

# The Red Jacket Submersible Turbine Pump

**Installation, Service, & Parts lists**

# Red Jacket

# Notice

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# Introduction

## Overview

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The Red Jacket submersible turbine pump (STP) is engineered for advanced environmental protection, serviceability, safety, and flow. The Red Jacket STP fits 4-inch NPT threaded, thin-wall risers and is available in a wide variety of horsepower.

Newly designed features of The Red Jacket STP are:

- **Service spill elimination**

The check valve can be raised to provide a larger path to depressurize the line and return fuel to the tank.

- **Vacuum monitoring applications**

The vacuum sensor siphon is a monitoring-grade siphon system. It is designed specifically for use in vacuum monitoring applications, and to integrate with V-R vacuum sensors. The two-port vacuum sensor-siphon system incorporates a redesigned one-piece rubber check valve with an inline filter screen that reduces the clogs and failures that can cause false alarms and downtime in vacuum monitoring applications.

- **Plug-in yoke electrical connection**

Current safety practice when servicing existing STPs requires turning off the circuit breaker, backing off the bolts by up to one inch, and then manually pulling the electrical yoke connection apart. With The Red Jacket STP you turn off the circuit breaker, then simply back off the two nuts holding the extractable in place and the yoke electrical connection is broken as the extractable is removed. After service is complete, the electrical circuit reconnects when the two nuts are retightened. Safe, simple, and easy.

- **Extractable is easy to service**

The Red Jacket STP incorporates industrial die springs that break loose the o-ring seals when the nuts holding the extractable in place are removed. No physical effort or special equipment is required to break the seal. In addition, all connected parts have been moved to the manifold. There is no need to remove parts, leak detectors, or siphons when service or upgrades require removing the extractable.

- **Manifold allows for vertical or horizontal discharge**

The Red Jacket STP has been designed for vertical product discharge via a 2-inch NPT threaded port, but with adequate swinging radius to allow for the addition of an elbow to accommodate a side discharge. In fact, the discharge is now located higher on the manifold so that a side discharge is on the same plane as the rest of the pump.

- **Built-in contractor's box**







An electrical connection housing (contractor's box) is built into The Red Jacket STP's manifold and is completely isolated from the fuel path. Unlike existing systems, there is no adjustment required to fit the yoke, making this pump easy to install.






- **Line leak detection**

Veeder-Root/Red Jacket industry leading pressurized line leak detection (PLLD) provides environmental compliance without the fuel flow restrictions of mechanical (MLLD) or electronic (ELLD) systems.

## Safety Precautions

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

 <p><b>EXPLOSIVE</b> Fuels and their vapors are extremely explosive if ignited.</p>	 <p><b>FLAMMABLE</b> Fuels and their vapors are extremely flammable.</p>
 <p><b>ELECTRICITY</b> High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>	 <p><b>TURN POWER OFF</b> 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><b>WARNING</b> Heed the adjacent instructions to avoid equipment damage or personal injury.</p>	 <p><b>READ ALL RELATED MANUALS</b> 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>

 <b>WARNING</b>	
<div style="display: flex; flex-direction: column; align-items: center; gap: 10px;">     </div>	<p><b>This product operates in the highly combustible atmosphere of a gasoline storage tank. Failure to follow all instructions in proper order can cause personal injury or death.</b></p> <ol style="list-style-type: none"> <li>1. All installation work must comply with the latest issue of the National Electrical Code (NFPA 30A), and any national, state, and local code requirements that apply.</li> <li>2. Turn off, tag, and lockout power to the STP before connecting or servicing wiring to the STP.</li> <li>3. Before installing pipe threads apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant.</li> <li>4. When servicing unit, use non-sparking tools.</li> <li>5. To protect yourself and others from serious injury, death, or substantial property damage, carefully read and follow all warnings and instructions in this manual.</li> </ol>

In addition to the specified torque values noted in this manual, when properly tightened, all flanged fittings should have metal-to-metal contact.

## Fuel Compatibilities

The Red Jacket STP is designed to be compatible with 100 percent gasoline, or diesel and 80 percent gasoline with 20 percent methanol, ethanol, TAME, ETBE, or MTBE (see Table 1). All UMPs having the model numbers including the AG prefix are designed to be compatible with 100 percent gasoline, methanol, ethanol, or diesel and 80 percent gasoline with 20 percent TAME, ETBE, or MTBE. Pumps are UL listed (Class I, Group D atmosphere) and are designed in accordance with CENELEC standards and the European Directive 94/9/EC "Equipment for Potentially Explosive Atmospheres" (II2 G Ex IIA T4).



**Table 1. Maximum Specific Gravity and Maximum Viscosity**

UMP Model	Maximum Specific Gravity	Maximum Viscosity
AGUMP75S1, UMP75U1	.95	70SSU at 60°F (15°C)
AGUMP150S1, UMP150U1	.95	70SSU at 60°F (15°C)
AGUMP75S3-3, UMP75U3-3	.95	70SSU at 60°F (15°C)
AGUMP150S3-3, UMP150U3-3	.95	70SSU at 60°F (15°C)
X3AGUMP150S1, X3UMP150U1	.87	70SSU at 60°F (15°C)
AGUMP75S17-3, UMP75U17-3	.95	70SSU at 60°F (15°C)
AGUMP150S17-3, UMP150U17-3	.95	70SSU at 60°F (15°C)
X4AGUMP150S17, X4UMP150U17	.86	70SSU at 60°F (15°C)
X4AGUMP150S3, X4UMP150U3	.86	70SSU at 60°F (15°C)
AGUMP200S1-3, UMP200U1-3	.87	70SSU at 60°F (15°C)
AGP200S3-4, P200U3-4	.87	70SSU at 60°F (15°C)
AGP200S17-4, P200U17-4	.87	70SSU at 60°F (15°C)

The Red Jacket features an adjustable column pipe and electrical conduit that allows the overall length to be adjusted to a wide range of overall pump lengths. By loosening a collet on the column pipe, the length of the ump may be varied by extending or retracting the column pipe. Three sizes of adjustable column pipe are available to cover most pump length requirements (RJ1, RJ2, and RJ3).

## Installation and Manifold Dimensions

Figure 1 shows several views and dimensions of The Red Jacket pac/man.

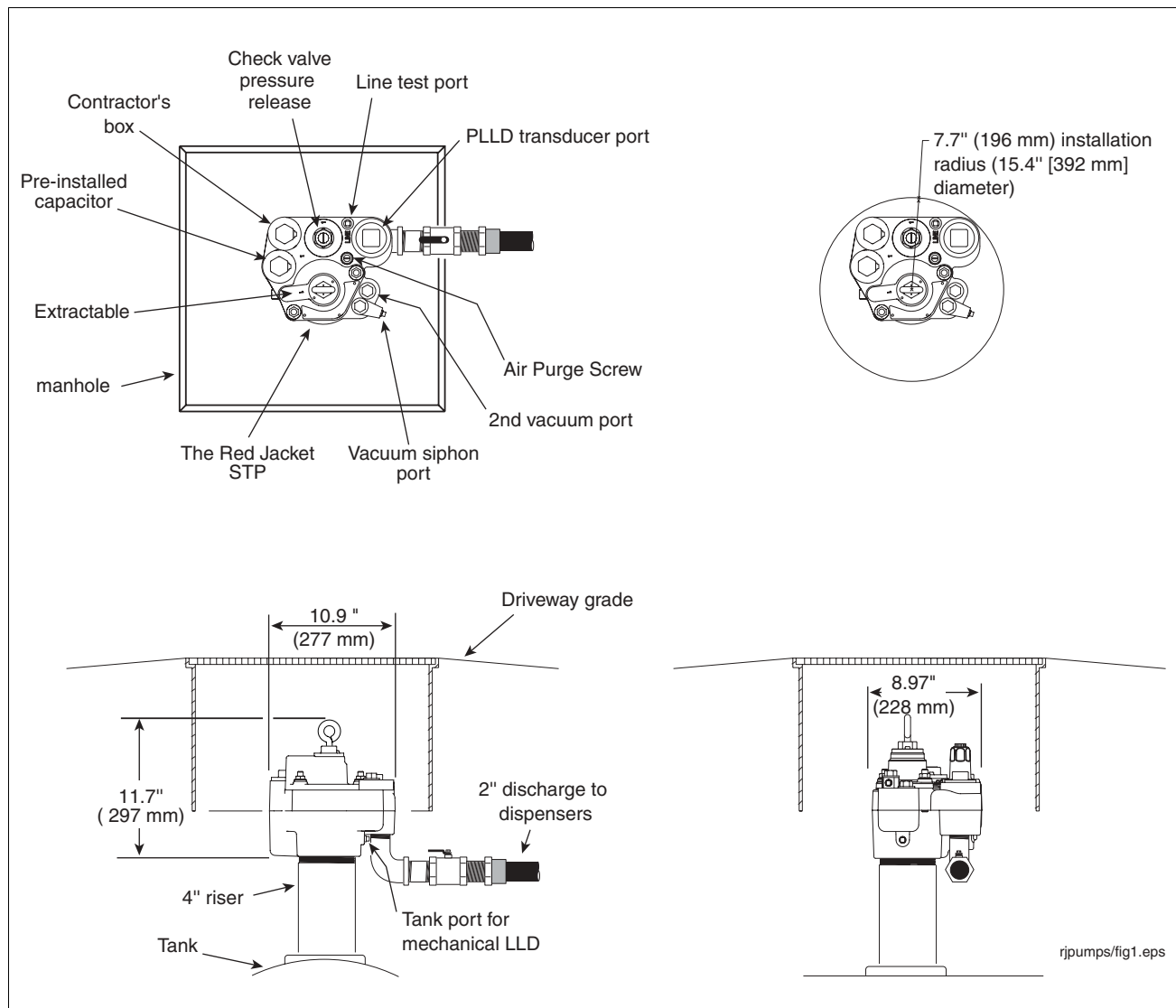


Figure 1. Red Jacket pac/man components and dimensions

## Recommended Floating Suction Installation

Figure 2 is an example of a floating suction installation. The floating suction arm can be mounted to pump previous to installing in tank.

**NOTE:** We supply adapter only, not the apparatus.

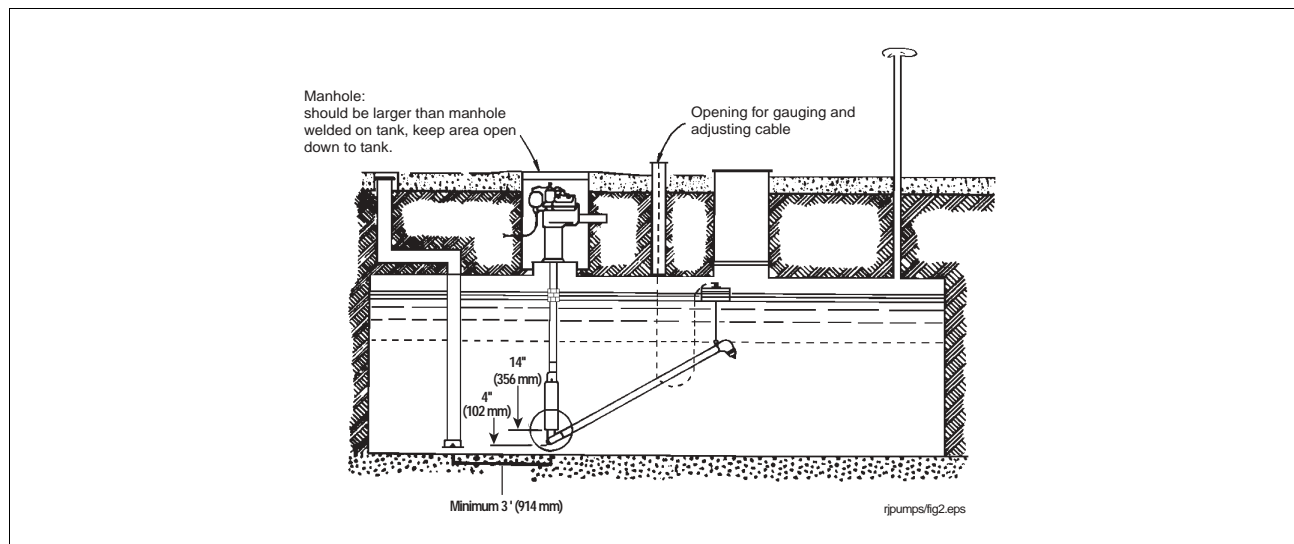


Figure 2. Floating suction installation

Figure 3 is an enlarged view within the circle in the above figure.

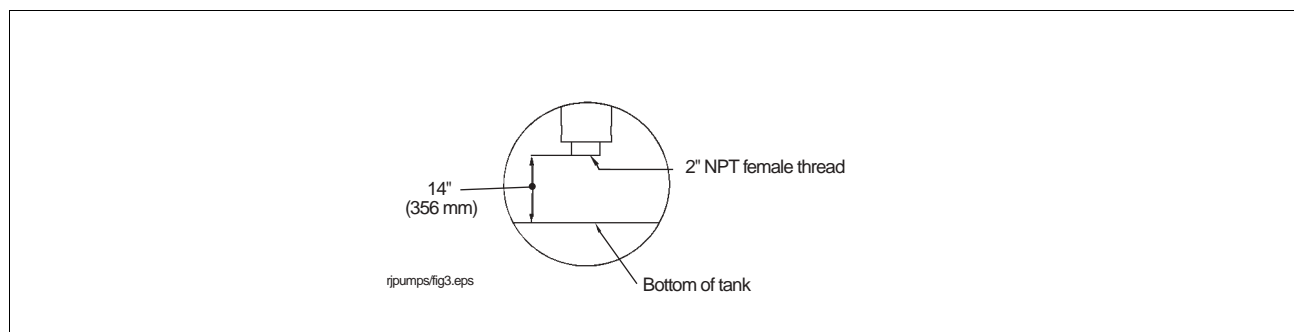


Figure 3. Floating suction adapter

Easy service access is provided by unbolting manhole lid through which pump is mounted and removing entire assembly. Use proper thread sealant and inset gasket between flanges of floating suction and pump. This prevents hindrance to pump performance when product level is below this point.

**NOTE: The Red Jacket is a centrifugal type pump and is not designed to pump product when the level is below the bottom end of the UMP.**

## Dimensions for Pump Selection

Figure 4 shows the dimensions needed to ensure a correctly sized pump.

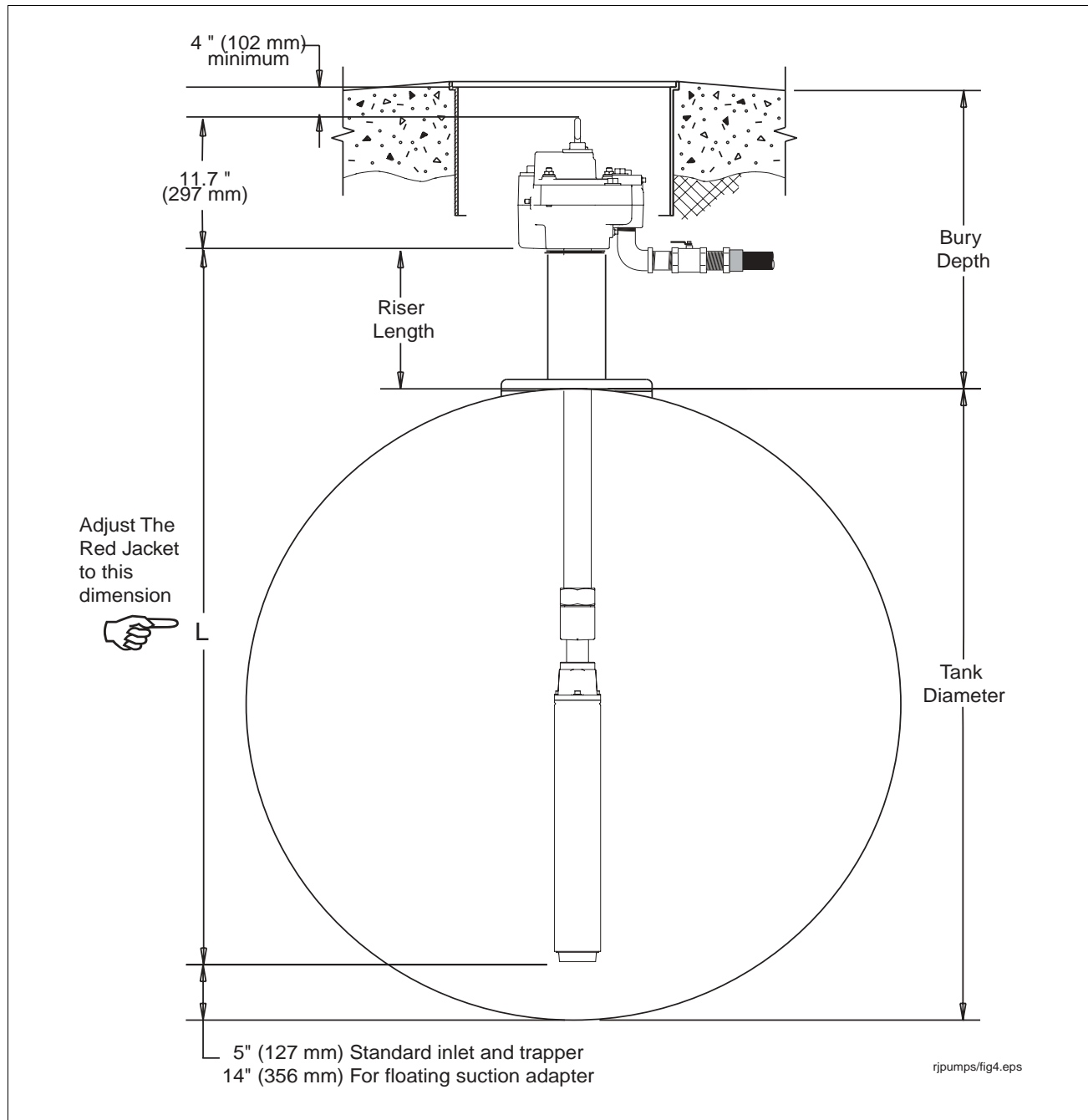


Figure 4. Measuring the tank (see Table 2 for adjustment ranges).

**NOTE:** Distance between centerline of UMP and centerline of bottom fill tube should be 3 feet (914 mm) minimum. Air locking of pump after product delivery may occur at distances less than this.

## Specifications

Table 2 shows the adjustable pump lengths by model

**Table 2. Distances from Top of Lifting Screw to Inlet**

Model#	Retracted		Extended	
	in.	mm	in.	mm
AGP75S1RJ1, P75U1RJ1	72.0	1828	102	2589
AGP75S1RJ2, P75U1RJ2	102.0	2590	162	4113
AGP75S1RJ3, P75U1RJ3	162.0	4115	222	5637
AGP150S1RJ1, P150U1RJ1	74.5	1891	105	2667
AGP150S1RJ2, P150U1RJ2	104.5	2653	165	4186
AGP150S1RJ3, P150U1RJ3	164.5	4177	225	5710
X3AGP150S1RJ1, X3P150U1RJ1	75.5	1913	105.5	2684
X3AGP150S1RJ2, X3P150U1RJ2	105.5	2675	165.5	4208
X3AGP150S1RJ3, X3P150U1RJ3	165.5	4199	225.5	5732
AGP75S3-3RJ1, P75U3-3RJ1	74	1879	104.5	2649
AGP75S3-3RJ2, P75U3-3RJ2	104	2641	164.5	4173
AGP75S3-3RJ3, P75U3-3RJ3	164	4165	224.5	5697
AGP150S3-3RJ1, P150U3-3RJ1	76	1932	106.5	2703
AGP150S3-3RJ2, P150U3-3RJ2	106	2694	166.5	4227
AGP150S3-3RJ3, P150U3-3RJ3	166	4218	226.5	5751
X4AGP150S3RJ1, X4P150U3RJ1	76.5	1946	107	2717
X4AGP150S3RJ2, X4P150U3RJ2	106.5	2708	167	4241
X4AGP150S3RJ3, X4P150U3RJ3	166.5	4232	227	5765
AGP75S17-3RJ1, P75U17-3RJ1	73	1853	103.5	2624
AGP75S17-3RJ2, P75U17-3RJ2	103	2615	163.5	4148
AGP75S17-3RJ3, P75U17-3RJ3	163	4139	223.5	5672
AGP150S17-3RJ1, P150U17-3RJ1	75	1903	105.5	2674
AGP150S17-3RJ2, P150U17-3RJ2	105	2665	165.5	4198
AGP150S17-3RJ3, P150U17-3RJ3	165	4189	225.5	5722
X4AGP150S17RJ1, X4AGP150U17RJ1	75.5	1917	106	2688
X4AGP150S17RJ2, X4AGP150U17RJ2	105.5	2679	166	4212
X4AGP150S17RJ3, X4AGP150U17RJ3	165.5	4203	226	5736
AGP200S1-3RJ1, P200U1-3RJ1	78.5	1971	108.5	2756
AGP200S1-3RJ2, P200U1-3RJ2	108.5	2733	168.5	4280
AGP200S1-3RJ3, P200U1-3RJ3	168.5	4257	228.5	5804

**Table 2. Distances from Top of Lifting Screw to Inlet**

Model#	Retracted		Extended	
	in.	mm	in.	mm
AGP200S3-4RJ1, P200U3-4RJ1	80.0	2030	110.5	2800
AGP200S3-4RJ2, P200U3-4RJ2	110.0	2790	170.5	4325
AGP200S3-4RJ3, P200U3-4RJ3	170.0	4314	230.5	5850
AGP200S17-4RJ1, P200U17-4RJ1	77.5	1975	108.0	2745
AGP200S17-4RJ2, P200U17-4RJ2	107.5	2735	168.0	4270
AGP200S17-4RJ3, P200U17-4RJ3	167.5	4260	228.0	5790

Table 3 shows pump electrical service requirements.

**Table 3. Electrical Service Information**

Required power supply rating for 60 Hz, 1 phase pumps is 208 - 230 Vac. For 50 Hz, 1 phase pumps, required rating is 220 - 240 Vac. For 3 phase pumps, required rating is 380 - 415 Vac.

UMP Model No.	HP	Hz	PH	Voltage Fluctuation Range		Max. Load Amps	Locked Rotor Amps	Winding Resistance (Ohms)			Capacitor Kit (µF)
				Min.	Max.			Black-Orange	Red-Orange	Black-Red	
AGUMP75S1, UMP75U1	3/4	60	1	200	250	6.5	25	2.9 - 3.6	14.9 - 18.2	17.7 - 21.9	410164-001 (17.5)
AGUMP150S1, UMP150U1	1-1/2	60	1	200	250	10.5	37	2.0 - 2.5	11.6 - 14.2	13.5 - 16.8	410164-002 (25)
X3AGUMP150S1, X3UMP150U1	1-1/2	60	1	200	250	10.5	37	2.0 - 2.5	11.6 - 14.2	13.5 - 16.8	410164-002 (25)
AGUMP200S1-3, UMP200U1-3	2	60	1	200	250	11.4	46	1.4 - 1.7	2.5 - 3.2	3.8 - 5	410164-003 (40)
AGUMP75S3-3, UMP75U3-3	3/4	50	1	200	250	5.8	17	3.6 - 4.5	20.4 - 25	23.9 - 29.6	410164-001 (17.5)
AGUMP150S3-3, UMP150U3-3	1-1/2	50	1	200	250	10	28	2.5 - 3.1	11.5 - 14	13.9 - 17.2	410164-002 (25)
X4AGUMP150S3, X4UMP150U3	1-1/2	50	1	200	250	10	28	2.5 - 3.1	11.5 - 14	13.9 - 17.2	410164-002 (25)
AGUMP200S3-4, UMP200U3-4	2	50	1	200	250	11	37	1.9 - 2.4	3.1 - 3.9	5.0 - 6.3	410164-003 (40)

UMP Model No.	HP	Hz	PH	Voltage Fluctuation Range		Max. Load Amps	Locked Rotor Amps	Winding Resistance (Ohms)			Magnetic Starter 279-231-5 Heaters (3 Required)
				Min.	Max.			Black-Orange	Red-Orange	Black-Red	
AGUMP75S17-3, UMP75U17-3	3/4	50	3	342	457	2.2	8	25.8- 32.4	25.8- 32.4	25.8- 32.4	K26
AGUMP150S17-3, UMP150U17-3	1-1/2	50	3	342	457	3.8	15	13.1 - 16.4	13.1 - 16.4	13.1 - 16.4	K33
X4AGUMP150S17, X4UMP150U17	1-1/2	50	3	342	457	3.8	15	13.1 - 16.4	13.1 - 16.4	13.1 - 16.4	K33
AGUMP200S17-4, UMP200U17-4	2	50	3	342	457	5.0	22	9.3 - 11.6	9.3 - 11.6	9.3 - 11.6	K37

Table 4 lists UMP weights and lengths and Table 5 lists pump shut off pressures.

**NOTE: The weights and lengths listed below are approximate values and will vary due to manufacturing tolerances.**

The optional trapper intake screen is available as a field installed accessory. Trapper options will increase the length of the UMP by 3-5/8 inches (92 mm). For installation instructions, see Red Jacket installation instructions #051-256-1. For models with floating suction adapter, add 2-3/8 inches (59 mm) and 4 pounds (1.8 kg).

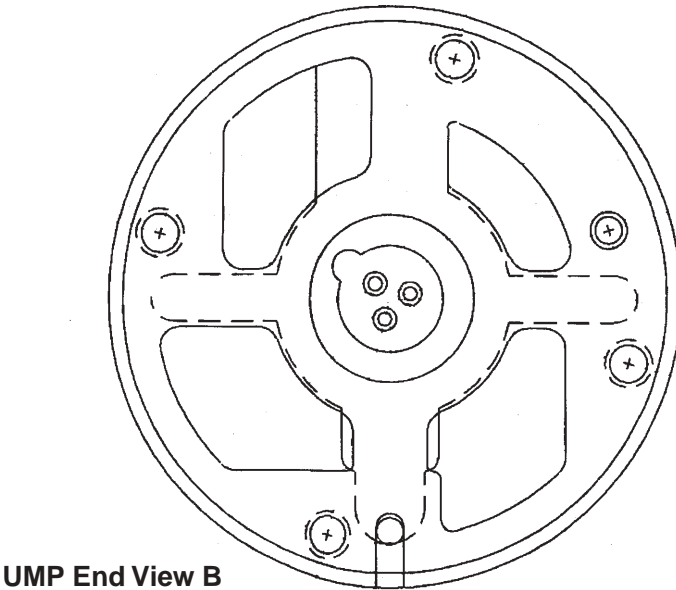
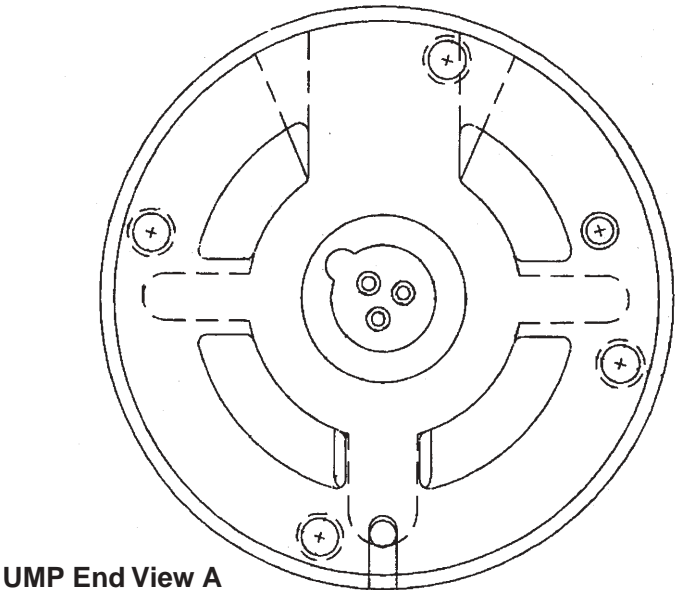
**Table 4. UMP Model Dimensions**

		A (Use these lengths for UMPs with end view A shown in Figure 5)		B (Use these lengths for UMPs with end view B shown in Figure 5)		Weight	
UMP Model	HP	in.	mm	in.	mm	lb.	kg
UMP75U1, AGUMP75S1	¾	17.6	447	17¾	447	28	12.7
UMP75U3-3, AGUMP75S3-3	¾	20	507	20	507	30.5	13.9
UMP75U17-3, AGUMP75U17-3	¾	19	482	19¾	489	28	12.7
UMP150U1, AGUMP150S1	1½	20.4	519	20½	519	34	15.5
X3P150U1, X3AGUMP150S1	1½	21.3	541	21¼	541	35	15.8
UMP150U3-3, AGUMP150S3-3	1½	22.1	560	22¼	560	34	15.5
X4P150U3, X4GUMP150S3	1½	22.7	576	22¾	576	35	15.9
UMP150U17-3, AGUMP150S17-3	1½	20.9	532	21	532	31	14.1
X4P150U17, X4AGUMP150S17	1½	21.5	547	21½	547	32	14.5
UMP200U1-3, AGUMP200S1-3	2	23.5	600	24¼	618	36	16.3
UMP200U3-4, AGUMP200S3-4	2	—	—	26	660	38	17.2
UMP200U17-4, AGUMP200S17-4	2	—	—	23¾	600	36	16.3

**Table 5. Approximate Pump Shut Off Pressures**

<b>UMP Model</b>	<b>Approximate Shut Off Pressure</b>
AGUMP75S1, UMP75U1	28 psi (193 kPa) .74 SG @ 60°F (15°C)
AGUMP150S1, UMP150U1	30 psi (207 kPa) .74 SG @ 60°F (15°C)
X3AGUMP150S1, X3UMP150U1	43 psi (297 kPa) .74 SG @ 60°F (15°C)
AGUMP75S3-3, UMP75U3-3	30 psi (207 kPa) .74 SG @ 60°F (15°C)
AGUMP75S17-3, UMP75U17-3	29 psi (200 kPa) .74 SG @ 60°F (15°C)
AGUMP150S3-3, UMP150U3-3	32 psi (220 kPa) .74 SG @ 60°F (15°C)
AGUMP150S17-3, UMP150U17-3	32 psi (220 kPa) .74 SG @ 60°F (15°C)
X4AGUMP150S3, X4UMP150U3	40 psi (275 kPa) .74 SG @ 60°F (15°C)
X4AGUMP150S17, X4UMP150U17	39 psi (267 kPa) .74 SG @ 60°F (15°C)
AGUMP200S1-3, UMP200U1-3	43 psi (297 kPa) .74 SG @ 60°F (15°C)
AGUMP200S3-4, UMP200U3-4	43 psi (297 kPa) .74 SG @ 60°F (15°C)
AGUMP200U17-4, UMP200U17-4	43 psi (297 kPa) .74 SG @ 60°F (15°C)





rjpumps\umpend.eps

Figure 5. Identifying UMP models by their end view

## Installation



## WARNING



This product operates in the highly combustible atmosphere of a gasoline storage tank. Failure to follow all instructions in proper order can cause personal injury or death.

