Manual No: **577013-893** ● Revision: **J**

The Red Jacket Contained Submersible Turbine Pump (CSTP)

Installation, Service, & Parts Lists

Red Jacket® Quick-Set® Submersible Pump

RED JACKET™

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2. Customer may submit a replacement purchase order. Customer Service will work with production facility to have the replacement product shipped as soon as possible.
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Introduction

Overview

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

The CSTP offers the following features:

- **Secondary Space**

  For the purpose of detecting fuel leaks, a secondary space is incorporated into the CSTP design.

- **Vacuum Monitoring Applications**

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

- **Line Leak Detection**

  As an option, Veeder-Root pressurized line leak detection (PLLD) and mechanical line leak detection (MLLD) could be used to detect line leaks.

- **Liquid Switch**

  A liquid switch is incorporated in the secondary of the CSTP for detecting any leaks in the secondary space.

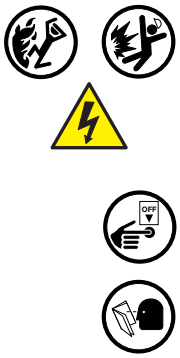
Safety Precautions

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

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

 **EXPLOSIVE** Fuels and their vapors are extremely explosive if ignited.	 **FLAMMABLE** Fuels and their vapors are extremely flammable.
 **ELECTRICITY** High voltage exists in, and is supplied to, the device. A potential shock hazard exists.	 **TURN POWER OFF** Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.
⚠WARNING **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.	⚠CAUTION **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 **WEAR EYE PROTECTION** Wear eye protection when working with pressurized fuel lines to avoid possible eye injury.	NOTICE **NOTICE** is used to address practices not related to physical injury.
 **WEAR GLOVES** Wear gloves to protect hands from irritation or injury.	 **NO POWER TOOLS** Sparks from power tools (such as drills) can ignite fuels and their vapors.
 **NO SMOKING** Sparks and embers from burning cigarettes or pipes can ignite fuels and their vapors.	 **NO OPEN FLAMES** Open flames from matches, lighters, welding torches, etc. can ignite fuels and their vapors.
 **READ ALL RELATED MANUALS** Knowledge of all related procedures before you begin work is important. Read and understand all manuals thoroughly. If you do not understand a procedure, ask someone who does	 **TURN OFF CELL PHONES/PAGERS** Sparks from electronic devices in the vicinity of gasoline storage tanks could cause an explosion or fire resulting in bodily injury or death.

⚠ WARNING



This product operates in the highly combustible atmosphere of a gasoline storage tank.

FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.

1. **All installation work must comply with the latest issue of the National Electrical Code (NFPA 70), the Code for Motor Fuel Dispensing Facilities and Repair Garages (NFPA 30A), and any European, national, state, and local code requirements that apply.**
2. **Turn off, tag, and lockout power to the STP before connecting or servicing the STP.**
3. **Do not step on CSTP when entering or leaving the sump.**
4. **Before installing pipe threads apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant.**
5. **When servicing unit, use non-sparking tools and use caution when removing or installing equipment to avoid generating a spark.**
6. **Not reading and following all warnings and instructions in this manual can cause damage to property, environment, resulting in serious injury or death.**

Warnings and Instructions

IMPORTANT SAFETY INFORMATION

⚠WARNING **This section introduces the hazards and safety precautions associated with installing, inspecting, maintaining or servicing this product. Before performing any task on this product, read this safety information and the applicable sections in this manual, where additional hazards and safety precautions for your task will be found. Fire, explosion, electrical shock or pressure release could occur and cause damage to property, environment, resulting in serious injury or death, if these safe service procedures are not followed.**

PRELIMINARY PRECAUTIONS

⚠WARNING **You are working in a potentially dangerous environment of flammable fuels, vapors, and high voltage or pressures. Only trained or authorized individuals knowledgeable in the related procedures should install, inspect, maintain or service this equipment.**

Read the Manual

Read, understand and follow this manual and any other labels or related materials supplied with this equipment. If you do not understand a procedure, call 1-800-323-1719 to locate a qualified technician. It is imperative to your safety and the safety of others to understand the procedures before beginning work. **Make sure your employees and any service contractors read and follow the instructions.**

Follow the Regulations

Applicable information is available in National Fire Protection Association (NFPA) 30A; *Code for Motor Field Dispensing Facilities and Repair Garages*, NFPA 70; *National Electrical Code* (NEC), Occupational Safety and Hazard Association (OSHA) regulations and federal, state, and local codes. All these regulations must be followed. Failure to install, inspect, maintain or service this equipment in accordance with these codes, regulations and standards may lead to legal citations with penalties or affect the safe use and operation of the equipment.

