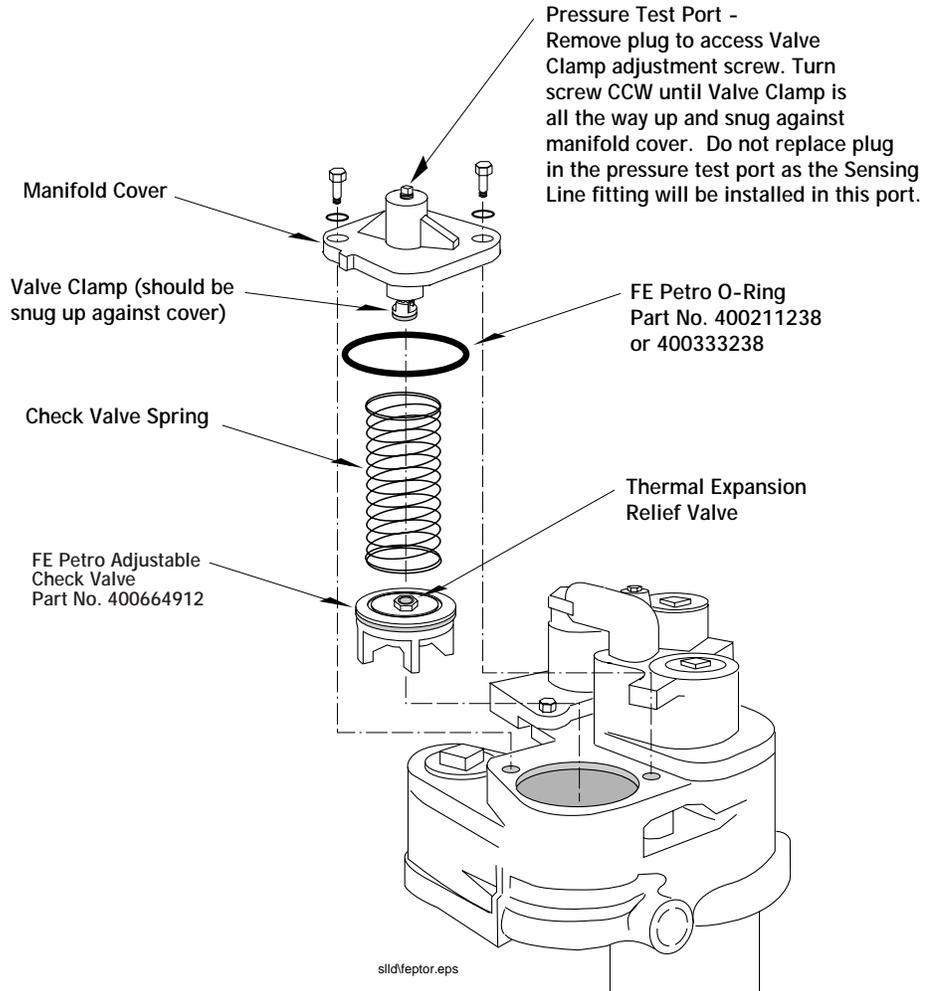


Figure 13.FE Petro Check Valves



1. Turn off and tag the breaker supplying power to the STP. To install the adjustable check valve remove the bolts securing the manifold cover [Figure 14].



**Figure 14.**Installing FE Petro Precision Check Valve



2. Install the FE Petro adjustable check valve oriented as shown, then replace the remaining parts of the assembly following the instructions in Figure 14.
3. Catch all fuel drainage in an approved container and return to the tank. Do not contaminate the environment.
4. Replace and tighten the manifold cover bolts.
5. Screw the tank port fitting from the installation kit into the pressure test port on top of the manifold cover.

## WPLLD Sensor Installation

1. Install the O-ring from the installation kit onto WPLLD sensor by carefully pushing it over the external threads and into the groove above the threads. Then remove the protective plastic cap from the WPLLD sensor.
2. WPLLD sensors are equipped with a vent screw to equalize internal pressure. If the sensor is being installed at altitudes above 2,000 feet, open the vent screw at least two turns, but not more than three turns to vent any internal pressure. Then retighten the vent screw securely to prevent water from entering. Failure to release internal pressure in the WPLLD sensor at altitudes above 2,000 feet could cause inaccurate pressure readings and false line leak alarms.
3. Remove the capacitor cover from the pump head and place the protective plastic cap (removed from the WPLLD sensor) over the threads. The capacitor cover must remain with the pump because it contains important safety and manufacturers information. Put the cover aside for now. If fuel is present in the pump capacitor housing, identify and correct the source of the leak before proceeding.
4. Follow the instructions in Figure 9 on page 26 to connect the WPLLD sensor to the pump.
5. Place the shield (from the installation kit) into the capacitor housing with open side up [Figure 10 on page 27]. Hold the shield at an angle and place notched tab into the compartment first. Guide the two wires from the WPLLD sensor into the notch on the shield, leaving as much slack in the wires as possible above the shield (this will prevent stressing them when the transducer is threaded into the pump).
6. Lightly lubricate the O-ring with mineral oil or other suitable lubricant.
7. Rotate the sensor about three turns counterclockwise then screw the Wireless Line Leak Sensor into the pump compartment and tighten it securely.
8. Install one end of the sensing line from the installation kit to the port on top of the WPLLD sensor and the other end to the tank port fitting [Figure 15].
9. With the two 6-32 x 0.375" screws provided, attach the capacitor cover bracket to the top of the WPLLD sensor. Snap the capacitor cover into the storage bracket.
10. Attach one warning tag from the installation kit to the sensing line.

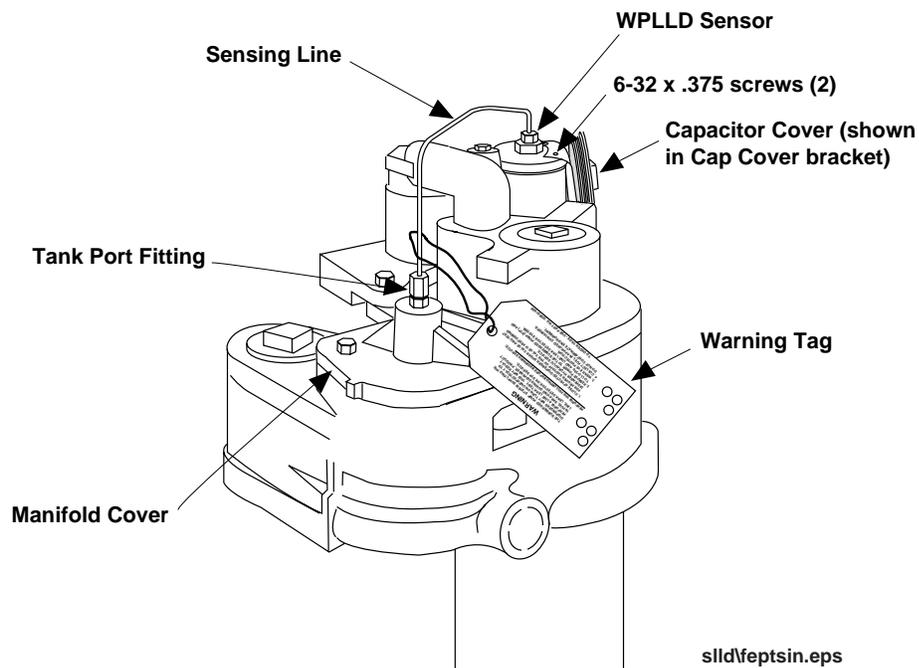


Figure 15. Completed WPLLD Sensor Installation - FE Petro Pump

## Warning Tags

Ten “WARNING” tags [Figure 16] are provided with the WPLLD System. For your safety and the safety of others who may service dispensers, STPs or WPLLD Systems, you must attach a tag in a location likely to be noticed by a serviceman performing work on a device that will be pressurized or powered during a leak test.