1. All installation work must comply with the latest issue of the National Electrical Code (NFPA 30A), and any national, state, and local code requirements that apply.
2. Turn off, tag, and lockout power to the STP before connecting or servicing wiring to the STP.
3. Before installing pipe threads apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant.
4. When servicing unit, use non-sparking tools.
5. To protect yourself and others from serious injury, death, or substantial property damage, carefully read and follow all warnings and instructions in this manual.

## Attaching the UMP

Table 6 lists the applicable UMPs for each packer/manifold.

**Table 6. UMP and Packer/Manifold Combinations**

Packer/Manifold	UMP	Packer/Manifold	UMP
AGP75S1RJ1, RJ2, RJ3	AGUMP75S1	P150U3-3RJ1, RJ2, RJ3	UMP150U3-3
P75U1RJ1, RJ2, RJ3	UMP75U1	X4AGP150S3RJ1, RJ2, RJ3	X4AGUMP150S3
AGP150S1RJ1, RJ2, RJ3	AGUMP150S1	X4P150U3RJ1, RJ2, RJ3	X4UMP150U3
P150U1RJ1, RJ2, RJ3	UMP150U1	AGP75S17-3RJ1, RJ2, RJ3	AGUMP75S17-3
X3AGP150S1RJ1, RJ2, RJ3	X3AGUMP150S1	P75U17-3RJ1, RJ2, RJ3	UMP75U17-3
X3P150U1RJ1, RJ2, RJ3	X3UMP150U1	AGP150S17-3RJ1, RJ2, RJ3	AGUMP150S17-3
AGP75S3-3RJ1, RJ2, RJ3	AGUMP75S3-3	P150U17-3RJ1, RJ2, RJ3	UMP150U17-3
AGP200S1-3RJ1, RJ2, RJ3	AGUMP200S1-3	X4AGP150S17RJ1, RJ2, RJ3	X4AGUMP150S17
P75U3-3RJ1, RJ2, RJ3	UMP75U3-3	X4P150U17RJ1, RJ2, RJ3	X4UMP150U17
AGP150S3-3RJ1, RJ2, RJ3	AGUMP150S3-3	P200U1-3RJ1, RJ2, RJ3	UMP200U1-3
AGP200S3-4RJ1, RJ2, RJ3	AGUMP200S3-4	P200U3-4RJ1, RJ2, RJ3	UMP200U3-4
AGP200S17-4RJ1, RJ2, RJ3	AGUMP200S17-4	P200U17-4RJ1, RJ2, RJ3	UMP200U17-4

The UMP is identified by the model number marked on the shell. The packer/manifold with piping is identified by the catalog number on the packer nameplate. The hardware kit consists of four 5/16-18 socket head cap screws, four 5/16 lock washers and one discharge head gasket identified by the kit number (144-327-4) marked on the bag (see Figure 6).

The UMP attaches to the packer/manifold column piping discharge head using hardware kit number 144-327-4.

**NOTE: when servicing unit, use non-sparking tools.**

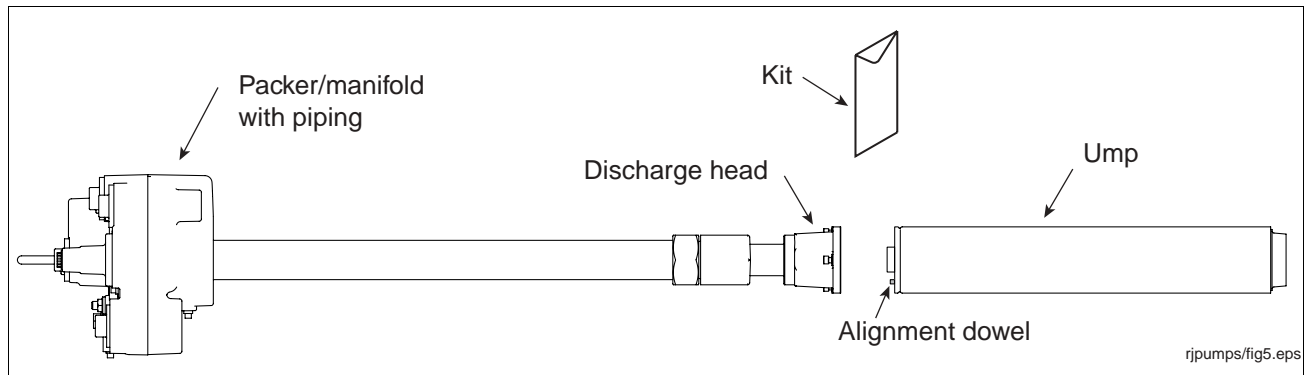


Figure 6. Packer/manifold with piping attaching to UMP

1. Visually inspect the pigtail connector in the end of the discharge head. Be certain the pigtail connector is seated in its socket and its index tab is in the socket's notch (see Figure 7).

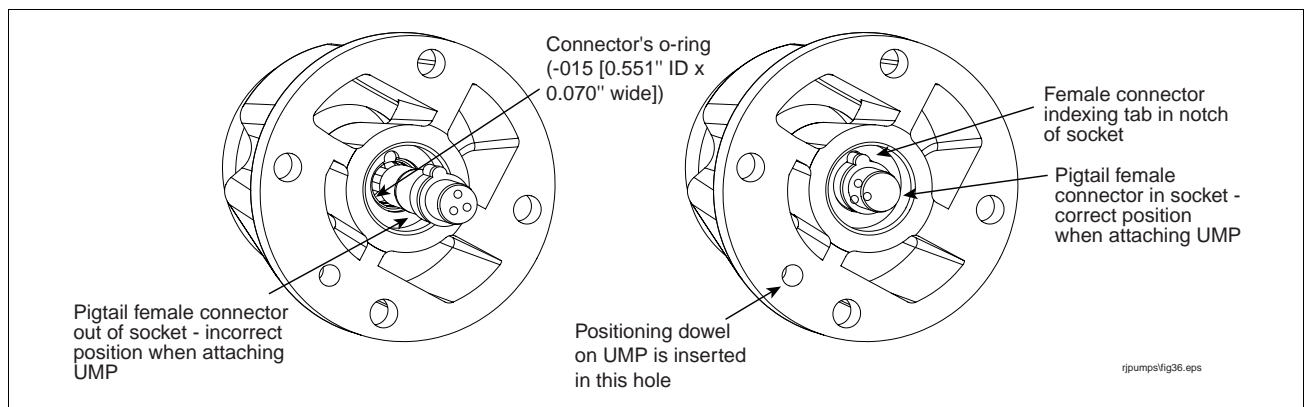


Figure 7. Verifying pigtail's female connector is seated properly

2. Place the new gasket on the new UMP so that all holes align (see Figure 8).

**NOTE: Gaskets from competitive UMPs will not seal properly and performance will be reduced.**

3. Align the UMP positioning dowel insert in the proper hole in the discharge head (ref. Figure 7) and push the UMP into position using hand force only. The UMP should be snug against the discharge head prior to installing the UMP retaining bolts.

**NOTE: Use hand force to push the UMP onto the discharge head. If the UMP does not seat snug against the discharge head, remove the UMP and correct the problem.**

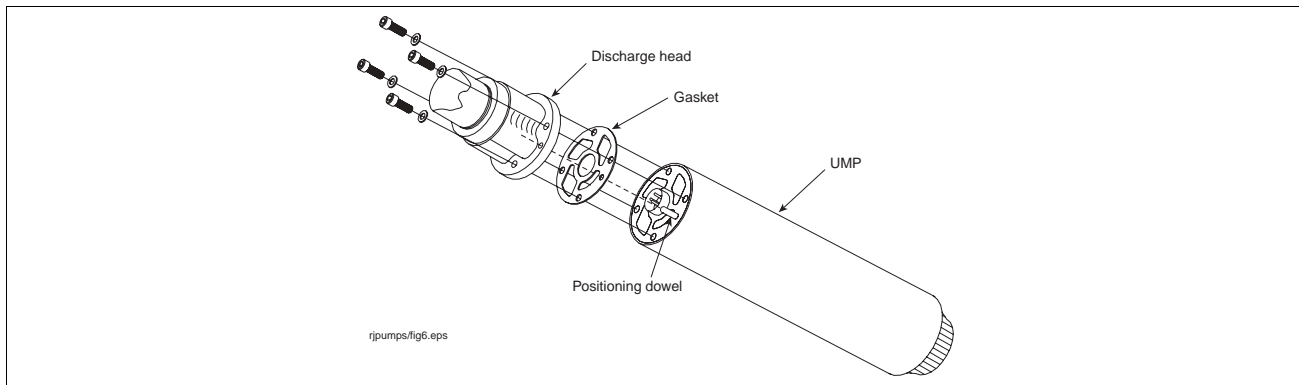


Figure 8. Aligning the UMP gasket

4. Install the UMP retaining bolts and lock washers (ref. Figure 8). Snug and then torque the bolts using a cross pattern. Torque to 7 ft-lbs (11 N•m).

**NOTE: Do not use the bolts to pull the UMP into position. Use the cross pattern to snug and torque bolts. Do not over torque the bolts.**

## Installing the Pump

### NOTES:

- The Red Jacket STP is designed to operate in a Class 1, Group D atmosphere.
  - Specifications and installation instructions may change if the manufacturer recommends changes.
  - The product temperature must not exceed 105°F (41°C) because the thermal overload protectors in the submersible motor may trip.
1. Install the riser pipe into the 4-inch tank opening. Use thread sealant. Tighten the riser pipe in the tank until watertight.
  2. Measure the distance from the bottom of the tank to the top of the 4-inch riser pipe as shown in Figure 9.  
Note: For fixed-length pumps, skip to Step 7.

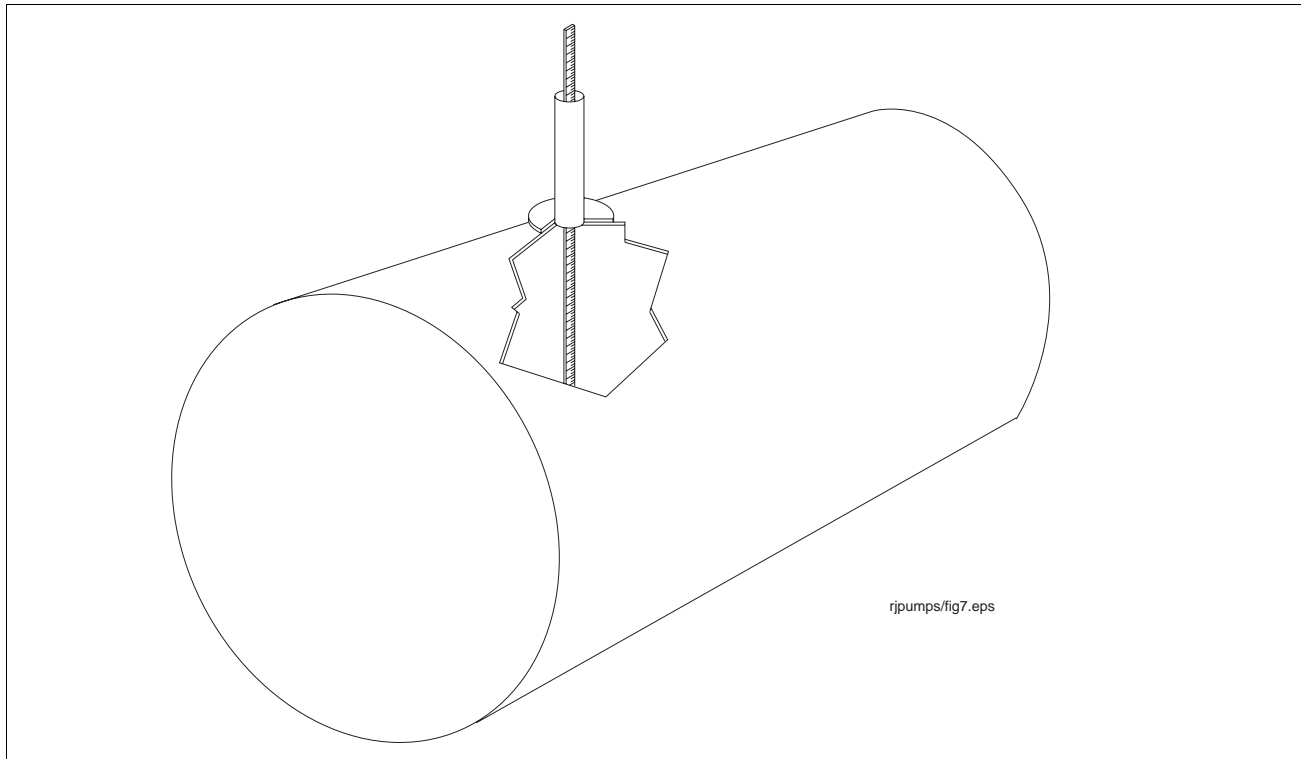


Figure 9. Measuring tank

3. Uncoil the pigtail at the top of the packer and lay it flat so it will feed into the packer without knotting or kinking.
4. Loosen the clinch assembly on the column pipe by unscrewing the set screw in the side of locking nut, then backing off the locking nut (see Figure 10).

**NOTE:** a slight twisting of the UMP will loosen the seals and facilitate adjusting it to the correct length.



**WARNING!** Do not rotate piping beyond 1/4 turn.

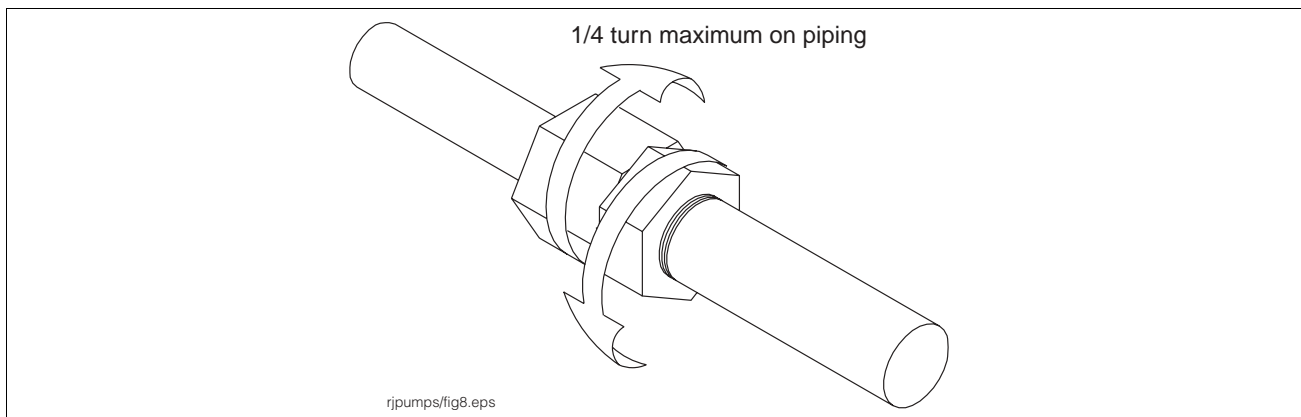


Figure 10. Loosening locking nut

- Referencing Figure 11, pull the UMP end until the distance between the bottom of the manifold and the bottom of the UMP is 5 inches (125 mm) (15 inches [381 mm] for floating suction) shorter than the distance measured in step 2.

**NOTE: If UMP is equipped with floating suction adapter, see section entitled “Recommended Floating Suction Installation” on page 4.**

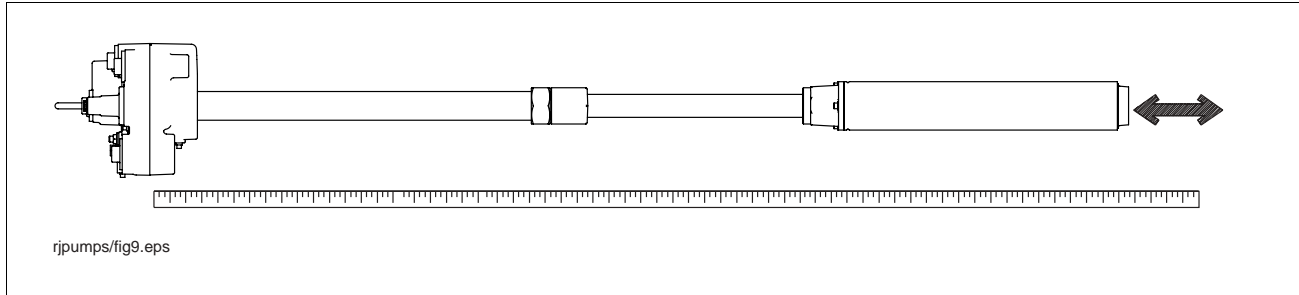


Figure 11. Adjusting pump length

**NOTE: Take care not to damage the pigtail. If pump is to be adjusted shorter, have someone keep tension on the pigtail to eliminate kinking.**

- Tighten locking nut and torque to 150 ft-lbs (200 N•m) minimum, then torque the set screw in the locking nut to 30 - 35 in. lb. (3.5 - 4 N•m).
- Attach return line tubing to barbed fitting in base of packer and secure with a clamp (see Figure 12).

**NOTE: Return line should be installed on every application to insure against nuisance trips of electronic tank monitoring.**

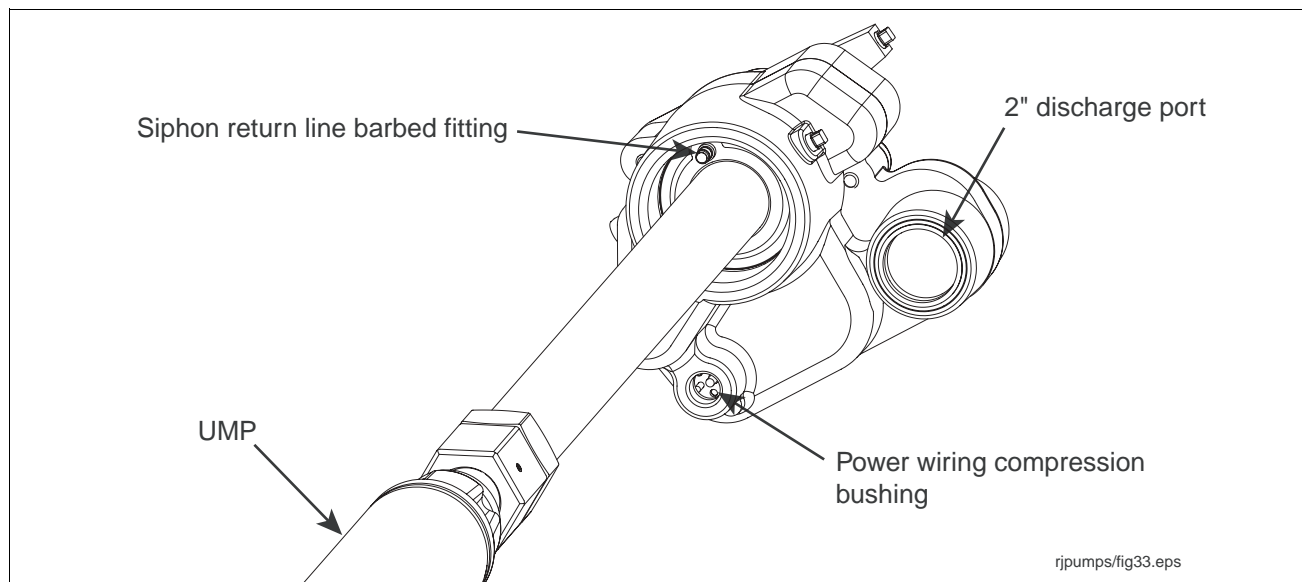


Figure 12. Locating return line fitting on packer

- Lay return line tubing beside column pipe. Cut off 1 - 3 inches (25 - 76 mm) above the discharge head.

9. Secure return line tubing to column pipe with tie straps. Locate tie straps approximately 6 inches (152 mm) from manifold, 6 inches from discharge head and middle of tubing (see Figure 13).

**NOTE: Do not overtighten tie straps as a pinched or flattened return line will restrict flow, interfering with proper operation of siphon system.**

Note: For fixed-length pumps, skip to Step 14.

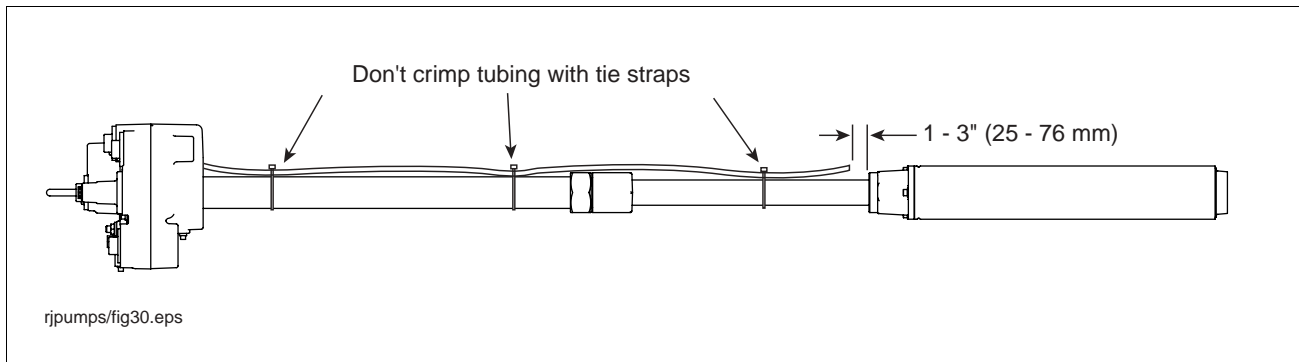


Figure 13. Attaching return line tubing to pump

10. Pull on the pigtail wires where they exit the packer wiring compartment. Cut off pigtail wires approximately 8 inches (200 mm) beyond top of packer.
11. There should be three wires from the male connector installed in the packer's housing and the three-wire pigtail from the UMP.
12. Strip back insulation of all six wires 3/8 inch (10 mm).
13. Connect like colored wires from the UMP to like colored wires from the male connector with wire nuts. When finished connecting the wires, neatly coil wires inside the packer's wiring compartment (see Figure 14).
14. Lubricate the o-ring on the packer wiring compartment cover (with lifting eyebolt) with petroleum based jelly. Screw in the packer wiring compartment cover (thread sealant should not be used). Torque to 35 ft-lbs (50 N•m).
15. Install the pump onto the riser pipe using thread sealant until watertight and in alignment with the piping to the dispensers.

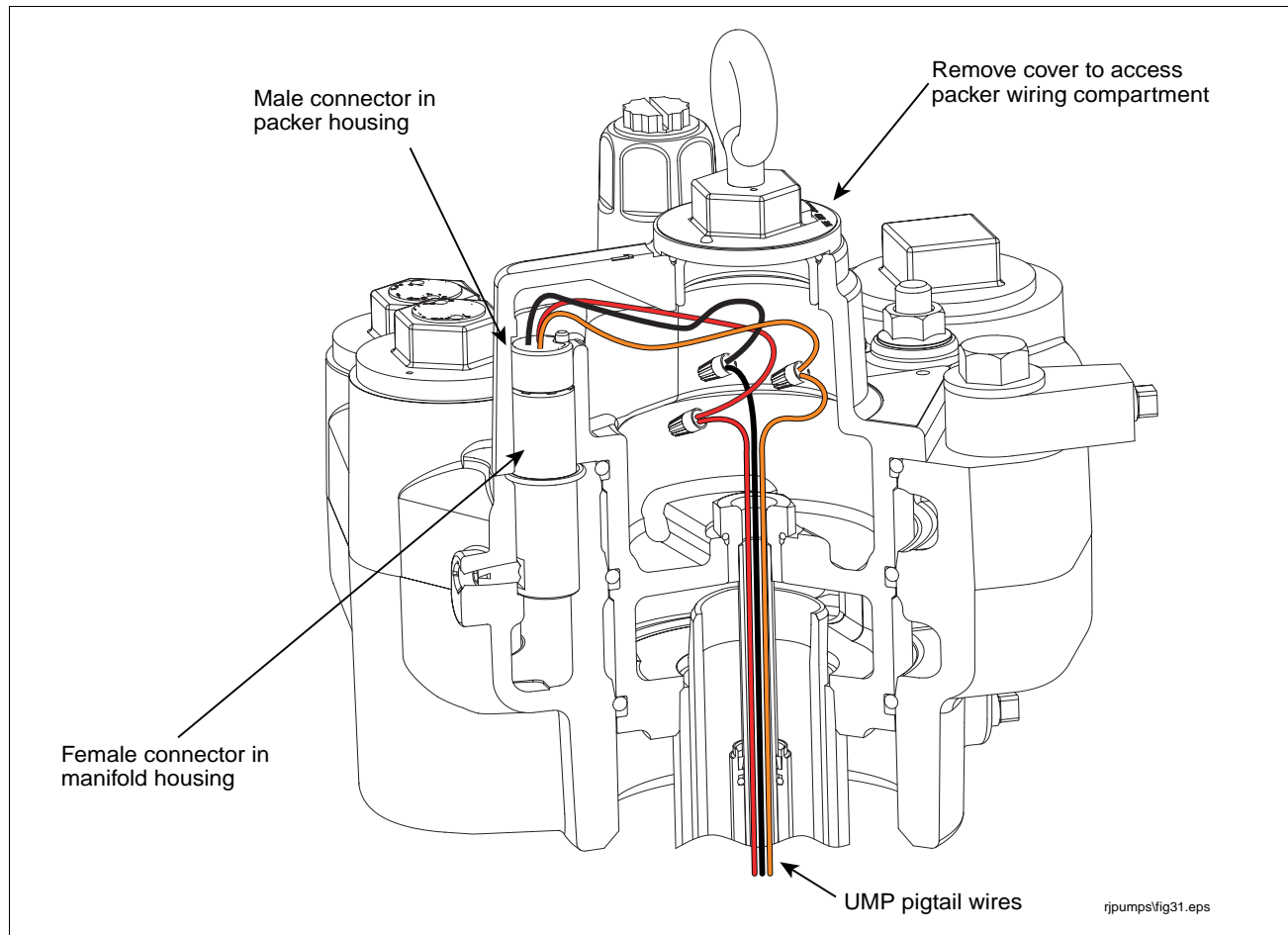


Figure 14. Connecting UMP to packer wiring

## Wiring Power from the Panel to the Red Jacket STP



**WARNING!** Always disconnect, lock out, and tag the power at the panel before starting to service the pump.

1. Connect electrical conduit approved fittings to power wiring entry at base of manifold's contractors box (see cutaway example in Figure 15 for single phase power wiring or Figure 17 for three phase power wiring).

**NOTE:** For installations requiring ATEX approval, the end user must use an ATEX EEx d IIB certified cable gland or stopping box

2. Loosen the two screws in the compression bushing just enough so you can remove the bushing from its socket in the bottom of the manifold's contractor box (see Figure 15). Notice that the top plate of the bushing assembly (facing into the manifold) has a larger diameter than the bottom plate, and that there are two open holes and three holes with plastic rod inserts. The plastic inserts seal the bushing and must be left in any unused hole. For example, if you are bringing three wires from the power panel, use the two empty holes and remove and discard one of the two smaller diameter plastic inserts for the third wire. Push each of the incoming power wires through the empty holes in the bushing assembly. Slide the bushing assembly down over the power wires until it seats in its socket in the base of the manifold's contractor box and then tighten the two screws in bushing assembly securely to compress the bushing and seal the wiring entry.



