

DPLLD

Site Prep and Installation Guide

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Contact Red Jacket Technical Support for additional troubleshooting information at 800-323-1799.

DAMAGE GOODS/LOST EQUIPMENT

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

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

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1. Fax Bill of Lading to V/R Customer Service at 800-234-5350.
2. Call V/R Customer Service at 800-873-3313 with the specific part numbers and quantities that were received damaged or lost.
3. VR will file the claim with the carrier and replace the damaged/missing product at no charge to the customer. Customer Service will work with production facility to have the replacement product shipped as soon as possible.

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2. Customer may submit a replacement purchase order. Customer Service will work with production facility to have the replacement product shipped as soon as possible.
3. If "lost" equipment is delivered at a later date and is not needed, VR will allow a Return to Stock without a restocking fee.
4. VR will NOT be responsible for any compensation when a customer chooses their own carrier.

RETURN SHIPPING

For the parts return procedure, please follow the instructions in the "General Returned Goods Policy" pages of the "Policies and Literature" section of the Veeder-Root North American Red Jacket Mechanical Products Price Book. Veeder-Root will not accept any return product without a Return Goods Authorization (RGA) number clearly printed on the outside of the package.

RESPONSIBILITIES OF THE INSTALLER AND STATION OWNER

This installation, operation and service instruction manual shall be left with the owner of the service station at which this equipment is installed. Retain these instructions for future use and provide them to persons servicing or removing this equipment.

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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.

NOTICE

- 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-450PLUS/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:

Service Technician Certification (Previously known as Level 2/3): Contractors holding valid 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.

TLS-4xx Technician Certification: Contractors holding valid TLS-450 Technician Certifications are approved to perform installation checkout, startup, programming and operations training, troubleshooting and servicing for all Veeder-Root TLS-450 Series Tank Monitoring Systems, including Line Leak Detection and associated accessories.

All service personal on site must comply with all recommended safety practices identified by OSHA and your employer.

Review and comply with all the safety warnings in the manuals listed in this document above and any other Federal, State or Local requirements.

Warranty Registrations may only be submitted by selected Distributors.

Product Marking Information

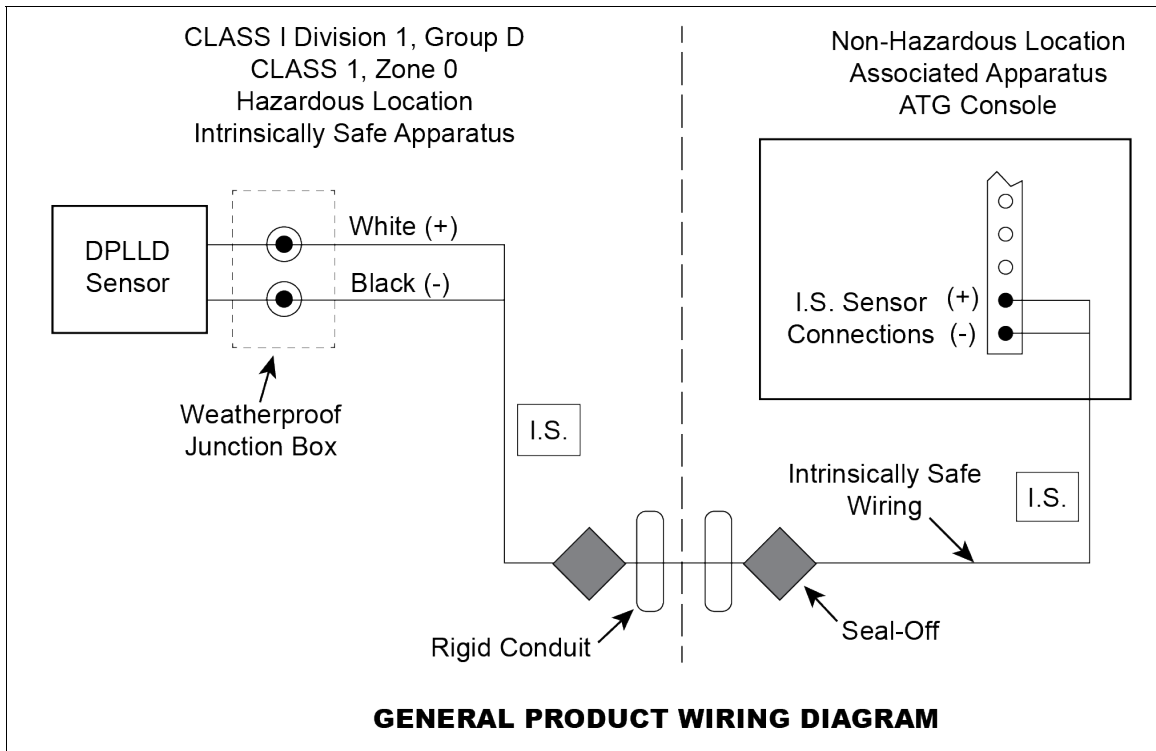
RELATED DOCUMENTS

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-450PLUS&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

 <p>CL I, DIV. 1, GP.D CL I, ZONE 0 AEx ia IIA Ex ia IIA TC=T4 SECURITE INTRINSEQUE</p>	<p>I.S. CIRCUIT FOR HAZLOC SENSOR F/N 8590XX-XXX S/N XXXXXX -40°C ≤ Ta ≤ +60°C MANUAL NO. 577013-933</p>	 <p>2466 c UL us LISTED</p>
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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>APPROVED CONTAINERS Use nonbreakable, clearly marked containers, suitable for collecting and transporting hazardous fuels during service.</p>
<p>WARNING WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>	<p>CAUTION CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</p>
 <p>USE SAFETY BARRICADES Always use safety cones or barricades, safety tape, and your vehicle to block the work area.</p>	<p>NOTICE NOTICE is used to address practices not related to physical 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>	

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.
	<ol style="list-style-type: none"> 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.
	<ol style="list-style-type: none"> 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. To prevent ignition of flammable or combustible atmospheres, turn off, tag and lockout power to console and pumps before servicing. 8. Before installing or taking the transducer 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.

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

REFERENCE MANUALS

577013-465	Line Leak Application Guide
577014-073	TLS-450PLUS Site Prep and Installation Manual
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 non-vented SwiftCheck valve requires a 1-1/2" hex socket (or wrench) for tightening it in the pump's leak detector port.
4. If you are installing DPLLD into a Red Jacket Standard STP you will need a new Functional Element.

Warning Tags

⚠ WARNING 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

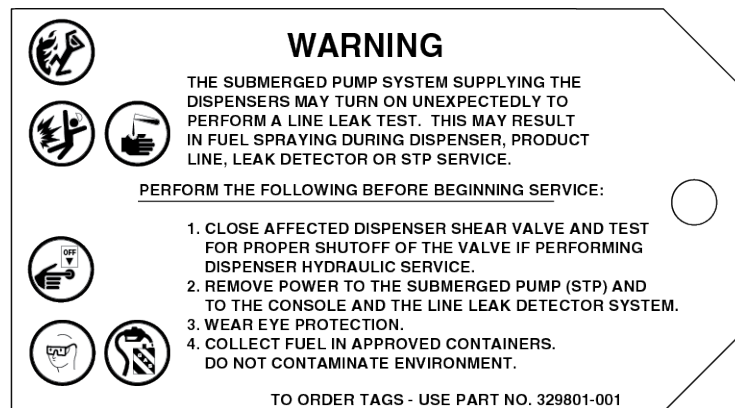


Figure 1. Warning tag

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 primary 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/TLS-450PLUS 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 primary and secondary 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.

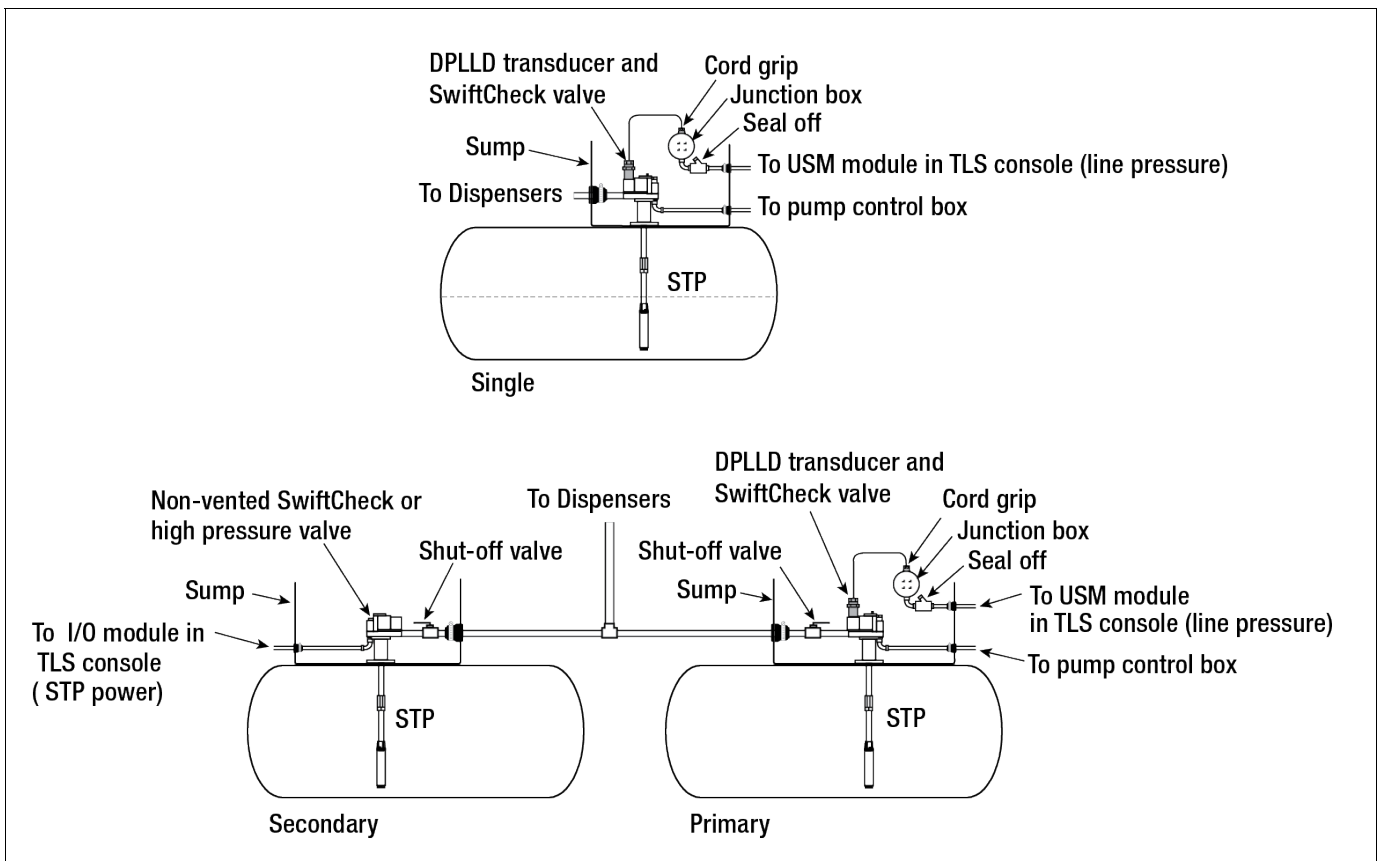


Figure 2. Example DPLLD Equipment Installation

DPLLD Transducer Installation

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

- Red Jacket Standard pumps - DPLLD transducer/SwiftCheck valve (page 8)
- Red Jacket Standard pumps - DPLLD transducer (page 14)
- The Red Jacket (page 15)
- Red Jacket Maxxum Big-Flo (page 16)
- FE-Petro (page 17)

Red Jacket Standard Pumps (DPLLD w/SwiftCheck)

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



Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.



