

DPLLD

Site Prep and Installation Guide

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Introduction

This manual contains instructions for installing the components for Veeder-Root Digital Pressurized Line Leak Detection (DPLLD). The DPLLD equipment performs 3.0 gph line leak tests following each dispense. Depending on the software enhancement module installed, the DPLLD equipment will also allow, with certain pump types, 0.2 and/or 0.1 gph line tests at full pump pressure. The DPLLD equipment executes leak tests automatically to eliminate the need for separate annual line leak testing.



IMPORTANT!

1. **The DPLLD, Digital Pressure Line Leak Detector, Form Number 8590, is Intrinsically Safe when installed according to Control Drawing Number 331940-008.**
2. **The TLS-450 console/DPLLD sensors are not supported by the Red Jacket Variable Speed Flow Controller (VSFC). The VSFC is designed for use with PLLD sensors/TLS-350 consoles only!**
3. **You must consult the Veeder-Root Line Leak Detection Systems Application Guide (P/N 577013-465) for all information relating to DPLLD applicable pipe types, equipment requirements, installation kits, and pump compatibilities.**
4. **A Sump Sensor is recommended for sites with line leak in the event the pump develops a leak. Line leak will only detect a leak in the line, not in the pump.**

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, sensor and carbon canister vapor polisher installation; wireless equipment installation; tank and line preparation; and line leak detector installation.

ATG Technician (Level 2/3 or 4) Certification: Contractors holding valid ATG Technician Certifications are approved to perform installation checkout, startup, programming and operations training, system tests, troubleshooting and servicing for all Veeder-Root Series Tank Monitoring Systems, including Line Leak Detection. In addition, Contractors with the following sub-certification designations are approved to perform installation checkout, startup, programming, system tests, troubleshooting, service techniques and operations training on the designated system.

- Wireless 2
- Tall Tank

Warranty Registrations may only be submitted by selected Distributors.

Product Marking Information

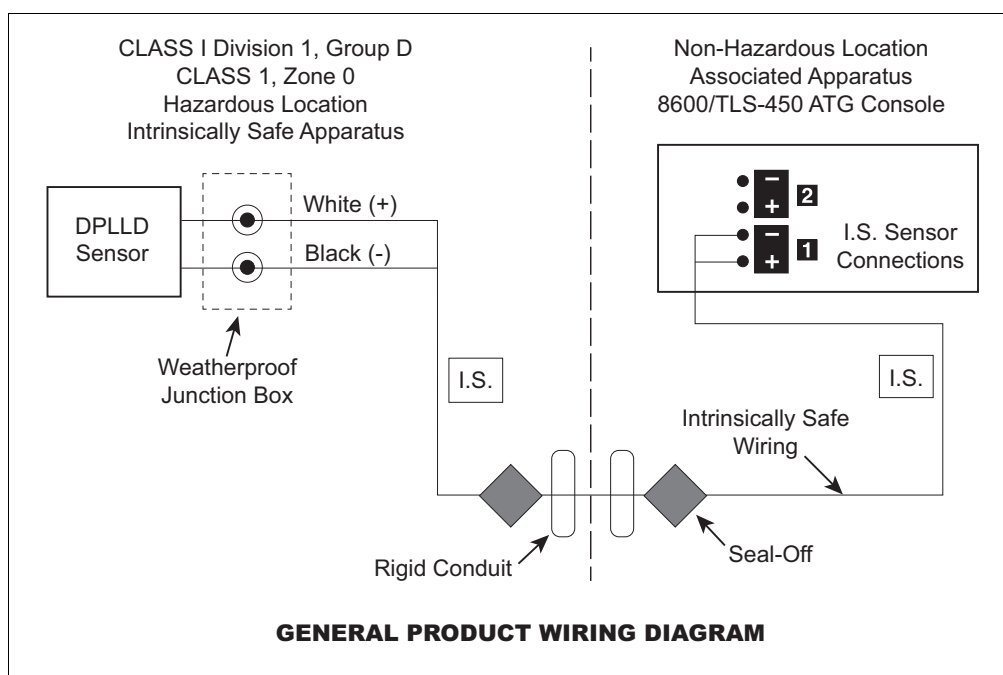
RELATED DOCUMENTS

Documents Required to Install Equipment



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

Associated Apparatus	UL/cUL Control Drawing Number
TLS-450/8600	331940-008

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









Product Label Contents

		I.S. CIRCUIT FOR HAZLOC SENSOR	
CL I, DIV. 1, GP.D CL I, ZONE 0 AEx ia IIA Ex ia IIA TC=T4 SECURITE INTRINSEQUE		F/N 8590XX-XXX S/N XXXXXX $-40^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$ MANUAL NO. 577013-933	
			

Safety Warnings





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







 WARNING	
    	<p>This product is to be installed in systems operating near locations where highly combustible fuels or vapors may be present.</p> <p>FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.</p> <ol style="list-style-type: none"> 1. Read and follow all instructions in this manual, including all safety warnings to protect yourself and others from serious injury, explosion, or electrical shock. 2. Comply with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes. 3. To protect yourself and others from being struck by vehicles, block off your work area during installation or service. 4. Do not alter or modify any component or substitute components in this kit. 5. Warning! Substitution of components may impair intrinsic safety. 6. Field wiring to the DPLLD Transducer must not share a conduit with any non-intrinsically safe device's wiring. 7. Warning! To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing. 8. Before installing or taking the unit into a hazardous area, earth the unit in a safe area to remove any static charge. Then immediately transport the unit to the installation site. Do not rub or clean the unit prior to installation. Cleaning is not required under normal service conditions. Do not rub or clean the unit after installation. If the unit is not fixed to a known earth point when installed, ensure that a separate earth connection is made to prevent the potential of a static discharge. When fitting or removing the unit, use of anti-static footwear or clothing is required. 9. Materials used in the construction of this device do not contain, by mass, more than 10% in total of aluminum, magnesium, zirconium and titanium or 7.5% in total of magnesium, titanium and zirconium.

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

Safety Symbols

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

	<p>EXPLOSIVE Fuels and their vapors are extremely explosive if ignited.</p>		<p>FLAMMABLE Fuels and their vapors are extremely flammable.</p>
	<p>ELECTRICITY High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>		<p>TURN POWER OFF Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.</p>

 <p>WEAR EYE PROTECTION Fuel spray from residual pressure in the lines can cause serious eye injuries. Always wear eye protection.</p>	 <p>INJURY Careless or improper handling of materials can result in bodily injury.</p>
 <p>GLOVES Wear gloves to protect hands from irritation or injury.</p>	 <p>READ ALL RELATED MANUALS Knowledge of all related procedures before you begin work is important. Read and understand all manuals thoroughly. If you do not understand a procedure, ask someone who does.</p>
 <p>WARNING Heed the adjacent instructions to avoid equipment damage or personal injury.</p>	 <p>USE SAFETY BARRICADES Unauthorized people or vehicles in the work area are dangerous. Always use safety cones or barricades, safety tape, and your vehicle to block the work area.</p>

REFERENCE MANUALS

577013-465	Line Leak Application Guide
577013-879	TLS-450 Console Site Prep and Installation Manual

Before You Begin

1. Ensure that the submersible turbine pump (STP) is properly grounded as per the manufacturer's instructions.
2. A shutoff valve installed between the DPLLD transducer and the product pipeline is recommended. Although not required for the DPLLD equipment to work, the valve will aid in troubleshooting the system and in reducing any product spillage when performing service work in the sump.
3. The SwiftCheck valve requires a 3" hex socket (or wrench) for tightening it in the pump's leak detector port. The DPLLD transducer requires a 2-1/4" hex socket (or wrench) for tightening it in the pump's leak detector port or in the SwiftCheck valve. You can purchase truck spindle nut wrenches from K.D. Tools to install/remove these components (2-1/4" hex socket P/N 2431, 3" hex socket P/N 2444). The non-vented SwiftCheck valve requires a 1-1/2" hex socket (or wrench) for tightening it in the pump's leak detector port.

Warning Tags



IMPORTANT! turn off, tag (using the warning tags provided), and lockout power to the console and submersible pumps while installing the DPLLD equipment. This will prevent either a dispense attempt or the DPLLD equipment from automatically starting up the pump.

Warning tags [Figure 1] are provided with the DPLLD equipment. For your safety and the safety of others who may service dispensers, submersible pumps, or DPLLD equipment, you must attach a tag to each of the following devices where it can clearly be seen by a service person performing work on the system:

- Console
- Submersible pump
- Dispenser filter

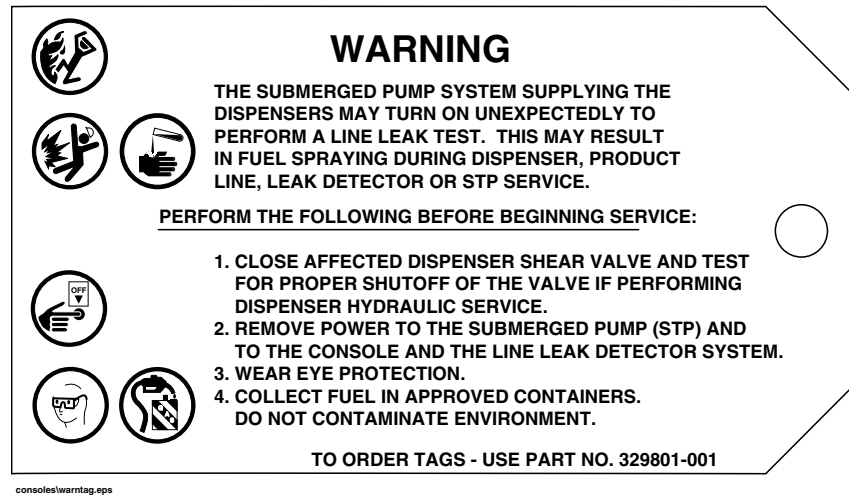


Figure 1. Warning tag

Site Considerations

Manholes

When using a SwiftCheck Valve, the manhole must provide at least 8 inches of clearance above the pump head to install the DPLLD components.

Unused Piping Runs

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 harm system performance.

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 DPLLD equipment) can prevent the DPLLD equipment from detecting line leaks in the area of pipeline downstream from the check valve.

Manifolded Product Lines

Follow these guidelines as you install a DPLLD equipment into multiple manifolded tanks:

- Dielectric unions and flexible piping elements should be used as required by federal, state, and local requirements for the specific piping application. Location of unions may vary with configuration.
- An I/O Module in the console is required to control the pump on the higher-numbered tank and pump control output for the primary tank, and the "Pump In" (Dispenser ON) signal for the set.
- A DPLLD transducer is only required in the master pump.
- Remove any other check valve or leak detect device in the line that is not shown.
- Refer to the Line Leak Application Guide for check valve requirements.

DPLLD Equipment Overview

DPLLD Components

- TLS-450 console with DPLLD feature
- DPLLD pressure transducer (one for each product line monitored) - vented or non-vented check valves may be required depending on pump type and application
- USM Module to monitor DPLLD transducers
- I/O Module to control site master and slave STPs

DPLLD Installation Example

Figure 2 shows an example DPLLD installation for a single tank and a manifolded tank set having Red Jacket Standard pumps.