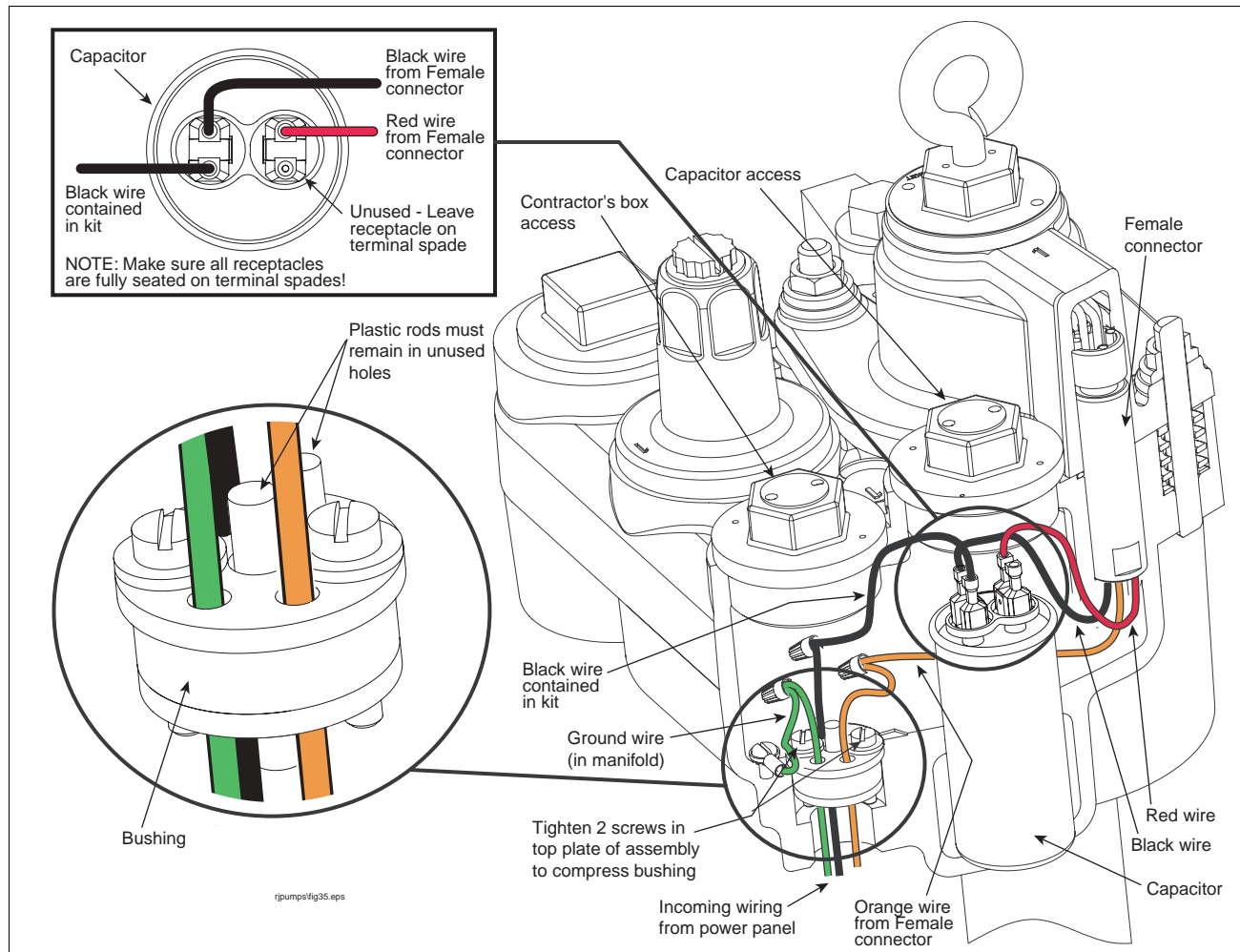


Figure 15. Power wiring enters through compression bushing - single phase example shown

### For Single Phase Pumps with Capacitor

1. Connect the orange wire from manifold's female connector to L1 from the power panel (see wiring diagram in Figure 16).
2. Connect the terminal end of the short black wire (in the kit) to one of the terminals on the same post of the capacitor as the black wire from the manifold's female connector. Connect L2 from power panel to the open end of this black wire.
3. Connect the ground wire from power panel to the attached ground wire in manifold.
4. Inspect o-rings on access covers, replace if necessary. Lubricate o-rings with petroleum based jelly. Reinstall access covers. Torque to 35 ft-lbs (50 N•m). Thread sealant should NOT be used.

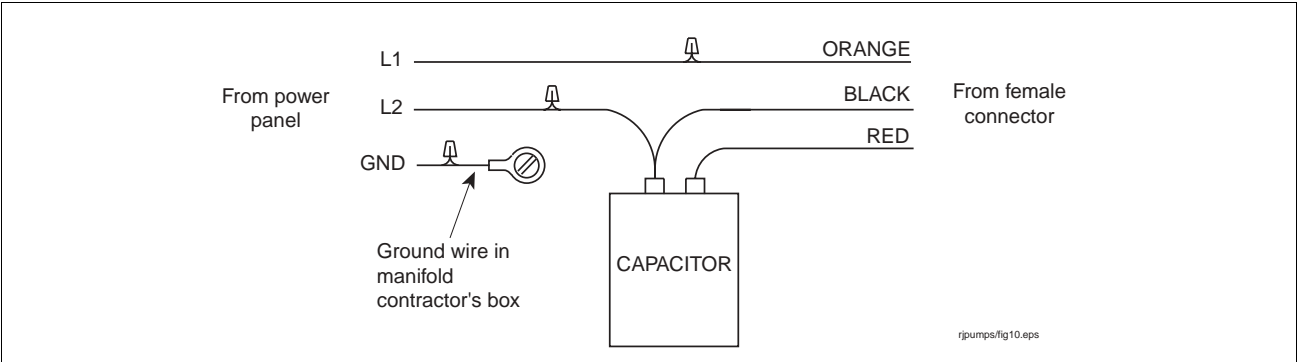


Figure 16. Power wiring schematic for single phase pumps

Refer to Figure 18 through Figure 23 for various single phase pump system example wiring diagrams.

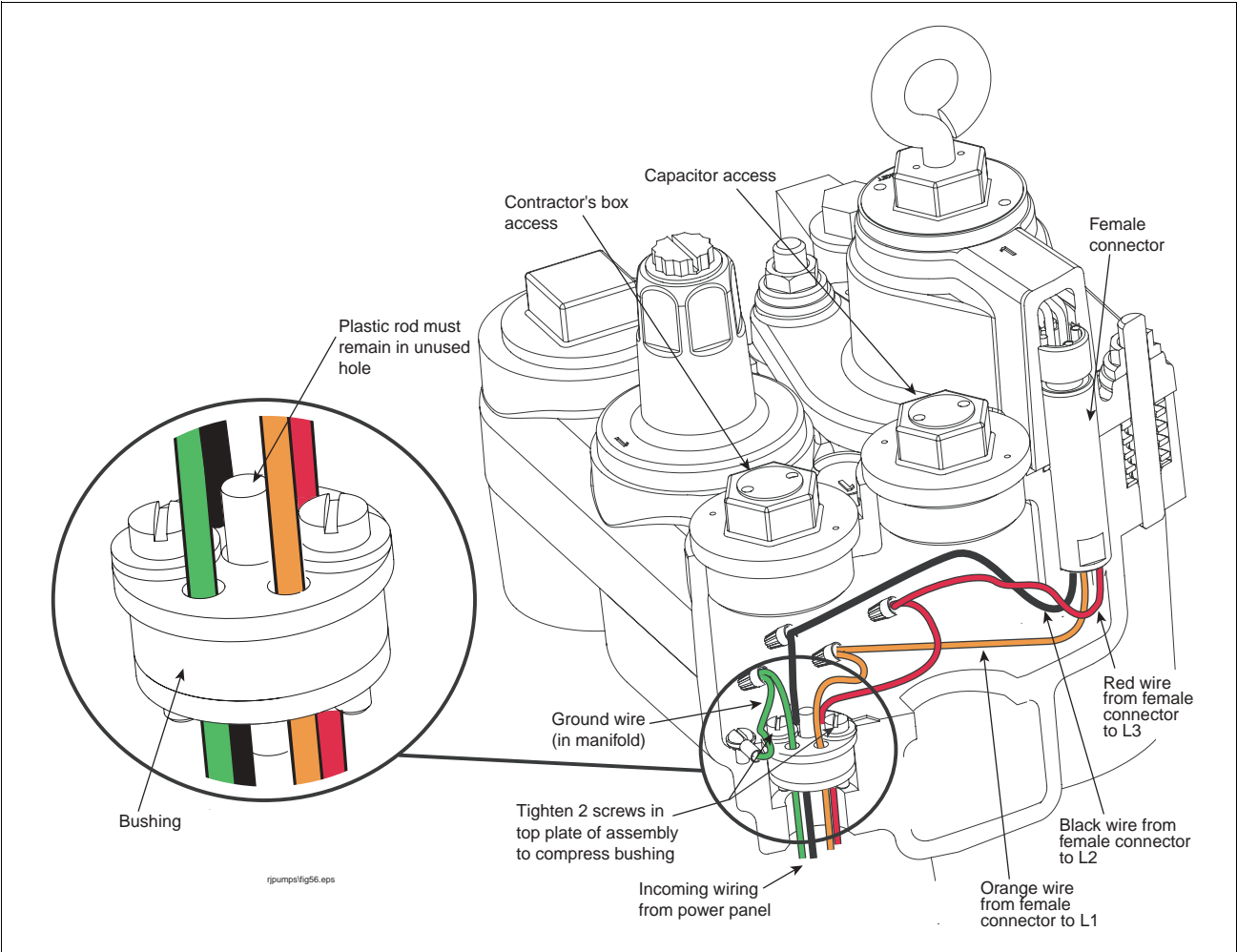


Figure 17. Power wiring enters through compression bushing - three phase example shown

### For Three Phase Pumps (without Capacitor)

1. Connect the orange wire from manifold's female connector to L1 from the power panel.
2. Connect the black wire from manifold's female connector to L2 from power panel.
3. Connect the red wire from manifold's female connector to L3 from power panel.
4. Connect the attached ground wire in manifold to the ground wire from the power panel.
5. Inspect o-rings on access covers, replace if necessary. Lubricate o-rings with petroleum based jelly. Reinstall access covers. Torque to 35 ft-lbs (50 N•m). Thread sealant should NOT be used.

Refer to Figure 28 for various three phase pump system example wiring diagrams.

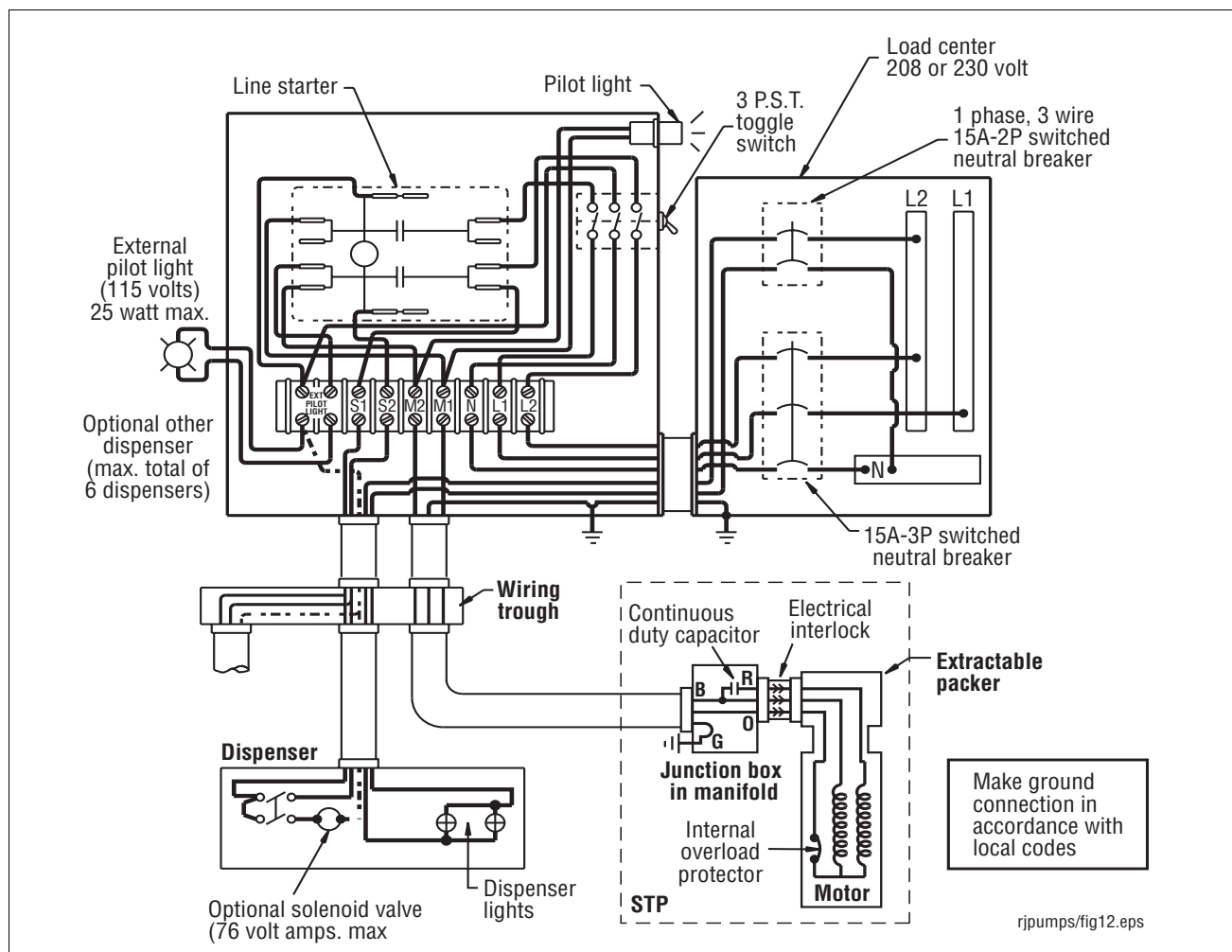


Figure 18. 230 Vac Remote Control Box with 110 Vac coil - Model 880-041-5

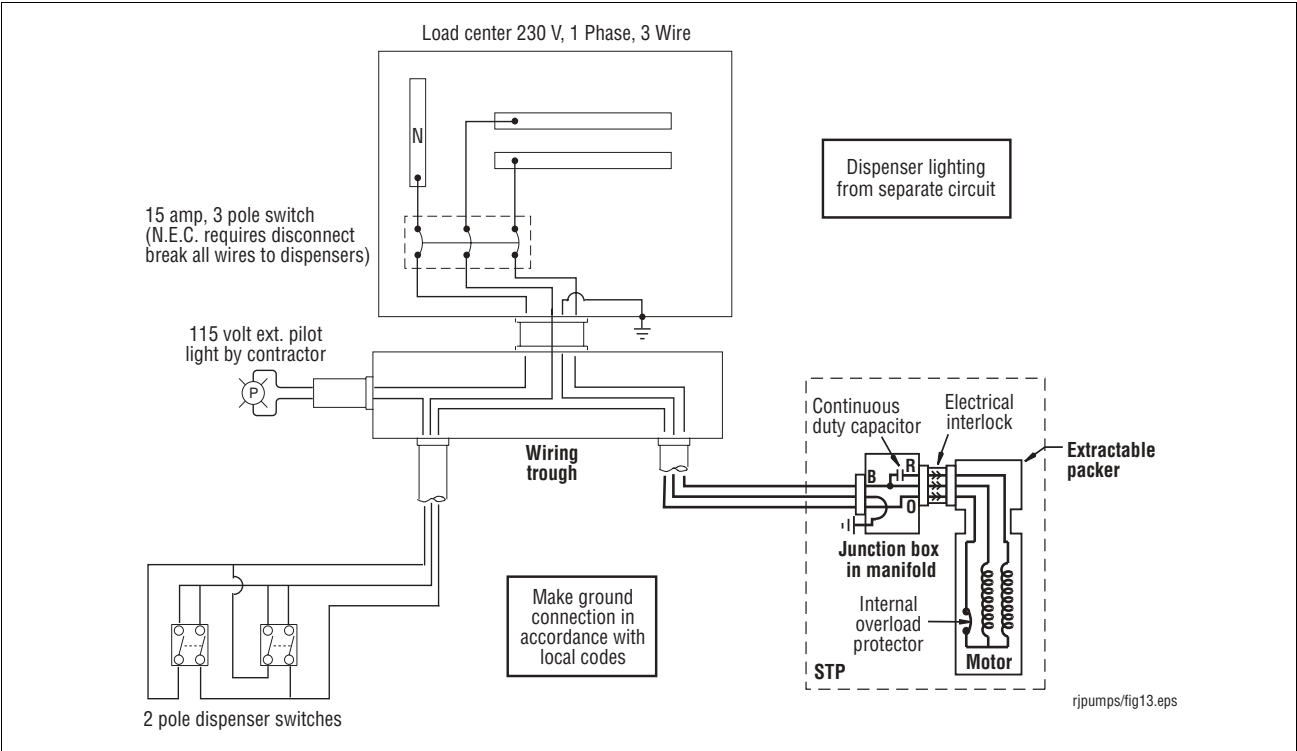


Figure 19. Suggested Wiring Diagram without Optional Control Box

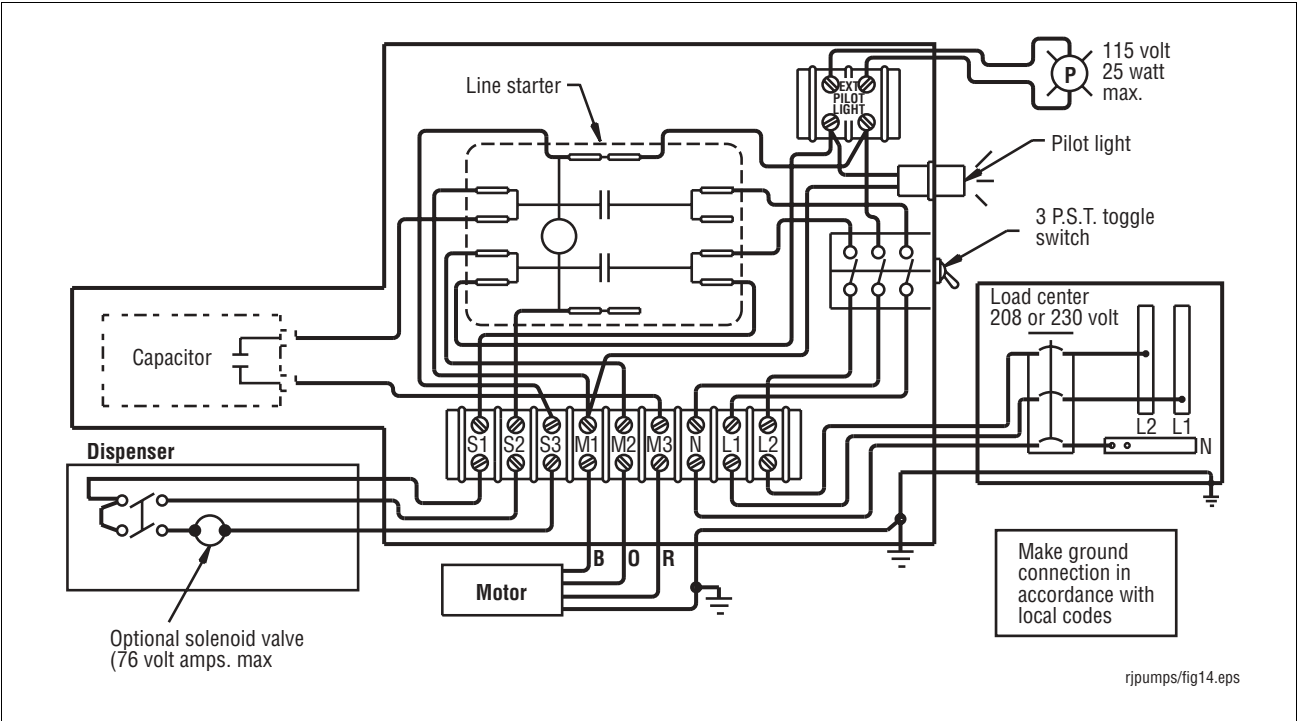


Figure 20. 230 Vac Remote Control Box with 110 Vac Coil & Cap - Model 880-045/880-046-5

**NOTE: APPROVED COMPONENT ONLY - TOTAL SYSTEM INSTALLED SHALL COMPLY WITH ALL LOCAL CODES 2HP MAX. 230 VOLT REMOTE CONTROL BOX**

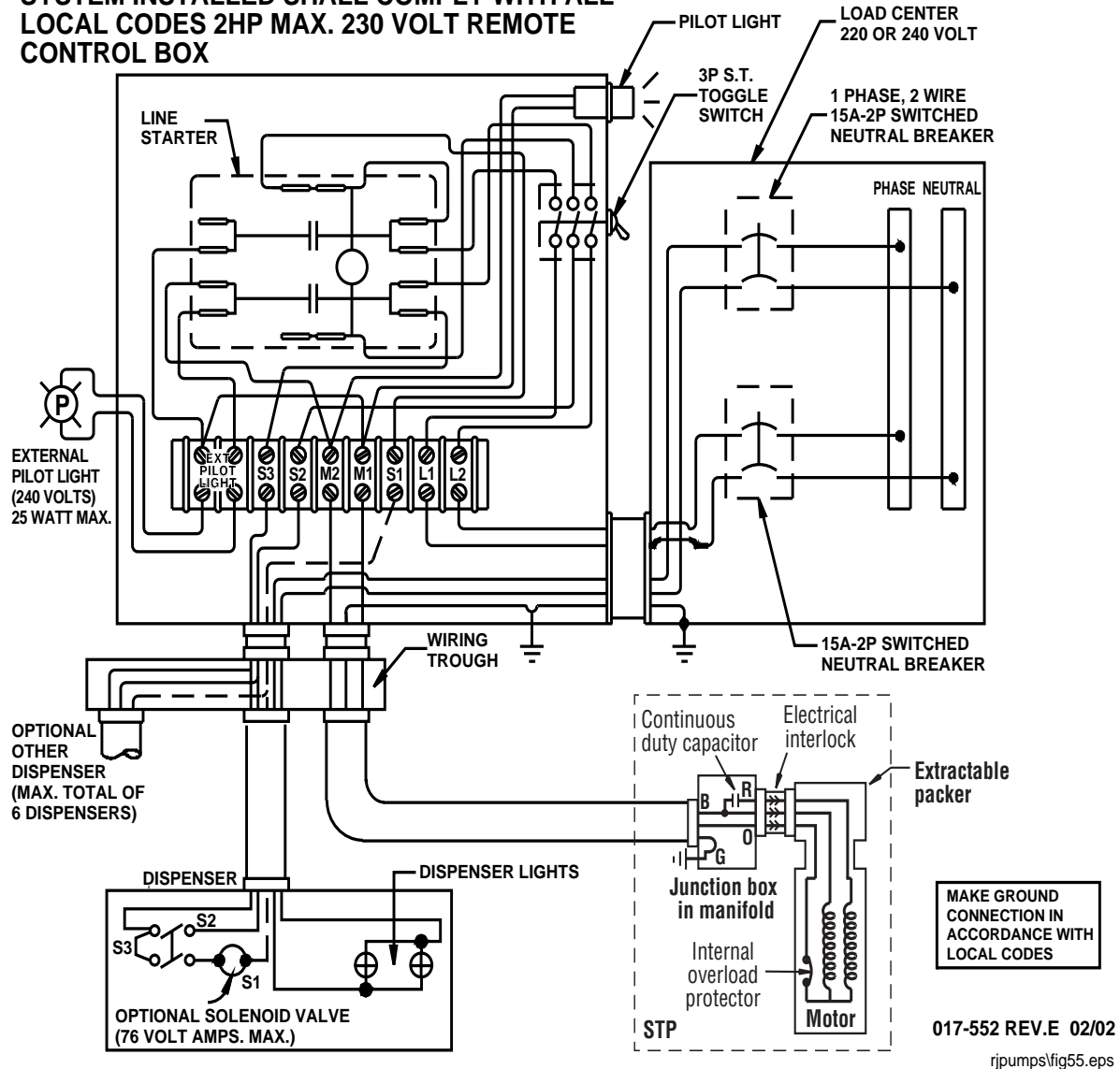
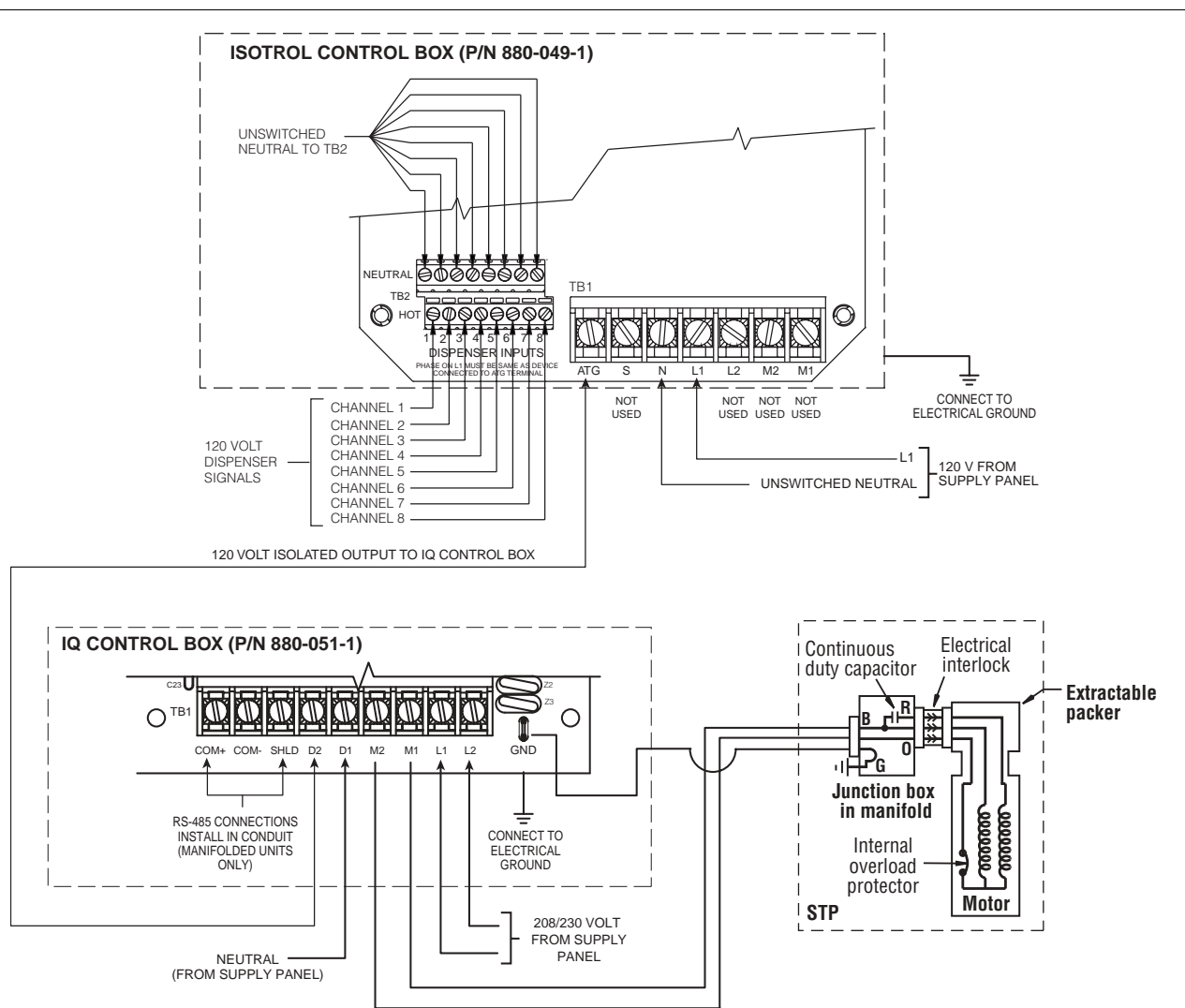


Figure 21. 230 Vac Remote Control Box with 230 Vac Coil - Model 880-042-5



### ISOTROL CONTROL BOX WIRING PRECAUTIONS



**WARNING!** This device is intended to provide electrical isolation between the dispenser pump enable (Hook) signal and the submersible turbine pump (STP) control relay. Other energized sources of power can still exist within the dispenser even with this device. The neutral connection to the N terminal of TB1 and N terminal of TB2 must be from the service panel and be a permanently connected, unswitched connection.

The N connection on TB1 and the eight N connections on TB2 may be spliced to a common neutral wire from the service panel described above.

Make only one "wire" connection on each N terminal on TB2.

**CAUTION!** The phase of L1 (TB1) must match the phase of the power supplying the ATG device in order to prevent cross phasing which may damage the input on some ATG equipment.

### GENERAL WIRING PRECAUTIONS

Wiring must be rated 90°C minimum.

Make ground connection in accordance with local codes.