- LLD-300 Console
- Submersible pump
- Dispenser filter

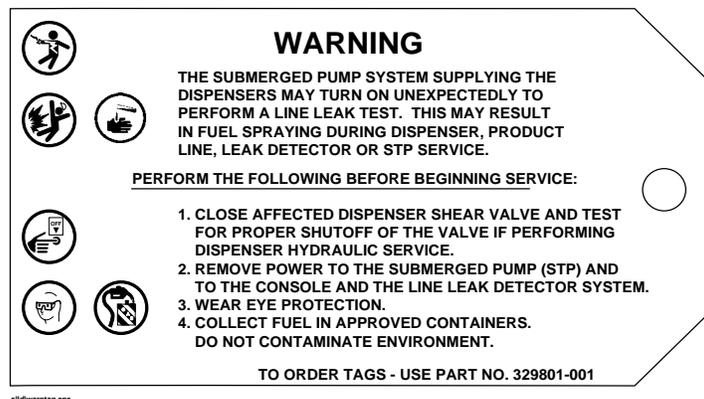


Figure 16. Warning Tag

# Wiring The Pumps To The Console

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 <b>WARNING</b>	
     	<p>This equipment uses lethal voltages and attaches to accessory components which operate in areas where flammable liquids and vapors may be present.</p> <p>Serious injury or death from shock, explosion, or fire may result if power is on during installation and the device is improperly installed.</p> <p>When installing this product:</p> <ol style="list-style-type: none"><li>1. Read and understand all instructions.</li><li>2. Turn off power to the console and submersible pumps during installation.</li><li>3. Use only Veeder-Root supplied service parts to avoid compromising safety.</li><li>4. Insure that any assembled conduit only enters the console through the properly designated knockouts.</li><li>5. Wiring must comply with all applicable requirements of the National Electrical Code; federal, state, and local codes; and any other safety codes.</li></ol>

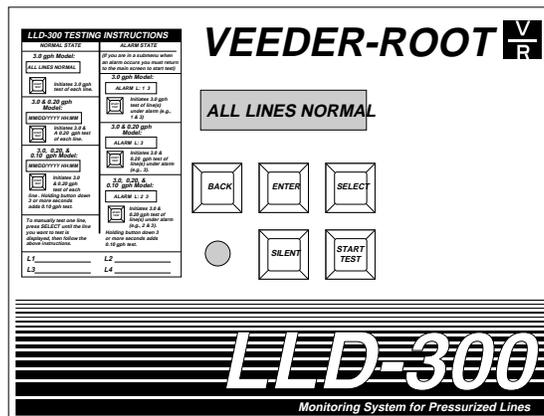
## Quick Test Reference Card

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Adhere the Quick Test Reference Card to the Console (e.g., to the left of the display).

As you connect the WPLLD sensors, write in the product for each pump (L1- regular, L2- super, etc.) wired to the LLD-300 Console in the circuit directory area of the Reference Card [Figure 17].

LLD-300 TESTING INSTRUCTIONS	
NORMAL STATE	ALARM STATE
<p><b>3.0 gph Model:</b></p> <p>ALL LINES NORMAL</p> <p> Initiates 3.0 gph test of each line.</p>	<p><i>(If you are in a submenu when an alarm occurs you must return to the main screen to start test)</i></p> <p><b>3.0 gph Model:</b></p> <p>ALARM L: 1 3</p> <p> Initiates 3.0 gph test of line(s) under alarm (e.g., 1 &amp; 3)</p>
<p><b>3.0 &amp; 0.20 gph Model:</b></p> <p>MM/DD/YYYY HH:MM</p> <p> Initiates 3.0 &amp; A 0.20 gph test of each line.</p>	<p><b>3.0 &amp; 0.20 gph Model:</b></p> <p>ALARM L: 3</p> <p> Initiates 3.0 &amp; 0.20 gph test of line(s) under alarm (e.g., 3).</p>
<p><b>3.0, 0.20, &amp; 0.10 gph Model:</b></p> <p>MM/DD/YYYY HH:MM</p> <p> Initiates 3.0 &amp; 0.20 gph test of each line. Holding button down 3 or more seconds adds 0.10 gph test.</p>	<p><b>3.0, 0.20, &amp; 0.10 gph Model:</b></p> <p>ALARM L: 2 3</p> <p> Initiates 3.0 &amp; 0.20 gph test of line(s) under alarm (e.g., 2 &amp; 3). Holding button down 3 or more seconds adds 0.10 gph test.</p>
<p>To manually test one line, press SELECT until the line you want to test is displayed, then follow the above instructions.</p>	
L1 _____	L2 _____
L3 _____	L4 _____



sllldcardonpl.eps

Figure 17. Quick Test Reference Card

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## Pump Control Wiring For Red Jacket And Other Pumps

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The LLD-300 Console must be able to detect when dispensers are on or off to schedule a line leak test when the dispenser is off. The console must also be able to start the STP to perform a line leak test, and shut off the STP if a leak is detected.

In this procedure you must interrupt the AC line between the “Dispenser on switch” and the pump contactor. You can usually break the AC line from the “Dispenser on switch” in the submersible pump relay control box. The “Dispenser on” signal may come from a point-of-sale terminal, self-serve console or switch or relay inside the dispenser. Refer to Figure 18 for Red Jacket pumps, Figure 19 for non-Red Jacket pumps, Figure 20 for installations having a Gilbarco Dispenser Isolation Box.



1. Turn off all AC power to the LLD-300 Console, dispensers, and submersible pumps.
2. Be sure all wires are color-coded or carefully marked to identify their source.
3. Follow the connection instructions in Figures 17, 18, or 19 as applicable.