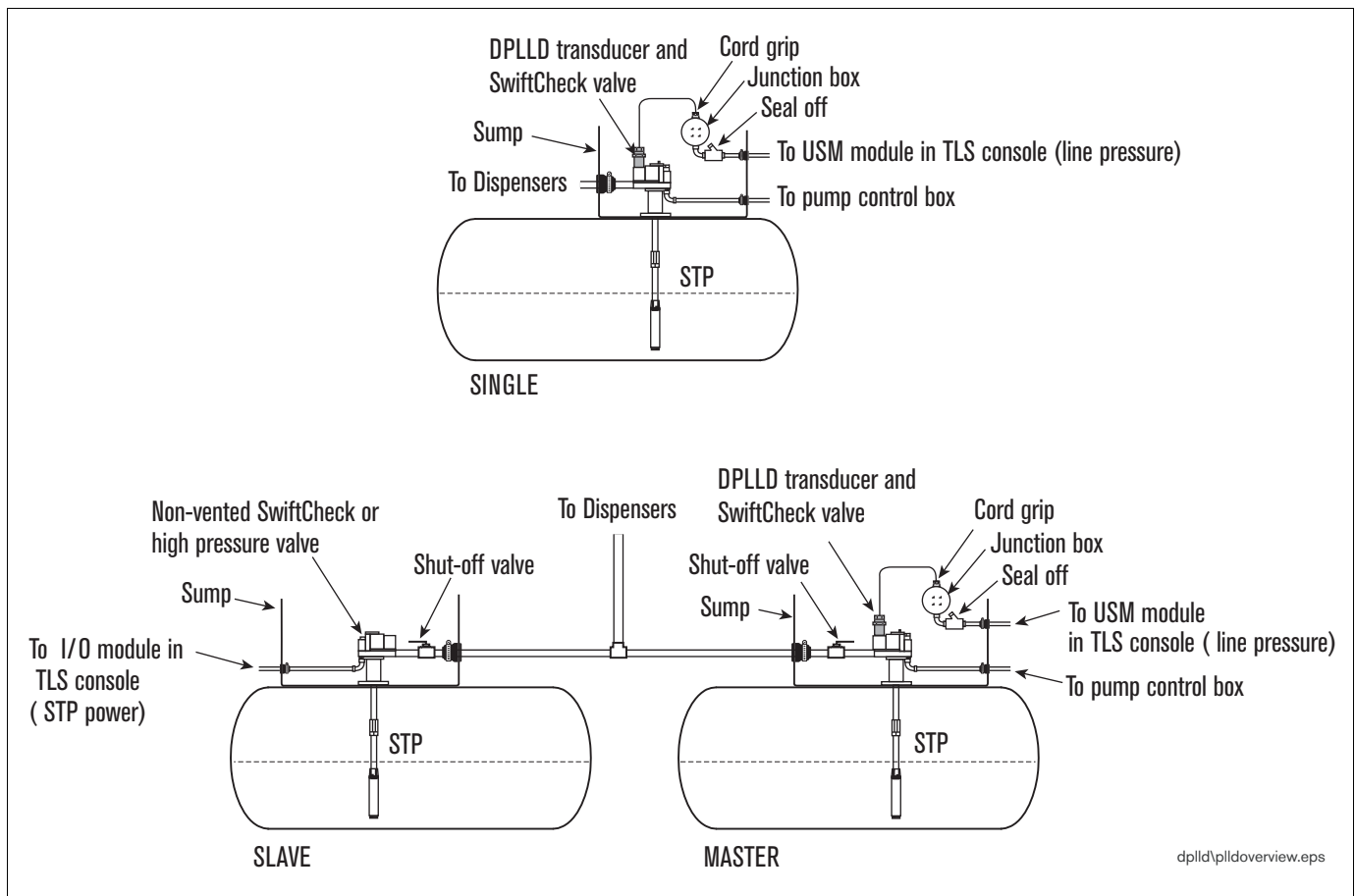


Figure 2. Example DPLLD equipment installation

DPLLD Transducer Installation

This section discusses DPLLD transducer installation for the following DPLLD approved pumps:

- Red Jacket Standard and Quantum pumps - DPLLD transducer/SwiftCheck valve (page 8)
- Red Jacket Standard and Quantum pumps - DPLLD transducer/Pressurstat (page 12)
- Red Jacket Quantum with SpikeCheck Valve (page 13)
- The Red Jacket (page 14)
- Red Jacket Maxxum Big-Flo (page 15)
- FE-Petro (page 16)

Red Jacket Standard and Quantum Pumps (DPLLD w/SwiftCheck)

Use this installation procedure to install a DPLLD transducer with a SwiftCheck valve in a Red Jacket Standard or Quantum pump.



1. Switch Off, tag, and lockout all AC power to the TLS console, dispensers and submersible pumps.
2. If a ball valve is installed down line from the pump, close it.
3. Do *one* of the following:
 - a. If the submersible turbine pump is equipped with a mechanical LLD, remove the mechanical unit and any related tubing and fittings, or
 - b. If the submersible turbine pump 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 free from corrosion, pitting, and any material build-up [Figure 3].



IMPORTANT! Failure to ensure a smooth seal surface can result in false line leak alarms.

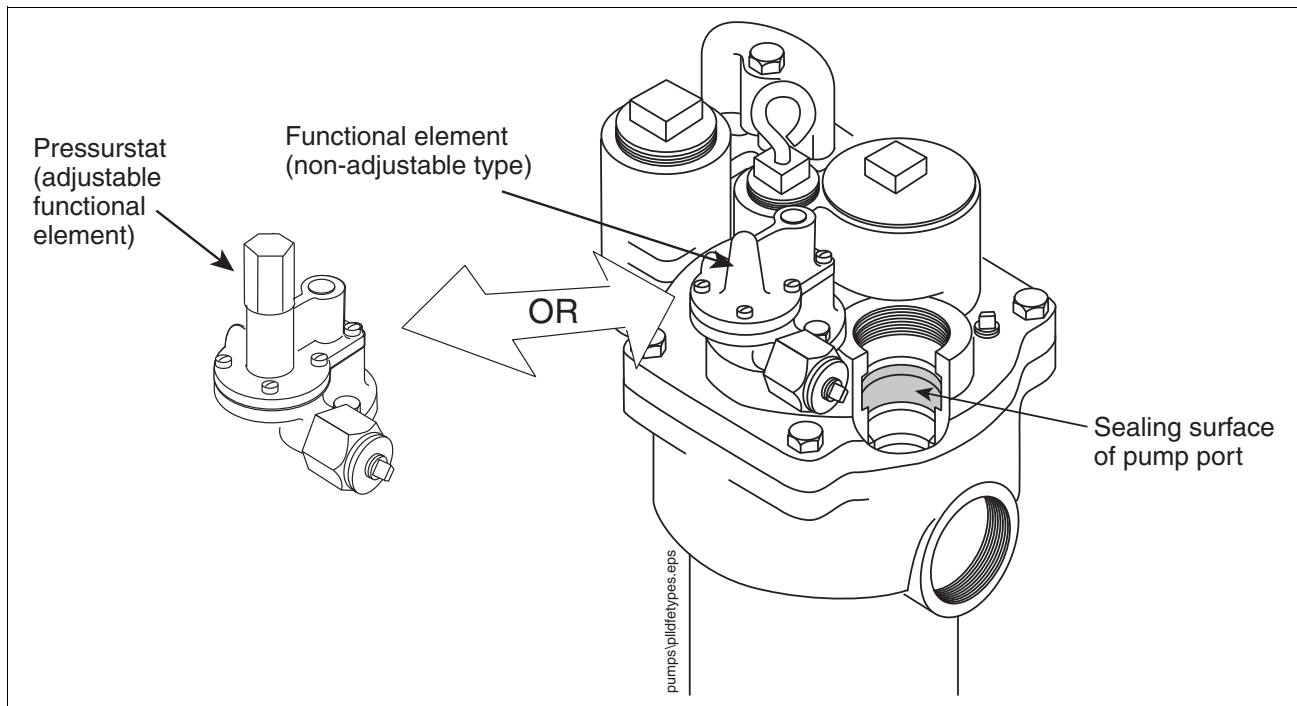


Figure 3. Sealing surface for SwiftCheck valve's external O-ring (with both functional element types identified)

5. Lubricate the external o-ring on the SwiftCheck valve using mineral oil or other suitable lubricant.
6. If there is a Stage II vapor recovery device installed, go to Step 7. If there is no Stage II vapor recovery, install the SwiftCheck valve [Figure 4] in the mechanical LLD pump port. Thread the DPLLD transducer into the SwiftCheck Valve.



IMPORTANT! Do not overtighten the SwiftCheck valve when installing it into the pump. Overtightening the valve can cause a flow restriction in the line!

Seal the NPT threads only with a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

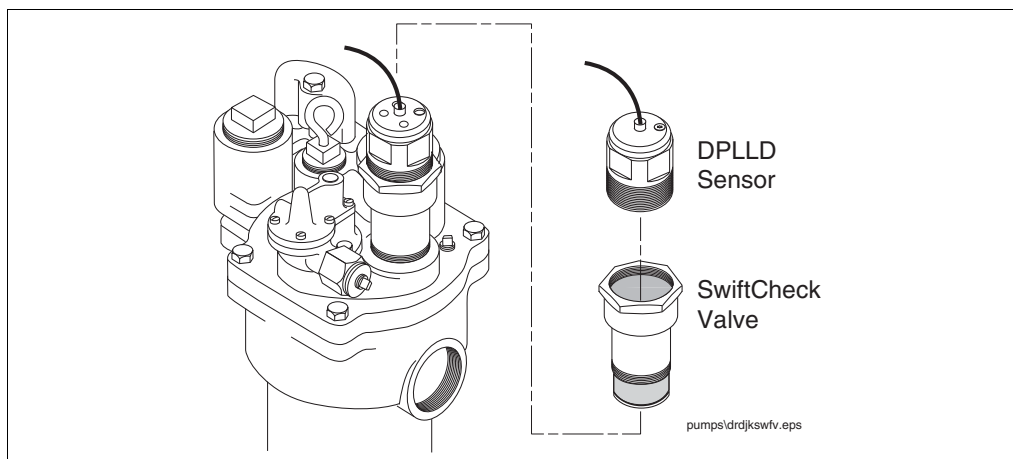


Figure 4. DPLLD transducer installation

7. If there is a Stage II vapor recovery device installed in the pressurized piping you must install the SwiftCheck valve into a Red Jacket leak detector fitting (P/N 038-072) as shown in Figure 5 instead of in the pump's leak detector port. Because the DPLLD transducer must be installed downstream from these devices, a monitored containment sump is required.

There *must* not be a check valve installed between the SwiftCheck valve and the pump for DPLLD to function properly.

Ensure that the Healy pump is wired according to the manufacturer's instructions and utilizes isolation relays.

Lubricate the external o-ring on the SwiftCheck valve using mineral oil or other suitable lubricant and thread the valve into the Red Jacket fitting.