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Figure 22. Isotrol to IQ System Wiring - 120 Volt Dispenser Signals

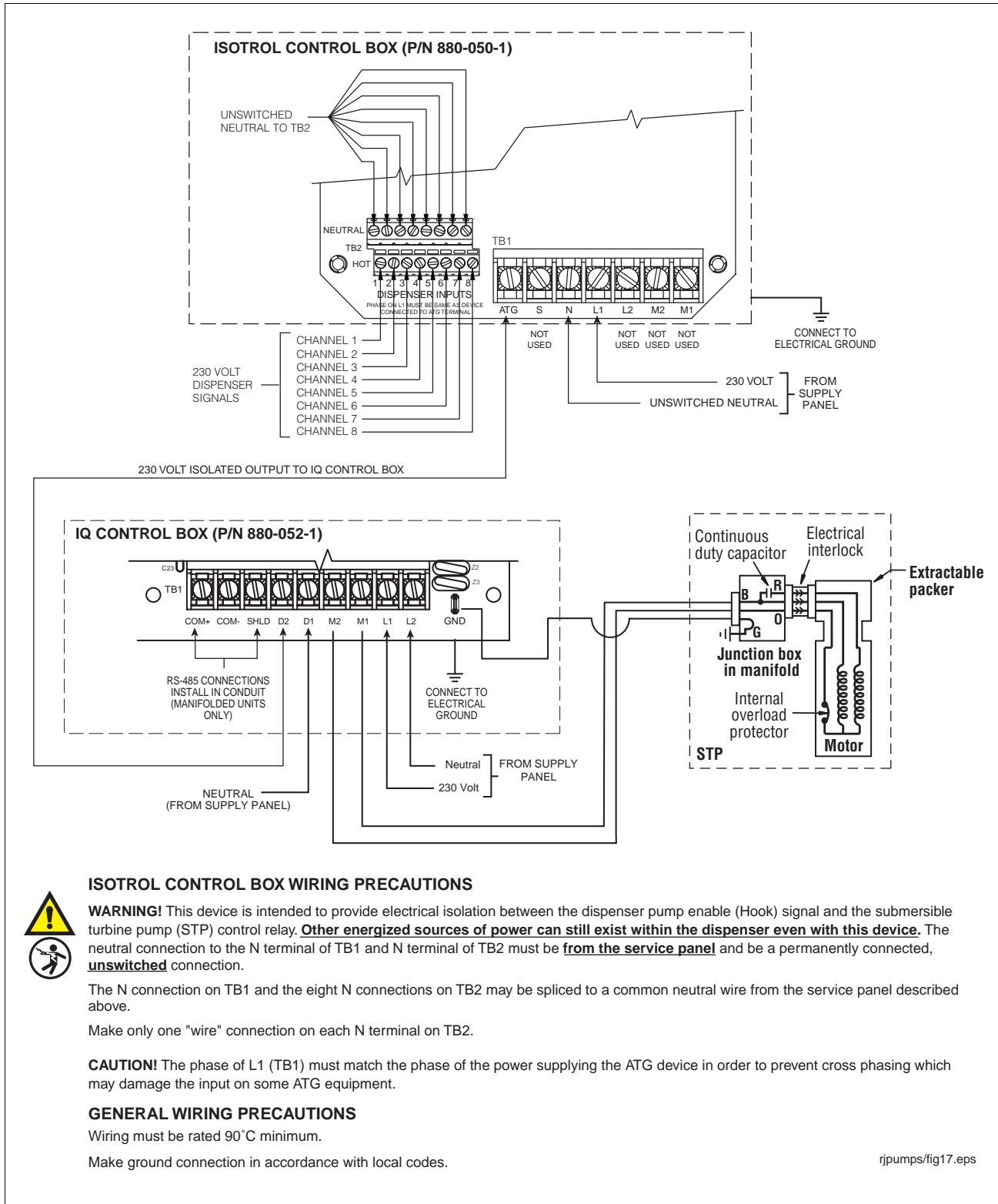


Figure 23. Isotrol to IQ System Wiring - 230 Volt Dispenser Signals

## Installing Two Pumps for Tandem Operation

When greater flow rates are needed, two pumps may be installed in the same piping system by means of a manifold. If installed according to the Figure 24, tandem systems offer backup support so operations can continue if one pump stops working.

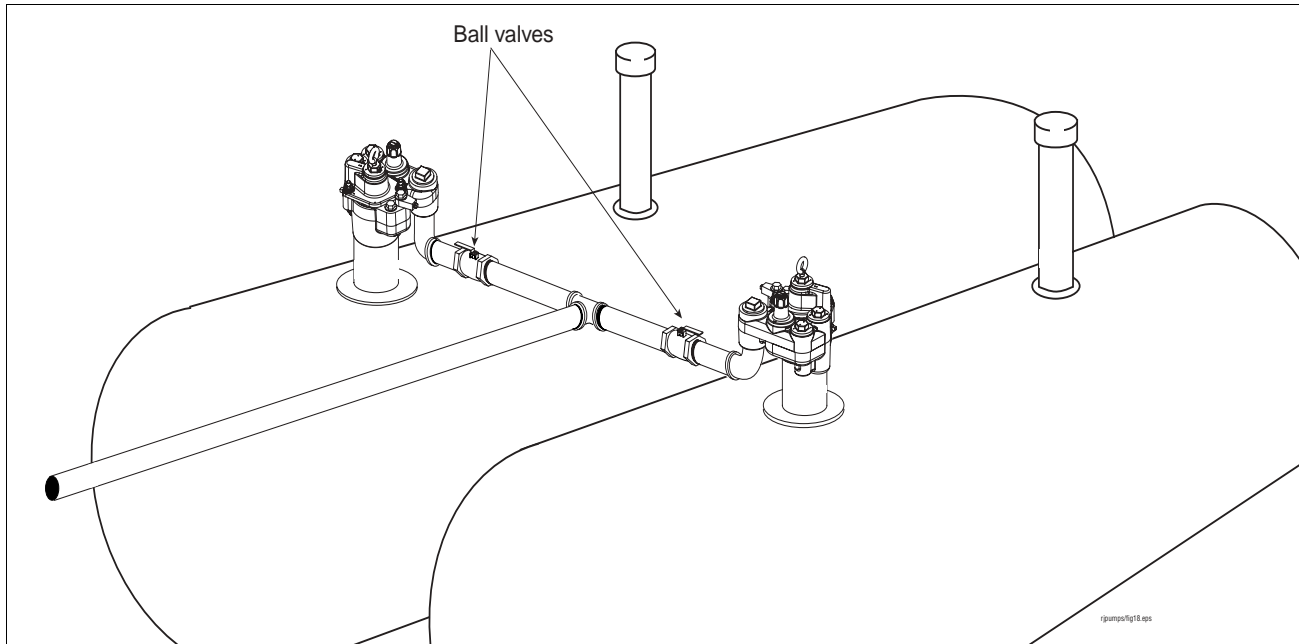


Figure 24. Tandem pumps



**CAUTION!** proper check valves with pressure relief are required to be installed in the discharge line of each pump to prevent product from being pumped through the pressure relief system of the adjacent pump when it is not operating.

**NOTE:** Ball valves should be installed at the pump end of the discharge line for ease of maintenance and troubleshooting (see Figure 24).

## Wiring Single Phase Tandem Pumps

Figure 25 shows the wiring allowing both single phase STPs to operate simultaneously with any combination of dispensers turned on. To operate individually, the appropriate toggle switch, located externally on the side of the control box, can be turned off manually.

Alternatively, Veeder-Root's Red Jacket IQ™ Control Unit can be connected to additional control boxes to allow up to four pumps per tank with demand-based sequencing.



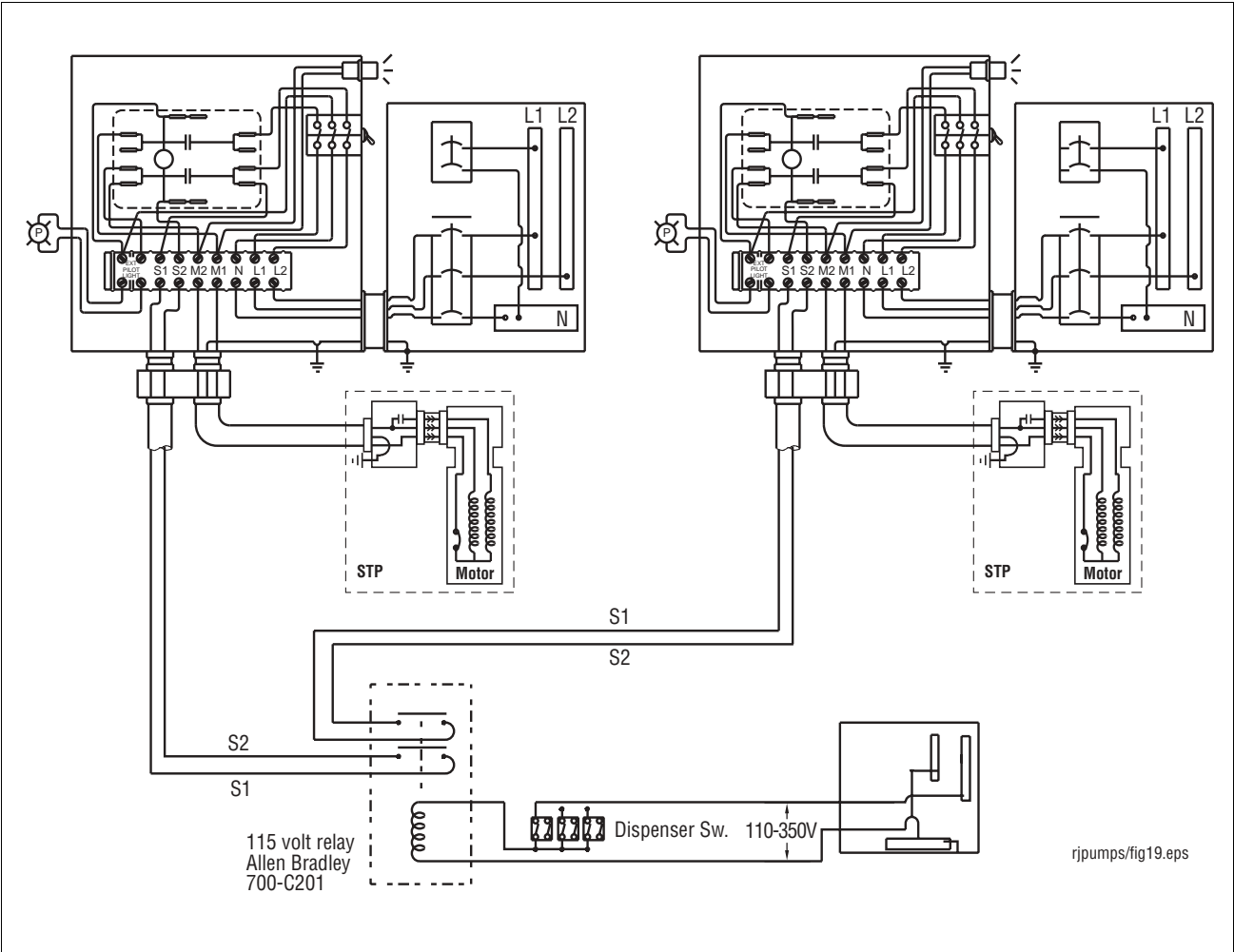
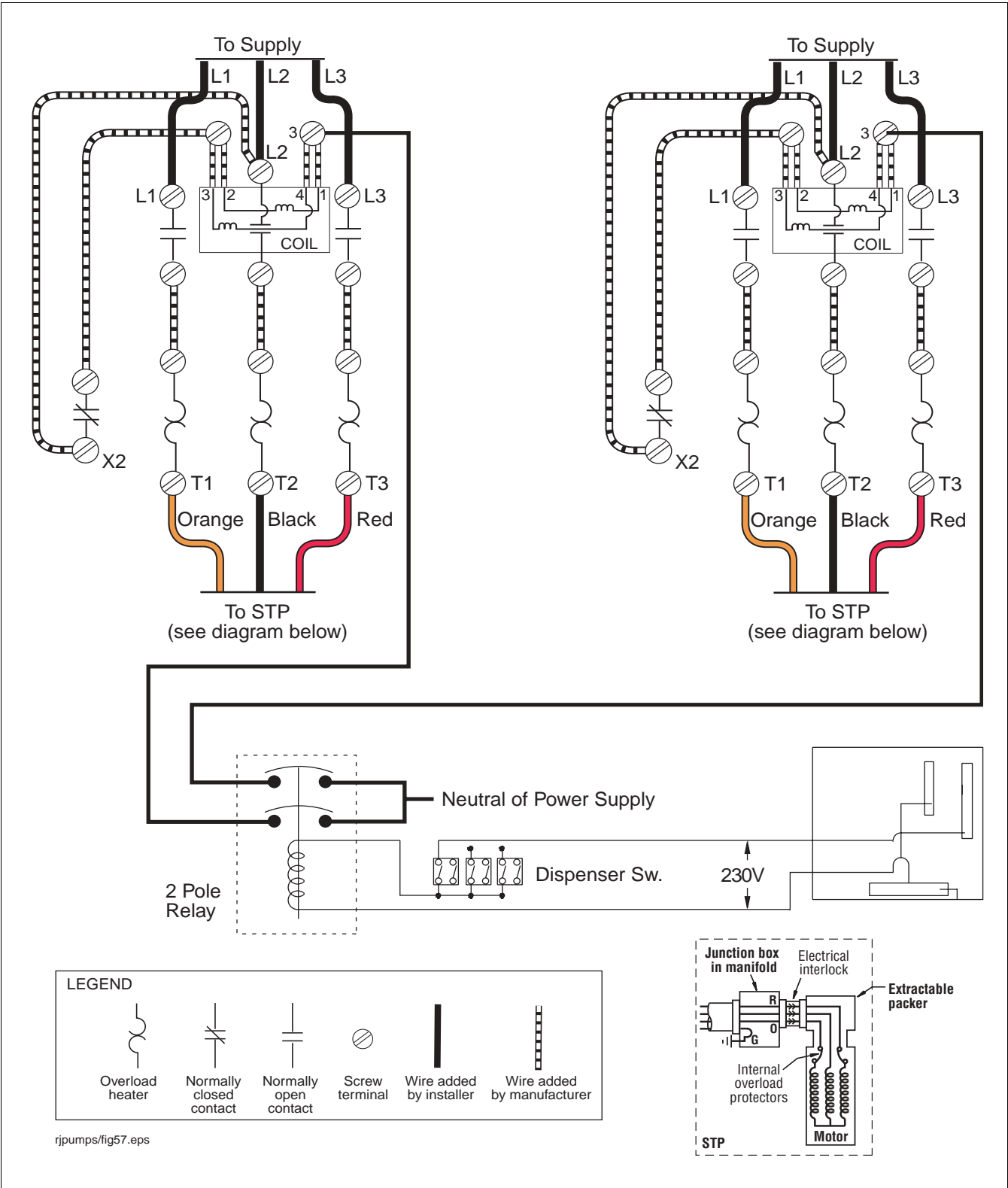


Figure 25. Suggested Wiring for Single Phase Tandem Pumps

Wiring Three Phase Tandem Pumps

Figure 26 shows the wiring allowing both three phase STPs to operate simultaneously with any combination of dispensers turned on.



## Siphon Ports

The siphon port for The Red Jacket STP is in a brass siphon assembly that fits into one of the two vacuum ports (see Figure 27). The port end can be swiveled after loosening the hex nut on top to accommodate the incoming siphon tube. Torque the siphon assembly retaining nut to 15-30 ft-lbs (20-41 N•m) after positioning.

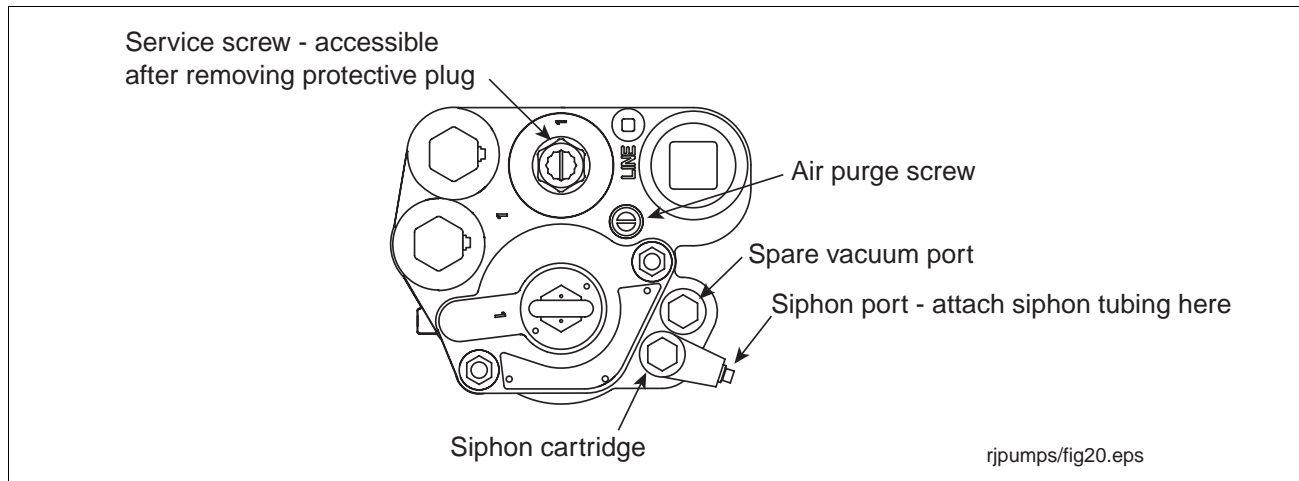


Figure 27. Siphon connection

**NOTICE:** The 1/4" NPT plug in the siphon assembly should be removed and the siphon line attached.



**CAUTION!** - Before installing pipe threads, apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant.

## Initial Start Up of Pump

Turn on the pump and purge system of air by pumping at least 15 gallons (57 liters) through each dispenser. Begin with the dispenser furthest from the pump and work back toward the pump.

Pump start up is now complete.

### NOTE: For Three Phase Pumps Only!

Where it is not convenient to predetermine the power supply phase rotation, proper rotation can be determined by pump performance. Pump head pressure and capacity will be considerably less than rated when rotating backwards.

Connect the pump leads to terminal T1, T2, and T3 of the magnetic starter observing color code shown in Figure 28 A, B, and C. With ample product in the tank and the system purged of air, start the pump and make a pressure gauge reading of the system pressure with the ball valve closed; or, open valve and calculate pumping rate.

Next, reverse power leads at L1 and L2. Repeat either pressure or capacity tests, as described above. If results are higher than the first test, the rotation of the second test is correct. If the second test gives lower performance than the first, reconnect the power leads to L1 and L2 (as under test 1) for correct rotation.

Where the power supply has been properly marked L1, L2, and L3 in accordance with accepted phase rotation standards, it is possible to predetermine the proper rotation of these units. The pump power leads are color coded

orange, black, and red, and if connected through the magnetic starter to L1, L2, and L3 respectively, the UMP will rotate in the correct direction. It is recommended, however, that the performance tests always be made whether or not the power supply has been properly 'phased out'.

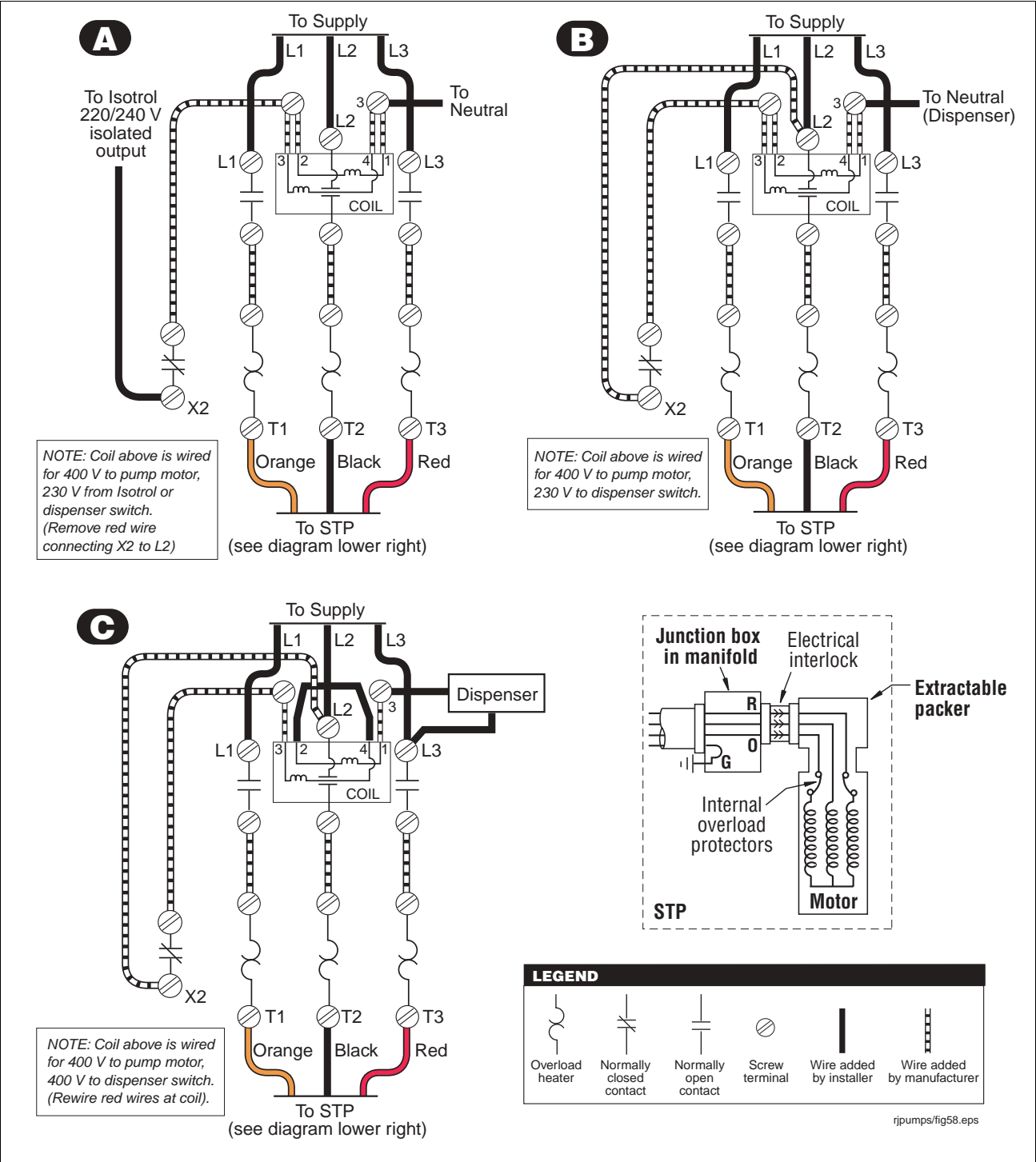


Figure 28. Three phase pump wiring diagram examples

## Service And Repair

### Replacing the UMP

Kits Required:

- UMP replacement kit (P/N 144-327-4)
- Hardware/seal kit (AG) P/N 410154-001

Procedure:



**WARNING! Disconnect, lock out, and tag power at the panel before starting to service the pump.**

1. If a ball valve is installed down line from the pump, close it.
2. Remove the two extractable lock-down nuts (see Figure 29). The springs on the lock-down studs between the extractable's flange and the manifold will push it up, breaking the seals.

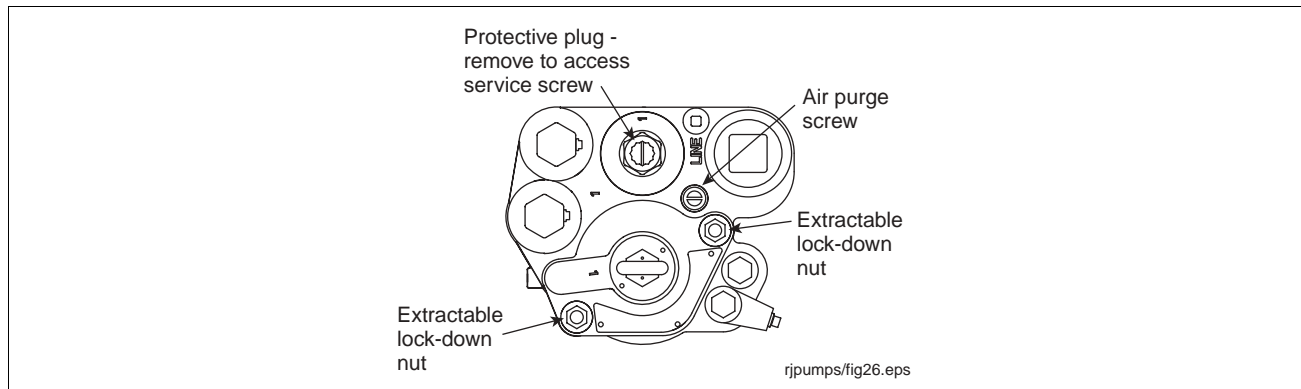


Figure 29. Extractable lock-down nuts

3. Lift out the extractable unit.
4. Remove the old UMP by removing the four bolts holding the discharge head as shown in Figure 30. Discard the old gasket.
5. Place the new gasket from the UMP replacement kit on the new UMP so that all the holes align.



**CAUTION! Gaskets from competitive UMPs will not seal properly and performance will be reduced.**

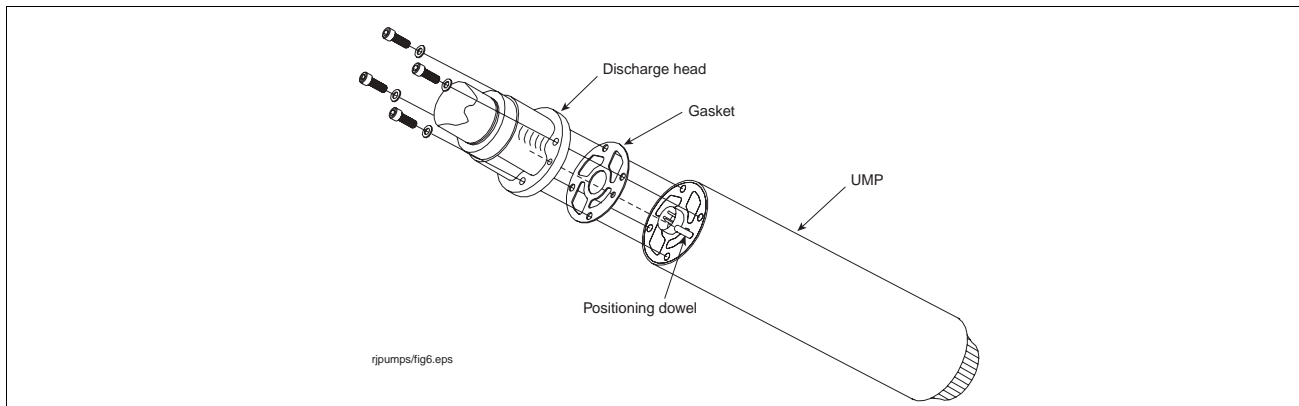


Figure 30. UMP bolts and gasket

6. Pull the pigtail connector in the discharge head out far enough to see the o-ring in the sidewall of its socket (see Figure 31). Remove the connector's o-ring from the connector's socket and discard it. Get a 0.551" ID x 0.070" wide o-ring from the kit and lubricate it with petroleum jelly. Slide the new o-ring over the pigtail connector and push it in the groove in the wall of the connector's socket. Lubricate the pigtail connector body with petroleum jelly and push it back into its socket, making sure its index tab is in the socket's notch.

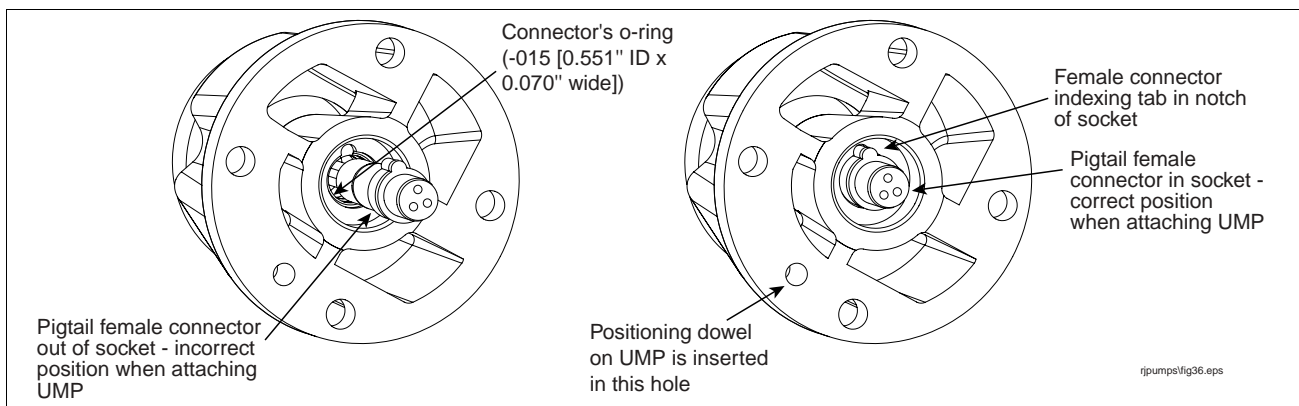


Figure 31. Verifying pigtail's female connector is seated properly

7. Align the UMP positioning dowel so it inserts in the proper hole in the discharge head (ref. Figure 31) and push the UMP into position using hand force only. The UMP should be snug against the discharge head prior to installing the UMP retaining bolts.

**NOTE: Use hand force to push the UMP onto the discharge head. If the UMP does not seat snug against the discharge head, remove the UMP and correct the problem.**

8. Install the four UMP retaining bolts and lock washers. Snug and then torque the bolts using a cross pattern. Torque to 7 ft-lbs (11 N•m).

**NOTE: Do not over torque the bolts. Not following these instructions may cause parts to fail.**

9. Get the three extractable o-ring seals ( 3.975" ID x 0.210" wide [upper], 3.850" ID x 0.210" wide [middle], and 3.725" x 0.210" wide [lower]) from the hardware/seal kit. The three o-rings are very close in size so take extra care to distinguish each one before replacing them in the extractable. Lubricate each o-ring with petroleum jelly and then install them in their assigned grooves in the extractable - see Figure 32.

10. Remove the manifold's female connector's o-ring - see Figure 32. Get a 0.862" ID x 0.103" wide o-ring from the kit and lubricate it with petroleum jelly. Slide the o-ring over the female connector and push it down into its groove.
11. Reinstall the extractable unit into the manifold and tank. Torque the extractable lock-down nuts in an alternating pattern to 50 ft-lbs (68 N•m).