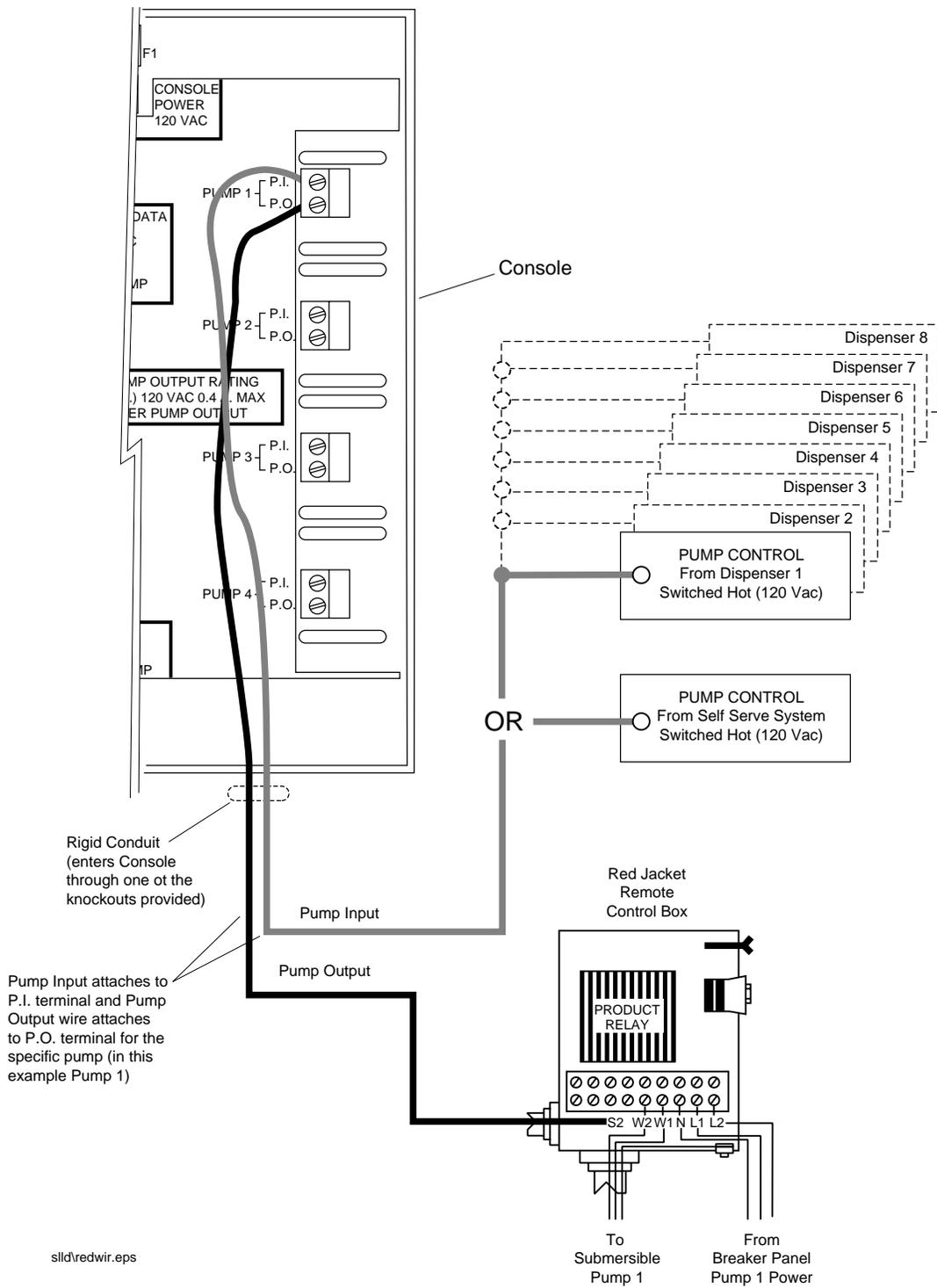


Figure 18. Pump Control Wiring Diagram - Red Jacket

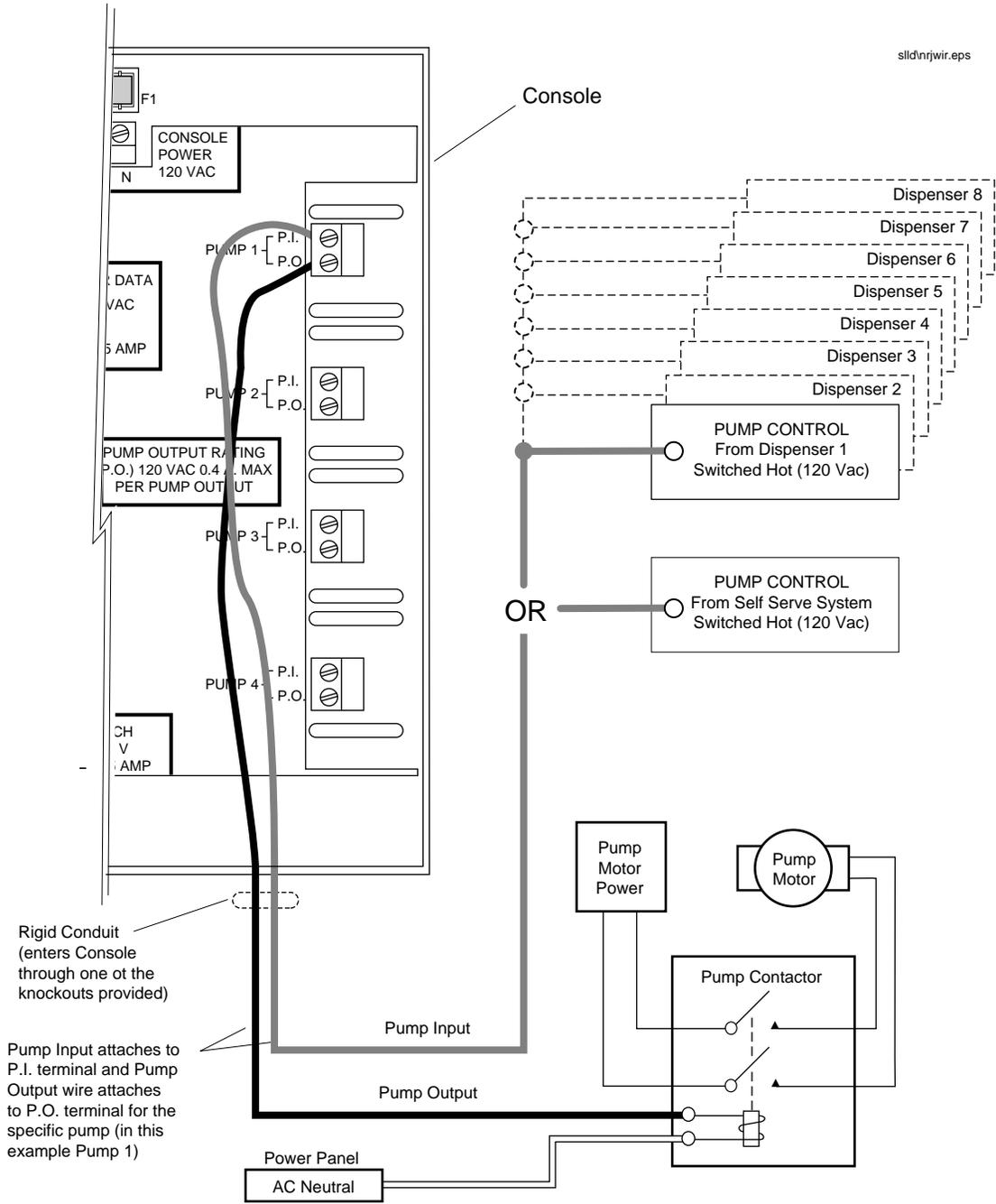


Figure 19. Pump Control Wiring Diagram - Non-Red Jacket

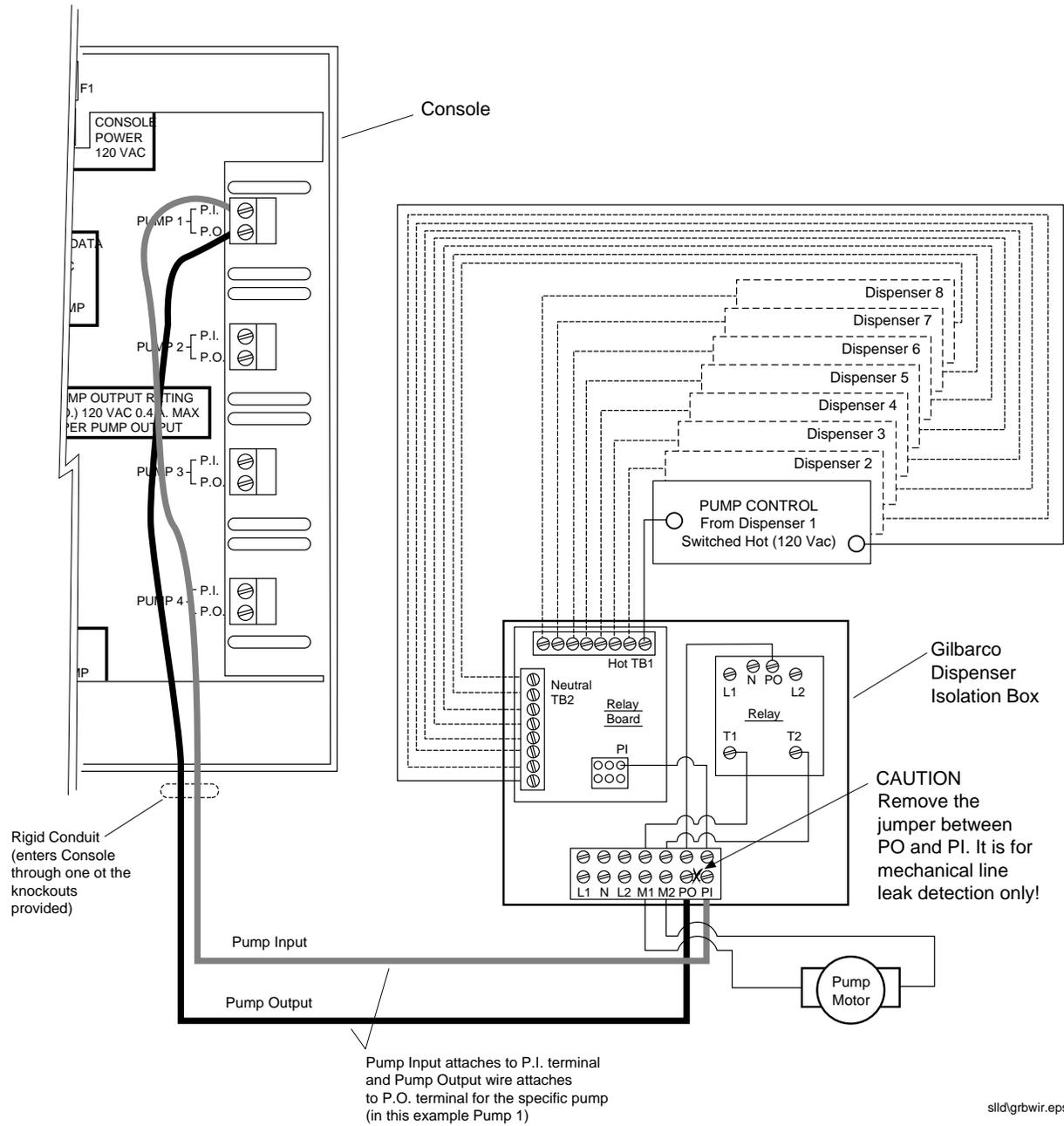


Figure 20. Wiring Pumps With A Gilbarco Dispenser Isolation Box

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## Checking STPs for leaks

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After connecting all of the sensors, apply power to each pump and check for leaks. Verify that the functional element, strainer, sensing lines, and check valve threads into each pump are not leaking. Product leakage can create serious environmental and safety hazards.