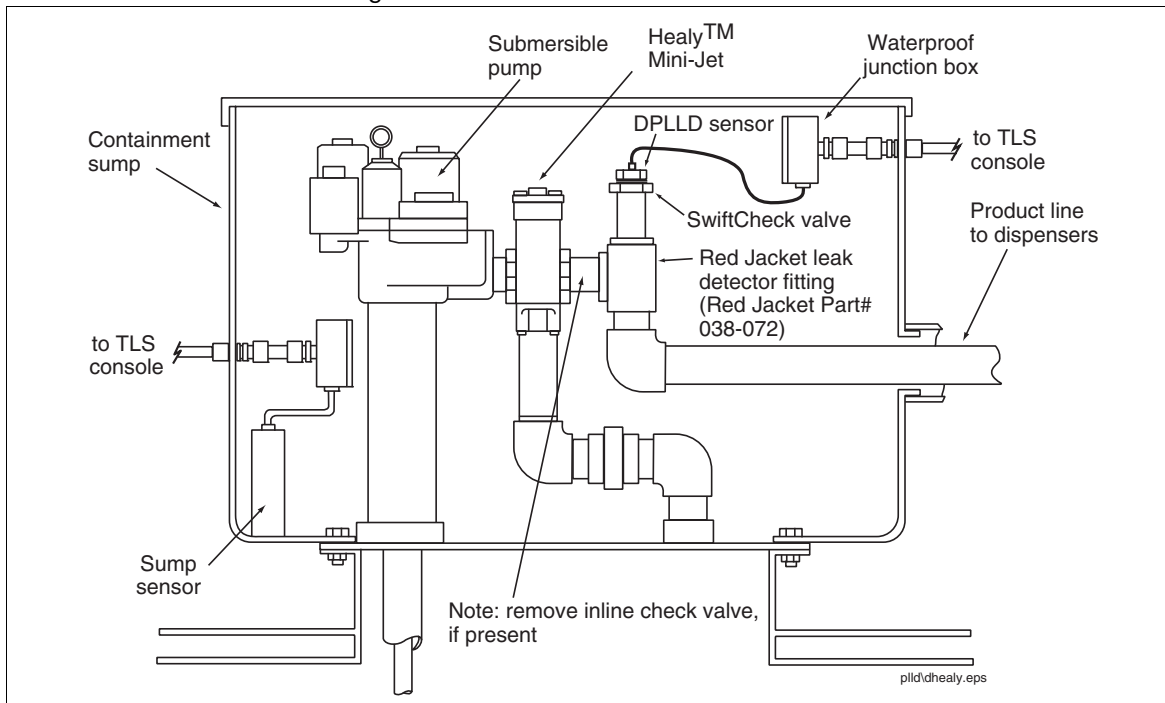


Figure 5. DPLLD install w/Healy Mini-Jet system (required dielectric union and shutoff valve not shown)


8. Thread the DPLLD transducer into the SwiftCheck valve (ref. Figure 4 or Figure 5 as appropriate).



IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

9. Get a watertight cord grip from the transducer installation kit and coat its 1/2" NPT threaded end with UL-classified, nontoxic pipe sealant suitable for the fuel involved. Screw the cord grip into one of the openings in the weatherproof junction box. Feed the end of the DPLLD transducer cable through the cord grip and then tighten the nut to ensure a watertight seal. Connect and seal the pressure transducer wires to the wires from the TLS console as described in 'Epoxy Sealing DPLLD Transducer Field Wiring Connections' on page 19.
10. The DPLLD SwiftCheck valve eliminates the need for the pump's Pressurstat or functional element relief valve so it must be modified as part of the DPLLD equipment installation. Remove the six 1/4-28 slot-head screws from the Pressurstat or functional element [Figure 6].
11. Remove the spring, piston and diaphragm.
12. Carefully reassemble the Pressurstat or functional element using a new diaphragm suitable for the fuel involved. Be sure that all mating surfaces are free from debris when reinstalling.

13. Torque the six slot-head screws to 40-65 in-lbs.
14. Open the ball valve down line from the pump.

⚠ WARNING	
	<p>Failure to properly reseal the Pressurstat or functional element may result in product leakage, which could create serious environmental and safety hazards.</p> <p>Fire, explosion, or ground contamination could occur.</p> <p>Carefully reassemble and reseal the Pressurstat or functional element, following the procedures described in this manual.</p>

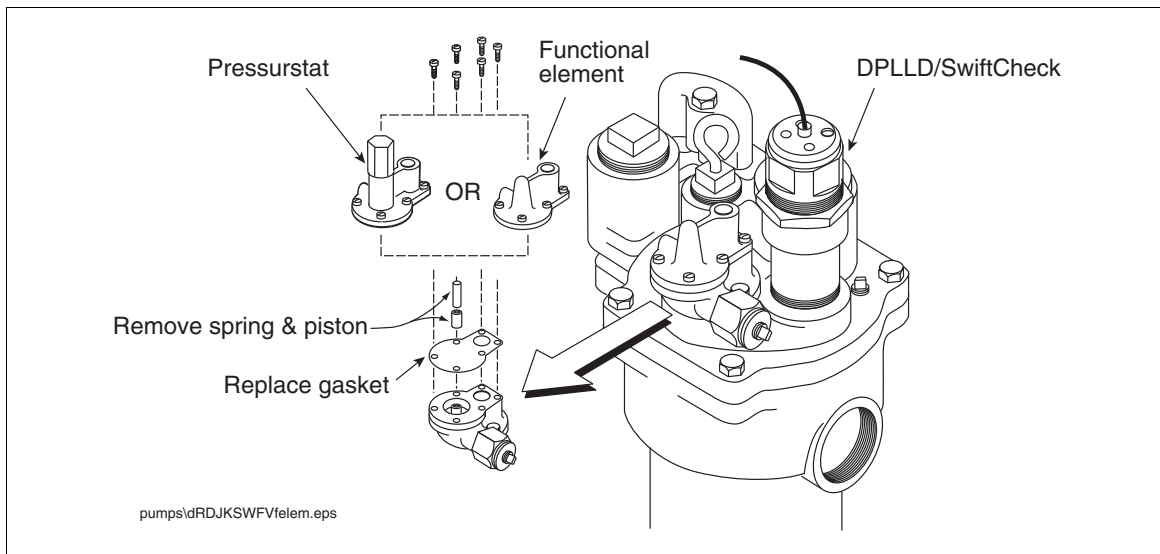


Figure 6. Modifying the pressurstat/functional element in Red Jacket pumps

Red Jacket Standard and Quantum Pumps (DPLLD w/Pressurstat)

Use this installation procedure to install a DPLLD transducer in a Red Jacket Standard or Quantum pump that has a Pressurstat that will be used for leak detection. NOTE: This installation method is approved for 3.0 gph testing only and cannot be used if there is a Stage II vapor recovery device installed in the pressurized piping.



1. Switch Off, tag, and lockout all AC power to the TLS console, dispensers and submersible pumps.
2. If a ball valve is installed down line from the pump, close it.
3. Do *one* of the following:
 - a. If the submersible turbine pump is equipped with a mechanical LLD, remove the mechanical unit and any related tubing and fittings, or
 - b. If the submersible turbine pump is **not** equipped with a mechanical LLD, remove the 2-inch mechanical LLD port plug.
4. Thread the DPLLD transducer into the LLD port (Figure 5).



IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

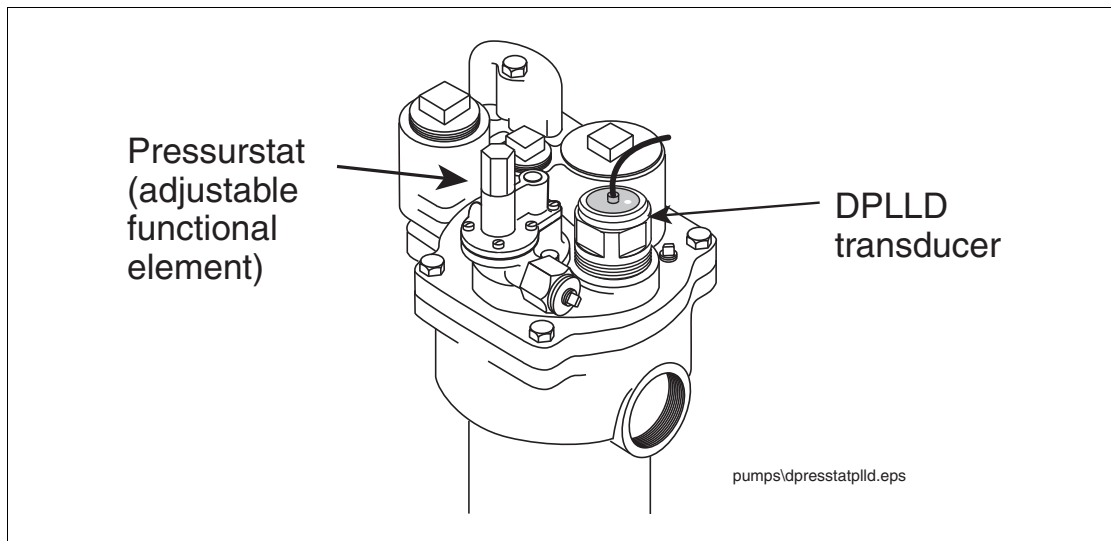


Figure 7. PLLD/Pressurstat installation

5. Get a watertight cord grip from the transducer installation kit and coat its 1/2" NPT threaded end with UL-classified, nontoxic pipe sealant suitable for the fuel involved. Screw the cord grip into one of the openings in the weatherproof junction box. Feed the end of the DPLLD transducer cable through the cord grip and then tighten the nut to ensure a watertight seal. Connect and seal the pressure transducer wires to the wires from the TLS console as described in 'Epoxy Sealing DPLLD Transducer Field Wiring Connections' on page 19.
6. Open the ball valve down line from the pump.

Red Jacket Quantum Pumps with SpikeCheck Valve



1. Switch Off, tag, and lockout all AC power to the TLS console, dispensers and submersible pumps.
2. If a ball valve is installed down line from the pump, close it.
3. If the pump does not have a Stage II vapor recovery device installed in the pressurized piping, do *one* of the following:
 - a. If the submersible turbine pump is equipped with a mechanical LLD, remove the mechanical unit and any related tubing and fittings, or
 - b. If the submersible turbine pump is **not** equipped with a mechanical LLD, remove the 2-inch mechanical LLD port plug.

Thread the DPLLD transducer directly into the mechanical LLD port on the pump (see Figure 8).

IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

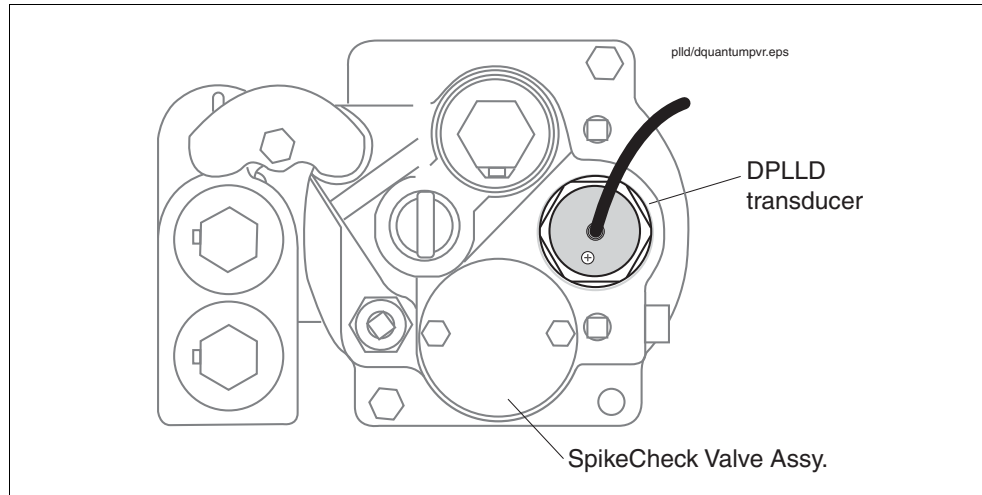


Figure 8. DPLLD installation in Red Jacket Quantum pumps (w/ SpikeCheck valve assy)

4. If the pump does have a Stage II vapor recovery device installed in the pressurized piping remove the mechanical LLD unit and any related tubing and fittings if present and plug the ports.
Lubricate the external o-ring on the SwiftCheck valve using mineral oil or other suitable lubricant and thread the valve into the Red Jacket leak detector fitting (P/N 038-072) as shown in Figure 5 on page 10 instead of in the pump's leak detector port. Next thread the DPLLD transducer into the SwiftCheck valve.

IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

Because the DPLLD transducer must be installed downstream from these devices, a monitored containment sump is required.

There *must* not be a check valve installed between the SwiftCheck valve and the pump for DPLLD to function properly.

Ensure that the Healy pump is wired according to the manufacturer's instructions and utilizes isolation relays.

5. Get a watertight cord grip from the transducer installation kit and coat its 1/2" NPT threaded end with UL-classified, nontoxic pipe sealant suitable for the fuel involved. Screw the cord grip into one of the openings in the weatherproof junction box. Feed the end of the DPLLD transducer cable through the cord grip and then tighten the nut to ensure a watertight seal. Connect and seal the pressure transducer wires to the wires from the TLS console as described in 'Epoxy Sealing DPLLD Transducer Field Wiring Connections' on page 19.
6. Open the ball valve down line from the pump.