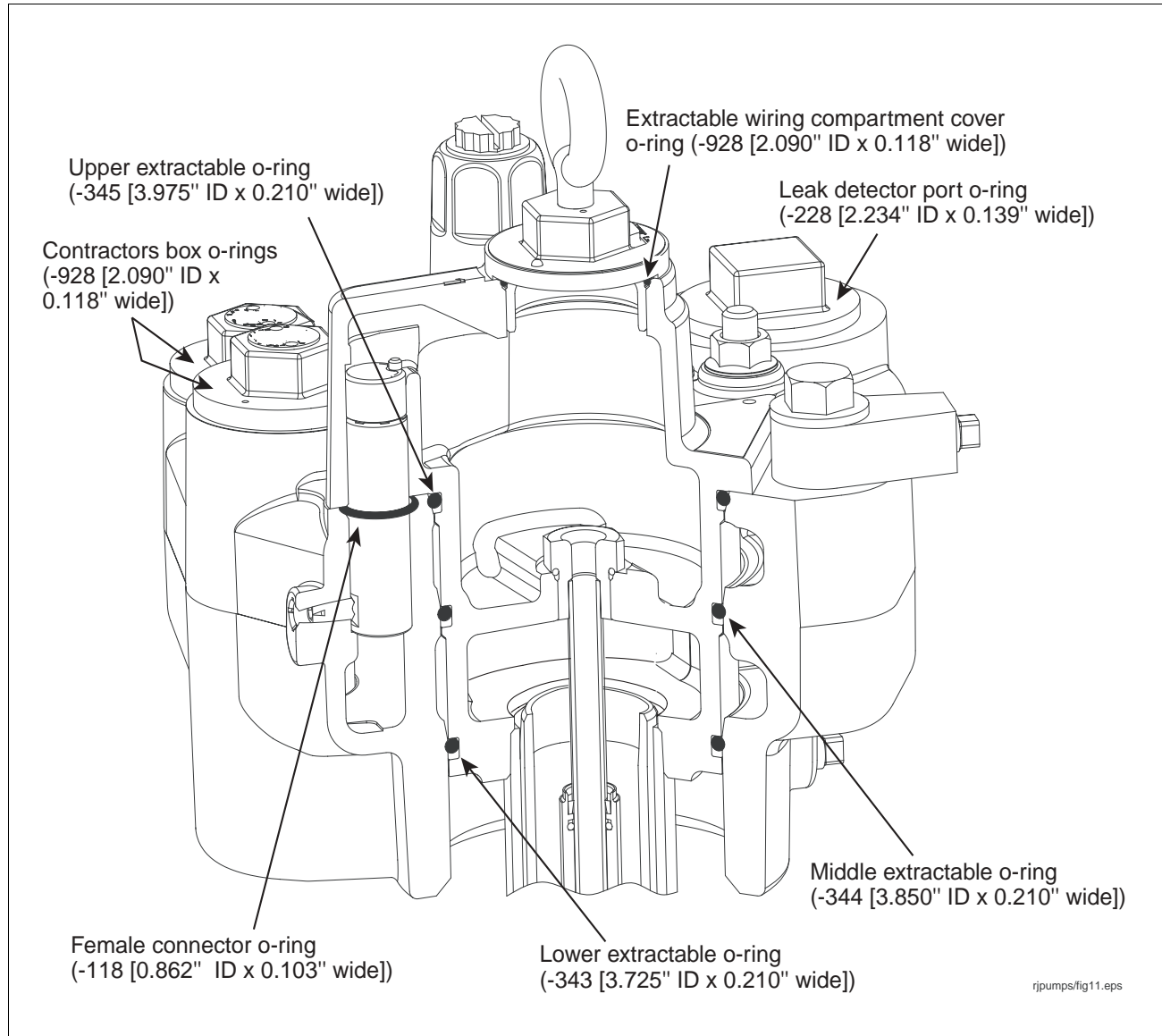


Figure 32. Locating packer and manifold o-rings

## Replacing the Capacitor in the Manifold for Single Phase Pumps



**WARNING!** Always disconnect, lock out, and tag the power before starting to service the pump.



**WARNING!** Serious injury or death can result from using a generic-type capacitor. Generic-type capacitors do not contain internal bleed resistors.

**NOTE:** The capacitor is 440V, 17.5  $\mu$ F continuous duty with internal bleed resistor for 3/4 HP models. The capacitor is 440V, 25  $\mu$ F continuous duty with internal bleed resistor for 1-1/2 HP models. The capacitor is 440V, 40  $\mu$ F continuous duty with internal bleed resistor for 2 HP models.

Kits Required:

- Capacitor kit (P/N 410164-001 [17.5  $\mu$ F], 410164-002 [25  $\mu$ F], or 410164-003 [40  $\mu$ F] as required).
- Hardware/seal kit (AG) P/N 410154-001

Procedure:

1. Remove capacitor access cover (see Figure 33).

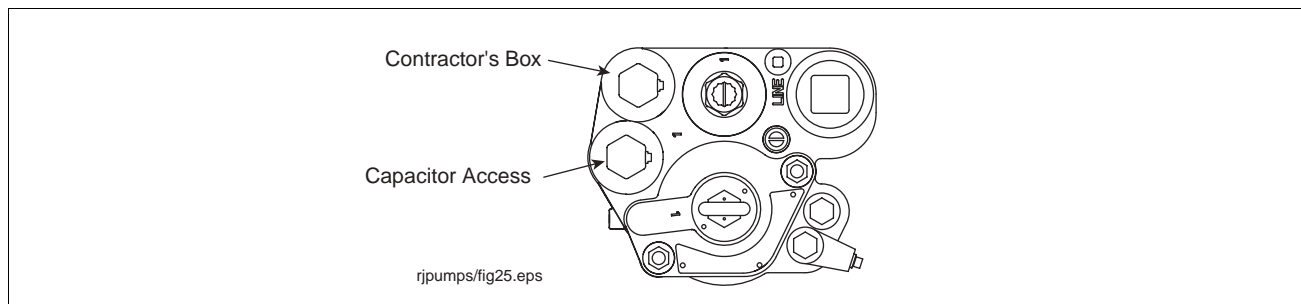


Figure 33. Locating contractor's box and capacitor compartment

2. Examine current wiring attached to existing capacitor as the wiring will attach in an identical manner to the replacement capacitor.
3. Remove wires from old capacitor and remove old capacitor from manifold compartment.
4. Insert new capacitor into manifold compartment and attach wire terminals exactly as they were connected to the old capacitor (ref. Figure 16 on page 20).
5. Replace the o-ring (2.090" ID x 0.118" wide) in the capacitor access cover after lubricating the o-ring with petroleum jelly. Reinstall the cover. Do not use thread sealant. Torque the cover to 35 ft-lbs (50 N•m).



## Installing a Siphon Assembly



**WARNING!** Always disconnect, lock out, and tag the power before starting to service the pump.

Kits Required:

- Siphon Cartridge kit (P/N 410151-001)

Procedure:

1. If a ball valve is installed down line from the pump, close it.
2. Remove and save the protective plug over the service screw and turn the screw clockwise (see Figure 34). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further. When the screw is all the way down, backoff the screw 4 turns to lift the check valve and let the fuel drain out of the manifold's hydraulic cavities.
3. Remove one of the two siphon port plugs from the manifold (see Figure 34).

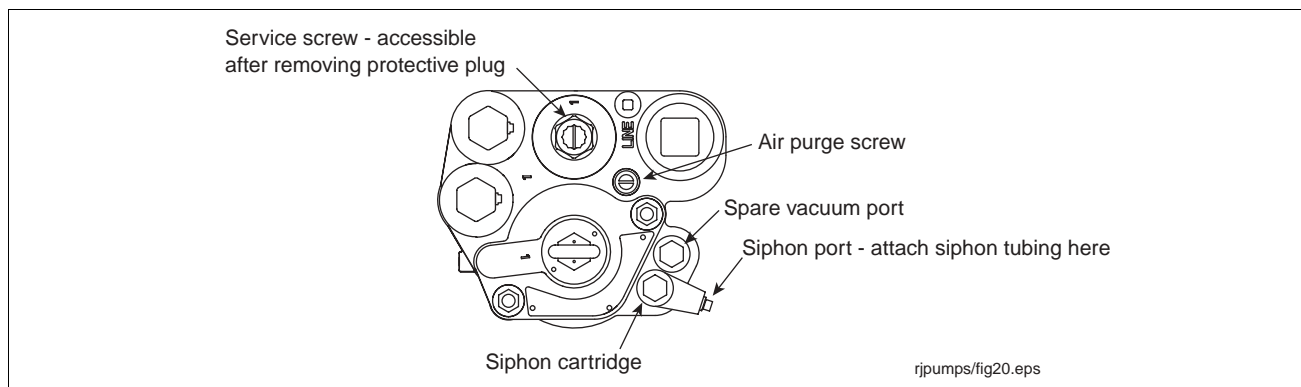


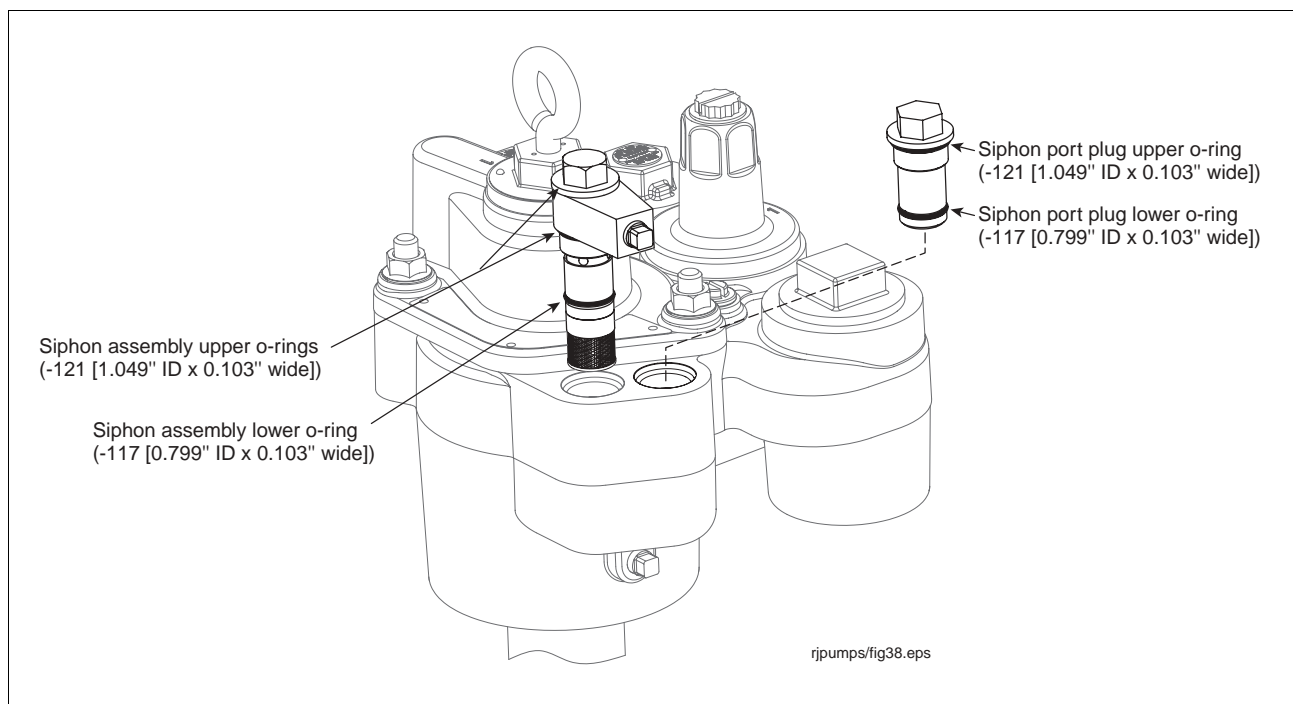
Figure 34. Siphon ports

4. Get the siphon cartridge from the kit and apply a coating of petroleum jelly onto the two o-rings on the outside of the siphon cartridge.
5. Insert the siphon cartridge into the siphon port (see Figure 35). Swivel the outlet port of the siphon in the desired direction, and then hand tighten the siphon's retaining hex body. Torque the body to 15 - 30 ft-lbs (20 - 41 N•m).
6. Remove the 1/4" NPT plug from the siphon outlet port and attach siphon system tubing.
7. Turn the service screw counterclockwise all the way up, as the screw approaches its top position, the check valve will drop into position.
8. Replace the protective plug over the service screw.
9. Turn the air purge screw 2 - 3 turns counterclockwise (see Figure 34).



**CAUTION!** The air purge screw is retained by a hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.

10. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
11. Open the ball valve down line from the pump.



**Figure 35. Inserting Siphon assembly into manifold**

## Replacing the Check Valve Assembly



**WARNING! Always disconnect, lock out, and tag the power before starting to service the pump.**

Kits Required:

- Check valve housing kit (P/N 410152-001), or
- Check valve kit (P/N 410153-001) and Hardware/seal kit (AG) (P/N 410154-001)

Procedure:

1. If a ball valve is installed down line from the pump, close it.
2. Remove and save the protective plug over the service screw and turn the screw clockwise (see Figure 34 on page 35). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further. When the screw is all the way down, backoff the screw 4 turns to lift the check valve and let the fuel drain out of the manifold's hydraulic cavities. Continue to turn the screw counterclockwise until you hear the check valve drop down into position.
3. Unscrew the check valve housing. Lift the spring and check valve out of the manifold. Discard the o-ring from the housing and from the check valve.  
  
NOTE: if replacing the check valve o-ring, avoid twisting or rotating the o-ring as it is being installed on the check valve.
4. Get the new check valve and spring from the kit. If you have the Check valve housing kit, get the new housing and o-ring (2.609" ID x 0.139" wide) from the kit, if you only have the check valve kit, get a new 2.609" ID x 0.139" wide housing o-ring from the hardware/seal kit.
5. Lubricate the new housing o-ring and the new 1.859" ID x 0.139" wide o-ring on the check valve with petroleum jelly.
6. With its lubricated o-ring in place, insert the check valve onto its seat in the manifold, and place the new spring over the check valve (see Figure 36). Place the check valve housing with o-ring over the spring and check valve and screw it in hand tight. Torque the housing to 20 - 50 ft-lbs (27 - 67 N•m).
7. Open the air purge screw 2 - 3 turns counterclockwise (see Figure 34).



**CAUTION! The air purge screw is retained by a hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

8. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
9. Open the ball valve down line from the pump.

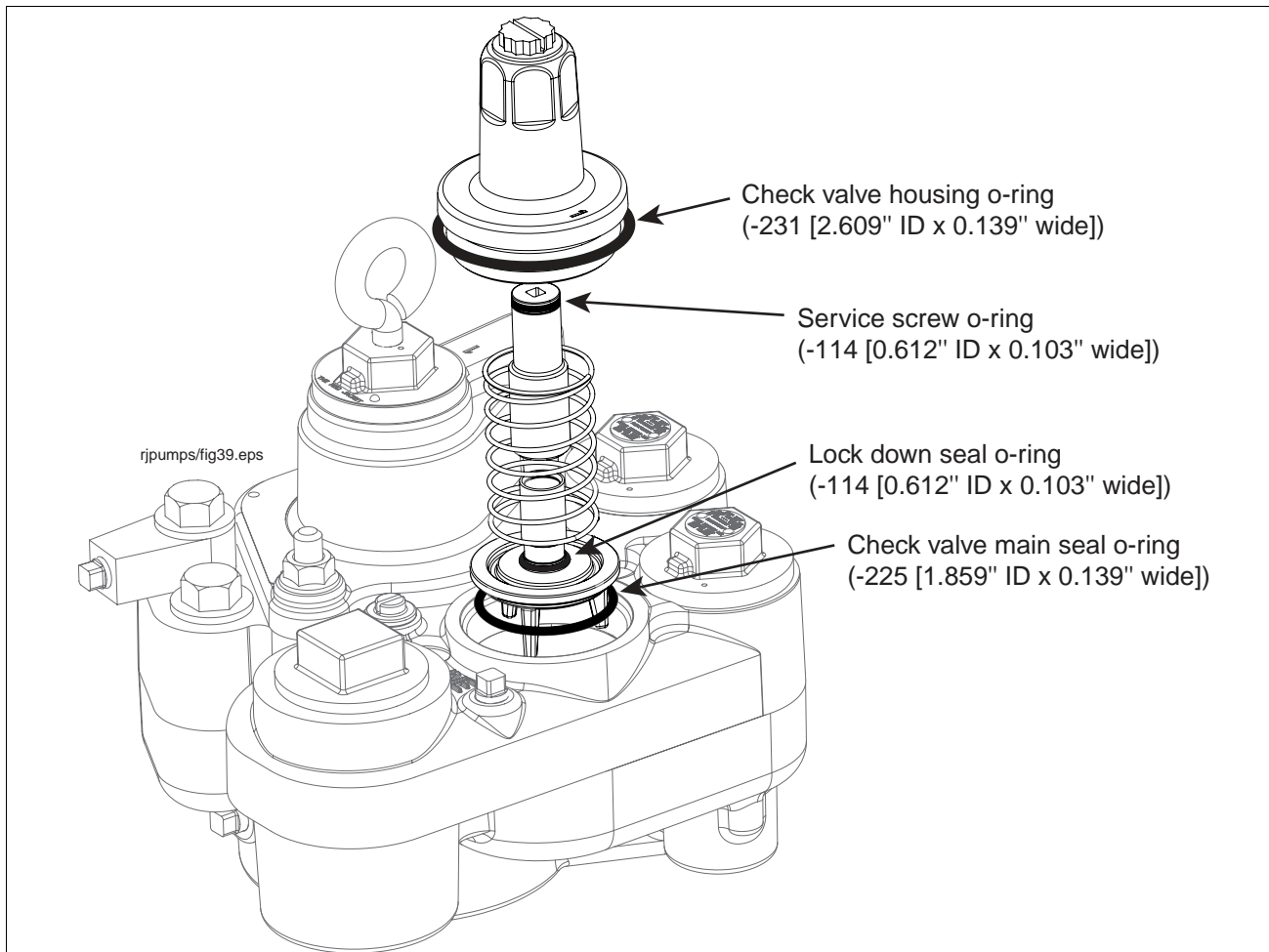


Figure 36. Inserting Check valve assembly into manifold

## Replacing the Conduit Bushing



**WARNING! Always disconnect, lock out, and tag the power before starting to service the pump.**

### Parts Required:

- Conduit bushing (P/N 410086-001),
- Hardware/seal kit (AG) (P/N 410154-001)

### Procedure:

1. Remove the contractor's box cover (Figure 33 on page 34). Remove and discard the o-ring from the cover. Set aside the cover.
2. Locate the conduit bushing at the base of the contractor's box (see Figure 15 on page 19). Note that the incoming power wires connect to the pump wiring. Make a note of which incoming wire connects to which pump wire then disconnect the incoming power wires from the pump wires and set aside the wire nuts.
3. Loosen the two screws in the conduit bushing just enough so the bushing can be lifted from its socket in the bottom of the manifold's contractor box. Continue lifting the bushing up, until it is free of the power wires. Notice that the top plate of the bushing assembly (facing into the manifold) has a larger diameter than the bottom plate, and that there are plastic rod inserts in the unused holes. The plastic inserts seal the bushing and must be in any unused hole.
4. Orient the replacement bushing so the screws are facing up, and push each of the incoming power wires through an empty hole in the bushing. Leave the plastic rod inserts in any unused holes.
5. Slide the bushing down over the power wires until it seats in its socket in the base of the manifold's contractor box and then tighten the two screws in the top plate of the bushing assembly to compress the bushing and seal the wiring entry.
6. Reconnect the power wires to the pump wires as recorded in Step 2 above.
7. Get a 2.090" ID x 0.118" wide o-ring from the hardware/seal kit. Lubricate the o-ring with petroleum jelly and slide it over the cover's threads up to the flange. Reinstall the cover. Do not use thread sealant. Torque the cover to 35 ft-lbs (50 N•m).

## Replacing the Pigtail

Kits Required:

- UMP replacement kit (P/N 144-327-4)
- Pigtail (P/N 410156-001)
- Hardware/seal kit (AG) P/N 410154-001

Procedure:



**WARNING! Disconnect, lock out, and tag power at the panel before starting to service the pump.**

1. If a ball valve is installed down line from the pump, close it.
2. Remove the two extractable lock-down nuts (see Figure 37). The springs on the lock-down studs between the extractable's flange and the manifold will push it up, breaking the seals.

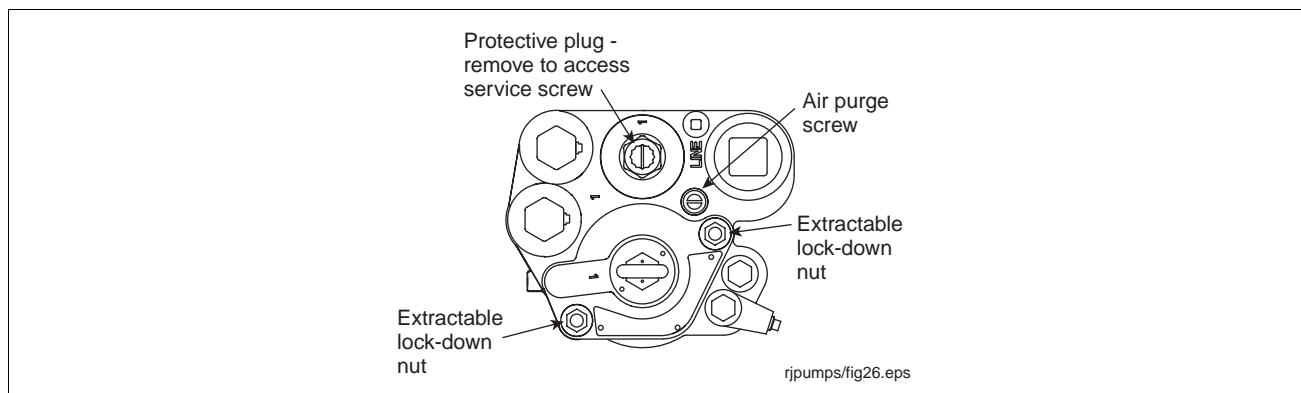


Figure 37. Extractable lock-down nuts

3. Lift out the extractable unit.
4. Remove the UMP by removing the four bolts holding the discharge head as shown in Figure 30 on page 32. Discard the old gasket.
5. Place the new gasket from the UMP replacement kit on the new UMP so that all the holes align.



**CAUTION! Gaskets from competitive UMPs will not seal properly and performance will be reduced.**

6. Remove the packer wiring compartment cover. Remove and discard the o-ring from the cover and set aside the cover. Observe the three wiring connections in the compartment. Make a note of which wire from the packer connects to which wire from the pigtail (it should be like colored wires connecting to like colored wires). Disconnect the wires and set aside the wire nuts.
7. Look at the end of the discharge head. Pull the pigtail connector out of its socket in the discharge head and remove and discard the pigtail. Remove the o-ring in the sidewall of the connector's socket in the discharge head.
8. Get the new pigtail assembly and uncoil the pigtail so it lays flat.
9. Get a 0.551" ID x 0.070" wide o-ring from the hardware/seal kit. Lubricate the o-ring with petroleum jelly and insert it in the sidewall of the connector's socket in the end of the discharge head.

10. Push the pigtail wires into the connector's socket until they exit into the packer's wiring compartment. At the discharge (connector) end of the pigtail, rub some petroleum jelly over the connector's outside surface and push it into its socket in the discharge head. Take care to align the connector index tab with the notch in the socket as shown in the drawing on the right in Figure 31 on page 32.
11. Align the UMP positioning dowel so it inserts in the proper hole in the discharge head (again ref. Figure 31 on page 32) and push the UMP into position using hand force only. The UMP should be snug against the discharge head prior to installing the UMP retaining bolts.

**NOTE: Use hand force to push the UMP onto the discharge head. If the UMP does not seat snug against the discharge head, remove the UMP and correct the problem.**

12. Install the four UMP retaining bolts and lock washers. Snug and then torque the bolts using a cross pattern. Torque to 7 ft-lbs (11 N•m).

**NOTE: Do not over torque the bolts. Not following these instructions may cause parts to fail.**

13. Carefully pull on the pigtail wires where they exit the packer wiring compartment until any excess length is out of the column pipe. Cut off the pigtail wires approximately 8 inches (200 mm) beyond the top of the packer.
14. Strip back insulation of the three pigtail wires 3/8 inch (10 mm).
15. Connect like colored wires from the pigtail to like colored wires from the packer connector with wire nuts. When finished connecting the wires, neatly coil wires inside the packer's wiring compartment (see Figure 14 on page 18).
16. Get a 2.090" ID x 0.118" wide o-ring from the hardware/seal kit. Lubricate the o-ring on the packer wiring compartment cover (with lifting eyebolt) with petroleum based jelly. Screw in the packer wiring compartment cover (thread sealant should not be used) and torque to 35 ft-lbs (50 N•m).
17. Get the three extractable o-ring seals ( 3.975" ID x 0.210" wide [upper], 3.850" ID x 0.210" wide [middle], and 3.725" x 0.210" wide [lower]) from the hardware/seal kit. The three o-rings are very close in size so take extra care to distinguish each one before replacing them in the extractable. Lubricate each o-ring with petroleum jelly and then install them in their assigned grooves in the extractable - see Figure 32 on page 33.
18. Remove the manifold's female connector's o-ring - see Figure 32 on page 33. Get a 0.862" ID x 0.103" wide o-ring from the kit and lubricate it with petroleum jelly. Slide the o-ring over the female connector and push it down into its groove.
19. Reinstall the extractable unit into the manifold and tank. Torque the extractable lock-down nuts in an alternating pattern to 50 ft-lbs (68 N•m).

## Replacing the Packer-to-Manifold Wiring Connectors

Kits Required:

- Electrical Connector kit (P/N 410165-001)
- Hardware/seal kit (AG) P/N 410154-001

Special tools - not supplied in kits:

- 3/16" hex wrench, Medium point felt-tip pen, small piece of masking tape, and a small ruler

Procedure:



**WARNING! Disconnect, lock out, and tag power at the panel before starting to service the pump.**

1. Remove the two extractable lock-down nuts (see Figure 29 on page 31). The springs on the lock-down studs between the extractable's flange and the manifold will push it up, breaking the seals.
2. Lift out the extractable unit and lay it on a clean surface.
3. Remove the packer wiring compartment cover (see Figure 32 on page 33). Remove and discard the o-ring from the cover and set aside the cover. Observe the three wiring connections inside the compartment. Make a note of which wire from the packer connects to which wire from the pigtail (it should be like colored wires connecting to like colored wires). Disconnect the wires and set aside the wire nuts.
4. Locate the male connector inside the packer (see Figure 38).

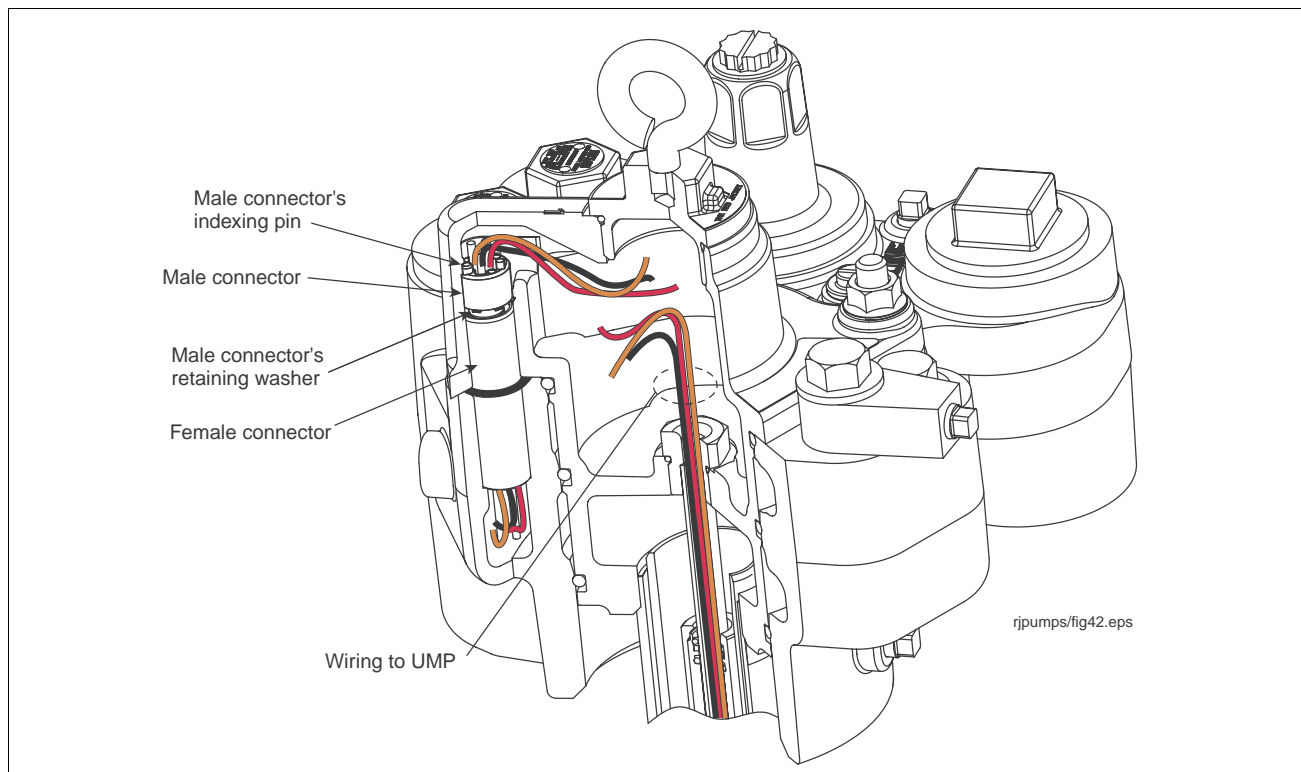


Figure 38. Packer-to-manifold wiring connectors



5. Use a pair of needlenose pliers to remove the retaining washer that holds the male connector in its socket.
6. Remove the male connector.
7. Get the new male connector and retaining washer from the electrical connector kit.
8. Notice the small indexing pin on the back of the male connector (see Figure 39).