When servicing equipment, use non-sparking tools and use caution when removing or installing equipment to avoid generating a spark.

1. If a ball valve is installed down line from the pump, close it.
2. Back out the electrical connector disconnect bolt.
3. Swing electrical connector aside.
4. To relieve pressure, back out the Functional Element screw or remove the 2 – 1/2-13 Hex Screws on the Packer-To-Manifold flange interface and rock the Packer/Extractable section of the pump to allow excess pressure to flow into the tank.
5. 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, and install 1/4" NPT pipe plugs into the respective "Line Test" and Tank Test" ports on the packer. Be certain to apply an adequate amount of fresh, UL "Classified for Petroleum", non-setting thread sealant on the 1/4" NPT pipe plugs and then torque each plug at 14-24 ft-lbs (19.4-29 Nm).
 - b. If the submersible turbine pump is **not** equipped with a mechanical LLD, remove the 2-inch mechanical LLD port plug.
6. 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].

▲WARNING Failure to ensure a smooth seal surface can result in false line leak alarms.

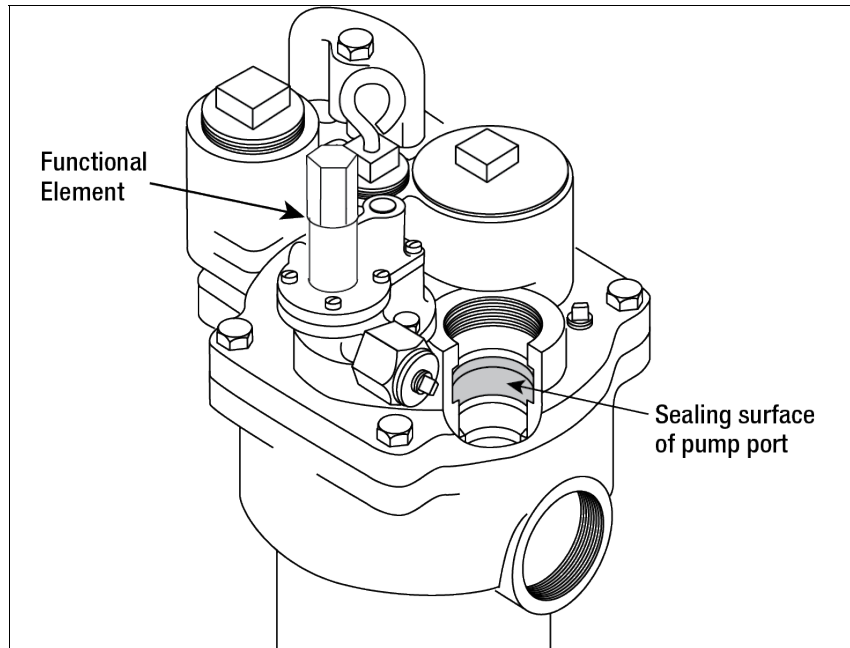


Figure 3. Sealing Surface For SwiftCheck Valve's External O-Ring

7. Lubricate the external o-ring on the SwiftCheck valve using mineral oil or other suitable lubricant.
8. 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.

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

▲WARNING Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

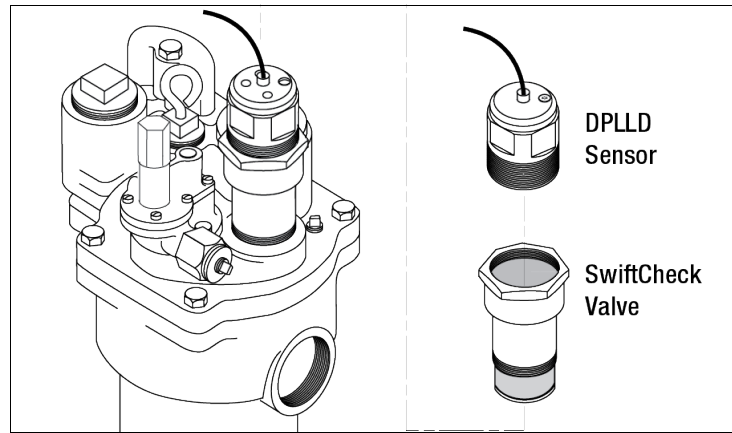


Figure 4. DPLLD Transducer Installation

9. 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.

⚠WARNING 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.

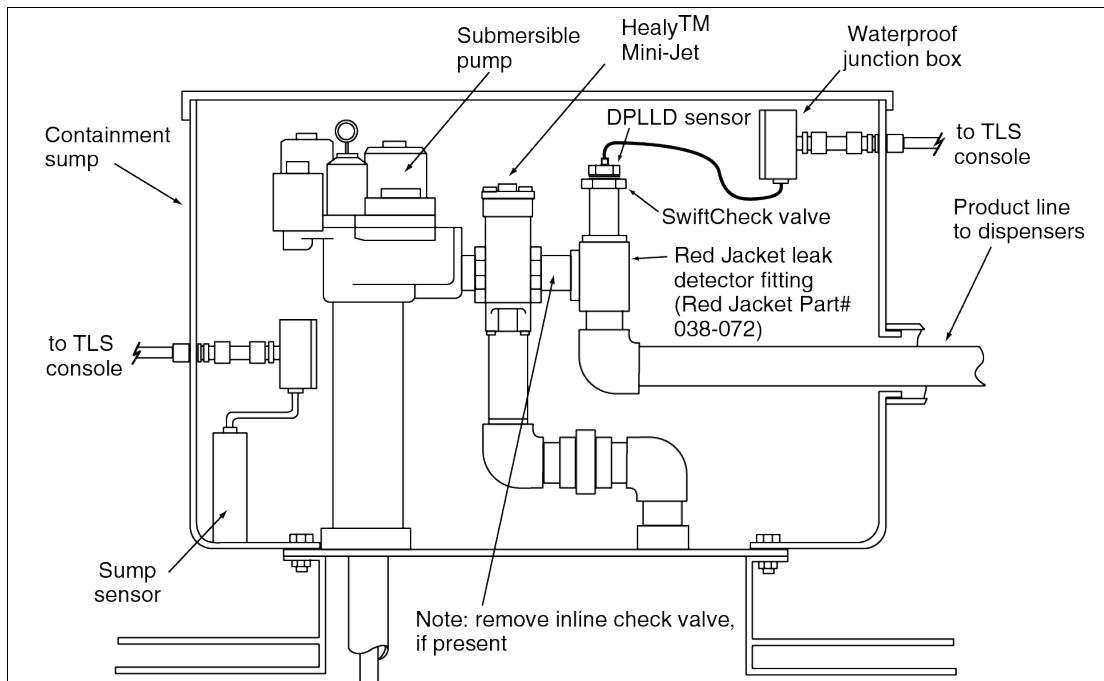


Figure 5. DPLLD Install W/Healy Mini-Jet System (Required Dielectric Union And Shutoff Valve Not Shown)

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

⚠WARNING Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

11. 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 21.
12. The DPLLD Swiftcheck valve eliminates the need for the pumps Functional Element relief valve function. Remove the existing Functional Element from the packer and discard. Obtain a new Pump Service Kit (P/N 344-001-5) which includes the new Functional Element, Check Valve and Seals. Using the new Functional Element, remove the 6 – 1/4-28 Fillister Head Screws and set aside. Remove the top assembly of the Functional Element from its body by pulling straight upward from to separate the top from the body. Gently fold back/separate the diaphragm from the top and remove the poppet and the spring. Discard the spring but reinstall the poppet (see Figure 6).

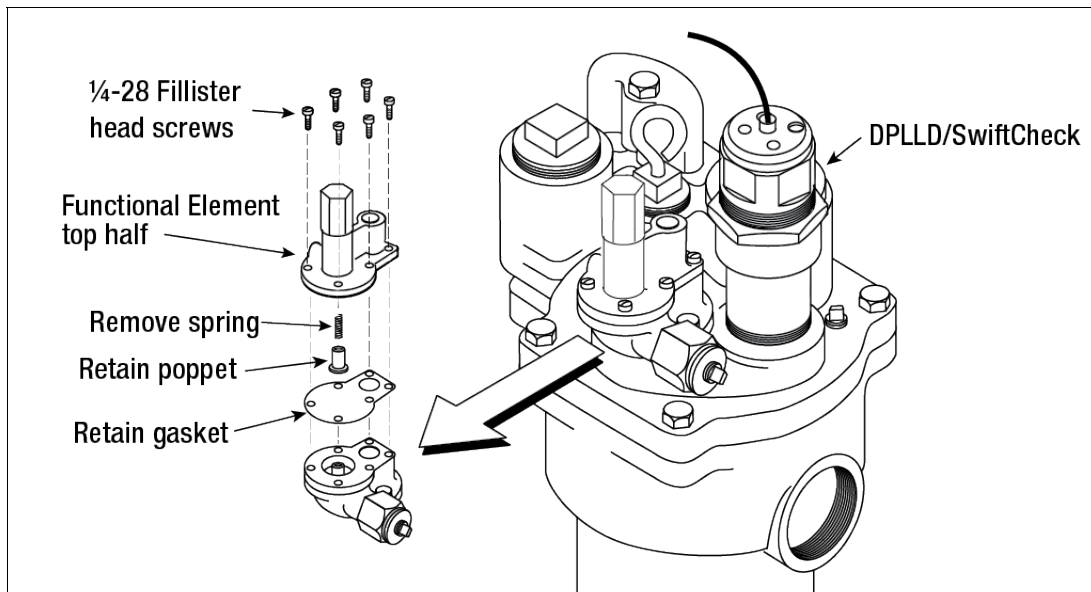


Figure 6. Modifying The Functional Element In Red Jacket Pumps

- Lubricate the o-ring on the Lockdown Screw, using petroleum jelly (see Figure 7).