Prevent Explosions and Fires

Fuels and their vapors will explode or burn, if ignited. Spilled or leaking fuels cause vapors. Even filling customer tanks will cause potentially dangerous vapors in the vicinity of the dispenser or island.

Working Alone

It is highly recommended that someone who is capable of rendering first aid be present during servicing. Familiarize yourself with Cardiopulmonary Resuscitation (CPR) methods, if you work with or around high voltages. This information is available from the American Red Cross. Always advise the station personnel about where you will be working, and caution them not to activate power while you are working on the equipment. Use the OSHA Lockout/Tagout procedures. If you are not familiar with this requirement, refer to OSHA documentation.

Working With Electricity Safely

Ensure that you use safe and established practices in working with electrical devices. Poorly wired devices may cause a fire, explosion or electrical shock. Ensure that grounding connections are properly made. Ensure that you do not pinch wires when replacing covers. Follow OSHA Lockout/Tagout requirements. Station employees and service contractors need to understand and comply with this program completely to ensure safety while the equipment is down. Before you start work, know the location of the Emergency Power Cutoff Switch (the E-STOP). This switch cuts off power to all fueling equipment and submerged turbine pumps and is to be used in the event of an emergency. The buttons on the console at the cashier's station WILL NOT shut off electrical power to the pump/dispenser. This means that even if you press a button on the console labeled EMERGENCY STOP, ALL STOP, PUMP STOP, or something similar, fuel may continue to flow uncontrolled.

Hazardous Materials

Some materials may present a health hazard if not handled correctly. Ensure that you clean hands after handling equipment. Do not place any equipment in the mouth.

⚠WARNING **FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD RESULT IN PROPERTY DAMAGE, INJURY OR DEATH.**

FIRE HAZARD! Do **NOT** use **power tools** (Class I Division I and Class I Division II) during the installation or maintenance of equipment. Sparking could ignite fuel or vapors, resulting in fire.

CHEMICAL EXPOSURE HAZARD! Wear appropriate **safety equipment** during installation or maintenance of equipment. Avoid exposure to fuel and vapors. Prolonged exposure to fuel may cause severe skin irritations and possible burns.

REQUIREMENTS FOR USE

- The CSTP is designed for use only at facilities dispensing motor fuels.
- Application of CSTP must be consistent with NFPA Code 30A, OSHA regulations, and federal, state and local fire codes, and other applicable local regulations.
- The selection of any Veeder-Root product must be based upon physical specifications and limitations and the product's compatibility with the materials to be handled. Veeder-Root makes no warranty of fitness for a particular purpose.
- All Veeder-Root products should be used in accordance with applicable federal, state and local laws, ordinances and regulations.

OPERATING PRECAUTIONS

- **NO SMOKING.** Extinguish all open flames and pilot lights, such as on RV appliances.
- **TURN OFF** cell phones and other electronic devices to avoid distractions while fueling.
- **GASOLINE CAN BE HARMFUL OR FATAL IF SWALLOWED.** Long-term exposure may cause cancer. Keep eyes and skin away from liquid gasoline and gasoline vapors. Avoid prolonged breathing of gasoline vapors

Fuel Compatibilities

Pumps are designed to operate in a Class 1, Group D atmosphere and in accordance with CENELEC standard and the European Directive 94/9/EC “Equipment for Potentially Explosive Atmosphere” (II 2G Ex IIA T4).

All Models of the CSTP are UL Listed for the Following Fuel Compatibility						
		Gasoline and up to				
Diesel	Gasoline	15% Ethanol	15% Methanol	20% MTBE	20% ETBE	20% TAME

The CSTP is designed to be compatible with 100 percent gasoline, or diesel and 80 percent gasoline with 20 percent methanol, ethanol, TAME, ETBE, or MTBE. All UMPs having the model numbers including the AG prefix are designed to be compatible with 100 percent gasoline, methanol or diesel and 90 percent ethanol with 10 percent gasoline and 80 percent gasoline with 20 percent TAME, ETBE, or MTBE (see Table 1 for UMP models and working parameters).