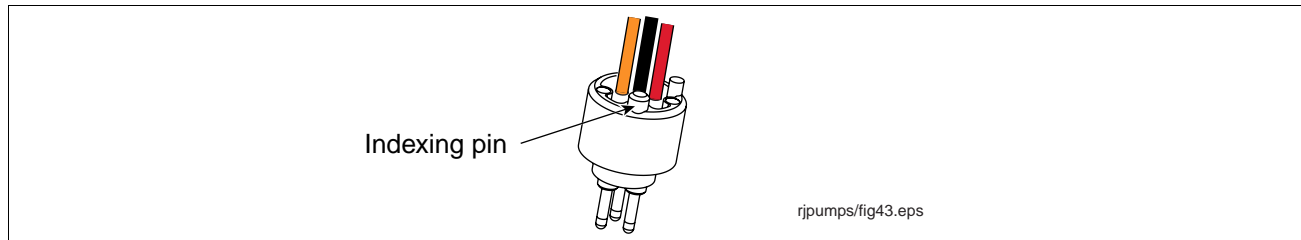


Figure 39. Male connector's indexing pin

9. The indexing pin on the back of the connector must seat in the index hole in the base of the male connector's socket (see Figure 40) for the connector to be correctly oriented relative to the female connector.

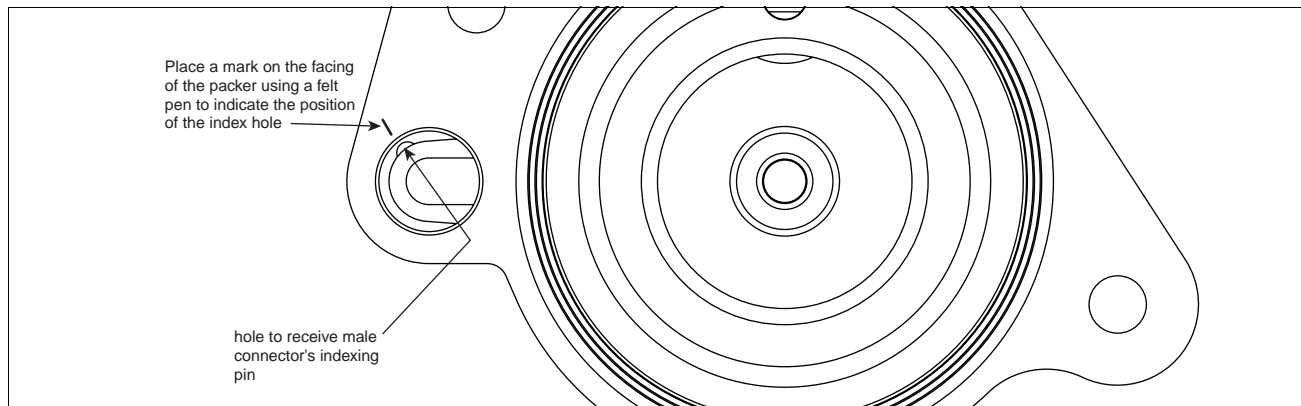


Figure 40. Male connector index hole in base of socket

10. Place a small piece of masking tape on the pins side of the connector inline with the indexing pin (see Figure 41).

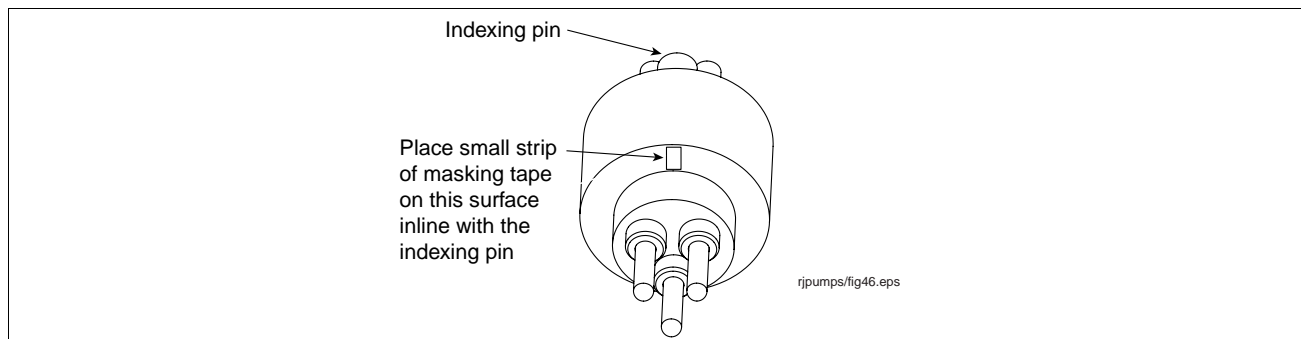


Figure 41. Placing masking tape alignment marker on front of male connector

11. Thread the wires of the new male connector down into the socket and out through the opening in the base of the socket into the packer wiring compartment. Gently pull the wires into the wiring compartment as you align the masking tape mark on the connector with the felt tip mark on the packer facing. When you have pushed the connector all the way into its socket it should not rotate if the indexing pin is in the index hole. Using the small ruler, measure the distance from the packer facing down to the connector, it should be a little more than 1-3/8" (see Figure 42). Hold the wires tight to keep the connector in position and insert the retaining washer (with upturned teeth facing out) forcing it down until it is firmly against the connector. Recheck the 1-3/8" measurement after installing the retaining washer to confirm that the connector is at the proper depth.

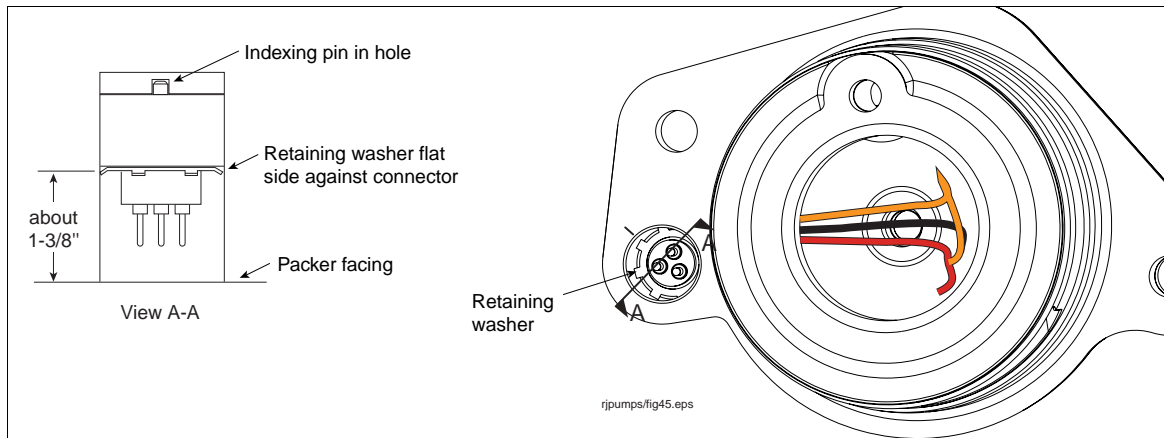


Figure 42. Correct depth of male connector in packer socket

12. Strip back insulation of the three connector wires 3/8 inch (10 mm).
13. Connect like colored wires from the pigtail to like colored wires from the packer male connector with wire nuts. When finished connecting the wires, neatly coil wires inside the packer's wiring compartment (see Figure 14 on page 18).
14. Get a 2.090" ID x 0.118" wide o-ring from the hardware/seal kit. Lubricate the o-ring on the packer wiring compartment cover (with lifting eyebolt) with petroleum based jelly. Screw in the packer wiring compartment cover (thread sealant should not be used) and torque to 35 ft-lbs (50 N•m).
15. Remove capacitor access cover (see Figure 33 on page 34). Remove and discard the o-ring from the cover and set aside the cover. Observe the three wiring connections from the female connector. Make a note of which wire from the connector connects to which wire from the capacitor and incoming power wiring. Disconnect the female connector wires and set aside the wire nuts.
16. Using a 3/16" hex wrench, turn the set screw that holds the female connector in place about 1-1/2 turns counterclockwise until you can lift out the connector (see Figure 43). **Note: Do not try to remove the set screw.**
17. Get the new female connector and its 0.862" ID x 0.103 wide o-ring from the kit. Push the three wires coming out of the connector down through the opening in the base of its socket and into the capacitor well. As you pull on its wires in the capacitor well, lower the connector with the flat cut in the side of the connector facing its retaining set screw. With the connector as far down as it can go (sitting on the ridge in the base of its socket), tighten the set screw firmly against the connector. As the set screw tightens it should rotate the connector to its proper position relative to the male connector.
18. Reconnect the connector's three wires as per your notes made in Step 15 above.
19. Get a 2.090" ID x 0.118" wide o-ring from the hardware/seal kit and lubricate with petroleum jelly. Insert this o-ring on the capacitor cover and screw in the cover. Do not use thread sealant. Torque the cover to 35 ft-lbs (50 N•m).

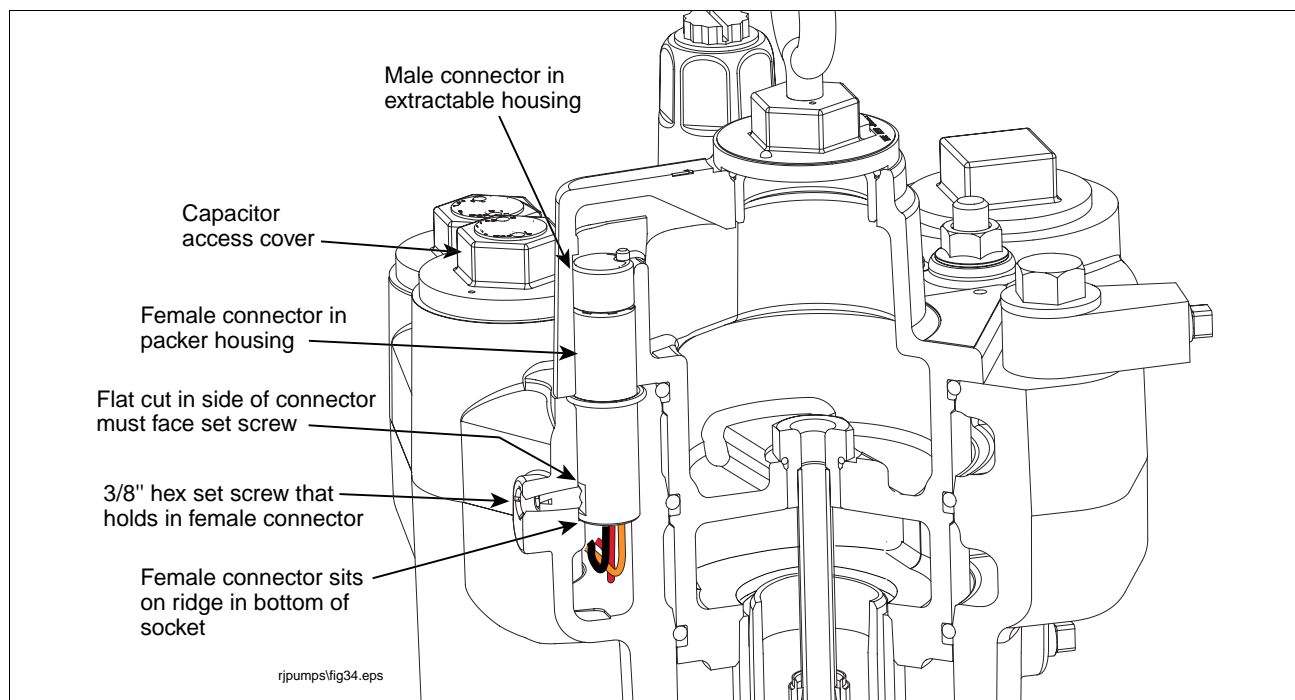


Figure 43. Locating female connector set screw

20. Get the 0.862" ID x 0.103" wide o-ring from the connector kit and lubricate it with petroleum jelly. Insert this o-ring in its groove in the manifold around the female connector (see Figure 38 on page 42).
21. Get the three extractable o-ring seals ( 3.975" ID x 0.210" wide [upper], 3.850" ID x 0.210" wide [middle], and 3.725" x 0.210" wide [lower]) from the hardware/seal kit. The three o-rings are very close in size so take extra care to distinguish each one before replacing them in the extractable. Lubricate each o-ring with petroleum jelly and then install them in their assigned grooves in the extractable - see Figure 32 on page 33.
22. Reinstall the extractable unit into the manifold and tank. Torque the extractable lock-down nuts in an alternating pattern to 50 ft-lbs (68 N•m).

## Installing an Electronic Line Leak Detector Transducer or Mechanical LLD

Kits Required:

- Hardware/seal kit (AG) P/N 410154-001

Other parts:

- Electronic or mechanical line leak detector

Procedure:



**WARNING! Disconnect, lock out, and tag power at the panel before starting to service the pump.**

1. If a ball valve is installed down line from the pump, close it.
2. Remove and save the protective plug over the service screw and turn the screw clockwise (see Figure 34). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further. When the screw is all the way down, backoff the screw 4 turns to lift the check valve and let the fuel drain out of the manifold's hydraulic cavities.
3. Remove the 2" NPT plug from line leak detector port.

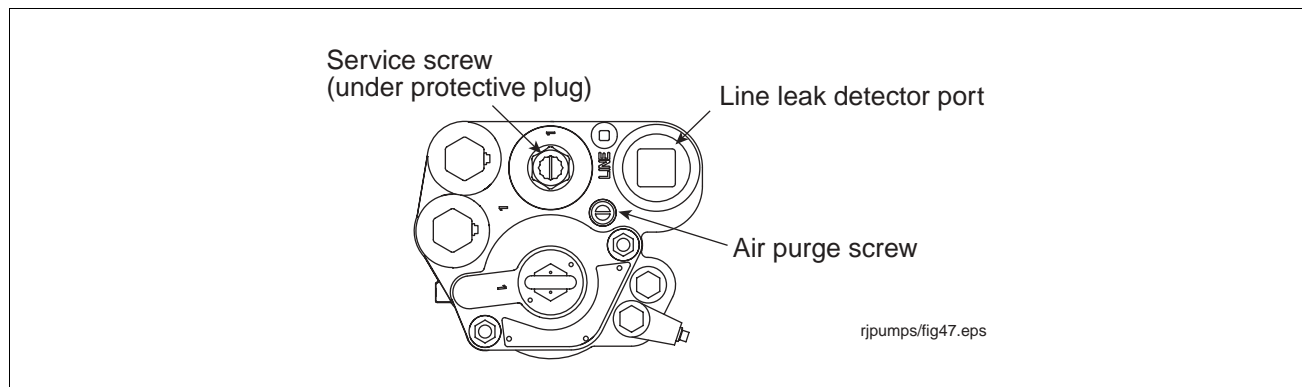


Figure 44. Locating discharge port plug for line leak transducer

4. Install leak detector into the 2" NPT port as per instructions included with device.
5. Open the air purge screw 2 - 3 turns counterclockwise (see Figure 44).



**CAUTION! The air purge screw is retained by a hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

6. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
7. Open the ball valve down line from the pump.

## Replacing the Air Purge Screw



**WARNING!** Always disconnect, lock out, and tag the power before starting to service the pump.

Kits Required:

- Air purge screw (P/N 410134-001),
- Hardware/seal kit (AG) (P/N 410154-001)

Special tool required: T-handle 1/4" hex drive

Procedure:

1. If a ball valve is installed down line from the pump, close it.
2. Remove and save the protective plug in the top of the check valve housing and turn the service screw clockwise (see Figure 45). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further. When the screw is all the way down, backoff the screw 4 turns to lift the check valve and let the fuel drain out of the manifold's hydraulic cavities.
3. Unscrew the check valve housing. Notice that the check valve and spring are still attached to the service screw. Remove and discard the housing o-ring (see Figure 36 on page 38). Set the housing/check valve assembly aside.
4. Remove the 2" NPT plug, LLD transducer, or MLLD from the line leak detector port in the manifold. Remove the o-ring from the device and discard.
5. Locate the air purge screw on the top of the manifold (Figure 45).

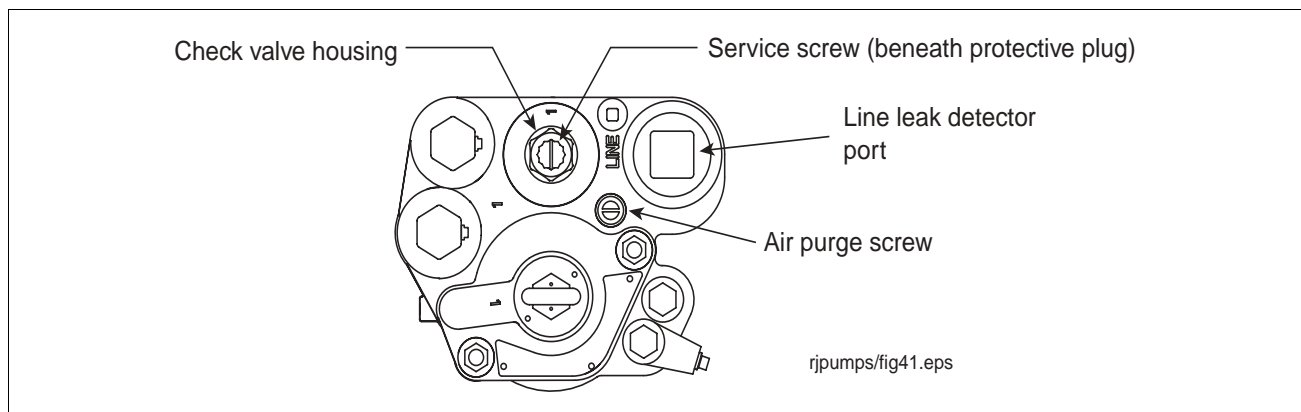


Figure 45. Locating air purge screw

6. The air purge screw has a hitch pin that is set in the horizontal position to limit travel of the screw (see Figure 46).
7. Accessing the hitch pin through the check valve port, use your forefinger to push the pin all the way in as far as you can. As you unscrew the screw, the pin will be forced down into the vertical position as it contacts the surface of the manifold's cavity.
8. Lubricate the three o-rings on the new screw with petroleum jelly and install it with the hitch pin pushed on and hanging in the vertical position (see Figure 48).

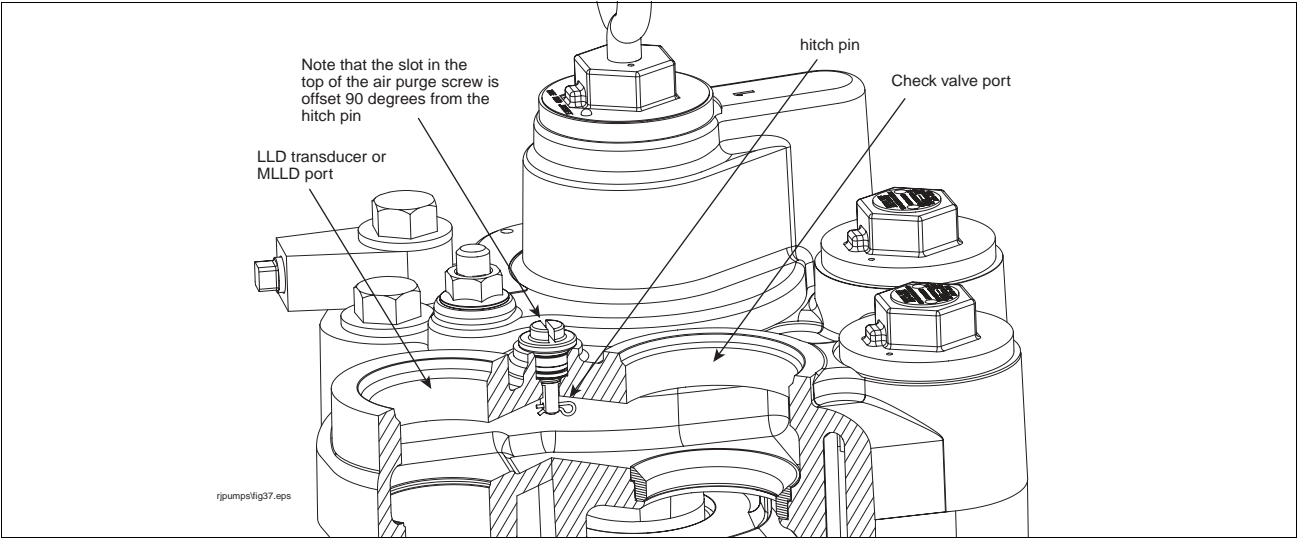


Figure 46. Locating air purge screw hitch pin

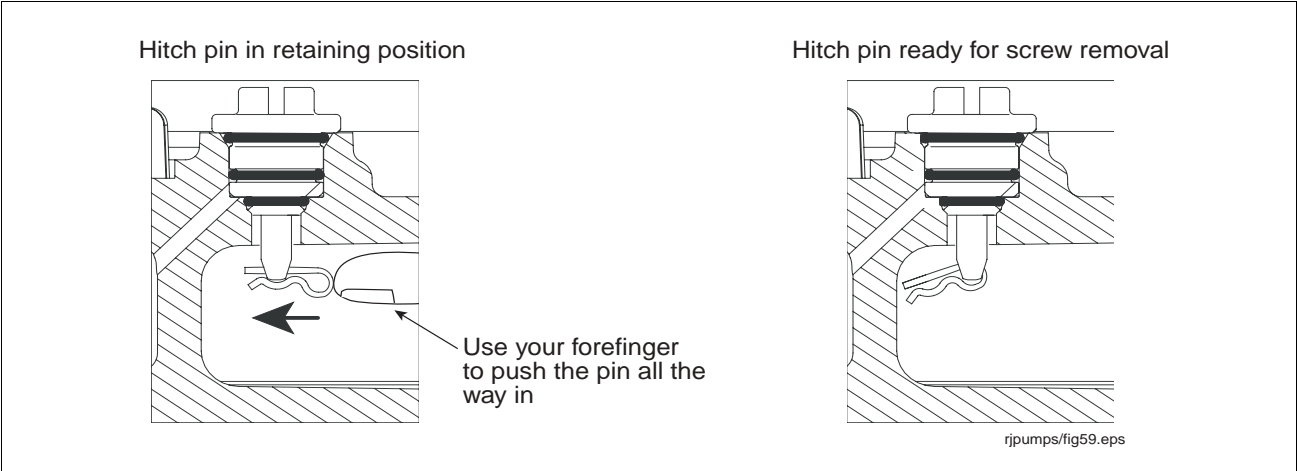


Figure 47. Reorienting the air purge screw's hitch pin

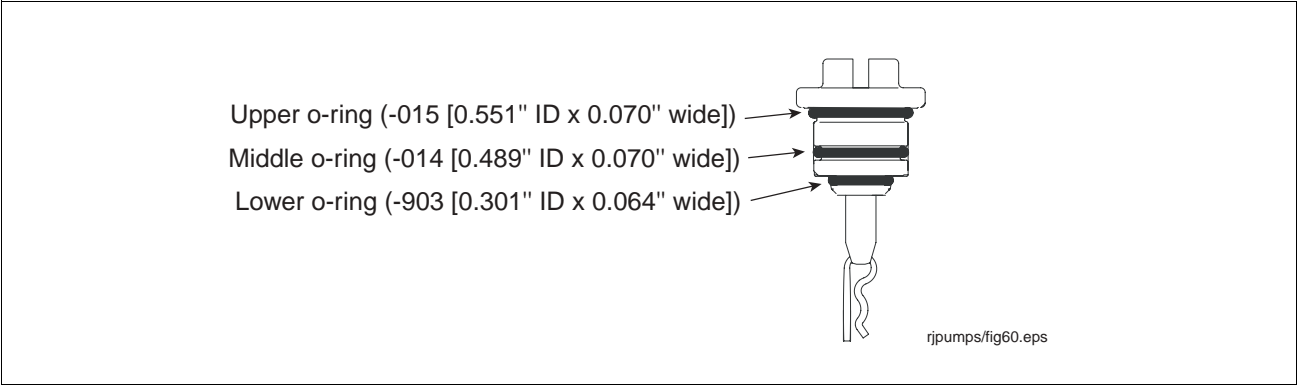
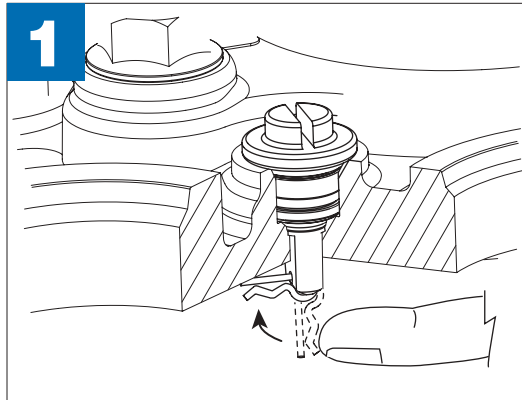
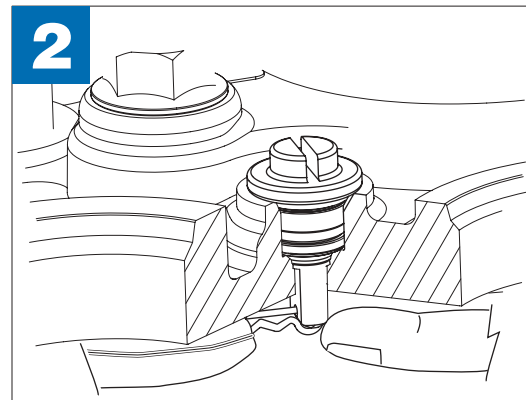


Figure 48. Hitch pin in position to install air purge screw

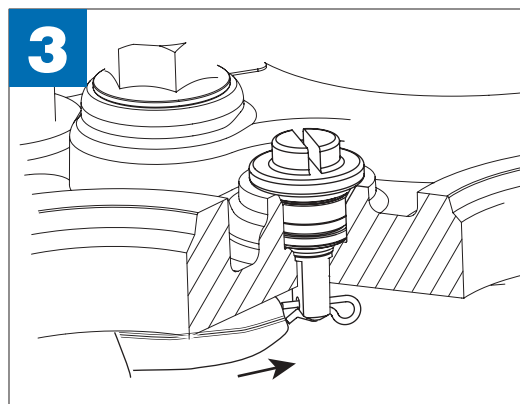
9. When the screw is turned clockwise all the way down, but not tight, use the forefinger of one hand to push the hitch pin up as shown in diagram 1 of Figure 49.
10. While holding the hitch pin up with the forefinger of one hand, place the gloved forefinger of your other hand against the end of the pin as shown in diagram 2 of Figure 49.
11. Push the end of the pin with the gloved forefinger until it snaps into the retaining position as shown in diagram 3 of Figure 49.



Push the hitch pin's up with one forefinger. Note that the crimped leg of the pin is facing down and the straight leg up.



While holding the pin up with one forefinger position the gloved forefinger of the other hand against the other end of the pin.



Push the end of the pin with the gloved forefinger until it snaps into the retaining position.

rjpumps\fig61.eps

**Figure 49. Installing air purge screw hitch pin in the retaining position**

12. If you removed the 2" NPT plug to access the screw, get a new 2.234" ID x 0.139" wide o-ring from the hardware/seal kit and install it on the 2" NPT plug. Lubricate the o-ring with petroleum jelly and install the plug into the leak detector port. Torque the plug to 20 - 50 ft-lbs (27 - 67 N•m).

If you removed a line leak detector to access the air purge screw, apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads of the leak detection device and screw it into the 2" port. Torque the device to 20 - 50 ft-lbs (27 - 67 N•m).

13. Get a new check valve housing o-ring (2.609" ID x 0.139" wide) from the hardware/seal kit. Lubricate the o-rings with petroleum jelly and install it on the valve as shown in Figure 36 on page 38.
14. Screw the check valve into its port in the manifold. Torque the housing to 20 - 50 ft-lbs (27 - 67 N•m). Turn the service screw all the way up (CCW). You will hear the check valve drop into place just before the screw is all the way up. Replace the protective plug over the service screw.
15. Screw the air purge screw all the way down (cw), then back it off 2 - 3 turns counterclockwise.



**CAUTION! The air purge screw is retained by the hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

16. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
17. Open the ball valve down line from the pump.

## Pump Tests

### Verifying Relief Pressure

The relief pressure is factory set to 19 to 25 psi (131 - 172 kPa).

There are two methods used to verify the relief pressure setting;

- The pressure reading can be taken from the control unit of an electronic line leak detection system if one is in operation. Observe the pressure that occurs after the pump turns off - this is the relief pressure.
- Pressure may be observed using a gauge attached at the impact valve or to the pump's line test port (see Figure 50).