- Tighten any leaking fittings until the leak is stopped. **Be careful** not to overtighten and strip the threads. If the leak cannot be stopped, turn off power to the pump and check the fitting for thread damage or improper sealing.
- Replace or reseal the fitting(s) as required.

# Powering Up the System

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After the LLD-300 console and sensors are installed the system can be powered up. Initialization of the system is performed by a Veeder-Root Authorized Service Contractor during the warranty checkout and start-up procedure.

## Applying Power To The LLD-300 Console (Cold Boot)

---

When you turn on power to the console for the first time the system will cold boot - All setup parameters will be set to default values and hardware self-testing will occur.

1. Switch on the circuit breakers for 120 Vac console power and 240 Vac sensor data power.
2. The system will perform hardware tests in the following sequence:
  - RAM test
  - ROM checksum
  - EEPROM check
  - Real-time clock (0.2 gph and 0.1 gph models only)
3. If the hardware test is successful the front panel display message will be either ALL LINES NORMAL (for 3 gph-only models) or MM/DD/YYYY HH:MM (for 0.2 gph and 0.1 gph models). If a fault is detected an error message will be generated on the display and the system will halt.
4. The line type defaults to NONE and the unit must be programmed.
5. The lines will be disabled, a manual line test must be completed.
6. If the unit is not programmed, the next time the unit is powered up, it will perform a cold boot.
7. If the unit is programmed, all power ups thereafter are considered a warm boot.
8. To get back to a cold boot state after doing setup programming, the RAM clear pins must be momentarily shorted. With power On, move shorting plug on jumper J2 from pins 1 and 2 onto pins 2 and 3 [Figure 21]. Wait until front panel display reads RAM CLEAR, then move shorting plug back onto pins 1 and 2.

## Testing The AC Lines For Noise

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Because the LLD-300 Console communicates with the WPLLD sensors over the AC power lines, you must verify that there is not excessive noise present on the lines. Excessive noise will cause WPLLD communication alarms and shutdown the lines.



1. Ensure that power to the STPs is switched off.



3. Ideally, no LEDs should be on at this point; however, communications may be successful even if the LO LED (weakest) is on.
4. Even if only the LO LED is on, it is recommended that you attempt to eliminate the noise. To do this, check the site for the presence of other wireless devices which transmit using the AC power lines, such as wireless intercoms, light switches, dimmers, and phone extension jacks. If unplugging one of these devices turns off the LED, that device is not compatible with WPLLD and should not be used.

**Important** ☞ *Do not unplug equipment required for site operation without permission of the site operator. Completion of this procedure may require the station to be taken out of service.*

5. Electrically AC-powered equipment can also be noise sources. Any device having an intermittent or faulty wiring connection, or an electric motor which is not running properly, can cause noise. Faulty connections or bad motors should be repaired or replaced prior to installing the WPLLD system. Motor speed controllers, light dimmers, neon signs, car wash systems, computers, or other electronic devices can cause noise. Unplug any of these devices, one at a time, to determine if the noise is eliminated. Once the device is identified, it may be possible to reduce the line noise by using a line filter on its input power instead of removing the device completely. Veeder-Root recommends the “Surge Arrest Plus” line filter available from American Power Conversion (contact them via email: [apcinfo@apcc.com](mailto:apcinfo@apcc.com), at their website: <http://www.apcc.com>, or by telephone: (800) 800-4272 or (401) 789-5735).
6. When you have achieved no noise, or the noise level is such that only the LO LED (weakest) is on, check the sensor signal strength.

## Sensor Signal Strength Check

Eight seconds after power to the STP is switched on, the WPLLD sensor will transmit its first message. Every 8 seconds thereafter (for up to 4 minutes), the sensor will transmit another message. It is during these transmissions that you can observe the signal strength of each line’s sensor, and if necessary, move the Gain jumper J1 toward its HI position to increase sensor signal strength (Caution: moving jumper J1 to amplify WPLLD sensor signal strength also amplifies any “noise” on the ac line).

Locate the Gain jumper J1, the P.I. and P.O. LEDs for each line, the four Noise/Signal Strength LEDs, the DATA LED, and the DIAG LED [Figure 21].

With power restored power to the STPs, have an assistant go to any dispenser on line 1. As the assistant lifts the handle, the green P.I. (pump request) LED will come on, and within 2 seconds, the red P.O. (pump on) LED will come on. Eight seconds later, the first sensor message will be received.

For optimum system operation, you should observe the following:

- When WPLLD sensors are not transmitting--none of the four red Noise/Signal Strength LEDs are on (indicating that no “noise” is on the ac lines).
- When WPLLD sensors are transmitting--At least 2 of the red Noise/Signal Strength LEDs are flashing and the green DATA LED is flashing. If the message was successfully received, the red DIAG LED will flash once.

**Important**  *During the message transmission it is more important that the green DATA LED be flashing than you see all of the 4 red LEDs on – The green DATA LED must be flashing or the LLD-300 Console is not receiving the sensor message and no testing can occur.*

Repeat the above steps for each line.

# Programming The LLD-300 Console

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## Front Panel Buttons

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Before programming the LLD-300 Console you need to understand the function of each of the front panel buttons [Figure 22].



Press the **SELECT** button to move down through the menu (displays). Also press this button to scroll through menu selections.



Press the **ENTER** button to move into a submenu (if it exists). Also press this button when you want to save your menu selections.



Press the **BACKUP** button to move backward in the menu. Also press this button to move backwards one menu step and cancel any changes to the current menu selection.



When the Main Screen is indicating an alarm state, pressing the **START TEST** button will immediately schedule all tests that have failed on all lines involved. When the Main Screen is indicating WARN, pressing the **START TEST** button will immediately schedule a 0.2 gph test for all lines that are in the periodic warning state.

**MANUAL LINE TEST** - In a no-alarm condition, and the screen is displaying the status of any line (L1, L2, L3, or L4), pressing the **START TEST** button will schedule a 3 gph and a 0.2 gph test (if available) of that line. Pressing the **START TEST** button down for at least 3 seconds will generate an audible beep and schedule a 3 gph, a 0.2 gph (if available), and a 0.1 gph (if available) test of that line. When in a no-alarm condition and in the Main Screen (the status screen for all the lines), the above key presses and test scheduling applies to all lines instead of one line.

**HALTING A MANUAL TEST**- When the screen is displaying the status of any line (L1, L2, L3, or L4), pressing the **START TEST** button will abort any test in progress on that line. Also, when in Diagnostic Mode and a line status screen is displayed (e.g., **L1 E1 T2 P0 H0**), pressing **START TEST** will abort any test in progress on that line.



Press the **SILENT** button to silence the beeper during an alarm situation. If another alarm goes into an active state, the beeper will reactivate. Pressing the **SILENT** button down for at least 3 seconds at any time will initialize a 1/2 second long audible beep to test the beeper.

## Menus

There is one top level menu used to view system status and three submenus:

- Top Level Menu - the operator scrolls through this menu to display system status and to enter the History, Setup, and Diagnostic submenus.
- History Menu - This menu provides access to leak test histories.
- Setup Menu - This menu is used to program your system.
- Diagnostic Menu - This menu is to be used by an authorized service contractor only and provides access to system parameters when troubleshooting the system
-  The symbol to the left appears in the menus to indicate pressing a key.

Table 3 lists the menus which apply to various LLD-300 models.