The Red Jacket Pump

The DPLLD transducer mounts directly into the line leak detector pump port. It eliminates the need to break product lines for installation and service.

Since the DPLLD transducer replaces the existing mechanical device, it is suitable in applications where there is no sump.



1. Switch Off, tag, and lockout all AC power to the TLS console, dispensers and submersible pumps.
2. If a ball valve is installed down line from the pump, close it.
3. If the pump does not have a Stage II vapor recovery device installed in the pressurized piping, remove the 2" NPT plug from line leak detector port. Install the DPLLD transducer into the 2" NPT port (see Figure 9).



IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

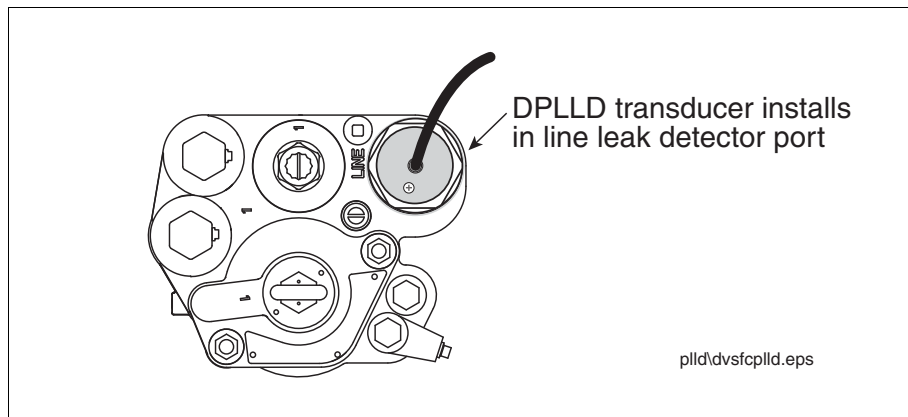


Figure 9. Locating discharge port plug for line leak transducer

4. If the pump does have a Stage II vapor recovery device installed in the pressurized piping, lubricate the external o-ring on the SwiftCheck valve using mineral oil or other suitable lubricant and thread the valve into the Red Jacket leak detector fitting (P/N 038-072) as shown in Figure 5 on page 10 instead of in the pump's leak detector port. Next thread the DPLLD transducer into the SwiftCheck valve.



IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

Because the DPLLD transducer must be installed downstream from these devices, a monitored containment sump is required.

There *must* not be a check valve installed between the SwiftCheck valve and the pump for DPLLD to function properly.

Ensure that the Healy pump is wired according to the manufacturer's instructions and utilizes isolation relays.

5. Get a watertight cord grip from the transducer installation kit and coat its 1/2" NPT threaded end with UL-classified, nontoxic pipe sealant suitable for the fuel involved. Screw the cord grip into one of the openings in the weatherproof junction box. Feed the end of the DPLLD transducer cable through the cord grip and then tighten the nut to ensure a watertight seal. Connect and seal the pressure transducer wires to the wires from the TLS console as described in 'Epoxy Sealing DPLLD Transducer Field Wiring Connections' on page 19.
6. Open the ball valve down line from the pump.

Red Jacket Maxxum Big-Flo



1. Switch Off, tag, and lockout all AC power to the TLS console, dispensers and submersible pumps.
2. If a ball valve is installed down line from the pump, close it.
3. Remove the cap from the 2-inch Transducer port next to the 3-inch discharge port. Thread the DPLLD transducer into the transducer port (see Figure 10).



IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

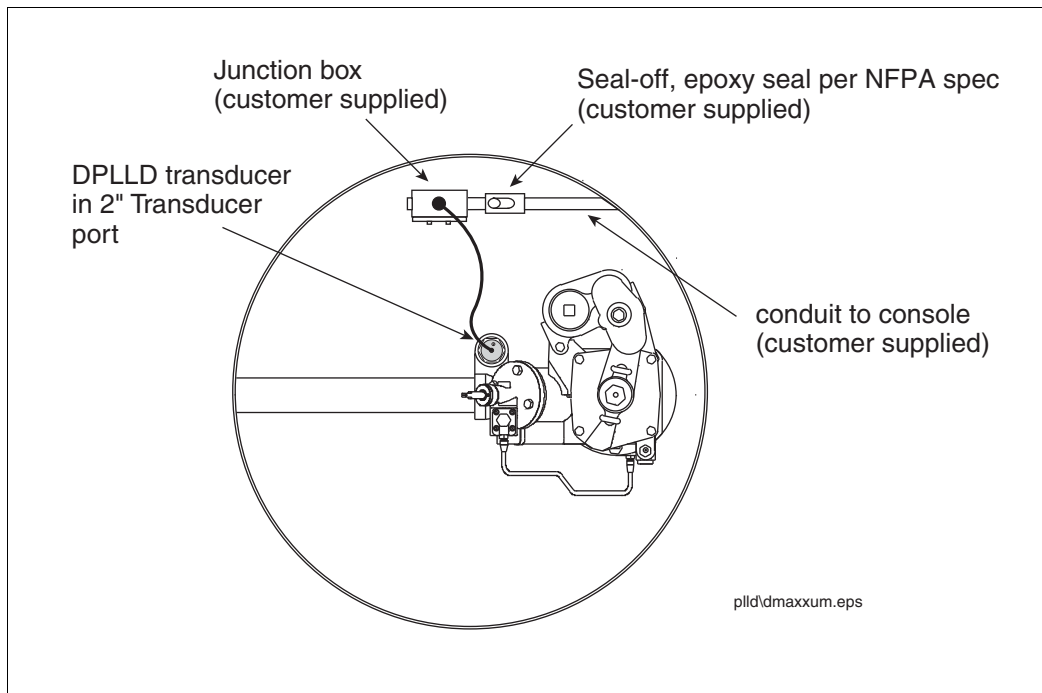


Figure 10. Example DPLLD installation in a Red Jacket Maxxum Big-Flo

4. Get a watertight cord grip from the transducer installation kit and coat its 1/2" NPT threaded end with UL-classified, nontoxic pipe sealant suitable for the fuel involved. Screw the cord grip into one of the openings in the weatherproof junction box. Feed the end of the DPLLD transducer cable through the cord grip and then tighten the nut to ensure a watertight seal. Connect and seal the pressure transducer wires to the wires from the TLS console as described in 'Epoxy Sealing DPLLD Transducer Field Wiring Connections' on page 19.
5. Open the ball valve down line from the pump.

FE Petro Pumps



1. Switch Off, tag, and lockout all AC power to the TLS console, dispensers and submersible pumps.
2. If a ball valve is installed down line from the pump, close it.
3. If the pump does not have a Stage II vapor recovery device installed in the pressurized piping, remove the 2" NPT plug from line leak detector port.

Install the DPLLD transducer into the 2" NPT port as shown in Figure 11.



IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

4. If the pump does have a Stage II vapor recovery device installed in the pressurized piping, lubricate the external o-ring on the SwiftCheck valve using mineral oil or other suitable lubricant and thread the valve into the Red Jacket leak detector fitting (P/N 038-072) as shown in Figure 5 on page 10 instead of in the pump's leak detector port. Next thread the DPLLD transducer into the SwiftCheck valve.



IMPORTANT! Seal any pipe threads using a UL-classified, nontoxic pipe sealant suitable for the fuel involved.

Because the DPLLD transducer must be installed downstream from these devices, a monitored containment sump is required.

There *must* not be a check valve installed between the SwiftCheck valve and the pump for DPLLD to function properly.

Ensure that the Healy pump is wired according to the manufacturer's instructions and utilizes isolation relays.

5. For DPLLD operation there must be a FE Petro model R precision check valve in the pump, If necessary, replace the current check valve with a model R precision check valve (ref. Figure 11).

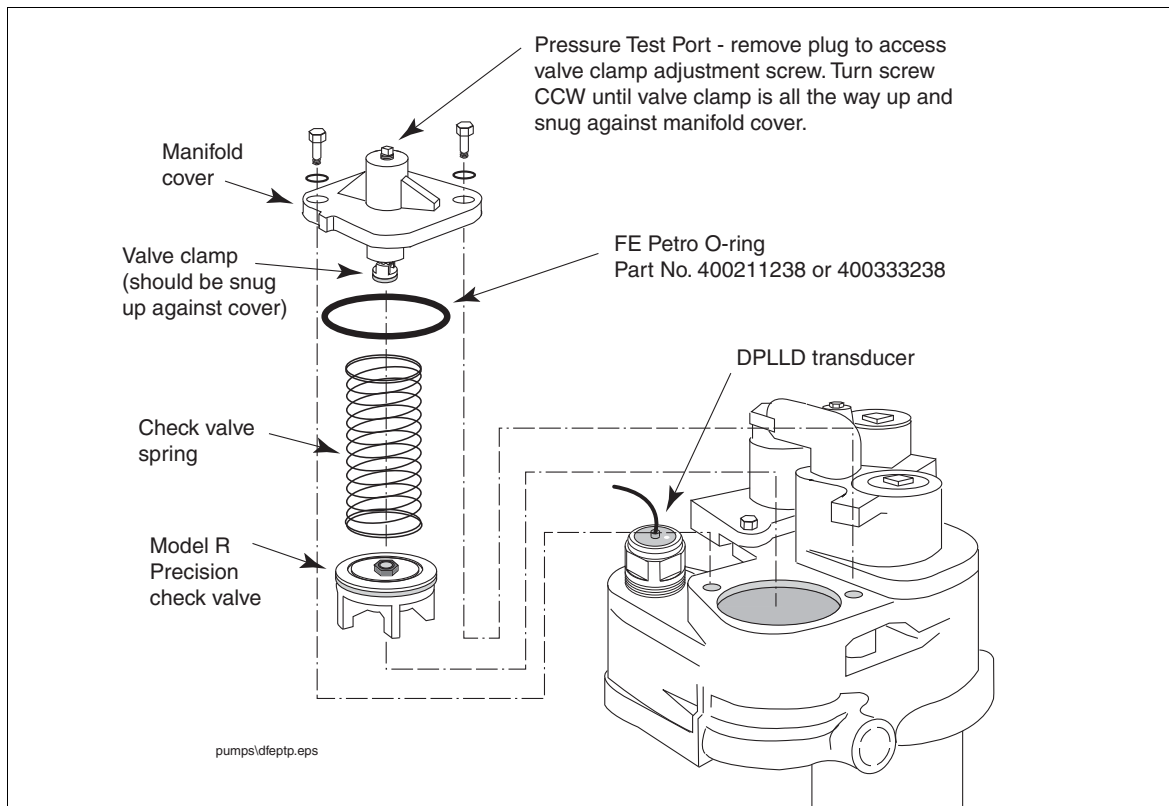


Figure 11. Location of DPLLD transducer and model R precision check valve in FE Petro pump

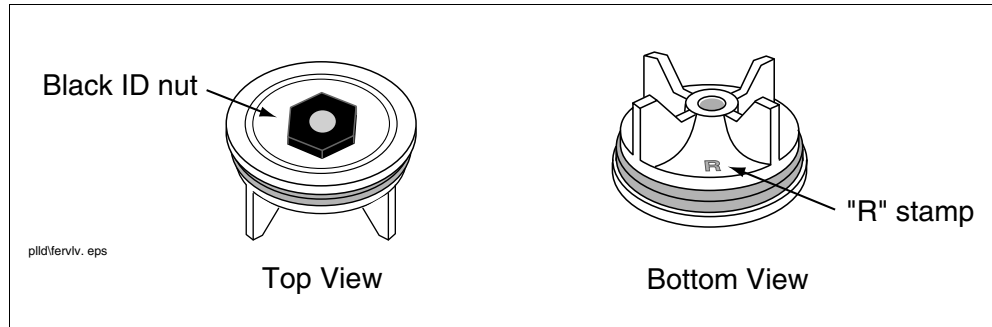


Figure 12. Identifying a FE Petro "R" style precision check valve

6. Get a watertight cord grip from the transducer installation kit and coat its 1/2" NPT threaded end with UL-classified, nontoxic pipe sealant suitable for the fuel involved. Screw the cord grip into one of the openings in the weatherproof junction box. Feed the end of the DPLLD transducer cable through the cord grip and then tighten the nut to ensure a watertight seal. Connect and seal the pressure transducer wires to the wires from the TLS console as described in 'Epoxy Sealing DPLLD Transducer Field Wiring Connections' on page 19.
7. Open the ball valve down line from the pump.