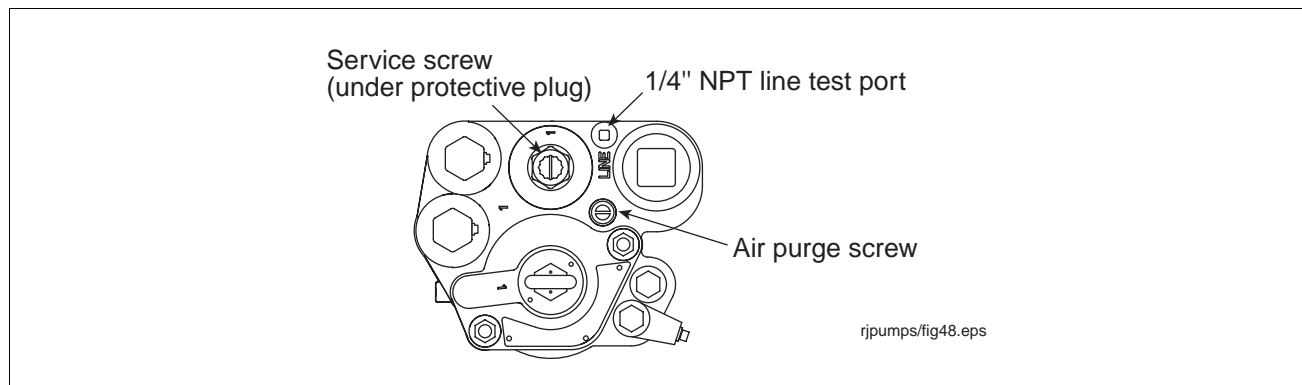


Figure 50. Locating pump line test port

### Checking Relief Pressure at the Pump

Equipment required:

- Pressure gauge with appropriate fittings to connect to the 1/4" NPT line test port

Procedure:



**WARNING! Disconnect, lock out, and tag power at the panel before starting to service the pump.**



1. If a ball valve is installed down line from the pump, close it.
2. Remove and save the protective plug over the service screw and turn the screw clockwise (see Figure 50). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further. When the screw is all the way down, backoff the screw 4 turns to lift the check valve and let the fuel drain out of the manifold's hydraulic cavities. Continue to turn the screw all the way counterclockwise. When the screw is almost up, the check valve will drop down into position.
3. Remove the line test port plug (see Figure 50) and attach test gauge.
4. Open the air purge screw 2 - 3 turns counterclockwise (see Figure 50).



**CAUTION! The air purge screw is retained by a hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

5. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
6. Turn off the pump and measure the relief pressure.
7. If a ball valve is installed down line from the pump, close it.
8. Turn the service screw clockwise. As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further. When the screw is all the way down, backoff the screw 4 turns to lift the check valve and let the fuel drain out of the manifold's hydraulic cavities.
9. Turn service screw counterclockwise as far (up) as possible (you will hear the check valve drop into place as the screw nears its up position).
10. Replace protective plug.
11. Remove the test gauge. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant on the 1/4" NPT plug and replace it in the line test port. Torque the plug to 14 to 21 ft-lbs (19.4 to 29 N•m).
12. Turn the air purge screw 2 - 3 turns counterclockwise.



**CAUTION! The air purge screw is retained by a hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

13. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
14. The pump is now ready for normal operation.

## Testing the Line

Equipment required:

- Pressure generating equipment with appropriate fittings to connect to the 1/4" NPT line test port



**WARNING! Always disconnect, lock out, and tag the power before starting to service the pump.**

1. Block lines at each dispenser.
2. Remove and retain the protective plug over the service screw and turn the screw clockwise (see Figure 50). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further.

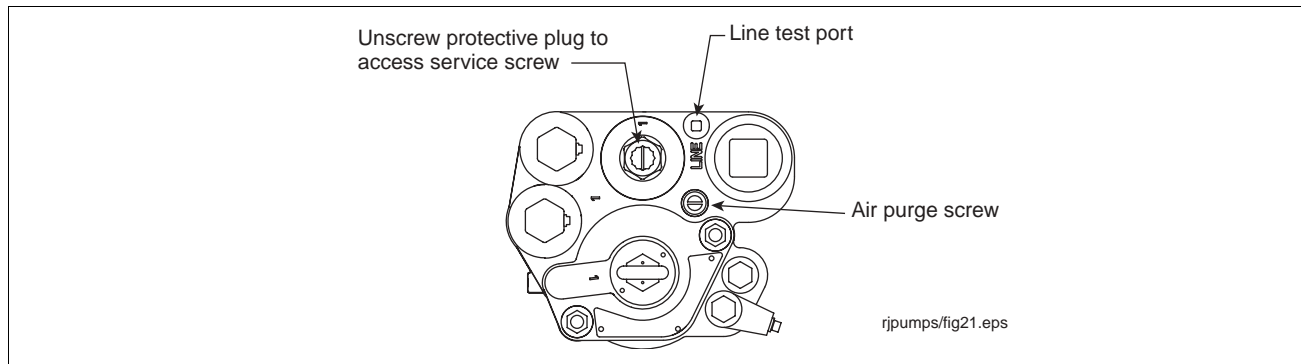


Figure 51. Service screw, line test port, and air purge screw locations

3. Remove line test port plug (see Figure 51). Apply line test pressure at line test port (50 psi [345 kPa] maximum).

**CAUTION! Excessive pressure (above the normal test pressure of 50 - 55 psi [345 - 380 kPa]) may damage check valve seat and other system components.**

4. Depressurize the line (as per Step 2 above) and remove test fixture. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant on the 1/4" NPT plug and replace it in the line test port. Torque the plug to 14 to 21 ft-lbs (19.4 to 29 N•m).
5. Turn the service screw counterclockwise all the way up. As the screw nears its top position you will hear the check valve drop into position. Replace the protective plug over the service screw.
6. Turn the air purge screw 2 - 3 turns counterclockwise (see Figure 51).



**CAUTION! The air purge screw is retained by a hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

7. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
8. The pump is now ready for normal operation.

## Testing the tank

Equipment required:

- Pressure generating equipment with appropriate fittings to connect to the 1/4" NPT tank test port



**WARNING! Always disconnect, lock out, and tag the power before starting to service the pump.**

1. Remove and retain the protective plug over service screw and turn the screw clockwise (see Figure 51). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further.
2. Remove and save the 1/4" NPT tank test port plug and attach tank testing equipment (see Figure 52).

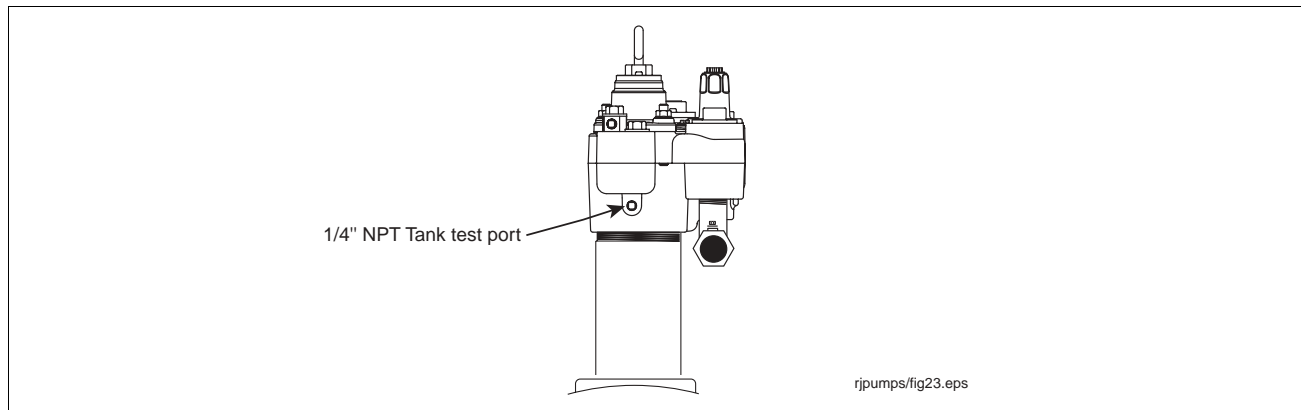


Figure 52. Tank test port on manifold

3. Depressurize tank and remove testing equipment. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant on the 1/4" NPT plug and replace it in the tank test port. Torque the plug to 14 to 21 ft-lbs (19.4 to 29 N•m).
4. Turn the service screw counterclockwise all the way up. As the screw nears its top position you will hear the check valve drop into position. Replace the protective plug over the service screw.
5. Turn the air purge screw 2 - 3 turns counterclockwise (see Figure 51).



**CAUTION! The air purge screw is retained by a hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

6. Turn the pump on and let it run for about 2 minutes to purge air from the manifold's hydraulic cavities. While the pump is still running, turn the air purge screw clockwise until it is completely closed.
7. The pump is now ready for normal operation.

## Parts Lists

### Customer Service Number

After unpacking the equipment, please inspect the parts. Make sure all accessories are included and that no damage occurred during shipping. Report any damage to the shipper immediately and inform a customer service representative at 1-800-873-3313 of any equipment damage or missing parts.

### Pump Parts

Table 7 lists the domestic pump parts list and Table 8 lists the international pump parts list.

**Table 7. Domestic Pump Parts List**

Item (ref. Figure 53)	Part No.	Description	DOM
1	410156-001	20 ft. pigtail	1
2	852-025-5	UMP75U1 W/FSA	1
2	852-042-5	UMP150U1 W/FSA	1
2	852-084-5	AGUMP75S1	1
2	852-199-5	UMP75U1	1
2	852-085-5	AGUMP150S1	1
2	852-200-5	UMP150U1	1
2	852-135-5	AGUMP75S1 W/FSA	1
2	852-136-5	AGUMP150S1 W/FSA	1
2	852-128-5	X3AGUMP150S1	1
2	852-202-5	X3UMP150U1	1
2	852-132-5	X3AGUMP150S1 W/FSA	1
2	852-203-5	X3UMP150U1 W/FSA	1
2	852-221-5	UMP200U1-3	1
2	852-222-5	AGUMP200S1-3	1
2	852-223-5	UMP200U1-3 W/FSA	1
2	852-224-5	AGUMP200S1-3 W/FSA	1
3	144-327-4	Kit - flex syphon/UMP (includes gasket, lockwashers and bolts)	1
---	144-194-5	Trapper - retrofit (not shown)	1

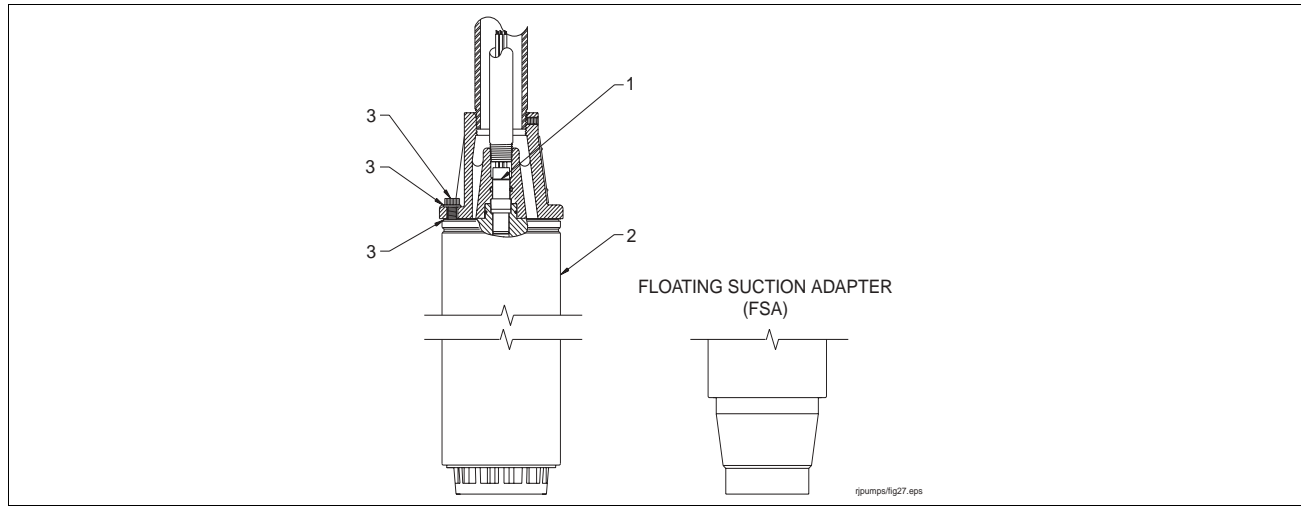


Figure 53. Pump parts

Table 8. International Pump Parts List

Item (ref. Figure 53)	Part No.	Description	INTL
1	410156-001	20 ft. pigtail	1
2	852-204-5	UMP75U3-3	1
2	852-205-5	UMP150U3-3	1
2	852-206-5	UMP75U3-3 W/FSA	1
2	852-207-5	UMP150U3-3 W/FSA	1
2	852-107-5	AGUMP75S3-3	1
2	852-111-5	AGUMP75S3-3 W/FSA	1
2	852-108-5	AGUMP150S3-3	1
2	852-112-5	AGUMP150S3-3 W/FSA	1
2	852-192-5	UMP75U3-3 W/2" Discharge head	1
2	852-193-5	UMP150U3-3 W/2" Discharge head	1
2	852-194-5	X4UMP150U3 W/2" Discharge head	1
2	852-195-5	UMP75U17-3 W/2" Discharge head	1
2	852-196-5	UMP150U17-3 W/2" Discharge head	1
2	852-197-5	X4UMP150U17 W/2" Discharge head	1
2	852-058-5	UMP75U17-3	1
2	852-059-5	UMP150U17-3	1
2	852-145-5	AGUMP75S17-3	1
2	852-146-5	AGUMP150S17-3	1

Table 8. International Pump Parts List

Item (ref. Figure 53)	Part No.	Description	INTL
2	852-147-5	AGUMP75S17-3 W/FSA	1
2	852-148-5	AGUMP150S17-3 W/FSA	1
2	852-153-5	X4UMP150U3	1
2	852-154-5	X4UMP150U3 W/FSA	1
2	852-155-5	X4UMP150U17	1
2	852-156-5	X4UMP150U17 W/FSA	1
2	852-215-5	X4AGUMP150S3	1
2	852-216-5	X4AGUMP150S3 W/FSA	1
2	852-217-5	X4AGUMP150S17	1
2	852-218-5	X4AGUMP150S17 W/FSA	1
2	852-219-5	UMP75U17-3 W/FSA	1
2	852-220-5	UMP150U17-3 W/FSA	1
2	410184-005	UMP200U3-4	1
2	410184-001	AGUMP200S3-4	1
2	410184-006	UMP200U17-4	1
2	410184-002	AGUMP200S17-4	1
2	410184-007	UMP200U3-4 W/2" Discharge Head	1
2	410184-008	UMP200U17-4 W/2" Discharge Head	1
2	410184-011	UMP200U3-4 W/FSA	1
2	410184-012	UMP200U17-4 W/FSA	1
2	410184-009	AGUMP200S3-4 W/FSA	1
2	410184-010	AGUMP200S17-4 W/FSA	1
	410145-001	PACMAN-P75U3-3 (packaged) - 20%	1
	410146-001	PACMAN-P75U17-3 (packaged) - 20%	1
	410147-001	PACMAN-P150U3-3 (packaged) - 20%	1
	410148-001	PACMAN-P150U17-3 (packaged) - 20%	1
	410149-001	PACMAN-X4P150U3 (packaged) - 20%	1
	410150-001	PACMAN-X4P150U17 (packaged) - 20%	1
	410162-001	PACMAN-P200U3-4 (packaged) - 20%	1
	410163-001	PACMAN-P200U17-4 (packaged) - 20%	1
	410161-001	Seal - conduit adapter assembly	1
3	144-327-5	Kit - flex syphon/UMP (includes gasket, lockwashers and bolts)	1
	144-194-5	Trapper - retrofit (not shown)	1

Siphon Cartridge Kit Parts

Table 9 lists the 410151-001 Siphon Cartridge Kit parts list.

Table 9. 410151-001 Siphon Cartridge Kit Parts List

Item (ref. Figure 54)	Part No.	Description	Qty.
1	410071-002	Siphon assembly	1

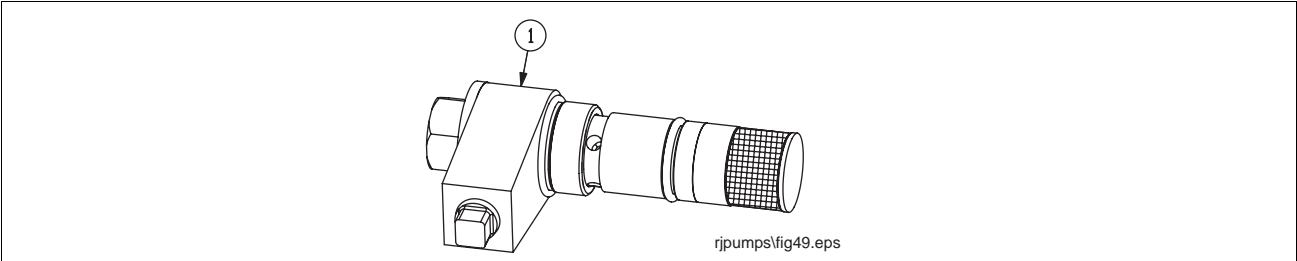


Figure 54. Siphon cartridge kit

Check Valve Housing Kit Parts

Table 10 lists the 410152-001 Check Valve Housing Kit parts list.

Table 10. 410152-001 Check Valve Housing Kit Parts List

Item (ref. Figure 55)	Part No.	Description	Qty.
1	410016-001	Housing assembly - chk/rlf vlv	1
2	410027-001	Spring	1
3	410022-001	Poppet assembly - chk/rlf vlv	1

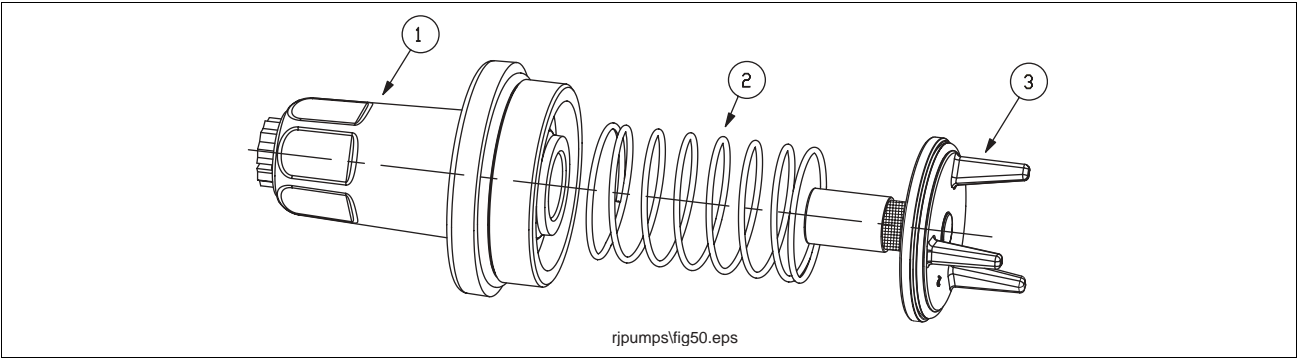


Figure 55. Check valve housing kit

## Check Valve Kit Parts

Table 11 lists the 410153-001 Check Valve Kit parts list.

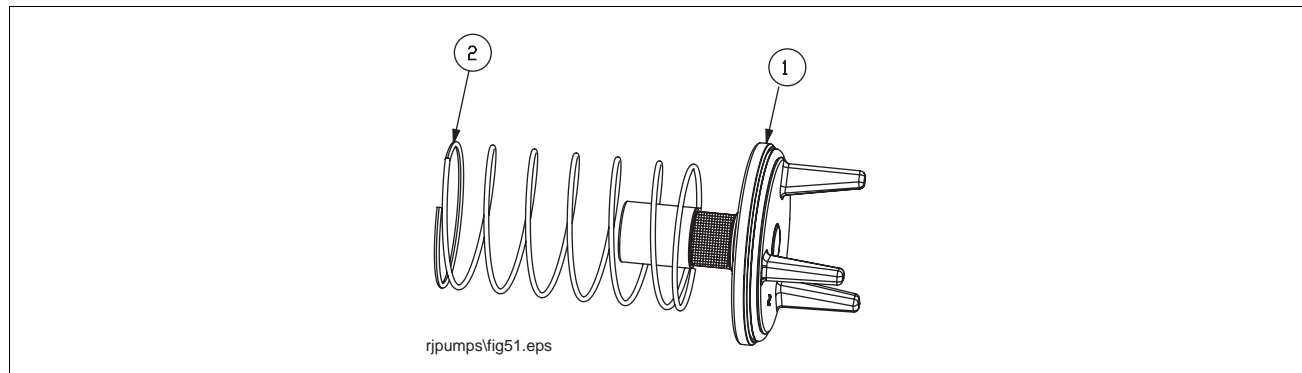
**Table 11. 410153-001 Check Valve Kit Parts List**

Item (ref. Figure 56)	Part No.	Description	Qty.
1	410022-001	Poppet assembly - chk/rlf vlv	1
2	410027-001	Spring	1

Table 12 lists the 410153-002 Hi Pressure Check Valve Kit parts list.

**Table 12. 410153-002 Hi Pressure Check Valve Kit Parts List**

Item (ref. Figure 56)	Part No.	Description	Qty.
1	410022-002	Hi press poppet assembly - chk/rlf vlv	1
2	410027-001	Spring	1



**Figure 56. Check valve kit**

## O-Ring Kit Parts

Table 13 lists the 410154-001 O-ring Kit parts list.

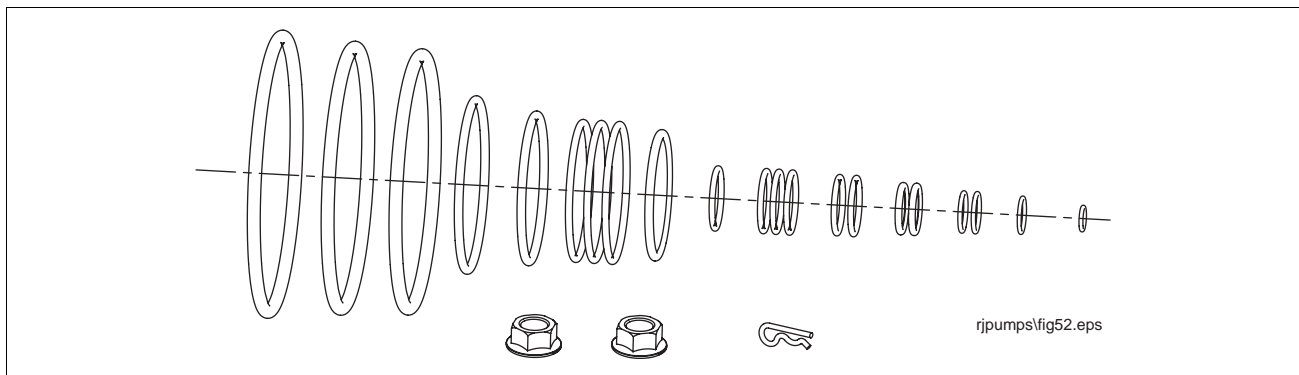
**Table 13. 410154-001 O-Ring Kit Parts List**

(Ref. Figure)	Part No.	Description	Qty.
Figure 32 on page 33	072-541-1	O-ring - 118-V121	1
Figure 36 on page 38	072-578-1	O-ring - 225-V123/19757	1
Figure 36 on page 38	072-685-1	O-ring - 114-V123/19757	2
Figure 32 on page 33	072-686-1	O-ring - 228-V123/19757	1



**Table 13. 410154-001 O-Ring Kit Parts List**

(Ref. Figure)	Part No.	Description	Qty.
Figure 32 on page 33	072-720-1	O-ring - 928-V75	3
Figure 32 on page 33	579005-001	O-ring - 343-V121	1
Figure 32 on page 33	579005-002	O-ring - 344-V121	1
Figure 32 on page 33	579005-003	O-ring - 345-V121	1
Figure 35 on page 36	579005-004	O-ring - 117-V121	2
Figure 35 on page 36	579005-005	O-ring - 121-V121	4
Figure 36 on page 38	579005-006	O-ring - 231-V121	1
Figure 48 on page 48	579005-007	O-ring - 014-V121	1
Figure 48 on page 48	579005-009	O-ring - 903-V121	1
Figure 7 on page 13, Figure 31 on page 32, and Figure 48 on page 48	072-690-1	O-ring - 015-19757	2
Figure 29 on page 31	410127-001	Nut - flanged - M12x1.75-6H	2
Figure 46 on page 48	579014-001	Hitch pin	1
Appendix C	577013-835	O-ring gauge	1

**Figure 57. O-ring kit**

## Capacitor Kits

Table 14 lists the capacitor kit parts list.

**Table 14. Capacitor Kits**

Item (ref. Figure 58)	Part No.	Description	Qty.
1	410164-001	17.5 $\mu$ F Capacitor	1
1	410164-002	25 $\mu$ F Capacitor	1
1	410164-003	40 $\mu$ F Capacitor	1

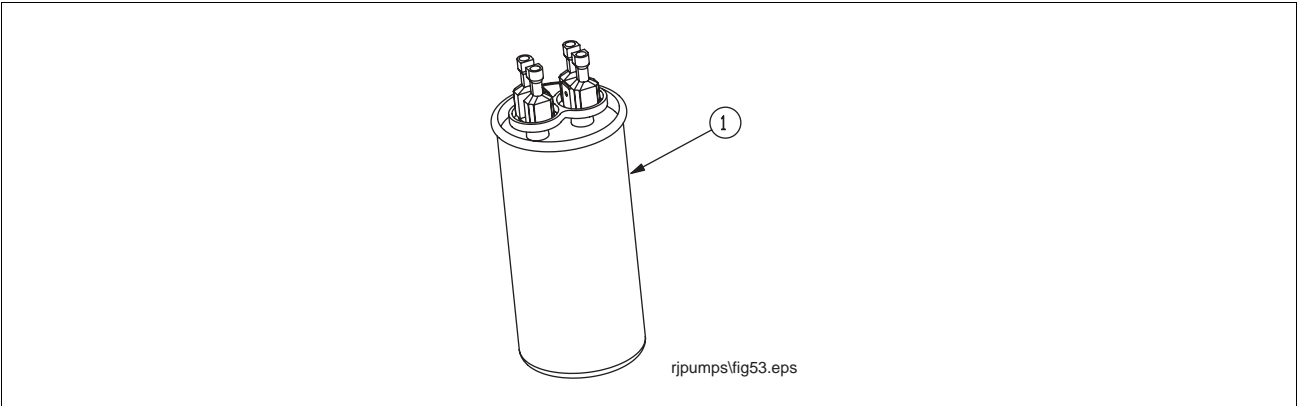


Figure 58. Capacitor kit

Electrical Connector Kit Parts

Table 15 lists the 410165-001 Electrical Connector Kit parts list.