**Table 3: LLD-300 Menus**

Menu	Step Procedure	
	3 gph-Only Models	0.2 gph & 0.1 gph Models
Top Level	Figure 22	Figure 23
History	Figure 24	Figure 25
Setup	Figure 26	Figure 27
Diagnostic	Figure 28	Figure 28

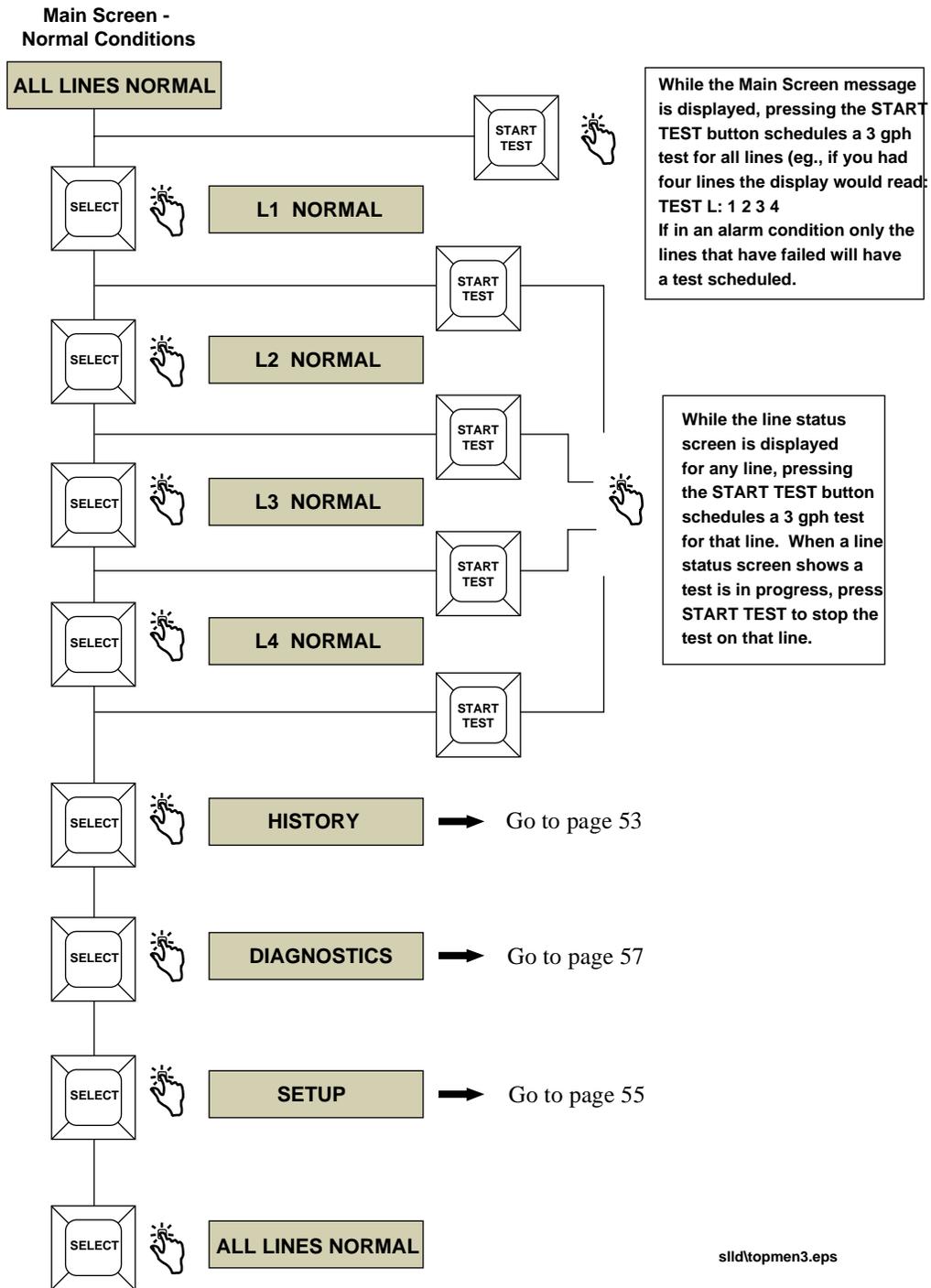


Figure 22. Top Level Menu for 3 GPH-Only Models

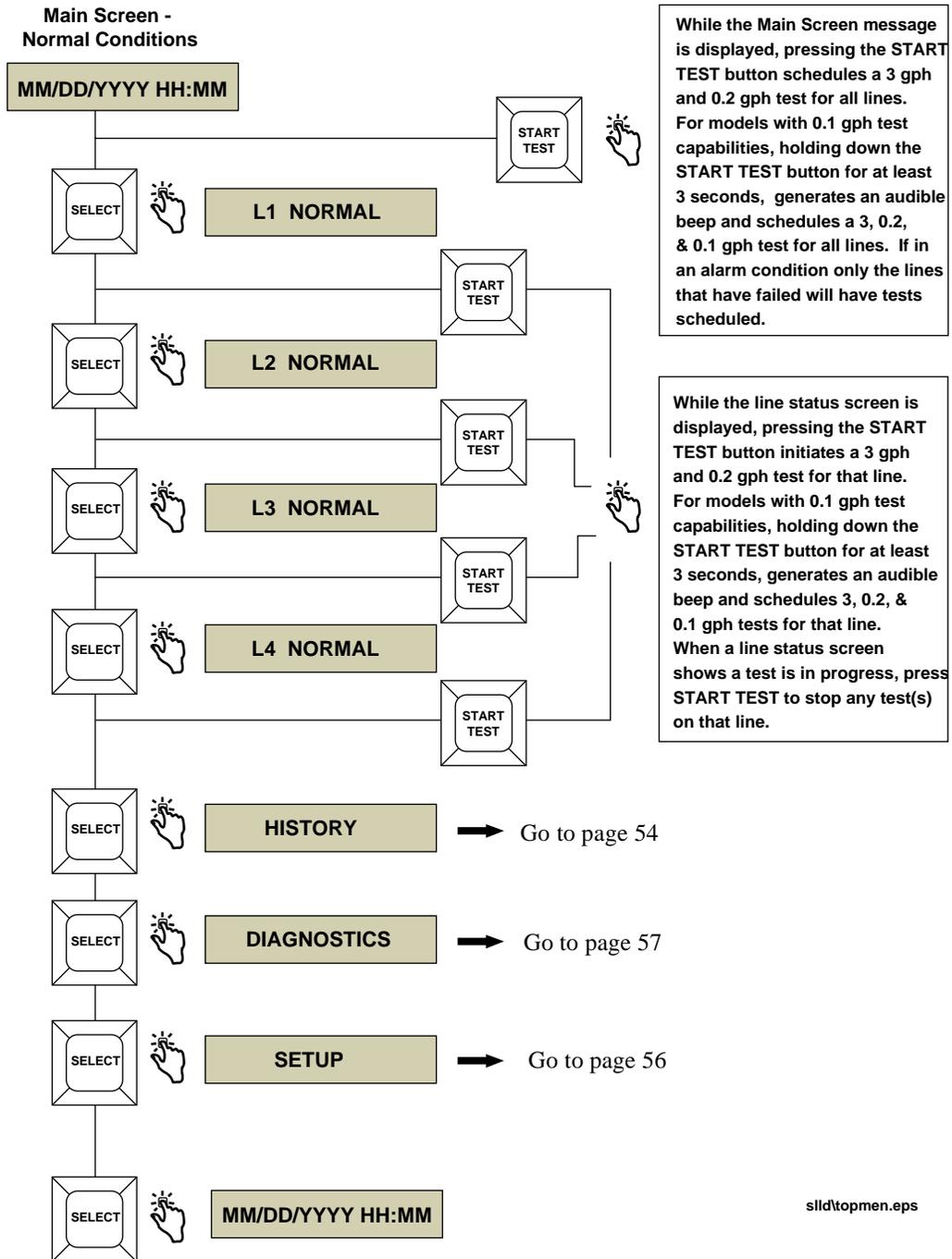


Figure 23. Top Level Menu for 0.2 GPH and 0.1 GPH Models

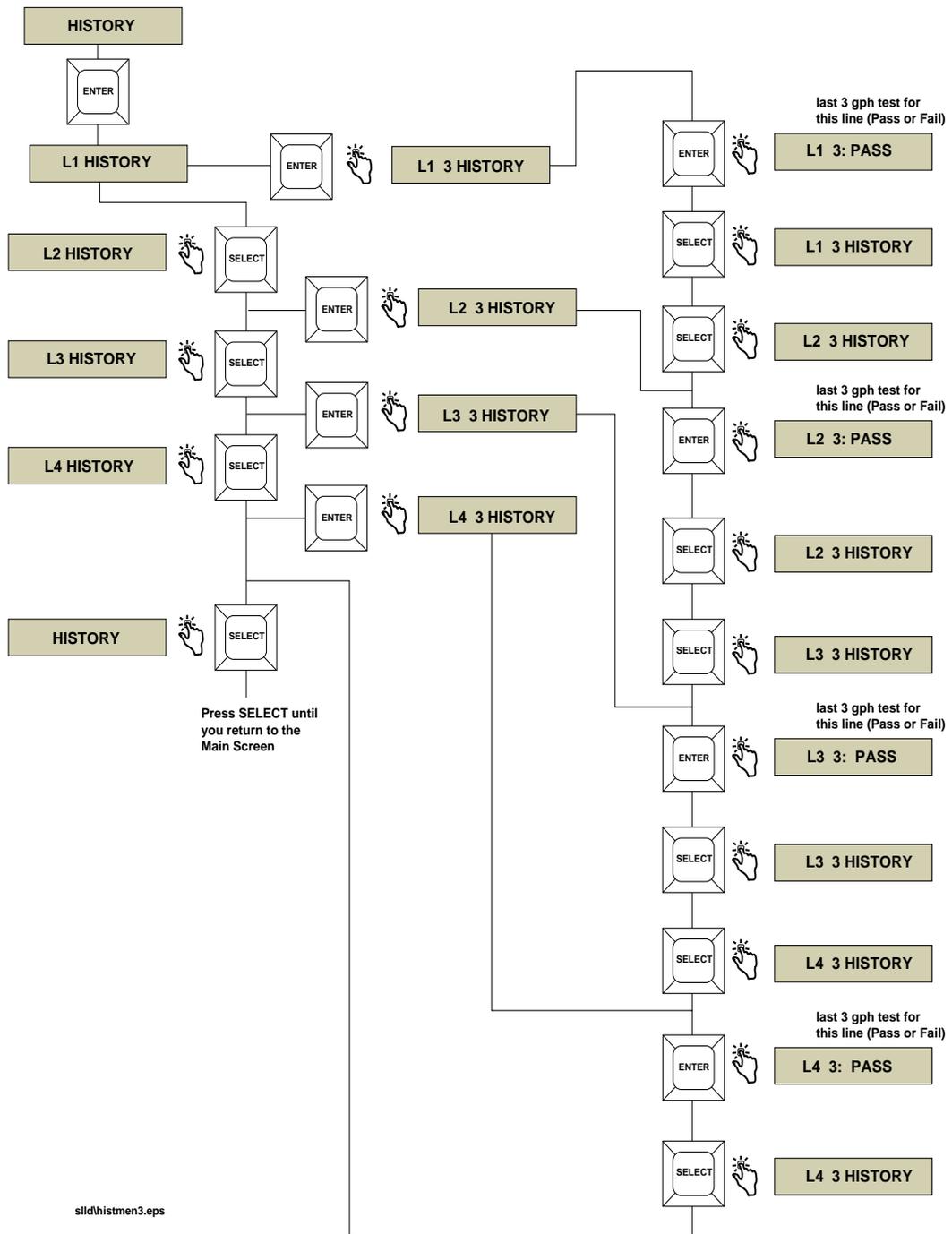


Figure 24. Test History Menu for 3 GPH-Only Models



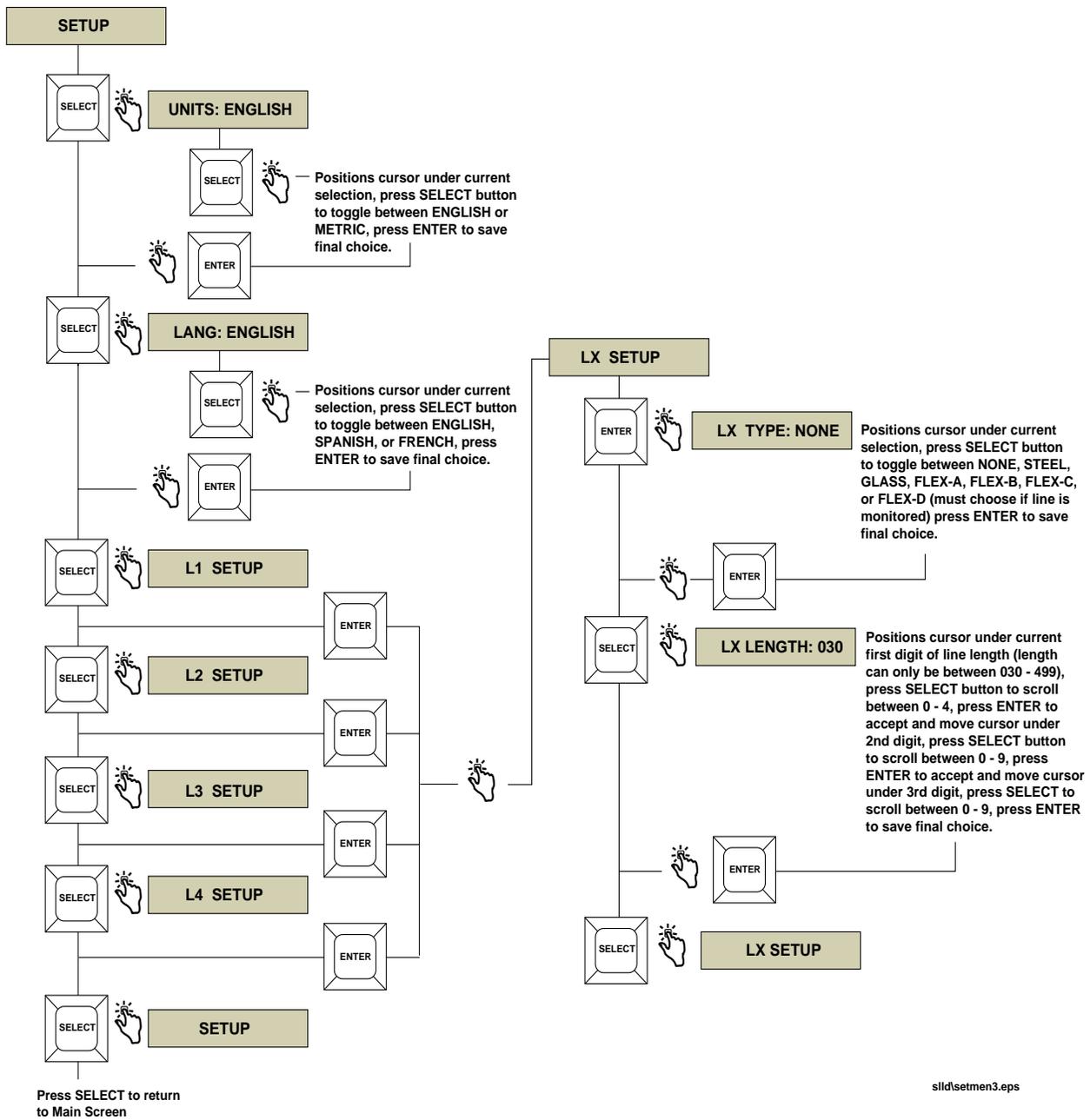


Figure 26. Setup Menu - Programming 3 GPH-Only Models

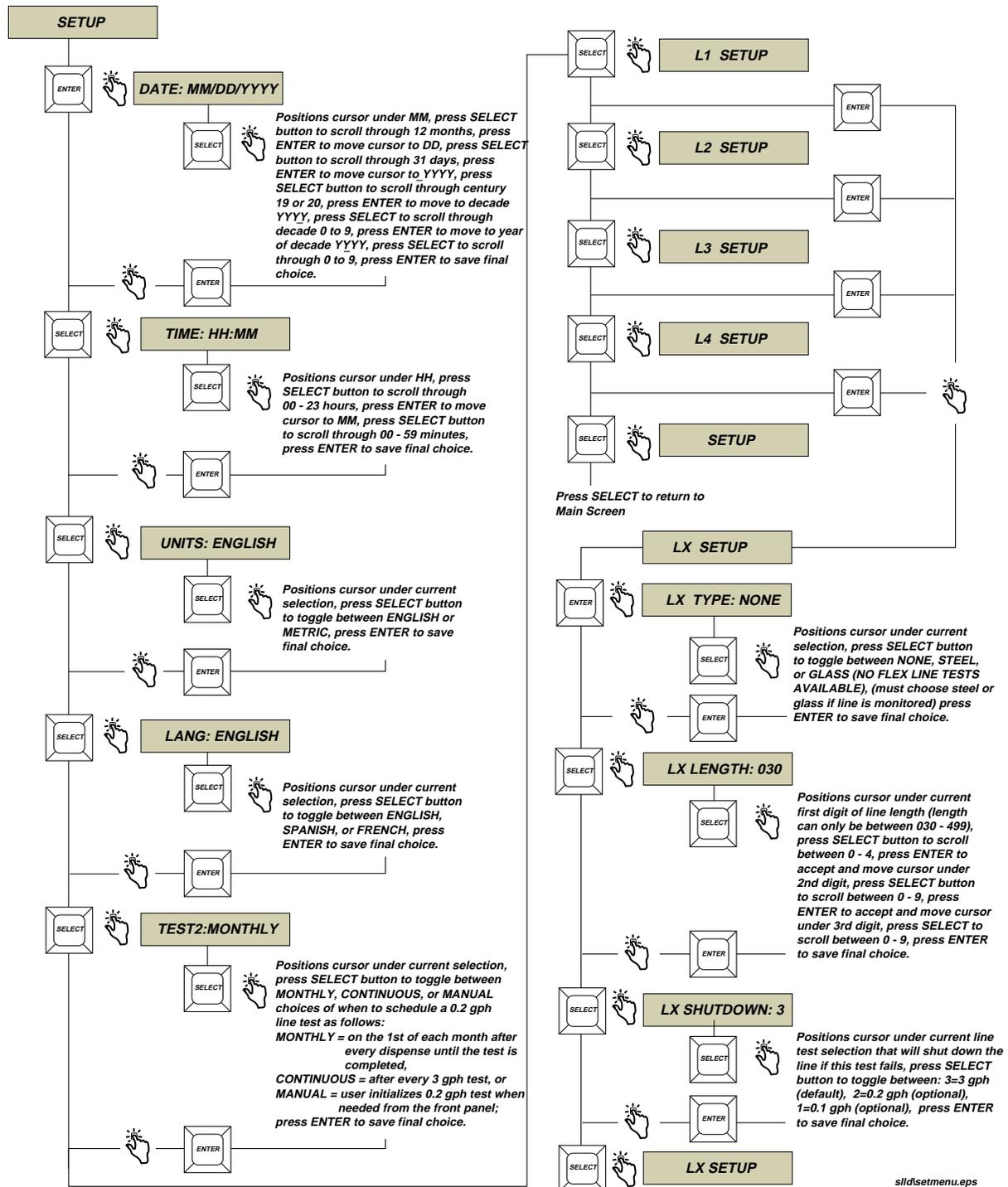


Figure 27.Setup Menu - Programming 0.2 GPH and 0.1 GPH Models

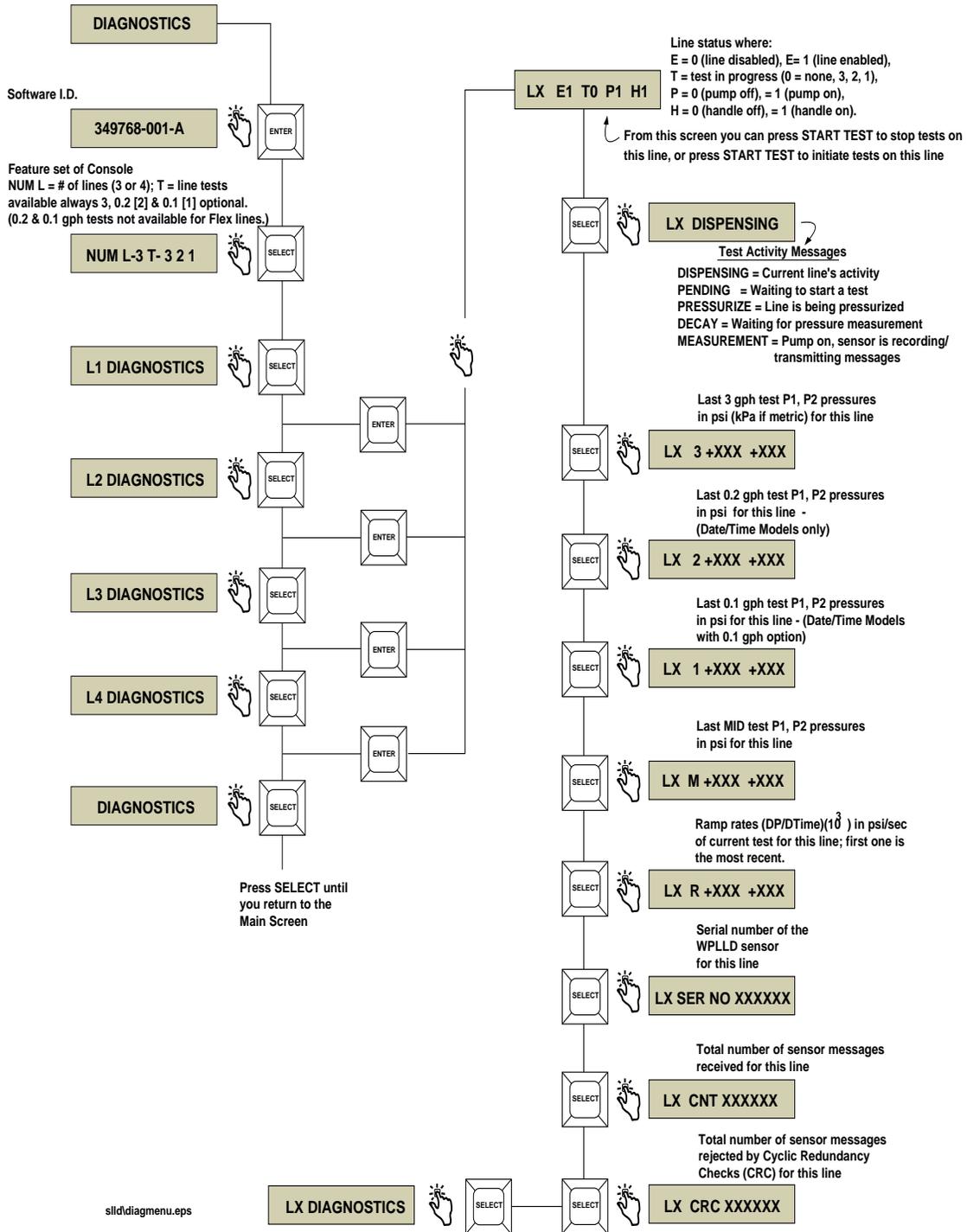


Figure 28. Diagnostic Menu - All Models

# Checking The System

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A Veeder-Root Authorized Service Contractor must program the setup information into the LLD-300 Console before beginning this procedure.