FE PETRO VARIABLE SPEED PUMP SYSTEM MODIFICATIONS

The FE Petro variable speed pump system contains a submersible pump and adjustable frequency drive. For satisfactory operation with the DPLLD System, you need to change the following in the adjustable frequency drive as described below:

- Dip switch (SW2) settings
- Rotary switch positions



IMPORTANT! The correct hardware and switch settings must be used for the system to detect leaks less than 3.0 gph. If the correct hardware and switch settings are not used, the system will always pass 0.1 gph tests, but the passing results will be invalid.

IST-VFC Software Versions 1.1 and 1.2

The settings and positions depend on the software version of the FE Petro IST-VFC (Intelligent Submersible Turbine-Variable Speed Controller). To determine the software version of the IST-VFC, remove its cover and check the label on the FE Petro chip, which is on the printed circuit board. The instructions below are for Version 1.1 and 1.2 of the IST-VFC.

Dip Switch SW2

Pole 1 on dip switch SW2 (Figure 13) controls the pump start up time. Set this switch to OFF so that the submersible pump will run at 34 psi for 6 seconds each time it is started. Pole 2 does not affect DPLLD operation; it sets the product type for the IST-VFC (ref. Table 1).

Table 1. FE-IST-VFC Product Type Dip Switch (SW2) Settings

Pole 1	Pole 2
OFF (required)	ON-gasoline, OFF-diesel

Rotary Switch

The rotary switch (Figure 13) controls the pump pressure of the submersible pump. As shown in Table 2, use positions 1, 2, 3, or 4 to run the pump at a pressure range compatible with DPLLD operation.



IMPORTANT! Do not use positions 0, 5, 6, 7, 8, or 9 with versions 1.1 or 1.2 software.

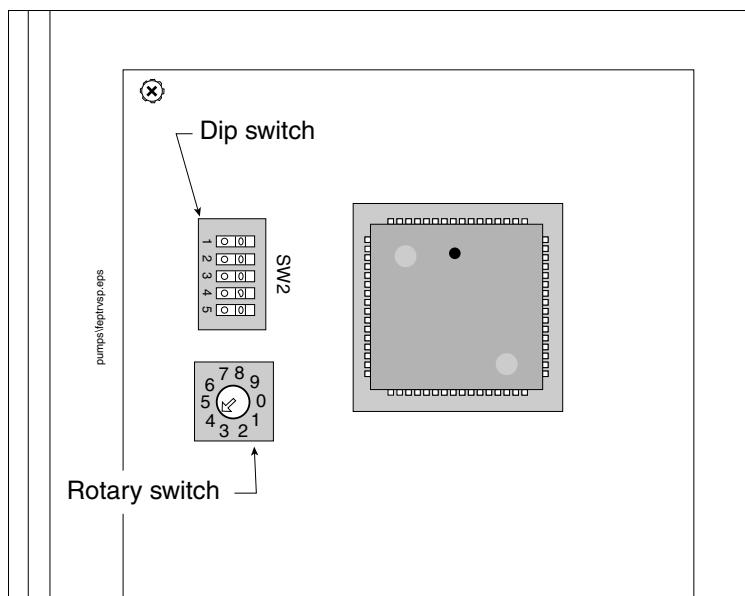


Figure 13. Dip switch SW2 and rotary switch locations in the FE-Petro IST-VFC unit

Table 2. FE-IST-VFC Rotary Switch Positions w/V1.1/1.2 Software

Position	Pressure (psi)
1	26
2	28
3	30
4	32

IST-VFC Software Version 1.3

The settings for software version 1.3 are the same as versions 1.1 and 1.2, except that the rotary switch can be set to any position from 1 to 9.

DPLLD Field Wiring



IMPORTANT! refer to the TLS-450 Site Prep manual (P/N 577013-879) for required wiring types/lengths for pressure transducer and pump control field wiring.

DPLLD Transducers



1. Pull a shielded, 2-conductor cable from each DPLLD transducer's sump junction box to the appropriate USM module in the TLS console. **NOTE:** The transducer is an intrinsically safe device and its wiring must not share a conduit with any non-intrinsically safe device.
2. Turn Off, tag and lock out all AC power to the TLS console and STP.
3. Using wire nuts, connect the white and black wires from the DPLLD transducer to field wires in the weatherproof sump junction box (ref. Figure 14). **Be sure to maintain correct polarity between the color-coded or marked field wires and DPLLD transducer wires when making all connections. Cut off the transducer shielded ground wire (if present) flush with the cable jacket. Do the same for the cable shield.**



IMPORTANT! The shielded cable must be connected to the ground lug in the intrinsically safe area of the console, not to the transducer!

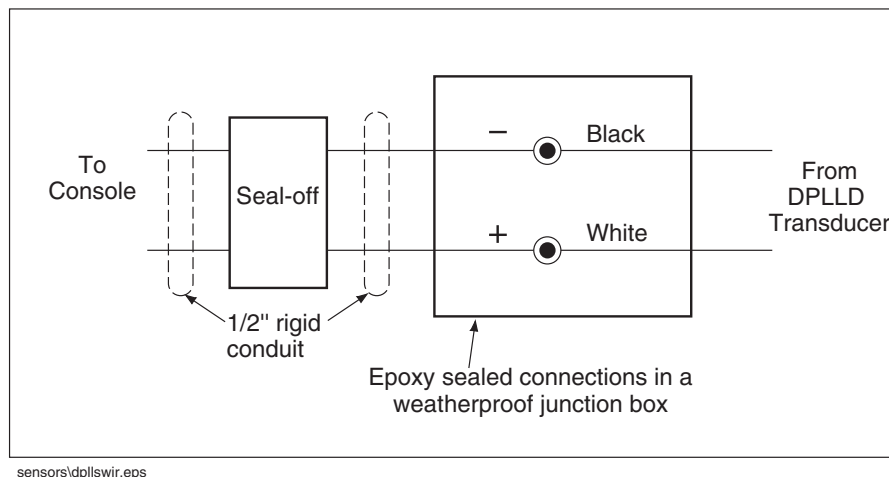
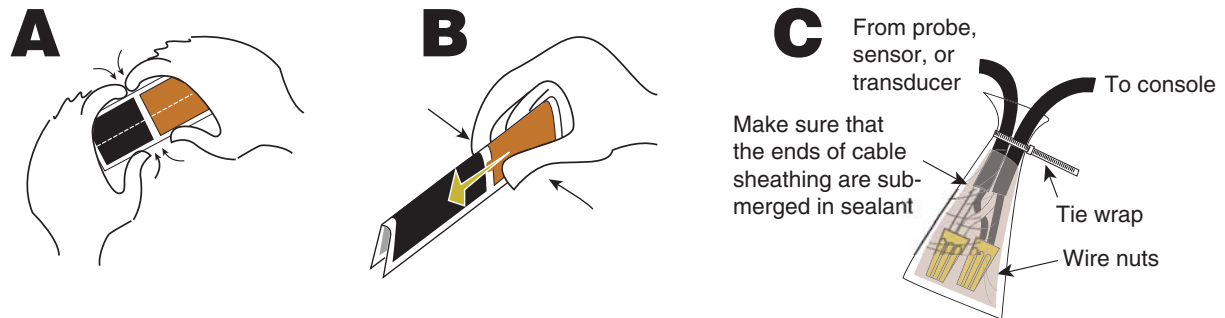


Figure 14. Field connections of DPLLD transducer

4. Seal wire nut connections using the epoxy sealant furnished with each transducer. Use one packet for no more than two wire nut connections. **Ensure the end of the cable jacket is submerged in the epoxy.** Refer to Figure 15 as you prepare epoxy and seal connections.



IMPORTANT! Do not put more than two wire nut connections in one epoxy sealant bag or the connections will not be properly sealed. Improper sealing of the connections will result in inaccurate system readings and possibly false alarms.

**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.



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.

consoles\epxy2w.eps

Figure 15. Epoxy sealing pressure transducer field connections

DPLLD Wiring Connections In the Console

DPLLD Transducer Wiring Connections

- Be sure all wires are color-coded or carefully marked to identify their source and to maintain polarity.



IMPORTANT! Once a connector has been wired to a module and the console has been programmed, the connector and module cannot be moved to another slot without reprogramming the system.

- Record the location (e.g., Line #1 (regular), Line #2 (super), etc.) of each DPLLD transducer on the circuit directory inside the right-hand console door.



1. Turn Off, tag, and lock out all AC power to the console and submersible pumps.
2. Connect the two color-coded or marked wires from each DPLLD transducer to the USM module. (see Figure 16). Maintain correct polarity between the color-coded or marked field wires and the connector terminals during wiring.
3. Connect the transducer cable's bare wire (shield) to one of the ground lugs in the TLS console.

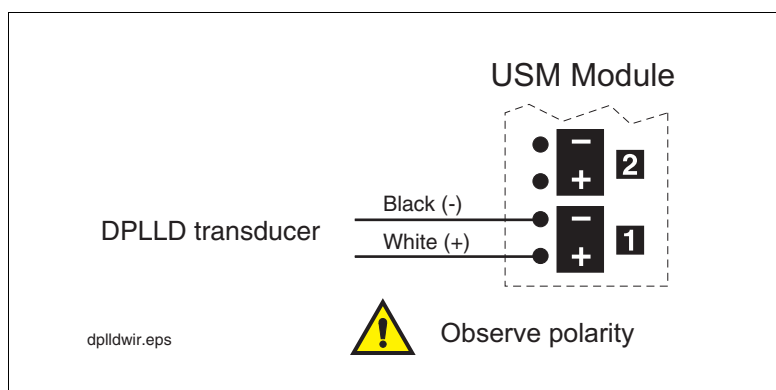


Figure 16. DPLLD transducer wiring to USM Module

Pump Wiring Connections

The console must be able to detect when dispensers are switched On or Off so it only initiates line leak tests when the dispenser is switched Off. The console must also be able to start the submersible pump to perform a line leak test, and shut off the pump if a leak is detected.



IMPORTANT! Dispensers and TLS console must be wired to the same leg of incoming power at the main electrical panel; otherwise damage to both may result.

IMPORTANT! The console, when wired correctly, will control the pump independent of the dispenser control circuits. It is imperative that when the emergency stop switch is wired and tested, the console's pump control circuitry CANNOT start up the pump. To ensure that the pumps are unable to be activated in an emergency situation, have the emergency stop switch interrupt pump power at the circuit breaker panel via shunt breakers.



1. **IMPORTANT! Before beginning the pump wiring connections turn Off, tag, and lock out all AC power to the console, dispensers and STPs!**

2. Referring to the appropriate wiring diagrams below, pull the necessary number of #14 AWG color-coded or marked copper wires from STP control boxes, self-serve system/dispenser, and power panel to the appropriate I/O module of the TLS console. Since wiring for multiple pump controls may be entering the console through the same conduit opening, **color code or mark each wire to identify its source!**



IMPORTANT! the dispensers and TLS console must be wired to the same leg of incoming power at the main electrical panel; otherwise damage may result to dispensers and console.