Table 15. 410165-001 Electrical Connector Kit Parts List

Item (ref. Figure 59)	Part No.	Description	Qty.
1	113-640-4	Connector - male	1
2	410117-001	Connector - electrical	1
3	072-541-1	O-ring - 118 - V121	1
4	072-214-1	Ring - internal lock - 5/8" ID x 7/8" OD	1

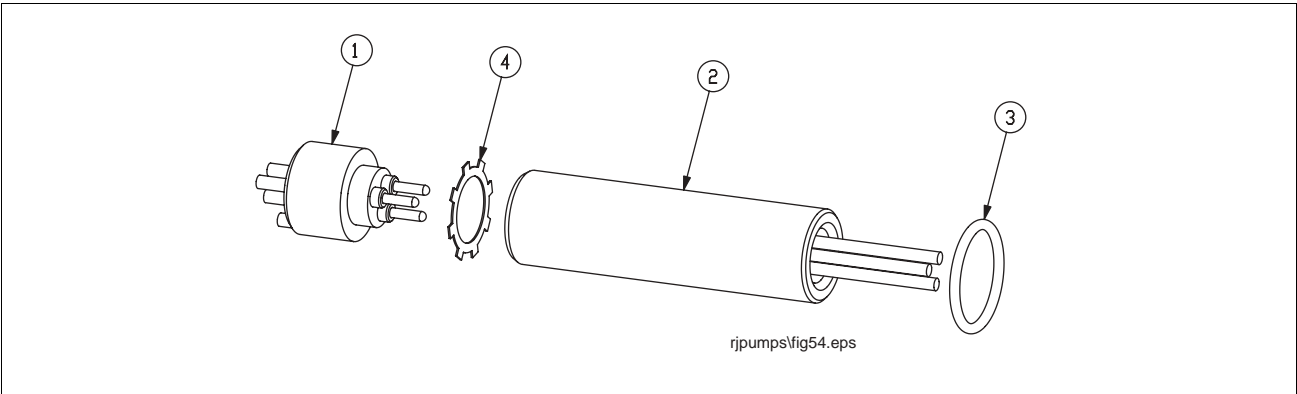


Figure 59. Electrical connector kit

Control Boxes

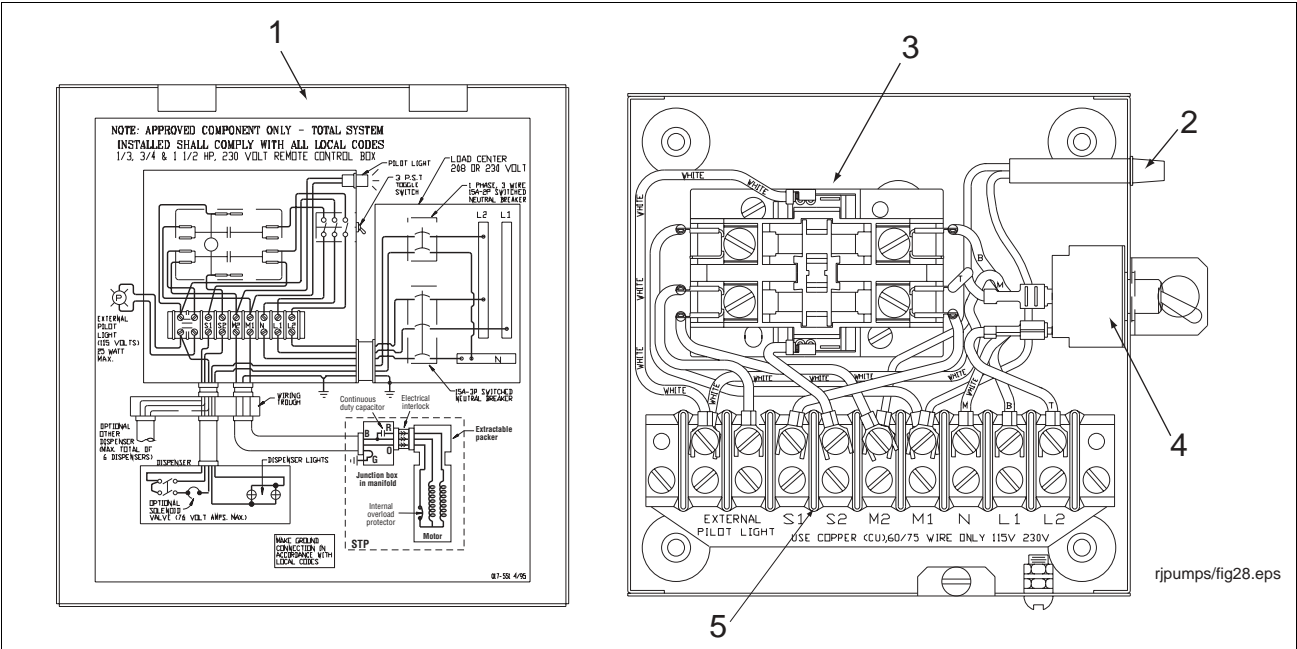


Figure 60. 880-041-5/880-042-5 control box

Table 16. 880-041-5 Control Box w/115V Coil (60 Hz)

Item (Ref. Figure 60)	Part No.	Description	Qty.
1	108-572-4	Control box	1
2	147-006-1	Pilot light ass'y	1
3	014-723-1	Line contractor relay	1
4	080-858-1	Toggle switch	1
5	008-202-1	Terminal block	1

Table 17. 880-042-5 Control Box w/230V Coil (50/60 Hz)

Item (Ref. Figure 60)	Part No.	Description	Qty.
1	108-572-4	Control box	1
2	147-006-1	Pilot light ass'y	1
3	014-720-1	Line contractor relay	1
4	080-858-1	Toggle switch	1
5	008-202-1	Terminal block	1

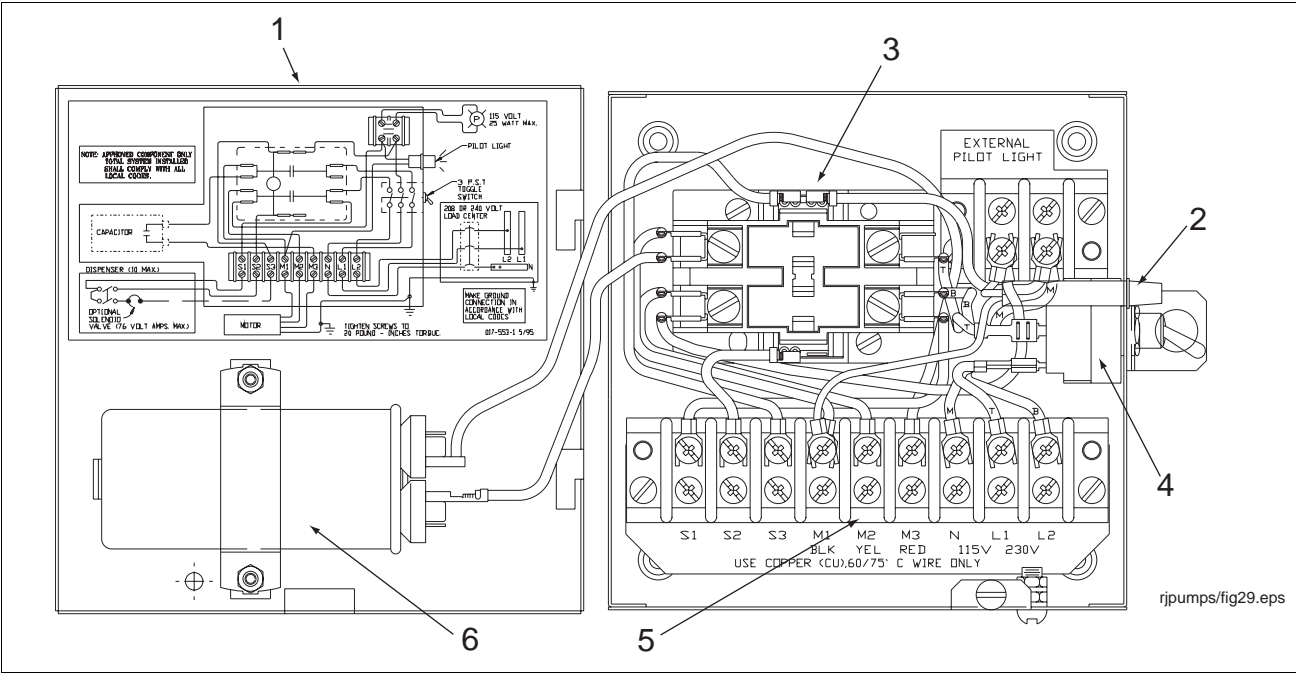


Figure 61. 880-045-5/880-046-5 control box

Table 18. 880-045-5 1/3 & 3/4 HP Control Box w/Cap (115V Coil)

Item (Ref. Figure 61)	Part No.	Description	Qty.
1	123-141-1	Control box	1
2	147-006-1	Pilot light ass'y	1
3	014-723-1	Line contractor relay	1
4	080-858-1	Toggle switch	1
5	008-202-1	Terminal block	1
6	111-092-5	Capacitor	1

Table 19. 880-046-5 All 1-1/2 HP Control Box w/Cap (115V Coil)

Item (Ref. Figure 61)	Part No.	Description	Qty.
1	123-141-1	Control box	1
2	147-006-1	Pilot light ass'y	1
3	014-723-1	Line contractor relay	1
4	080-858-1	Toggle switch	1
5	008-202-1	Terminal block	1
6	111-661-5	Capacitor	1

## Appendix A: 4" Standard Red Jacket STP Safety Instructions

1. ATEX Directive 94/9/EC approved Red Jacket Submersible Turbine Pump (STP) marked with the following information defining its limits for safe use.

- Location Classification:

Altoona, PA U.S.A.  1180  II2G  
Ex ds IIA T4

An 'M' preceding the pump model number shall indicate the pump has been assembled at the ATEX approved, Veeder-Root / Market Harborough facility in Market Harborough, U.K.

- Special Conditions for Safe Use:

"The pump motor must not be allowed to run dry. This assembly must be used with appropriately certified equipment that ensures that the motor either remains fully submersed or that there is a continuous presence of fluid inside the pump motor."

- Certification Number:

DEMKO 04ATEX0330285X

2. For European installations, electrical connections must be made through an ATEX EEx d IIB certified cable gland or stopping box.
3. At installation, initial start-up of this pump requires that the pump motor be fully submersed in fuel.
4. The Red Jacket Submersible Turbine Pump requires no periodic maintenance or calibration.



## *Declaration of Conformity*

**Certificate Number:** 04ATEX0330285X

**Notified Body:**

*UL International Demko A/S (0539)*

*P.O. Box 514*

*Lyskaer 8*

*DK-2730 Herlev*

*Denmark*

**Product:** "The Red Jacket" Submersible Gasoline Pumps

### **IV. Type / Models Covered**

Model designation P with or without Prefix X3 or X4, with or without Prefix AG, followed by 33, 75, 150, or 200, followed by R, S, T or U, followed by 1, 3, or 17, with or without -2, -3 or -4, followed by RJ1, RJ2, RJ3, or RJXXXX where XXXX is only 4 digit number representing length. Models that include Prefix AG have been evaluated for use with gasoline-alcohol blends with alcohol concentrations from 0 to 100 percent ethanol or methanol, and 80 percent gasoline and 20 percent TAME, ETBE or MTBE. Models without AG Prefix but with suffix RJ1, RJ2, RJ3, RJXXXX have been evaluated for use with gasoline-alcohol blends with alcohol concentrations from 0 to 20 percent Ethanol, Methanol, ETBE, MTBE, or TAME.

\*XXXX indicates length of column pipe.

**Harmonized Standards:**

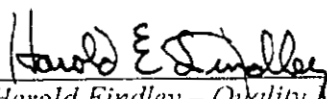
*EN50014: 1998 + A1 – A2: 1999 – Electrical apparatus for potentially explosive atmospheres - General Requirements*

*EN50018: 2000 + A1: 2002 - Electrical apparatus for potentially explosive atmospheres – Flameproof enclosure 'd'.*

*EN13463-1: 2001 – Non – electrical equipment for potentially explosive atmospheres – Part 1: Basic method and requirements.*

*SFA3009: 1985 – Special Protection*

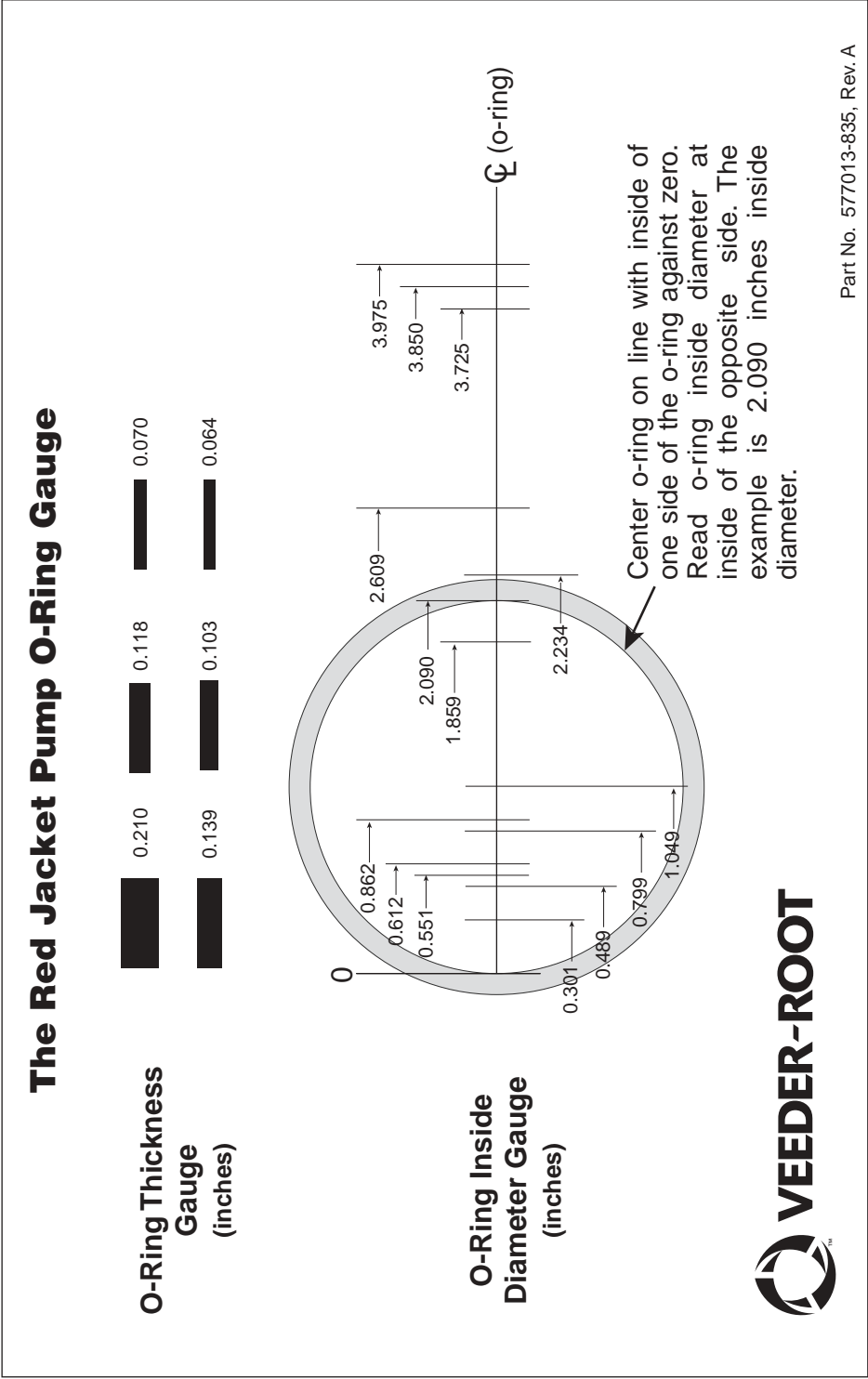
*The Veeder-Root Company-6<sup>th</sup> Ave. at Burns Crossing, Altoona, Pennsylvania 16603, U.S.A. declares that the products listed on this declaration are manufactured in accordance with the provisions set forth in the ATEX Directive 94/9/EC and subsequent normative documents as authorized by UL International Demko A/S.*

  
Harold Findley – Quality Manager





Appendix C: Hardware/Seal Kit O-Ring Gauge





## Appendix D: Check Valve/Air Purge Screw Operation

This appendix discusses the theory of operation of the Red Jacket STP's check valve and air purge screw.

### Check Valve Operation

#### Pump On

As shown in the check valve cutaway diagram in Figure D-1, when the pump is On, the check valve is opened by fuel flow.

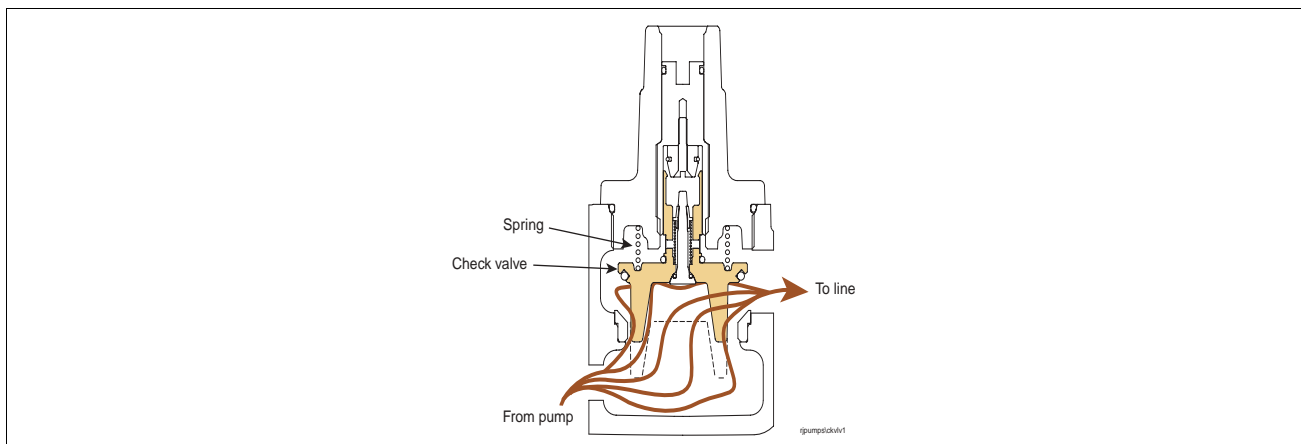


Figure D-1. Pump On condition

#### Pump Off

When the pump shuts off, the check valve reseats isolating the line. As pressure in the line builds due to thermal expansion, the excess pressure vents through the relief valve back into the tank as shown in Figure D-2.

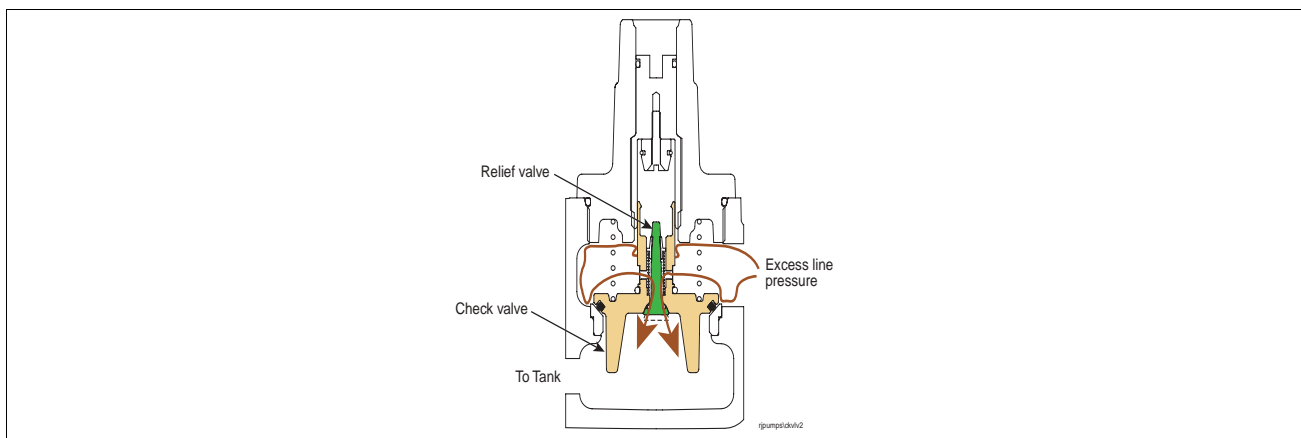


Figure D-2. Relief valve vents excess line pressure

## Locking Down Check Valve for Line Testing

Turning the service screw all the way clockwise, seals the relief valve and at the same time locks down and seals the check valve as shown in Figure D-3. The line is now isolated for pressure testing.

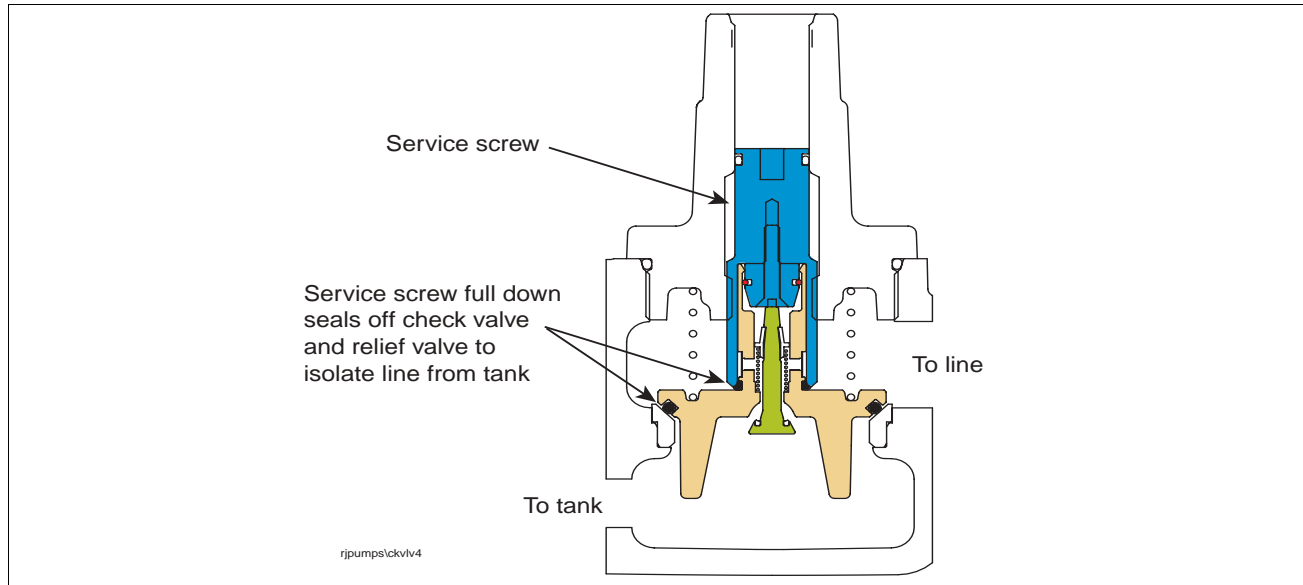


Figure D-3. Locking down the check valve for line testing

## Removing Check Valve

When removal of the check valve is desired, turn the service screw clockwise until it is all the way down as shown in Figure D-4. At about 7.5 clockwise turns, the relief valve will open (you will hear line pressure vent) and the service screw will lock onto the check valve. When you have turned the service screw all the way down, back off 3 or 4 turns (counterclockwise) and wait a few seconds for the product in the manifold to drain out. Unscrew the check valve housing and remove the complete valve assembly.

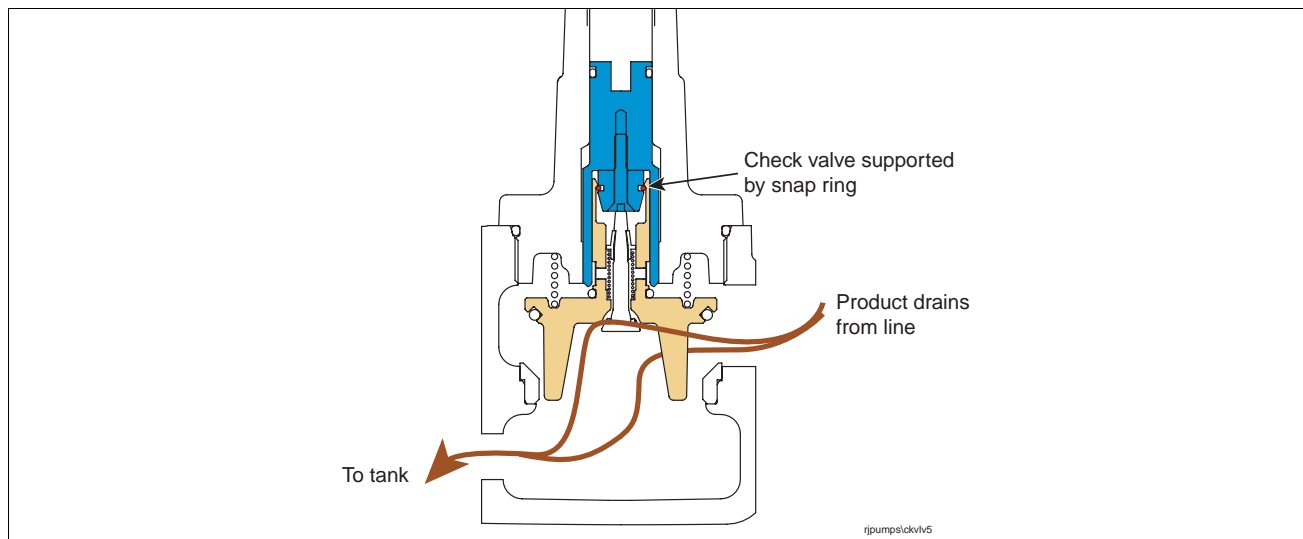


Figure D-4. Removal of check valve assembly for service

## How the Service Screw Lifts the Check Valve

When you turn the service screw clockwise 7.5 turns to push open the relief valve stem, a slightly compressible snap ring in the service screw squeezes past a rim on the inside of the top edge of the check valve as shown in Figure D-5. As the service screw is turned counterclockwise, the snap ring rises beneath the rim lifting the check valve. The check valve continues to rise as the service screw is turned ccw until the outer edge of the check valve contacts the bottom surface of the check valve housing (when you are unscrewing the service screw you will feel this 'stop'). Continuing to turn the service screw until it is all the way up, compresses the snap ring until it is past the rim to a degree that the spring in the check valve (and gravity) forces the check down onto its seat in the manifold. All the way up is the normal operating position of the service screw.

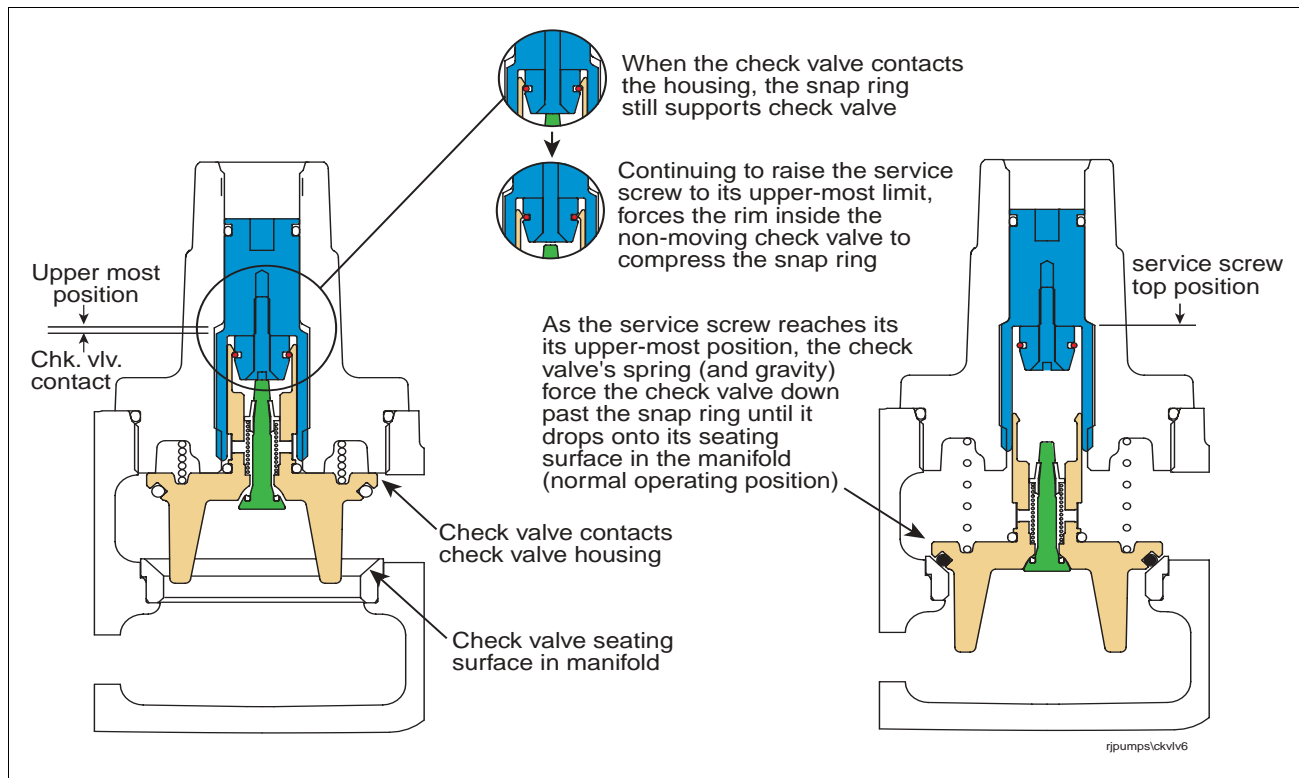


Figure D-5. Returning the check valve to its normal operating position

## Air Purge Screw Operation

The air purge screw is used to rid air from the line and manifold hydraulic cavities after opening a port in the manifold (e.g., after installing a line leak detector). When repairs to the pump have been made, the technician will need to purge the air within the manifold as shown in diagram 1 of Figure D-6. The air purge screw is rotated 2-3 turns counterclockwise, then the pump is turned on.



**CAUTION! The air purge screw is retained by the hitch pin to limit travel. Do not attempt to rotate beyond 3 turns.**

As the pump runs, any air in the cavities is pushed through the small tank return port as shown in diagram 2. After the pump has run for about 2 -3 minutes the air will have been removed from the manifold and piping as shown in diagram 3. While the pump is still running, turn the air purge screw clockwise until it is completely closed. Open the ball valve down line from the pump.

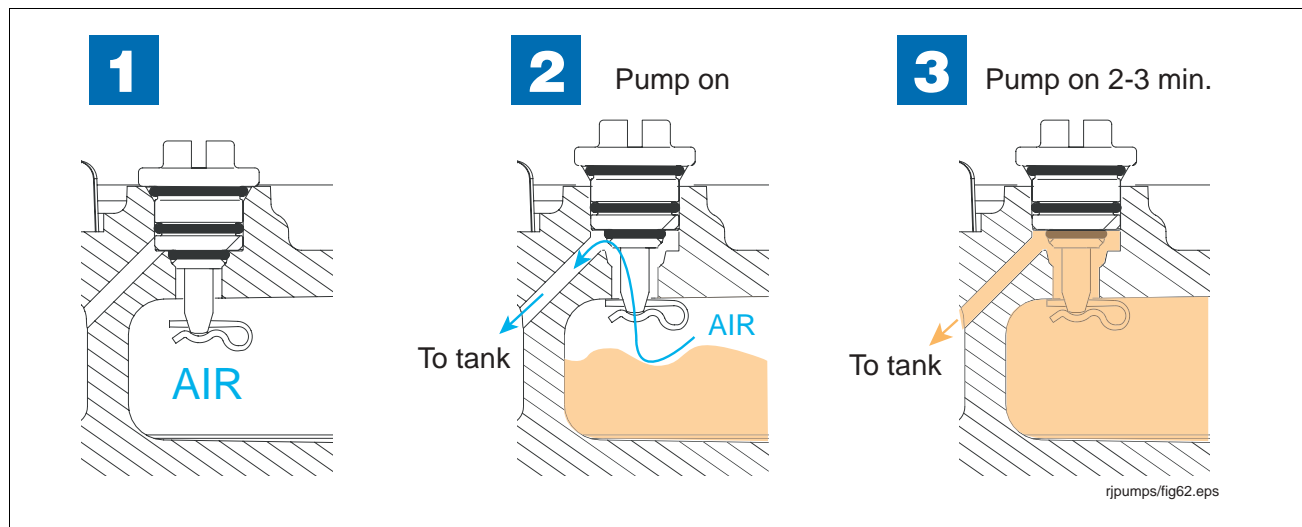


Figure D-6. Purging air from manifold



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