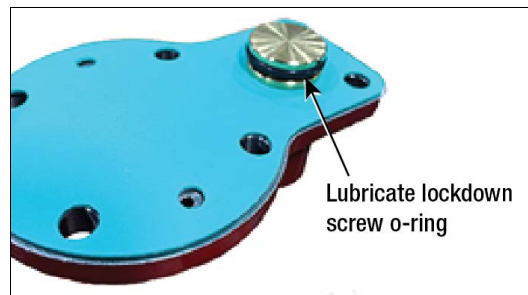


Figure 7. Functional Element Screw Tightening Sequence

- Return the Diaphragm to the normal position on the top of the Functional Element. Install the top of the Functional Element, Poppet, and Diaphragm assembly onto the body of the Functional Element using the 6 – 1/4-28 Fillister Head Screws and torque these fasteners, sequentially as shown in Figure 8 to 40-65 in-lbs.

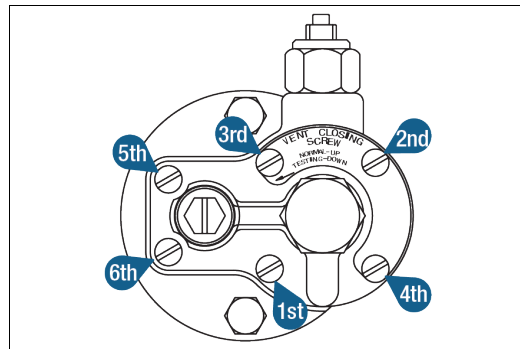


Figure 8. Functional Element Screw Tightening Sequence

- Be certain all mating surfaces are clean on the body of the Functional Element and the Packer. Lubricate the three new functional element O-rings from the kit with petroleum jelly. Install the 2.193" O.D. and 0.63" O.D. O-rings in the bottom of the functional element as shown in Figure 9. Install the new 0.379" O.D. O-ring in the groove around the packer's diaphragm vent port.

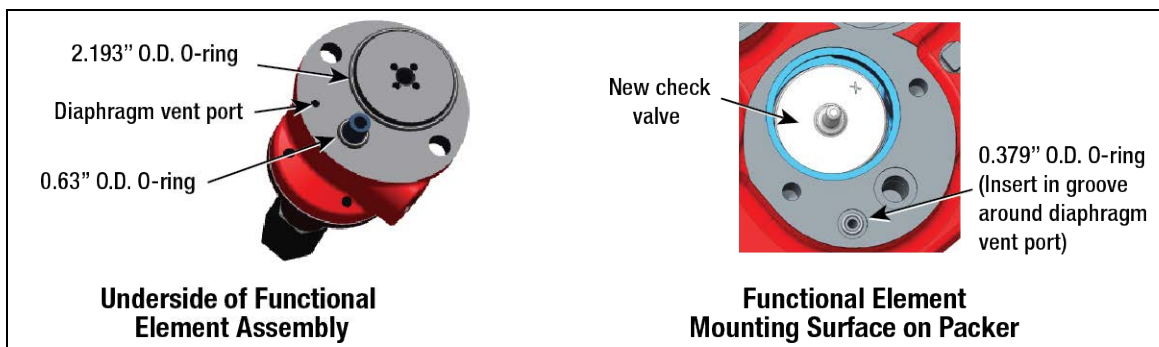


Figure 9. Functional Element O-Rings

- Position the new check valve in the packer in same position as was the old check valve (see Figure 10). Position the new check valve spring on top of the new check valve with the larger diameter end of the spring

facing up. Clean the packer facing prior to installing new Functional Element.



Figure 10. Installing Check Valve And Spring In Packer

17. Carefully set the new functional element assembly in place, then install the two new 3/8-inch securing bolts from the kit and torque to 20 - 35 ft-lb (27 - 50 N•m).
18. If siphon tubing is installed, remove the siphon plug from the new functional element. Connect the siphon tubing fitting to the siphon port using fresh, UL classified for petroleum, non-setting thread sealant.
19. If applicable, open ball valve down line from the pump. Upon start-up of the pump, check for leaks to ensure that the system is leak free.

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

Red Jacket Standard Pumps (DPLLD)

Use this installation procedure to install a DPLLD transducer in a Red Jacket Standard pump that has a Functional Element 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.

⚠ WARNING



Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.



When servicing equipment, use non-sparking tools and use caution when removing or installing equipment to avoid generating a spark.

1. If a ball valve is installed down line from the pump, close it.
2. 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, and install 1/4" NPT pipe plugs into the respective "Line Test" and Tank Test" ports on the packer. Be certain to apply an adequate amount of fresh, UL "Classified for Petroleum", non-setting thread sealant on the 1/4" NPT pipe plugs and then torque each plug at 14-24 ft-lbs (19.4-29 Nm), or
 - b. If the submersible turbine pump is **not** equipped with a mechanical LLD, remove the 2-inch mechanical LLD port plug.
3. Thread the DPLLD transducer into the LLD port (Figure 11).

⚠ WARNING

Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

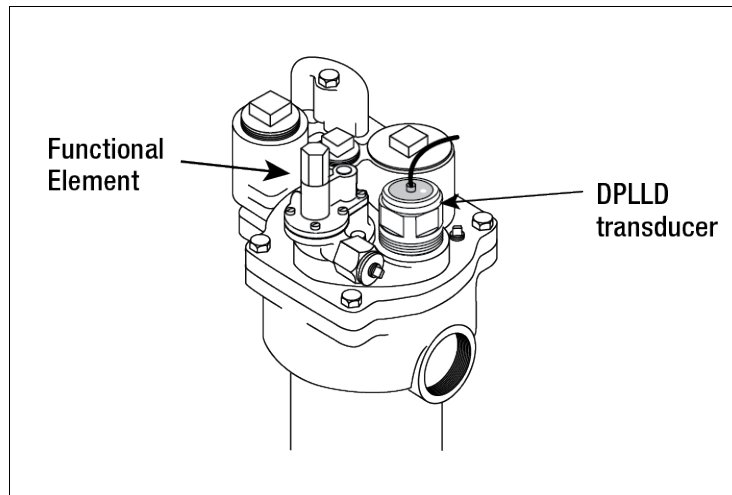


Figure 11. DPLLD Installation

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 21.

- If applicable, open ball valve down line from the pump. Upon start-up of the pump, check for leaks to ensure that the system is leak free.

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.



Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.



When servicing equipment, use non-sparking tools and use caution when removing or installing equipment to avoid generating a spark.

- If a ball valve is installed down line from the pump, close it.
- 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 12).



Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

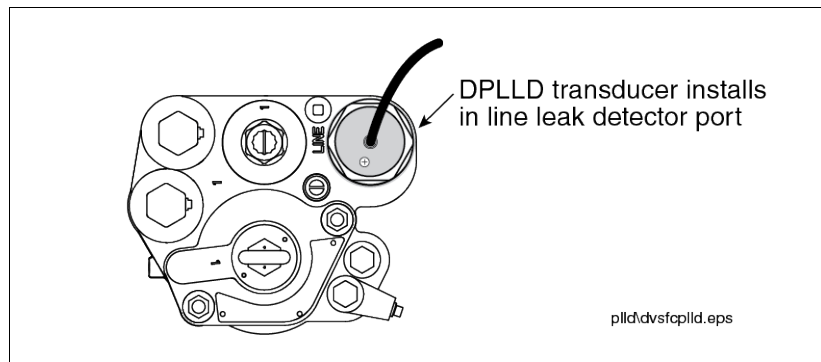


Figure 12. Locating Discharge Port Plug For Line Leak Transducer

- 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 038-072 fitting.



Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

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

⚠ WARNING 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.

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 21.
5. If applicable, open ball valve down line from the pump. Upon start-up of the pump, check for leaks to ensure that the system is leak free.

Red Jacket Maxxum Big-Flo

⚠ WARNING



Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.



When servicing equipment, use non-sparking tools and use caution when removing or installing equipment to avoid generating a spark.

1. If a ball valve is installed down line from the pump, close it.
2. If any in-line check valves or Big-Flo Diaphragm Valve are installed in the line, they must be removed.
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 13).

⚠ WARNING

Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

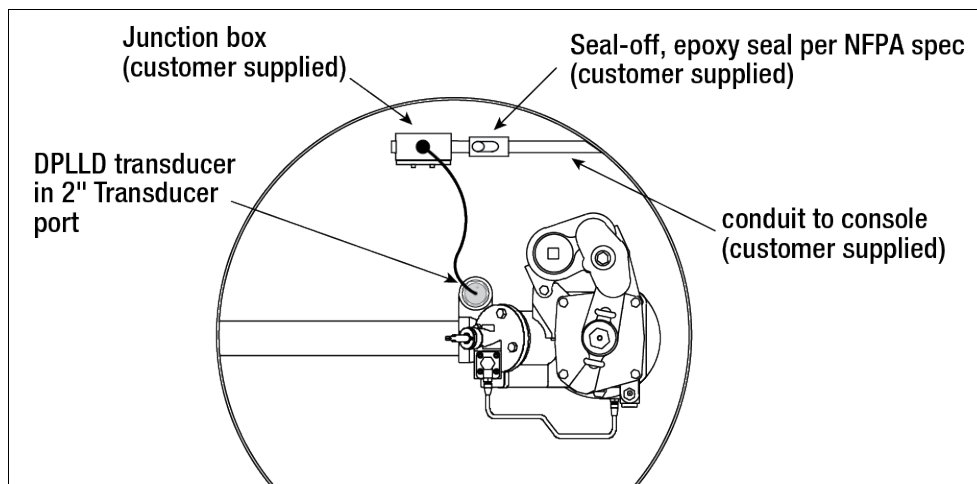


Figure 13. Example DPLLD Installation In A Red Jacket Maxxum Big-Flo Pump

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 21.