DPLLD pump control wiring varies depending on the pump manufacturer's relay control box. Refer to the appropriate wiring diagram example below to connect DPLLD controlled pumps to the I/O Module in the TLS console (circuit diagrams are for switched 'hot' dispensers):

- Red Jacket (ref. Figure 17, Figure 18, and Figure 19)
- Non-Red Jacket (ref. Figure 20)
- Manifolded tanks (ref. Figure 21, Figure 22, and Figure 24)
- Gilbarco dispenser isolation box (ref. Figure 22)

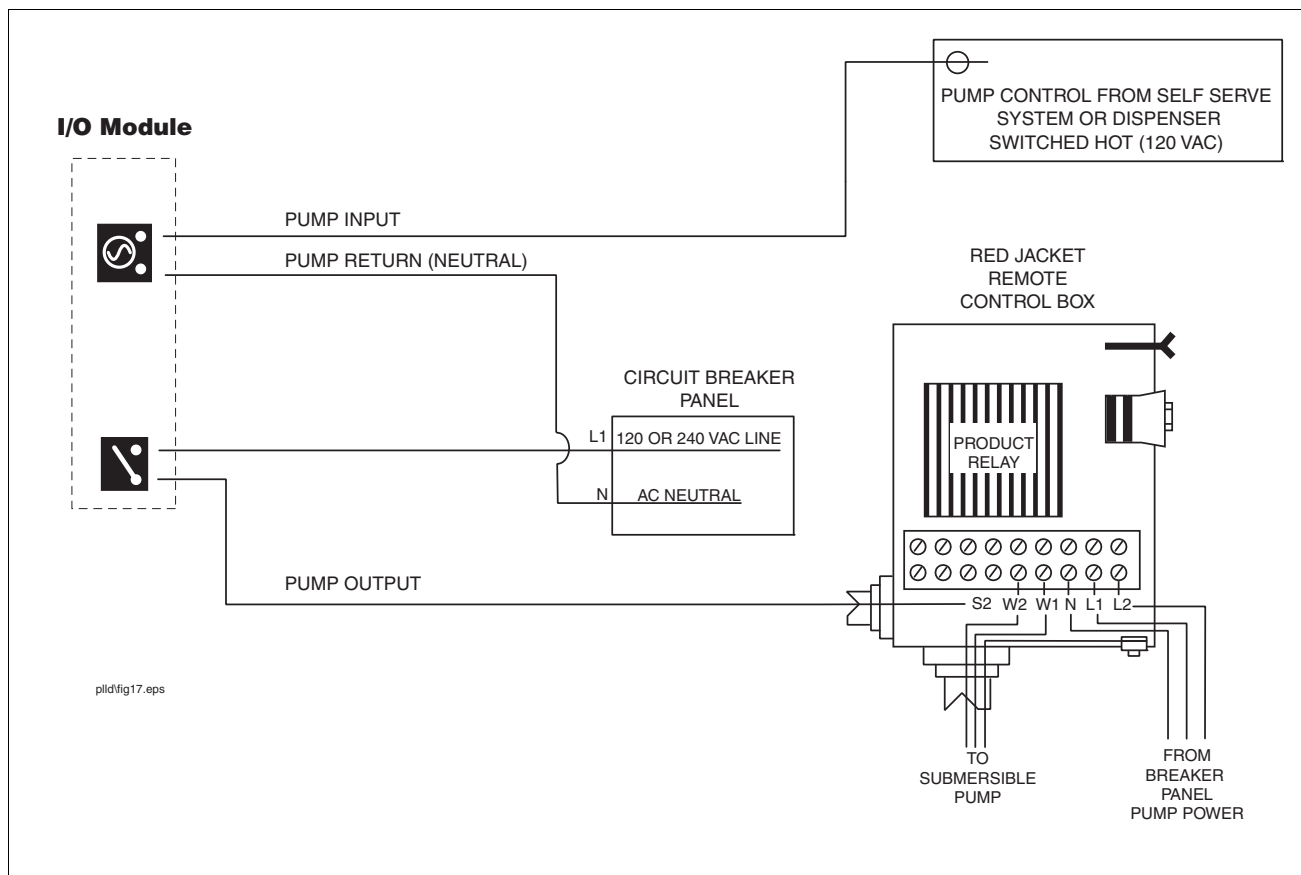