## 3 GPH Line Leak Test

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Before the site can pump fuel, a 3 gph line leak test must be passed.

1. Turn on power to the STP and the LLD-300 Console.
2. On all models, the system displays the message:

3 gph-only model:

**ALL LINES NORMAL**

The 0.2 and 0.1 gph models:

**MM/DD/YYYY HH:MM**

3. Press the **START TEST** button on the front panel.
4. The LLD-300 will begin the 3 gph test on all the lines, followed by the 0.2 gph test on models with this feature (note - 0.2 and 0.1 gph tests are not available when FLEX type lines are selected).

For example, if there were 4 lines, the system would display the message:

**TEST L: 1 2 3 4**

5. When the tests have successfully completed, depending on your system you should see the message

3 gph-only model:

**ALL LINES NORMAL**

The 0.2 gph and 0.1 gph models:

**MM/DD/YYYY HH:MM**

# Alarm Index

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## Displayed Alarms

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Possible displayed alarms are listed in Table 4, along with their cause (an L and number preceding an alarm message indicates the number of the line(s) in the alarm state)

**Table 4: Displayed Alarms**

<b>Alarm Message</b>	<b>Cause</b>
<b>3 FAIL</b>	3 gph test failed
<b>2 FAIL</b>	0.2 gph test failed (models w/ 0.2 gph leak tests)
<b>1 FAIL</b>	0.1 gph test failed (models w/ 0.1 gph leak tests)
<b>COMM ALARM</b>	Interrupted transmission from WPLLD Sensor.
<b>CONT PMP ALM</b>	A Pump In signal has been continuously active for a period exceeding 8 hours.
<b>MONTHLY WARN</b>	A 0.2 gph test was programmed to run monthly or continuous, but the calendar date has reached the 25th day of the month and a 0.2 gph test has not been completed during the month (models w/ 0.2 gph leak tests). This alarm will stay active until a 0.2 gph test has been successfully completed.