5. If applicable, open ball valve down line from the pump. Upon start-up of the pump, check for leaks to ensure that the system is leak free.

FE Petro Pumps



Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.



When servicing equipment, use non-sparking tools and use caution when removing or installing equipment to avoid generating a spark.

1. If a ball valve is installed down line from the pump, close it.
2. 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 14.



Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

3. 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.



Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

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.

4. 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 14).

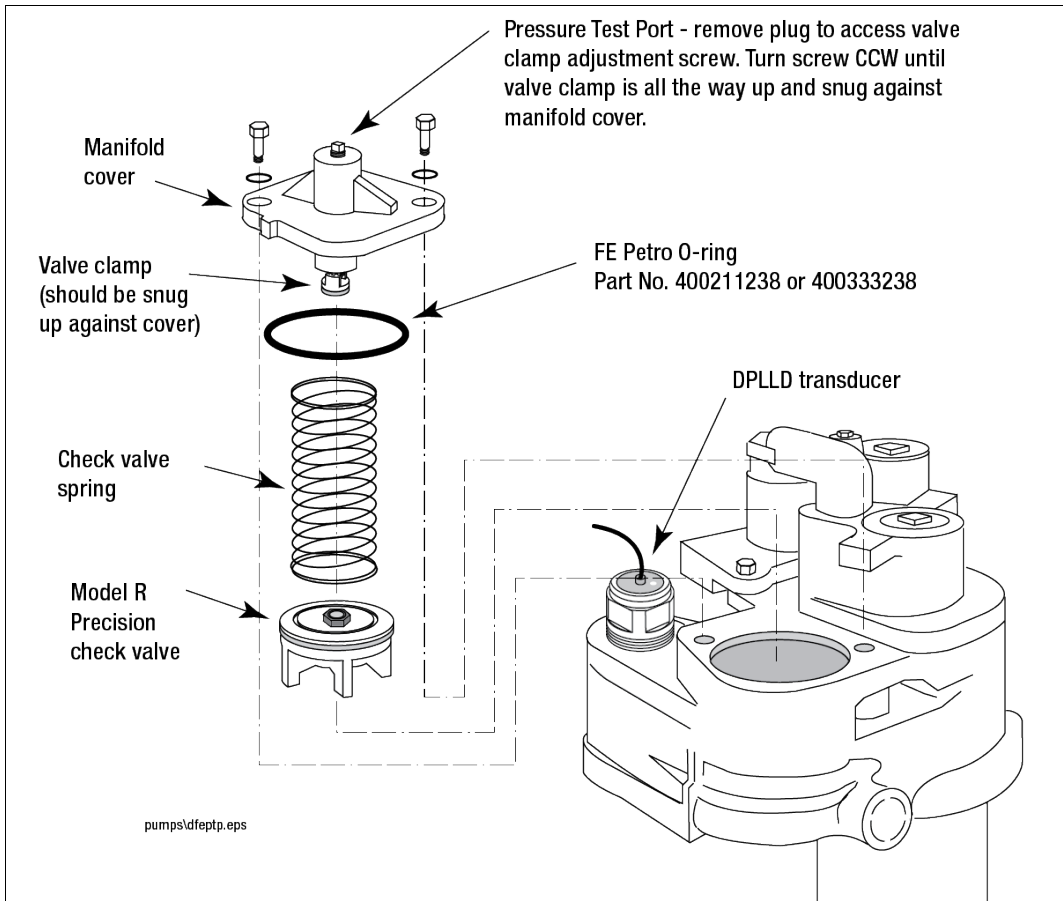


Figure 14. Location of DPLLD Transducer And Model 'R' Precision Check Valve In FE Petro Pump

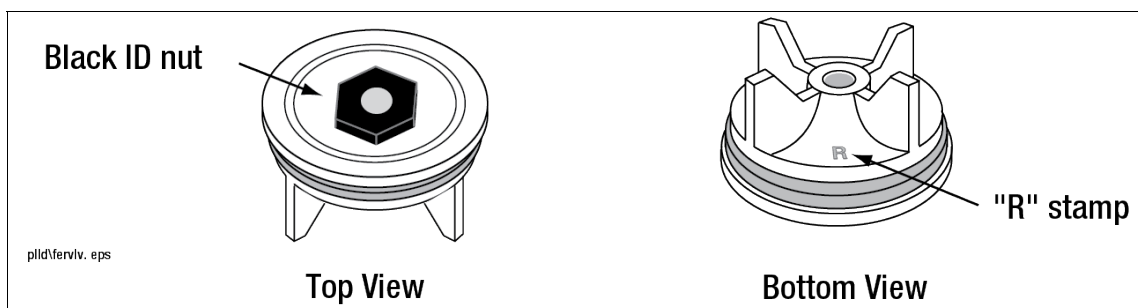


Figure 15. Identifying A FE Petro 'R' Style Precision Check Valve

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 21.
6. If applicable, open ball valve down line from the pump. Upon start-up of the pump, check for leaks to ensure that the system is leak free..

FE PETRO HIGH CAPACITY PUMPS

When installing PLLD in a FE Petro High Capacity pump, a FE Petro Model 'R' Relief Valve (P/N 401330902) must be installed in the pump. Refer to the manufacturer's documentation to verify that this relief valve is present. If the 'R' relief valve is not present install as per manufacturer's instructions.

You will also need to install a reducing tee (customer supplied) in the 3-inch discharge port of the pump with the 2-inch opening facing up. Thread the PLLD transducer into the 2-inch opening of the tee.

⚠️WARNING Seal the NPT threads only with a UL-Classified, nontoxic pipe sealant suitable for the fuel involved (for high-alcohol fuel blend applications, Loctite 564 is recommended). Apply sealant in a manner that prevents it from entering and contaminating hydraulic cavities.

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

⚠️WARNING 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 16) 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 16) 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.

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

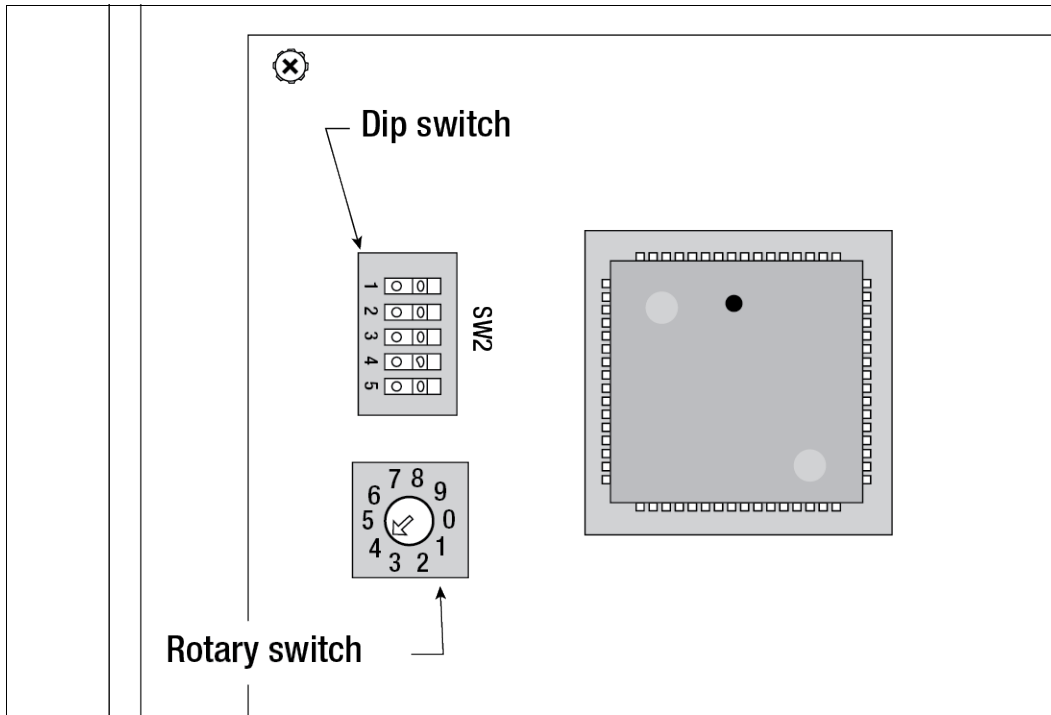


Figure 16. Dip Switch SW2 And Rotary Switch Locations In The FE-Petro IST-VFC Unit

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

NOTICE Refer to the appropriate Site Prep manual (P/N 577014-073 - TLS-450PLUS or P/N 577013-879 TLS-450) for required wiring types/lengths for pressure transducer and pump control field wiring.

DPLLD Transducers

WARNING  Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.

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. Using wire nuts, connect the white and black wires from the DPLLD transducer to field wires in the weatherproof sump junction box (ref. Figure 17). **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.**

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

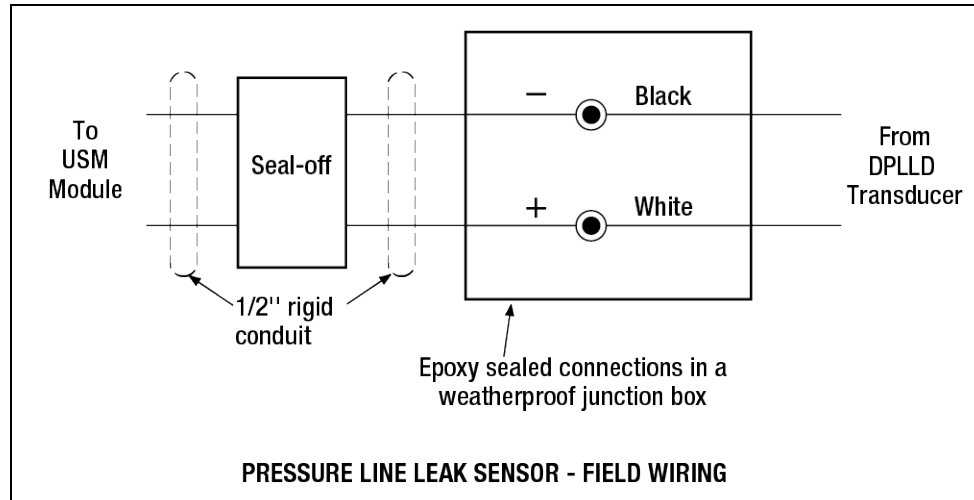


Figure 17. Field Connections Of DPLLD Transducer

3. 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 18 as you prepare epoxy and seal connections.

WARNING 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.