Figure 17. DPLLD pump control diagram for Red Jacket relay control box

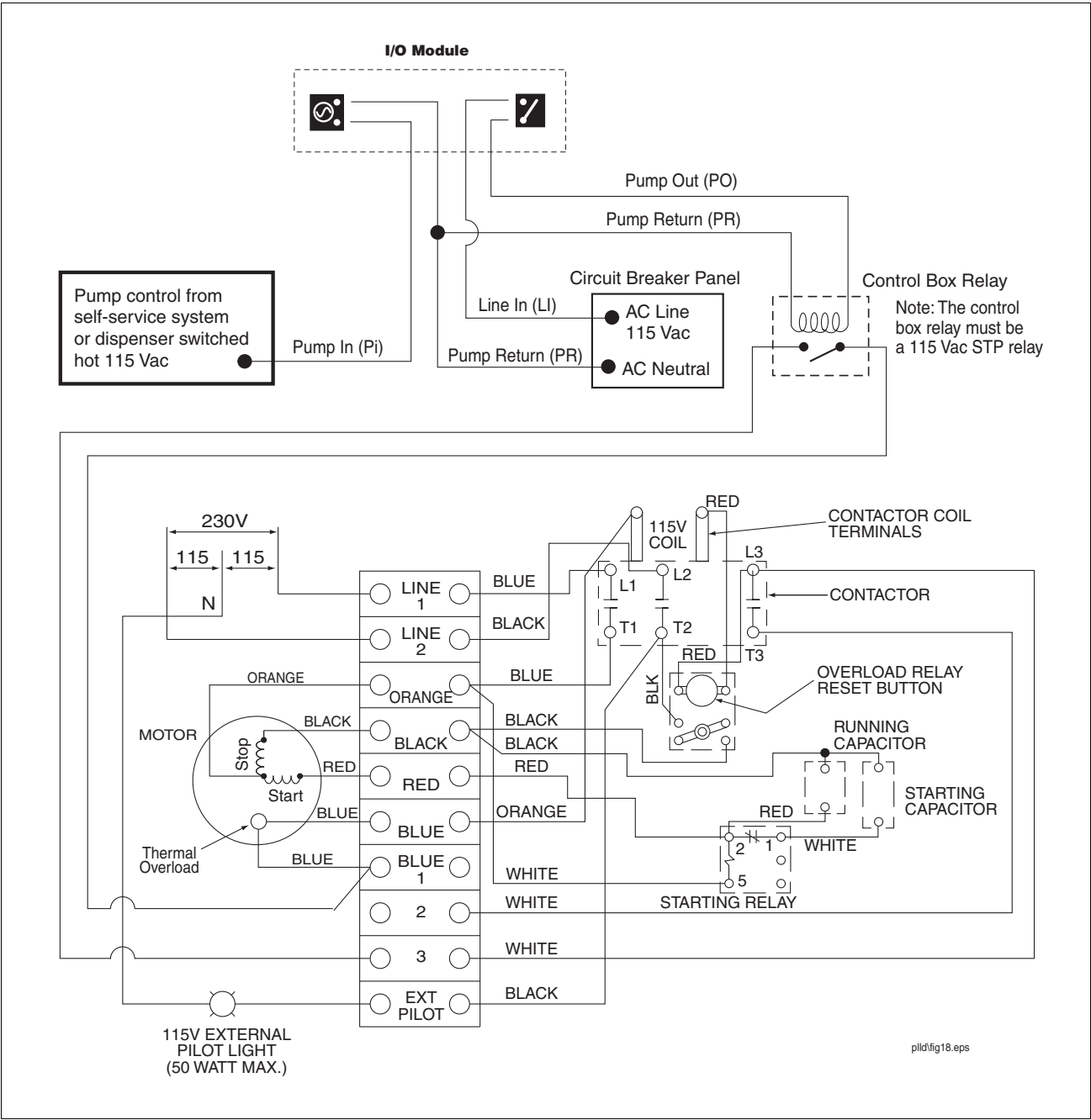


Figure 18. Red Jacket Maxxum Big-Flo single-phase wiring

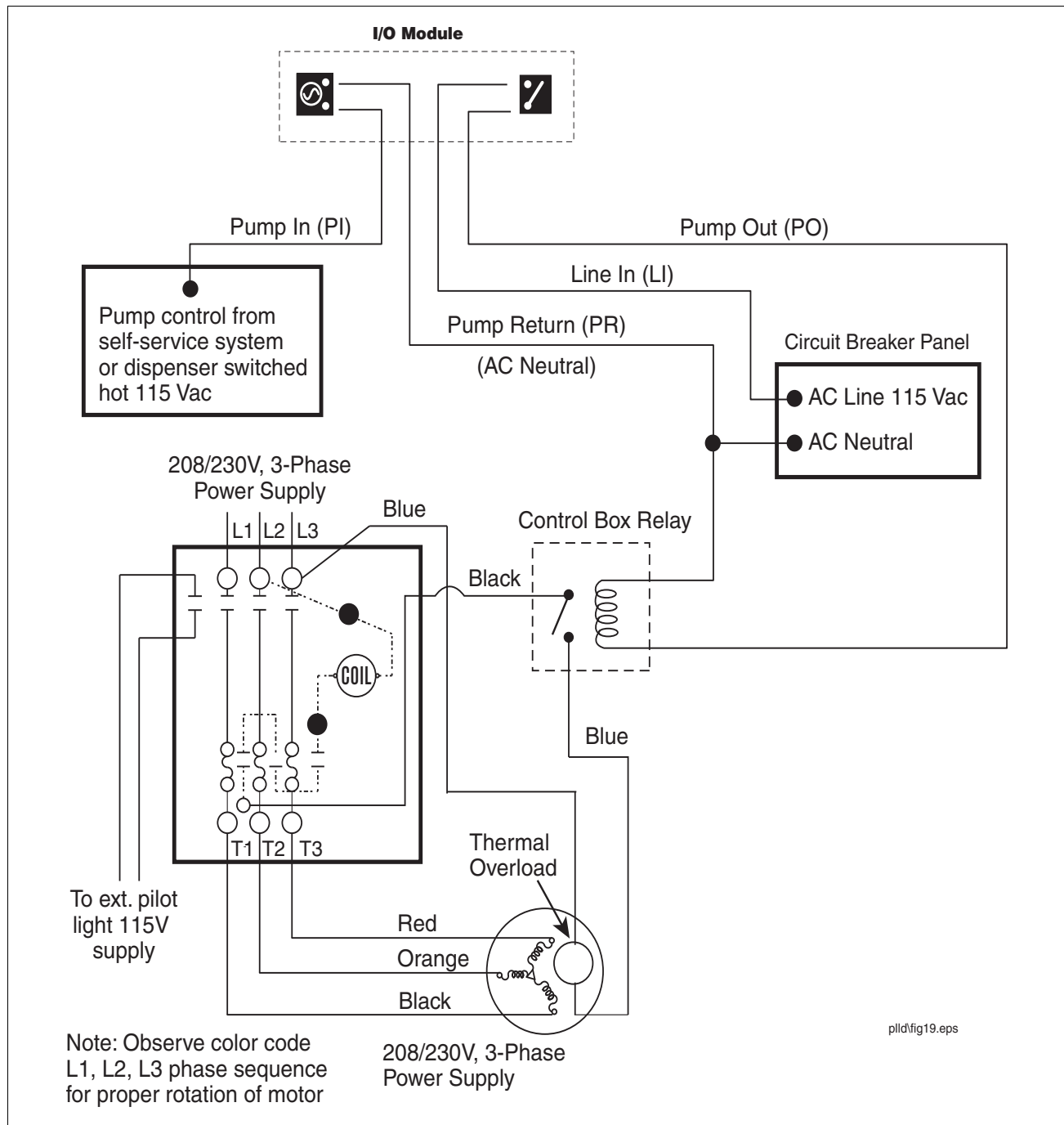


Figure 19. Red Jacket Maxxum Big-Flo 3-phase wiring

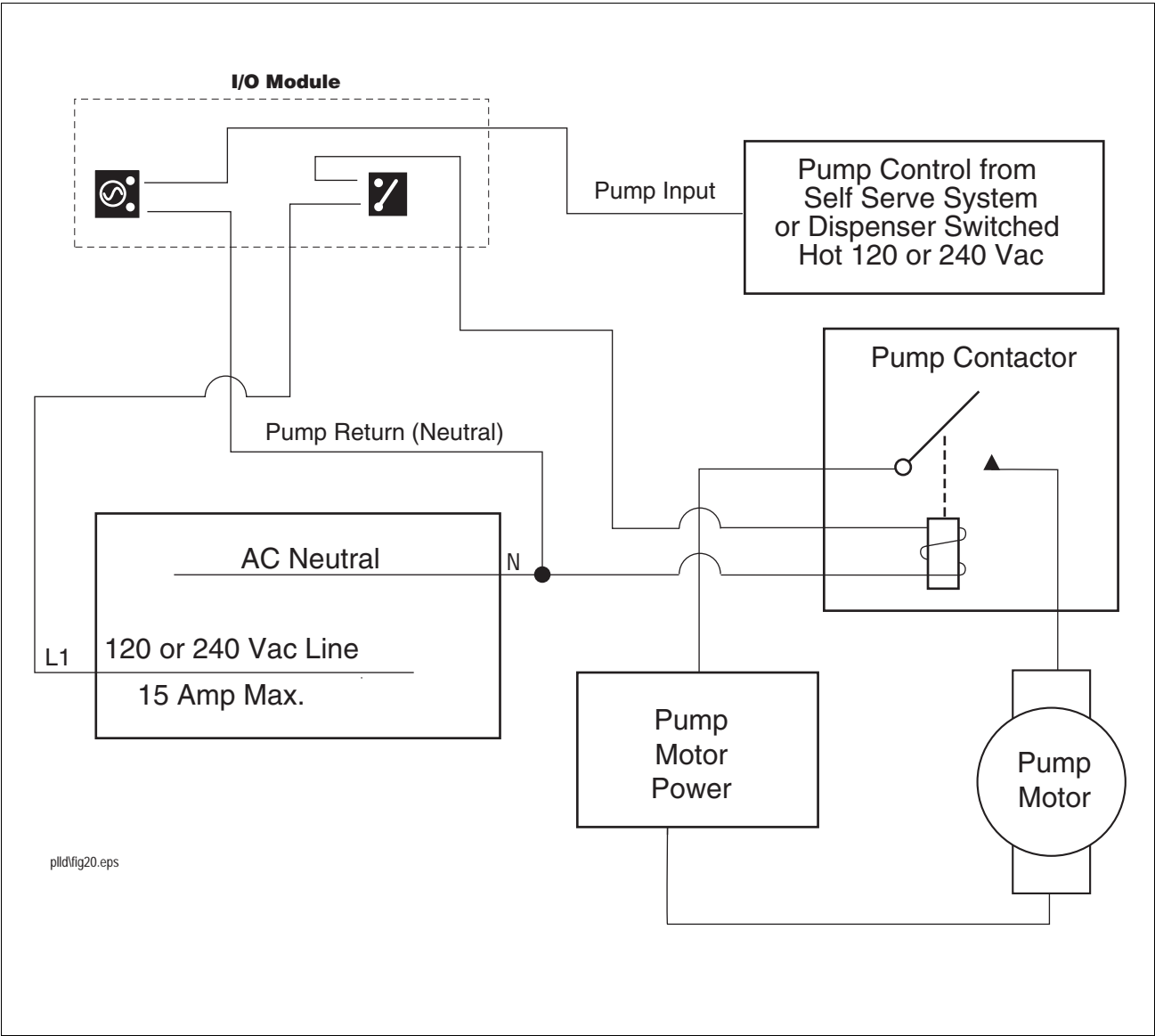


Figure 20. DPLLD pump control diagram for non-Red Jacket relay control box

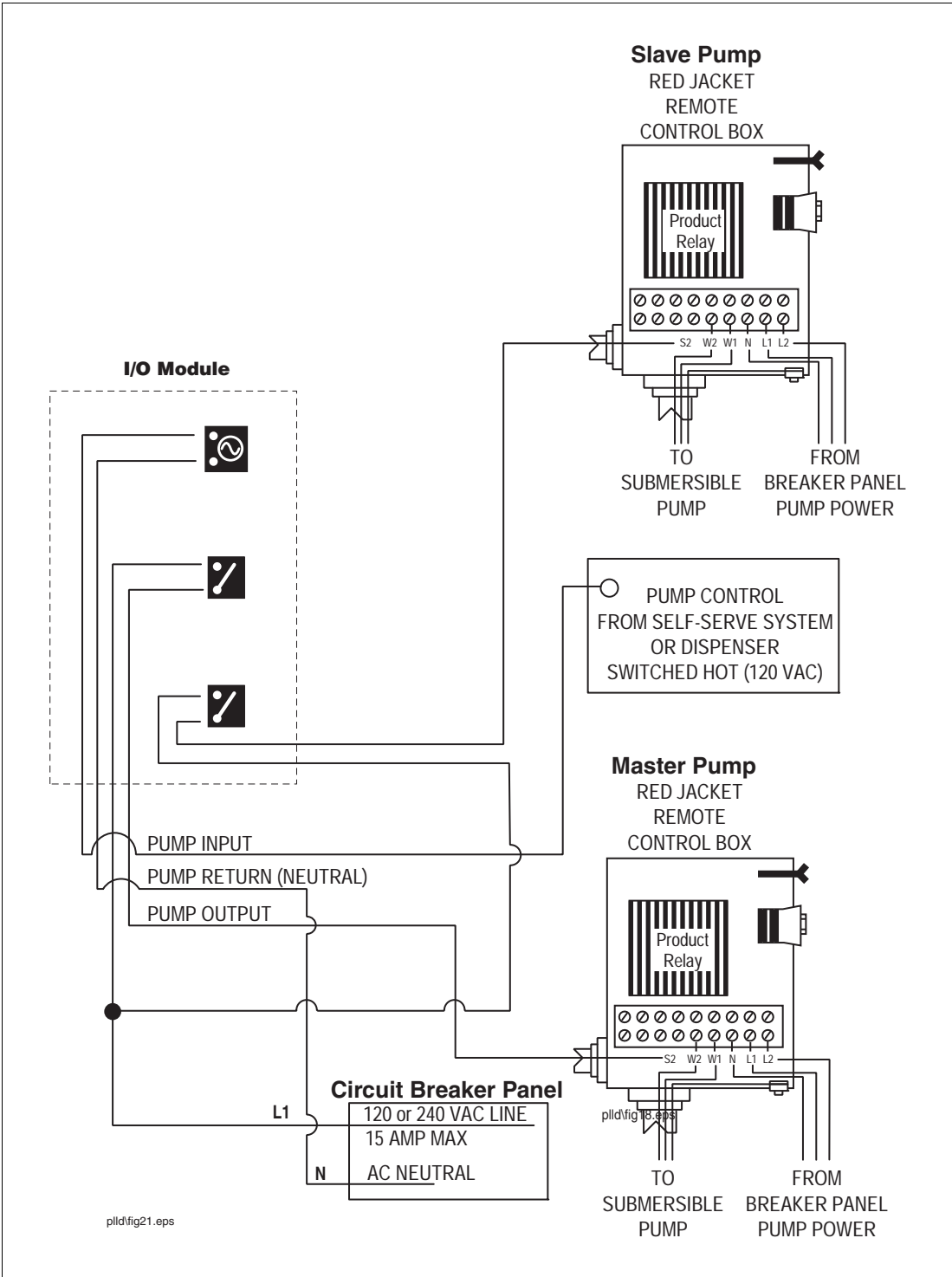


Figure 21. Wiring diagram - manifolded lines DPLLD - multiple tanks (RJ relay control box shown in this example)