## Alarms That Will Shut Down A Line

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- 3 FAIL** - will always shut down the line.
- 2 FAIL** - will shut down the line if programmed to do so in the user setup procedure.
- 1 FAIL** - will shut down the line if programmed to do so in the user setup procedure.
- COMM ALARM** - will always shut down the line

For detailed system troubleshooting information, consult the Veeder-Root LLD-300 Troubleshooting and Serial Communications Manual (V-R part no. 577013-602).

## Alarm Histories - 0.2 GPH And 0.1 GPH Models Only

An alarm history of each line's last 10 alarms is stored in the console. The alarm history contains the time, alarm type, and the status (active/clear). This history can only be retrieved via the optional RS-232 serial interface.

## External Output Switch

The external output, solid-state dc switch (open collector transistor) closes when any alarm is active. Figure 29 shows the location of the switch + and - terminals (J6).

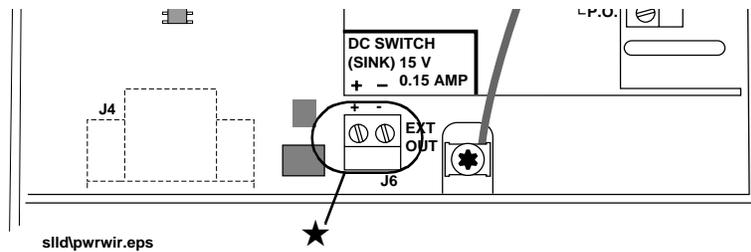


Figure 29. LLD-300 External Output Switch Connections

# Warranty Conditions and Limitations of Liability

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## Limitations Of Liability

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We warrant that this product will be free from defects in materials and workmanship for a period of 1 year from the date of installation or 24 months from the date of invoice, whichever occurs first. We will repair or replace the product if it is returned to us, transportation prepaid, within the warranty period and is determined by us to be defective.

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

This warranty applies only when the product is installed in accordance with Veeder-Root's specifications. This warranty will not apply to any product which has been subjected to misuse, negligence or accident; or misapplied; or used in violation of product manuals, instructions or warnings; or modified or repaired by unauthorized persons; or improperly installed.

## Inspection

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You shall inspect the product promptly after receipt and shall notify us at our Simsbury office in writing of any claims, including claims of breach of warranty, within 30 days after you discover or should have discovered the facts upon which the claim is based. Your failure to give written notice of a claim within the time period shall be deemed to be a waiver of such claim.

## Limitation of Remedy and Warranty

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The provisions of "Limitations Of Liability" on page 58 are our sole obligation and exclude all other remedies or warranties, express or implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, whether or not purposes or specifications are described herein. We further disclaim any responsibility whatsoever to you or to any other person for injury to person or damage to or loss of property or value caused by any product which has been subjected to misuse, negligence, or accident; or misapplied; or used in violation of product manuals, instructions or warnings; or modified or repaired by unauthorized persons; or improperly installed.

## **Limitation of Damages**

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Under no circumstances shall we be liable for any incidental, consequential or specific damages, losses or expenses arising from this contract or its performance or in connection with the use of, or inability to use, our product for any purpose whatsoever.

## **Limitation of Actions**

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No action regardless of form arising out of this contract may be commenced more than 1 year after the cause of action has accrued, except an action for nonpayment.

## **Collateral Promises**

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There are no representations, warranties, or conditions, express or implied, statutory or otherwise except those herein contained, and no agreement or waivers collateral hereto shall be binding on either party unless in writing and signed by you and accepted by us at our Simsbury office.

## **Interpretation**

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Rights and liabilities arising out of any contract with us shall be determined under the Uniform Commercial Code as enacted in Connecticut.



# Glossary

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<b>ASC</b>	Authorized Service Contractor
<b>AST</b>	Aboveground Storage Tank
<b>AWG</b>	American Wire Gauge
<b>asynchronous</b>	A mode of data transmission in which the time occurrence of the bits within each character or block of characters relates to a fixed time frame, but the start of each character or block of characters is not related to this fixed time frame.
<b>baud</b>	A unit of signaling speed equal to the number of discrete signal conditions or events per second. this refers to the physical symbols/second used within a transmission channel. For two devices to communicate they must be set to transmit/receive at the same baud rate.
<b>bit rate</b>	The speed at which data bits are transmitted over a communication path, usually expressed in bits per second. A 9600 bps terminal is a 2400 baud system with 4 bits/ baud.
<b>board</b>	A printed circuit board, such as the CPU
<b>CPU board</b>	Central Processing Unit printed circuit board
<b>chip</b>	Another term for an integrated circuit (see IC)
<b>communications</b>	Data transmissions between two or more pieces of equipment
<b>component</b>	Any resistor, capacitor, IC, etc., soldered onto a printed circuit board.
<b>configuration</b>	Relative arrangement of parts of a system
<b>containment sump</b>	An enclosure used to contain submersible pumps and related piping to prevent the release of product into the environment.
<b>data</b>	Information collected by the console.
<b>default parameter setting</b>	A system set-up parameter that is preset by the factory.
<b>diagnostics</b>	Indicators of the current conditions in the system
<b>dispenser</b>	Dispenses fuel through a nozzle, typically to a motor vehicle
<b>dispenser pan</b>	An enclosure used to contain dispenser piping to prevent release of product into the environment.
<b>double wall tank (DW tank)</b>	A tank with a secondary wall to prevent leakage of product into the environment.
<b>EIA</b>	Electronic Industries Association. The EIA is a voluntary standards organization in the U.S.A., mainly representing the manufacturers of electronic equipment, specializing in the electrical and functional characteristics of interface equipment.
<b>EIA-RS-232</b>	EIA Recommended Standard 232 that defines the “interface between data terminal equipment and data communications equipment employing serial binary data interchange”, and consists of three parts: electrical signal characteristics, interface mechanical characteristics, and a functional description of the interchange circuits. A letter suffix to the 232, such as C or D, indicates the applicable revision level of the standard.
<b>EEPROM</b>	Electrically Erasable Programmable Read Only Memory

<b>external output</b>	Field wiring locations where devices can be connected to the system, such as overflow alarms and warning lights.
<b>IC</b>	Integrated Circuit; refers to circuits, such as microprocessors, which are etched on single crystals, ceramics or other semiconductor layers and hermetically sealed.
<b>I.P.S.</b>	International Pipe Standard
<b>LED</b>	Light Emitting Diode
<b>MTBE</b>	tert.- Butyl Methyl Ether; mixed with unleaded gasoline for various gasohol blends.
<b>NEC</b>	National Electrical Code; a nationally accepted guide for the safe installation of electrical conductors and equipment.
<b>NFPA</b>	National Fire Protection Association; a nonprofit organization dedicated to protecting lives and property from the hazards of fire. NFPA publishes over 270 nationally recognized codes and standards, including the National Electrical Code.
<b>N.P.T.</b>	National Pipe Threads
<b>PROM</b>	Programmable Read Only Memory
<b>RAM</b>	Random Access Memory
<b>ROM</b>	Read Only Memory
<b>sensor</b>	A device that responds to a physical stimulus (e.g., pressure, magnetism, or a particular motion) and transmits a resulting impulse (as for measurement or operating a control).
<b>STP</b>	Submersible Turbine Pump
<b>surface-mount board</b>	A printed circuit board which has component leads soldered on its surface (face).
<b>through-hole mount board</b>	A printed circuit board which has component leads going through holes in the board for soldering on the back side.
<b>UL</b>	Underwriter's Laboratories
<b>vapor</b>	A substance in the gaseous state as distinguished from the liquid or solid state.
<b>WPLLD</b>	Wireless Pressurized Line Leak Detection



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