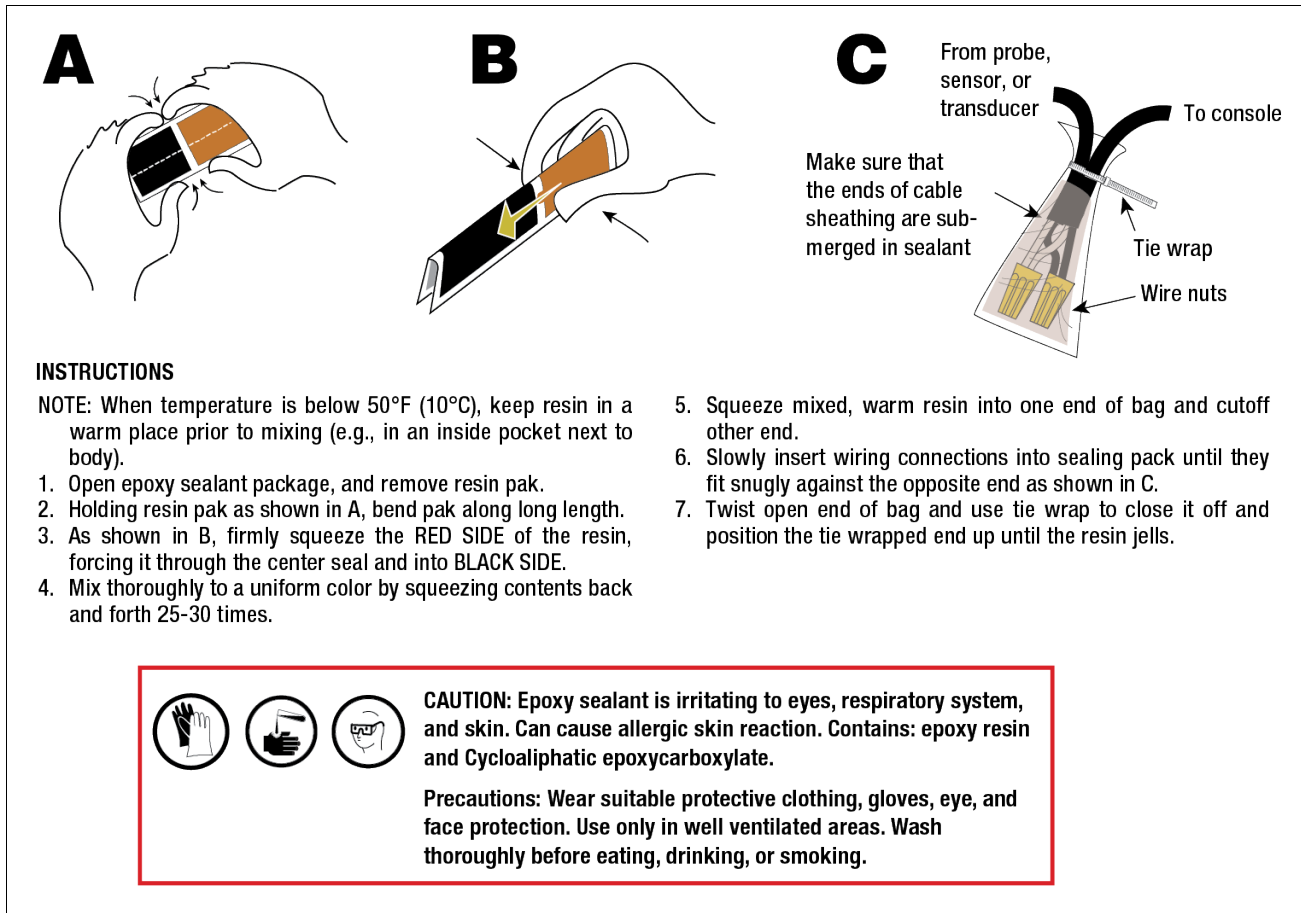


Figure 18. Epoxy Sealing Pressure Transducer Field Connections

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.

NOTICE 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.

WARNING



Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.

1. Connect the two color-coded or marked wires from each DPLLD transducer to the USM module. (see Figure 19). Maintain correct polarity between the color-coded or marked field wires and the connector terminals during wiring.
2. Connect the transducer cable's bare wire (shield) to one of the ground lugs in the TLS console.

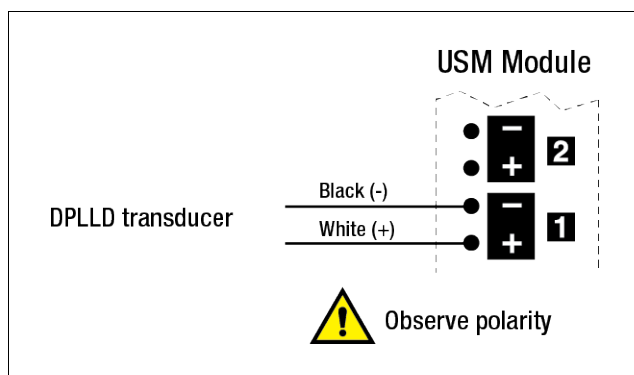


Figure 19. DPLLD Transducer Wiring To USM Module


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.

WARNING

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.

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.

⚠ WARNING  **Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps.**

1. 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!**

⚠ WARNING **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.**

2. 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 20, Figure 21, and Figure 22)
 - Non-Red Jacket (ref. Figure 23)
 - Manifolded tanks (ref. Figure 24, Figure 25, and Figure 27)
 - Gilbarco dispenser isolation box (ref. Figure 25)