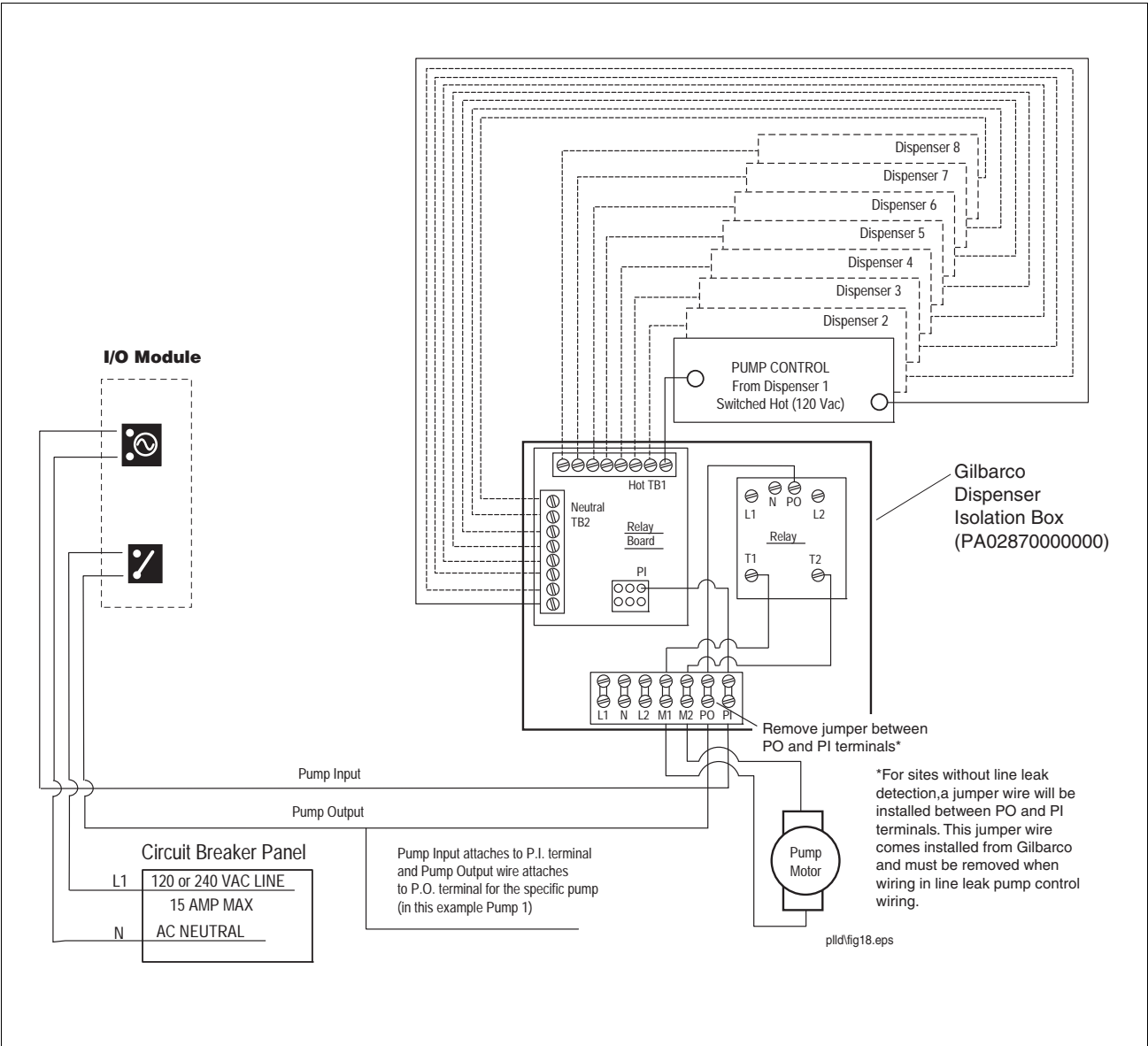


Figure 22. DPLLD pump control diagram for Gilbarco dispenser isolation box

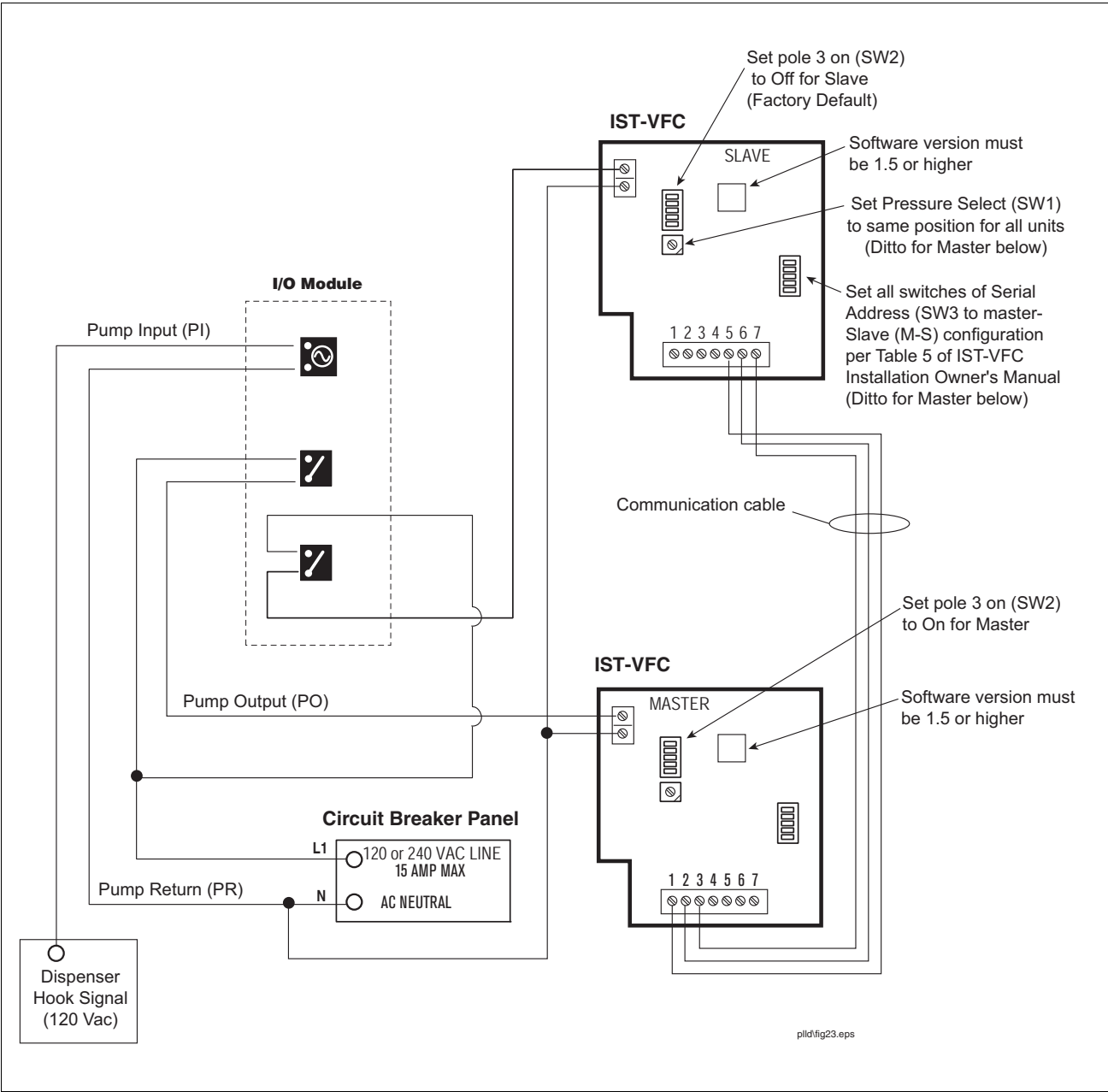


Figure 23. Manifolded product lines - dual FE Petro IST-VFC controllers

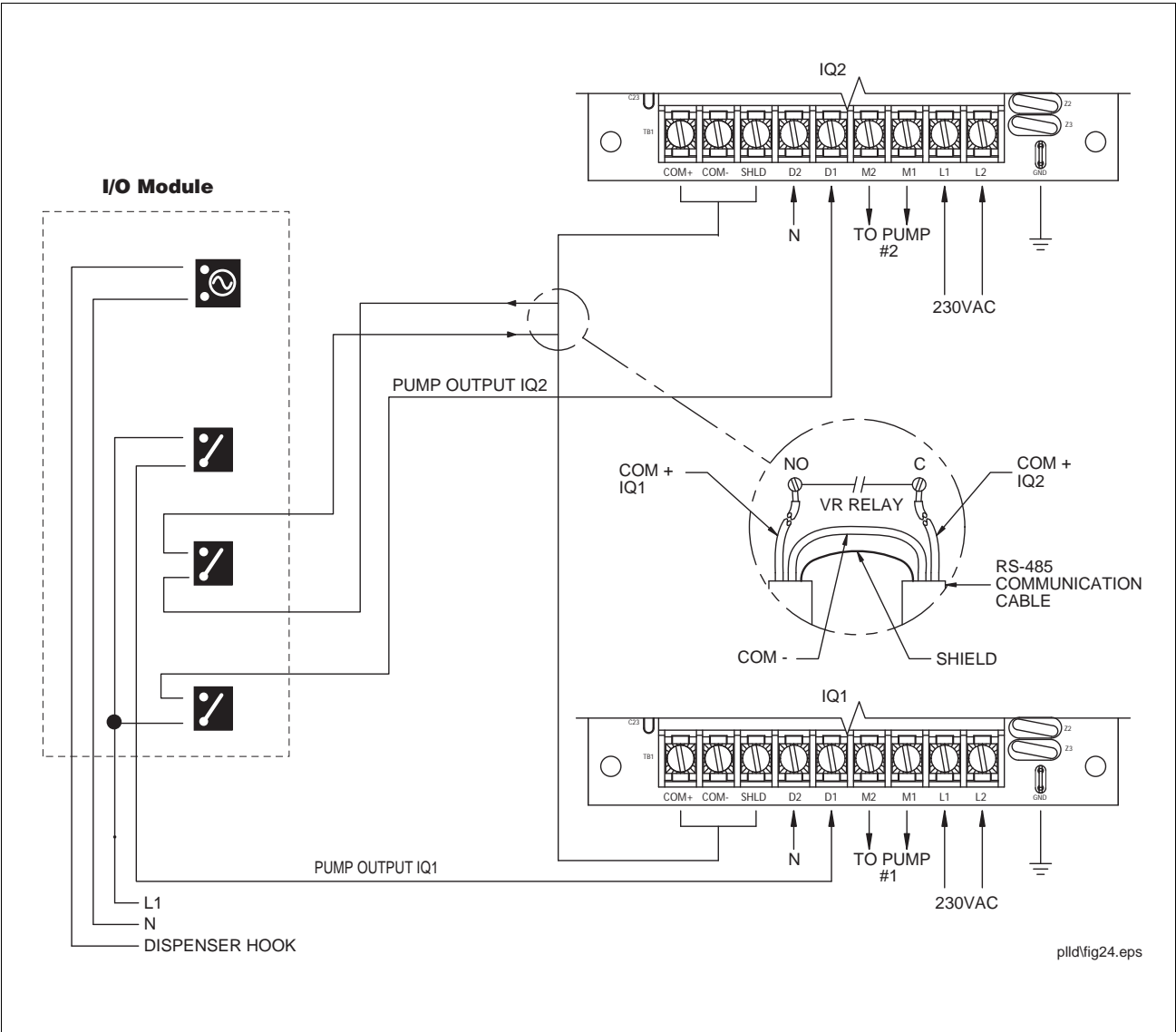


Figure 24. Manifolded product lines - dual Red Jacket IQ controllers

DPLLD Equipment Checkout



IMPORTANT! Do not switch On power to the console. This must be done by an Authorized Service Contractor during the warranty checkout and start-up procedure! An Authorized Service Contractor must program the DPLLD set-up information into the console before beginning these DPLLD equipment checks.

Repeat the four steps below for each DPLLD monitored line.

1. VENT THE LINE



- a. Turn Off, lock out, tag power to the STP.
- b. Vent the line to zero.
- c. Reseal the line.
- d. Turn On power to the STP.



- e. **If the pump has a functional element or PressurStat, verify that it is not leaking!**

2. RED JACKET STANDARD, QUANTUM, AND MAXXUM PUMPS WITH DPLLD TRANSDUCER AND PRESSURSTAT ONLY

You *must* reset the Pressurstat's relief pressure as part of the DPLLD installation.

- a. Unscrew the protective brass cap from the adjustment screw (Figure 25).
- b. When the adjustment screw is fully down, the relief pressure is approximately 40 psi.
- c. Install a pressure gauge in the line.
- d. Set the relief pressure to 20 - 25 psi (verify the relief pressure by using the console - [refer to "5. Enable the Line for Dispensing" on page 31 for the procedure to obtain pressure readings]).
- e. Check the sealing surface for the cap's o-ring and the condition of the o-ring. Clean or replace as required.
- f. Replace the brass cap and hand tighten (the o-ring completes the seal between the body and cap).

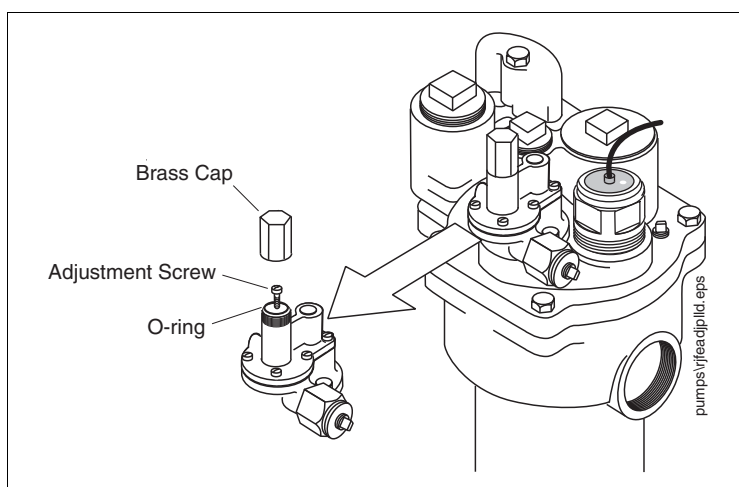


Figure 25. Pressurstat adjustable valve assembly (Red Jacket Standard pump shown)

3. DETERMINE DPLLD TRANSDUCER PRESSURE OFFSET

New transducers are now factory sealed and their internal chamber cannot be equalized to atmospheric pressure by opening a vent screw as in the past. The Pressure Offset test procedure described in this step **must** be performed when using new DPLLD transducers with serial numbers of 100,000 or above, in sites located at altitudes above 2,000 feet. Note: this procedure can also be used with transducers having serial numbers below 100,000 instead of using the vent screw to equalize pressure.

Before this procedure is performed, the pressure in the line **MUST** be vented to zero. It is recommended that this procedure be performed after installing the transducer, before energizing the STP. Consult the TLS-450 console's online help to perform the following steps:

- Run Pressure Offset Test
- Enter the Pressure Offset Value for the DPLLD Transducer

4. PURGE AIR FROM THE LINE

Follow accepted procedures, or appropriate pump manual, to purge all air from the product line being enabled for dispensing.

5. ENABLE THE LINE FOR DISPENSING

After completing the DPLLD installation, the console will not enable dispensing from a line until a 3.0 gph test on the line has been passed. In this step, as you run the required 3.0 gph test, you will also verify that the Pump On and Pump Off pressures are within their proper operating ranges.