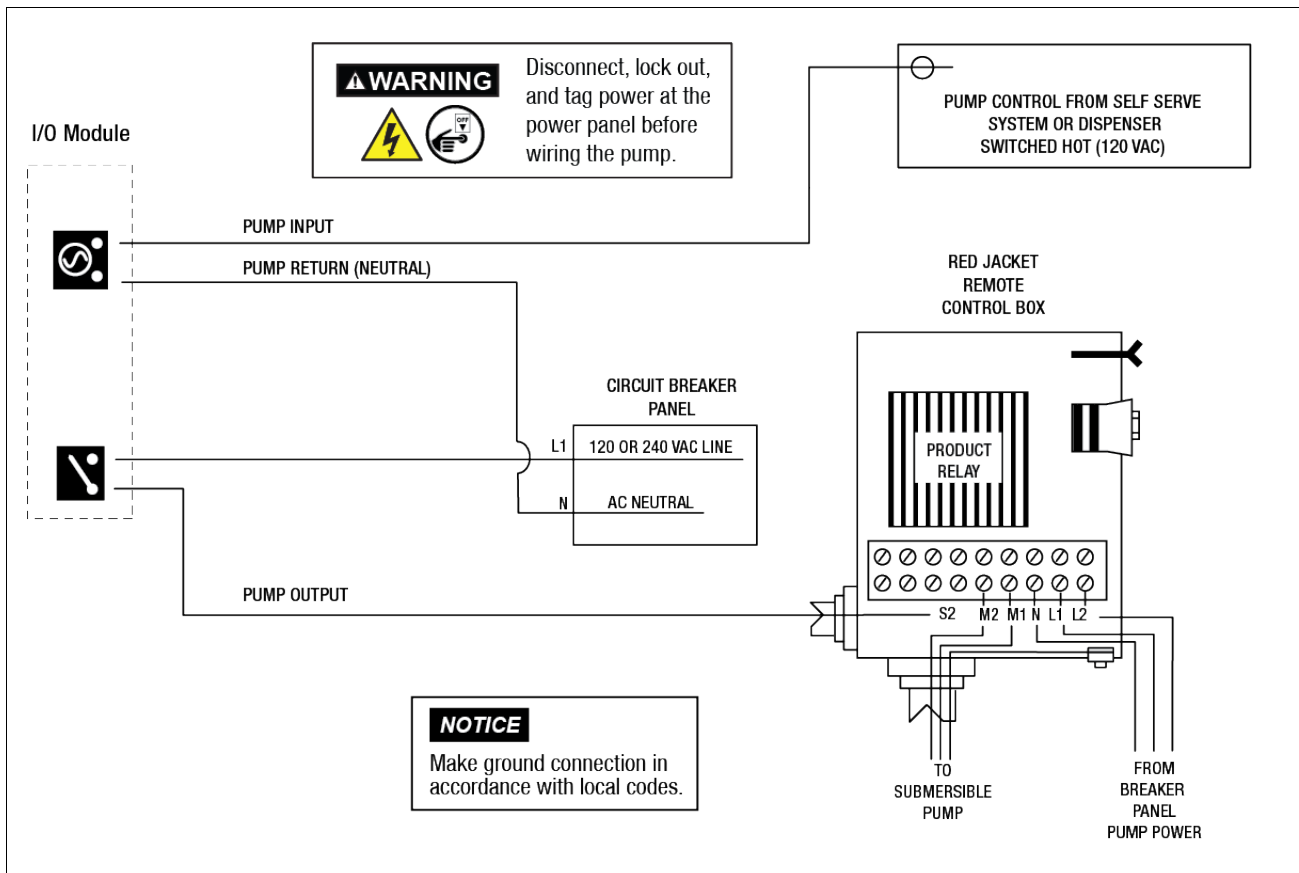


Figure 20. DPLLD Pump Control Diagram For Red Jacket Relay Control Box

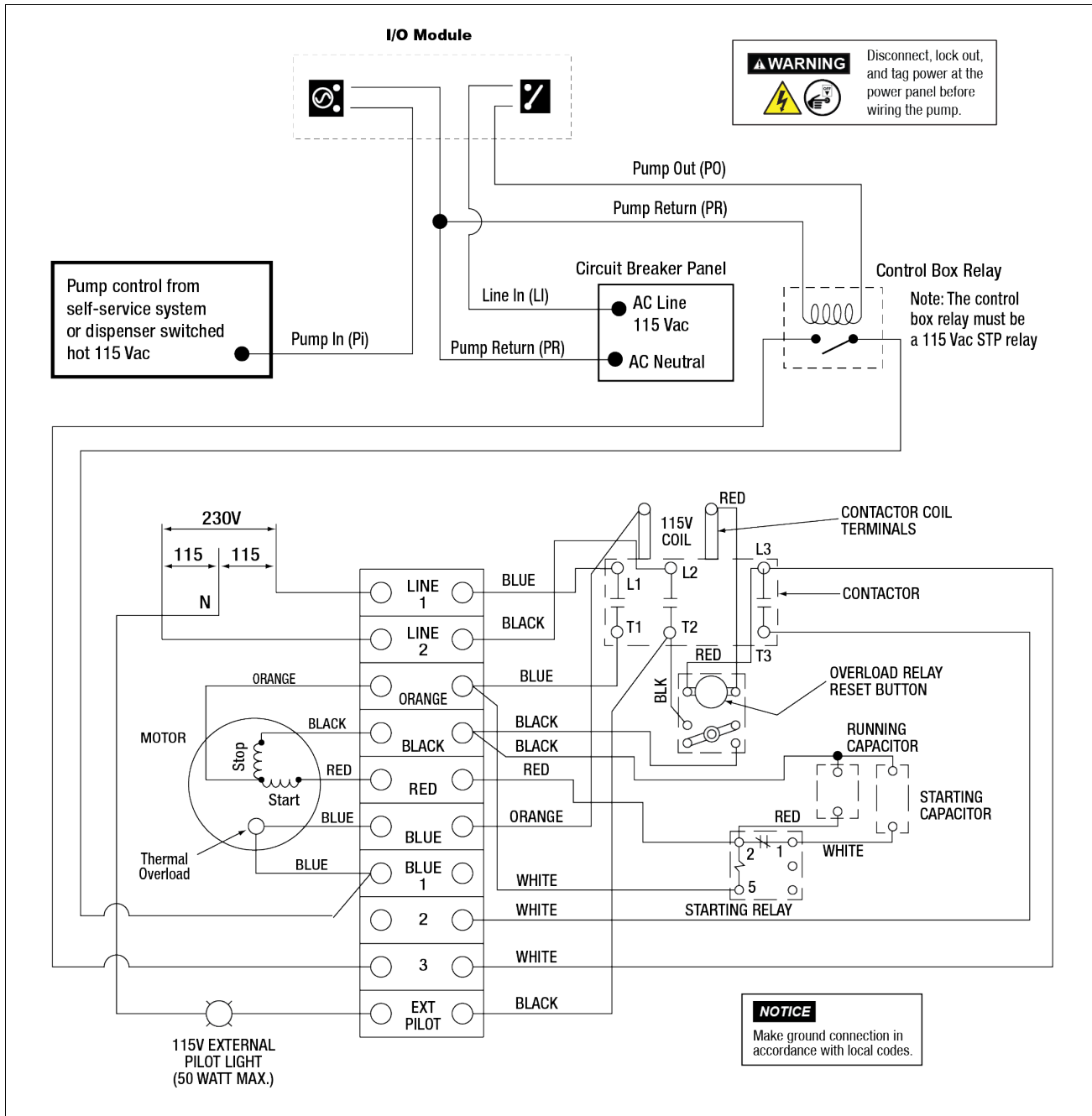


Figure 21. Red Jacket Maxxum Big-Flo Single-Phase Wiring

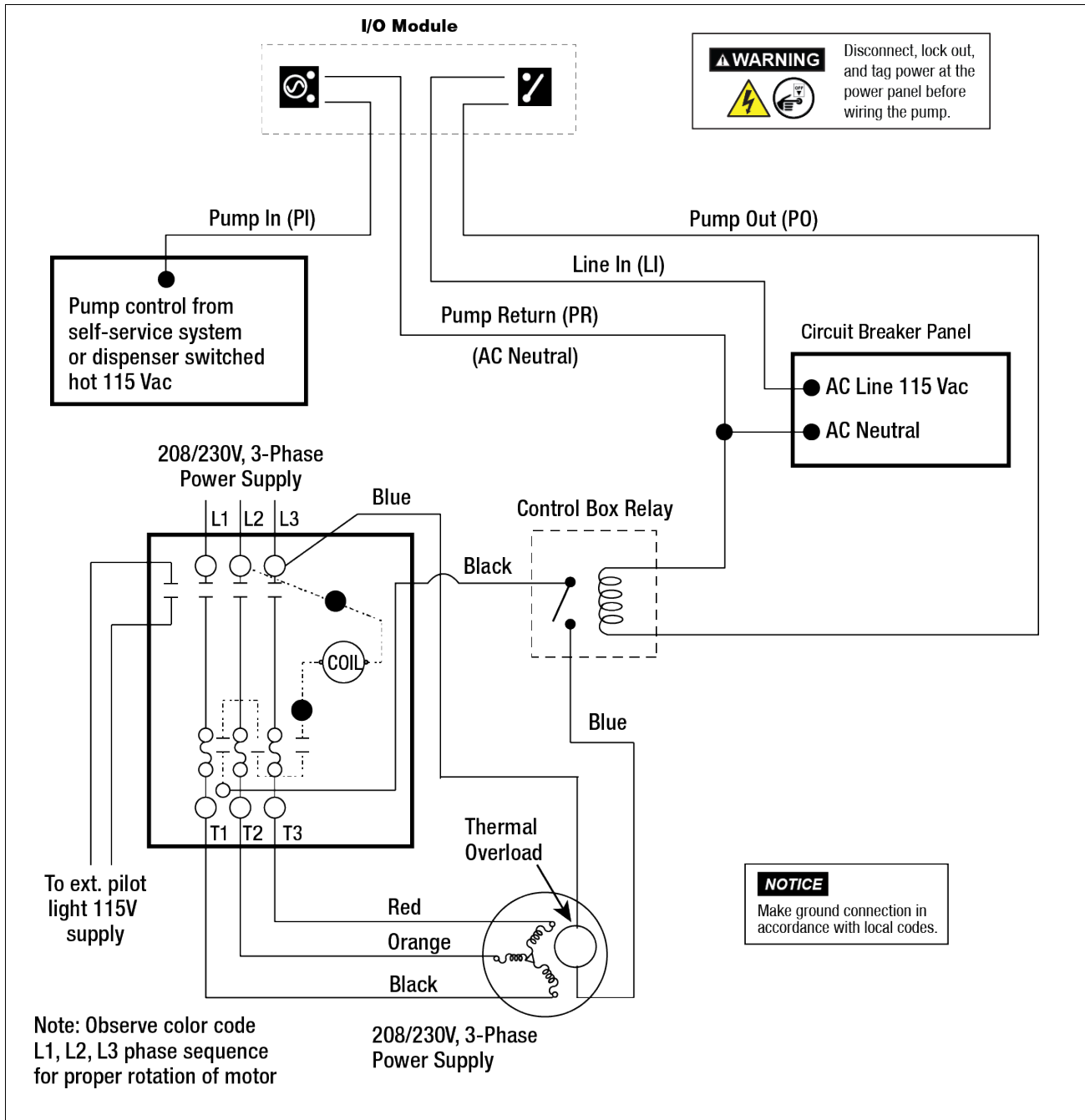


Figure 22. Red Jacket Maxxum Big-Flo 3-Phase Wiring

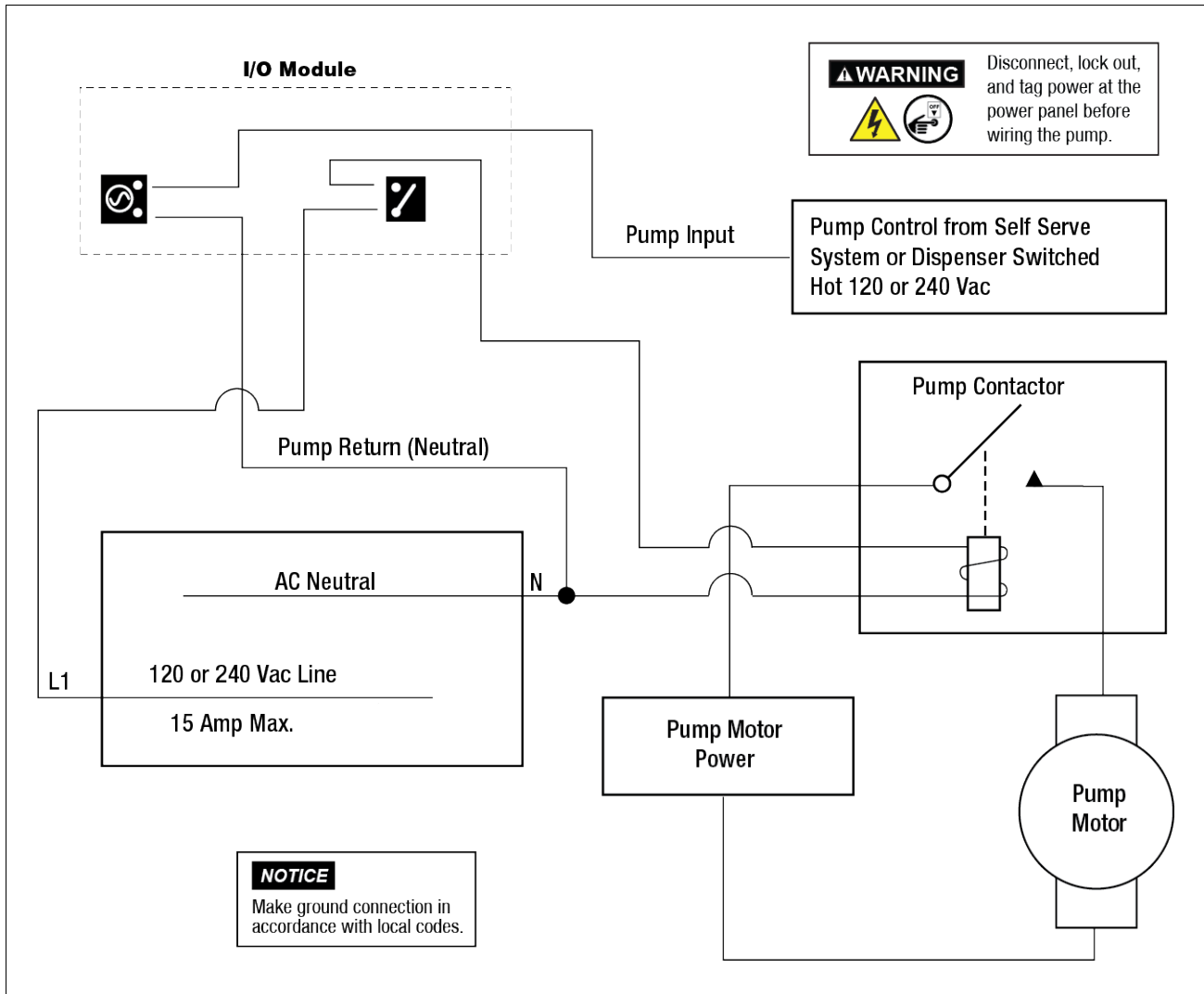


Figure 23. DPLLD Pump Control Diagram For Non-Red Jacket Relay Control Box

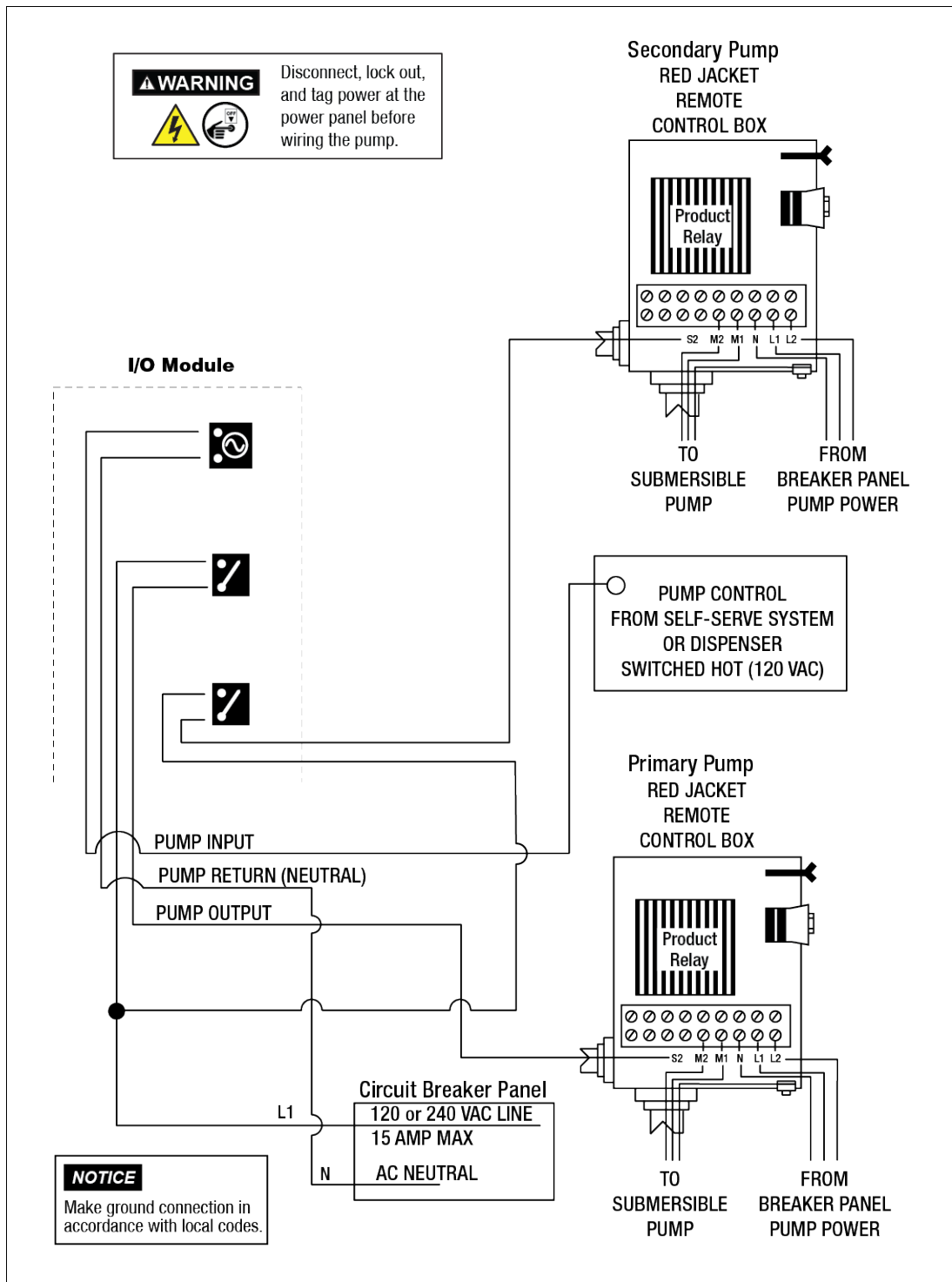


Figure 24. Wiring Diagram - Manifolded Lines DPLLD - Multiple Tanks (RJ Relay Control Box Shown In This Example)

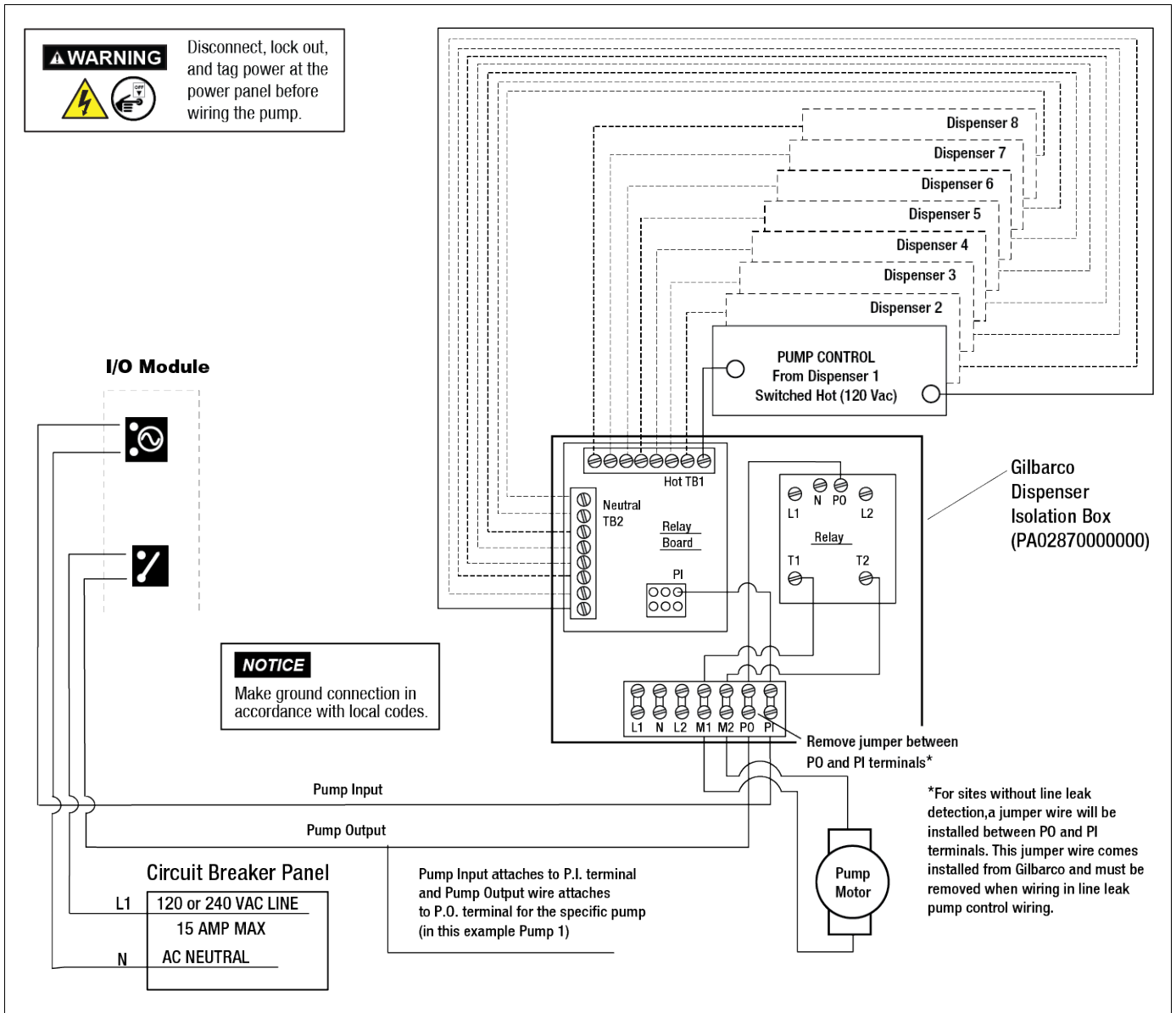


Figure 25. DPLLD Pump Control Diagram For Gilbarco Dispenser Isolation Box

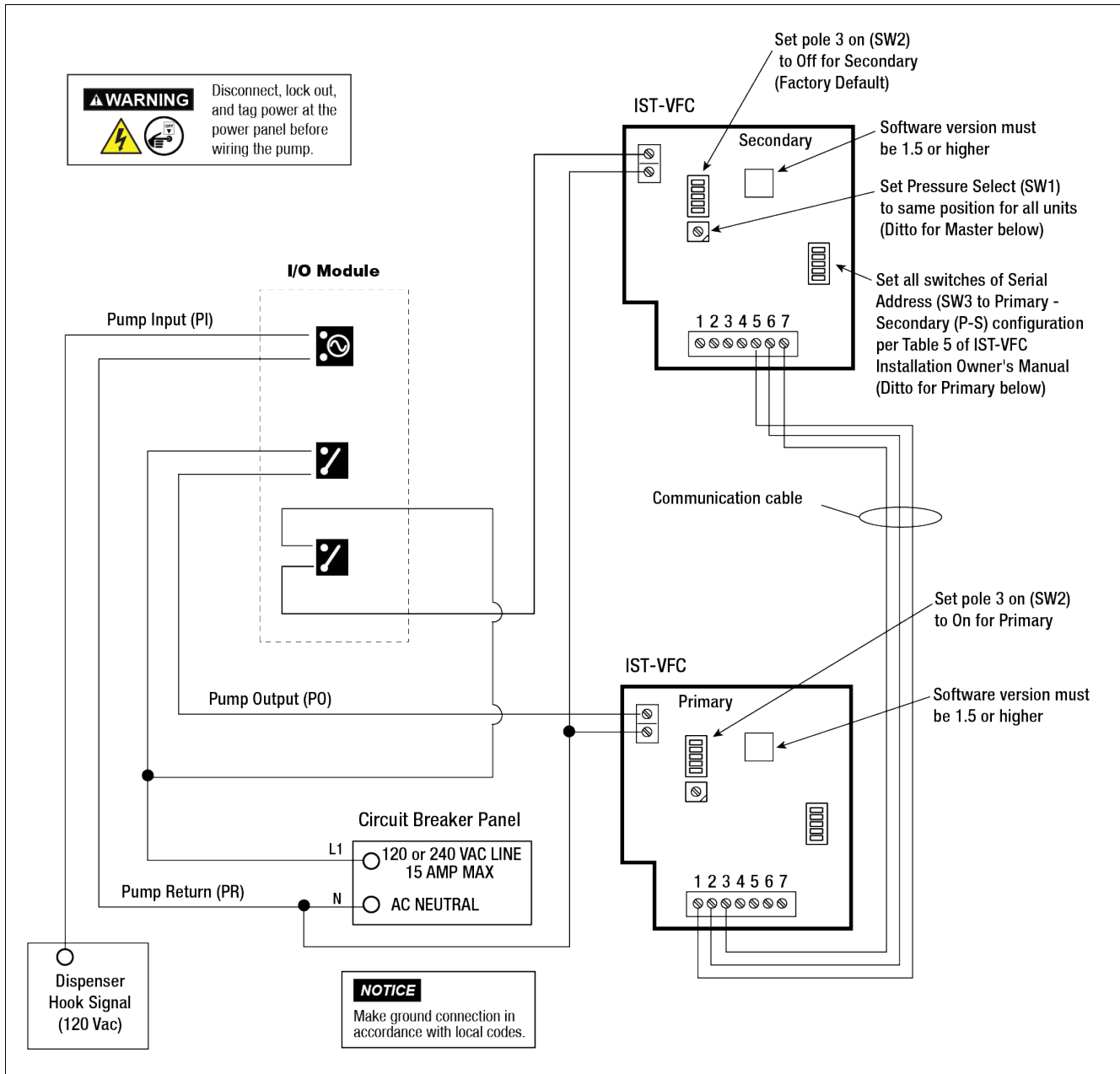


Figure 26. Manifolder Product Lines - Dual FE Petro IST-VFC Controllers

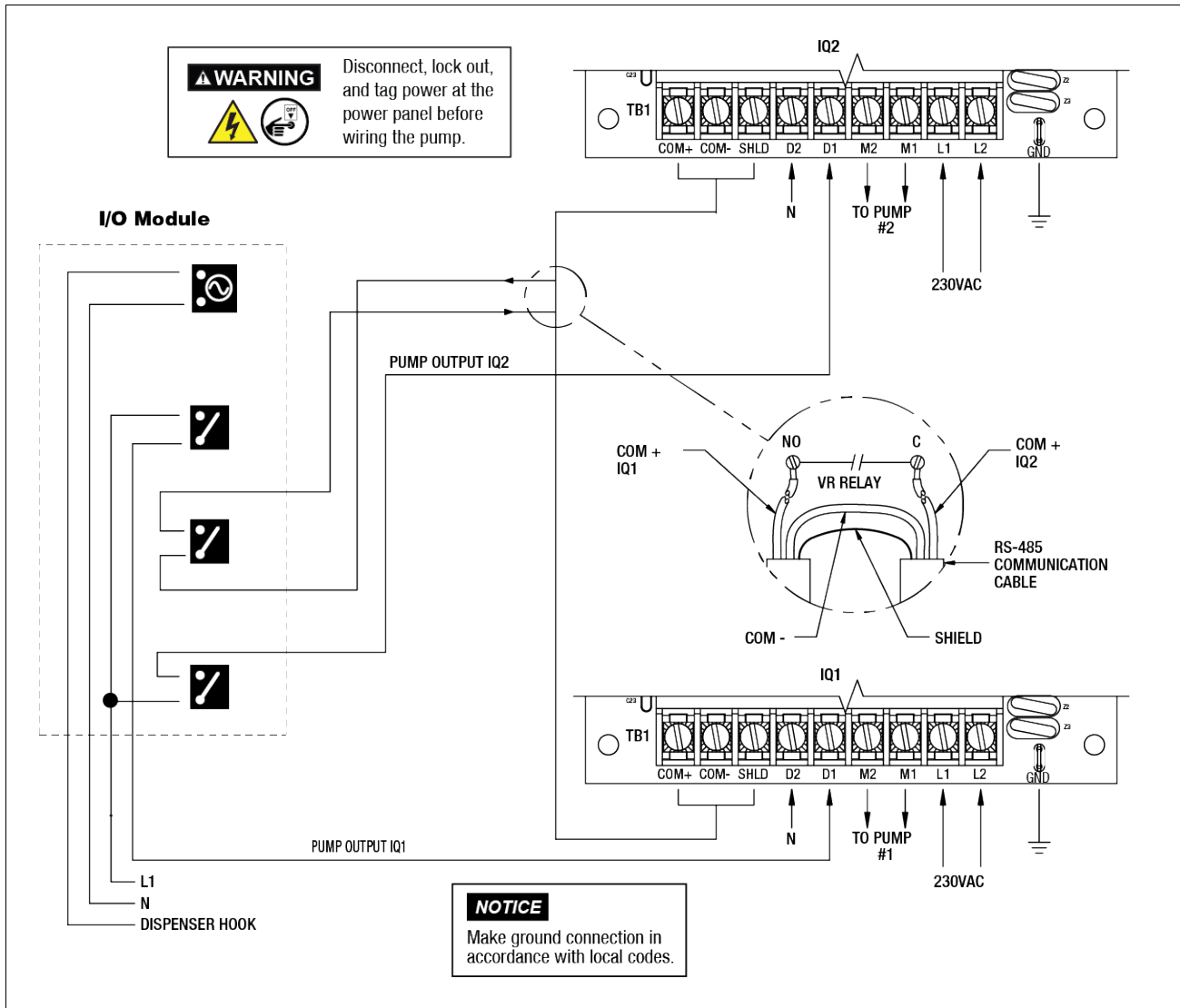




Figure 27. Manifolded Product Lines - Dual Red Jacket IQ Controllers

DPLLD Equipment Checkout Steps

▲WARNING 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 steps below for each DPLLD monitored line.

1. Vent The Line

▲WARNING   Disconnect, lock out, and tag all AC power to the TLS console, dispensers and submersible pumps. Turn Off, lock out, tag power to the STP.



When servicing equipment, use non-sparking tools and use caution when removing or installing equipment to avoid generating a spark.

- Vent the line to zero.
- Reseal the line.
- Turn On power to the STP.

▲WARNING If the pump has a Functional Element, verify that it is not leaking!

2. Reset FE Relief Pressure

NOTICE This step only applies to RJ Standard pumps with PLLD (w/o SwiftCheck) and to Maxxum Pumps with PLLD and Pressurstat.

▲WARNING You **MUST** reset the Functional Element/Pressurstat relief pressure as part of the PLLD system installation.

PROCEDURE FOR RJ STANDARD PUMP WITH PLLD (W/O SWIFTCHECK)

- Unscrew the protective cap from the adjustment screw (Figure 28).
- When the adjustment screw is fully down, the relief pressure is approximately 30 psi.
- Install a pressure gauge in the line.
- Set the relief pressure to 11 - 16 psi (verify the relief pressure by using the console - [refer to "5. Enable the Line for Dispensing" on page 34 for the procedure to obtain pressure readings]).
- Check the sealing surface for the cap's o-ring and the condition of the o-ring. Clean or replace as required.
- Replace the cap and hand tighten (the o-ring completes the seal between the body and cap).

PROCEDURE FOR MAXXUM PUMP WITH PLLD AND PRESSURSTAT

- Unscrew the protective cap from the adjustment screw (Figure 28).
- When the adjustment screw is fully down, the relief pressure is approximately 40 psi.

3. Install a pressure gauge in the line.
4. 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 34 for the procedure to obtain pressure readings]).
5. Check the sealing surface for the cap's o-ring and the condition of the o-ring. Clean or replace as required.
6. Replace the cap and hand tighten (the o-ring completes the seal between the body and cap).

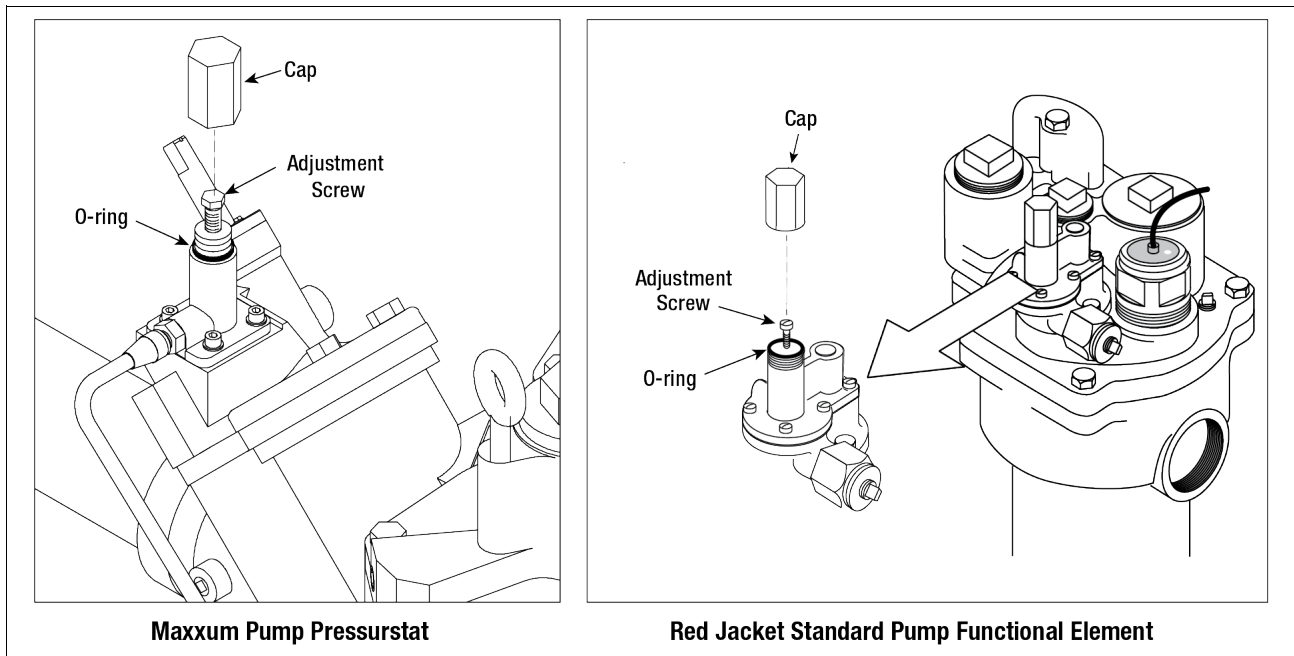


Figure 28. Functional Element (Red Jacket Standard Pump Shown)

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.