Table 1. Maximum Specific Gravity And Maximum Viscosity

UMP Model	Maximum Specific Gravity	Maximum Viscosity
AGUMP75S1, UMP75U1	.95	70SSU at 60°F (15°C)
AGUMP75S3-3, UMP75U3-3	.95	70SSU at 60°F (15°C)
AGUMP75S17-3, UMP75U17-3	.95	70SSU at 60°F (15°C)
AGUMP150S1, UMP150U1	.95	70SSU at 60°F (15°C)
AGUMP150S3-3, UMP150U3-3	.95	70SSU at 60°F (15°C)
AGUMP150S17-3, UMP150U17-3	.95	70SSU at 60°F (15°C)
AGUMP200S1-3, UMP200U1-3	.87	70SSU at 60°F (15°C)
AGUMP200S3-4, UMP200U3-4	.87	70SSU at 60°F (15°C)
AGUMP200S17-4, UMP200U17-4	.87	70SSU at 60°F (15°C)
AGUMP200T20-2, UMP200U20-2	.95	70SSU at 60°F (15°C)

The CSTP 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 CSTP packer/manifold.

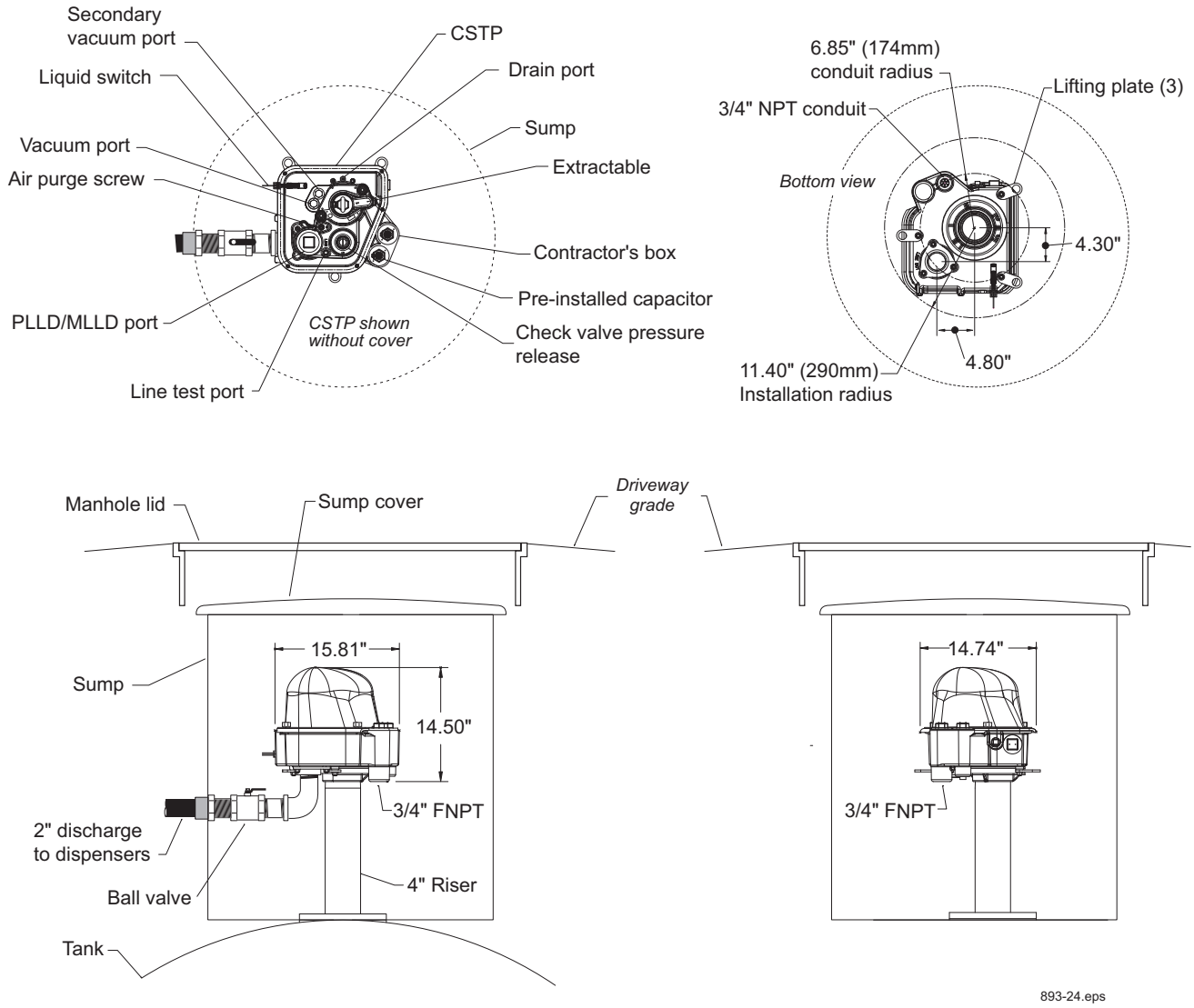


Figure 1. CSTP Packer/Manifold Components And Dimensions

Dimensions for Pump Selection

Figure 2 shows the dimensions needed to ensure a correctly sized pump.

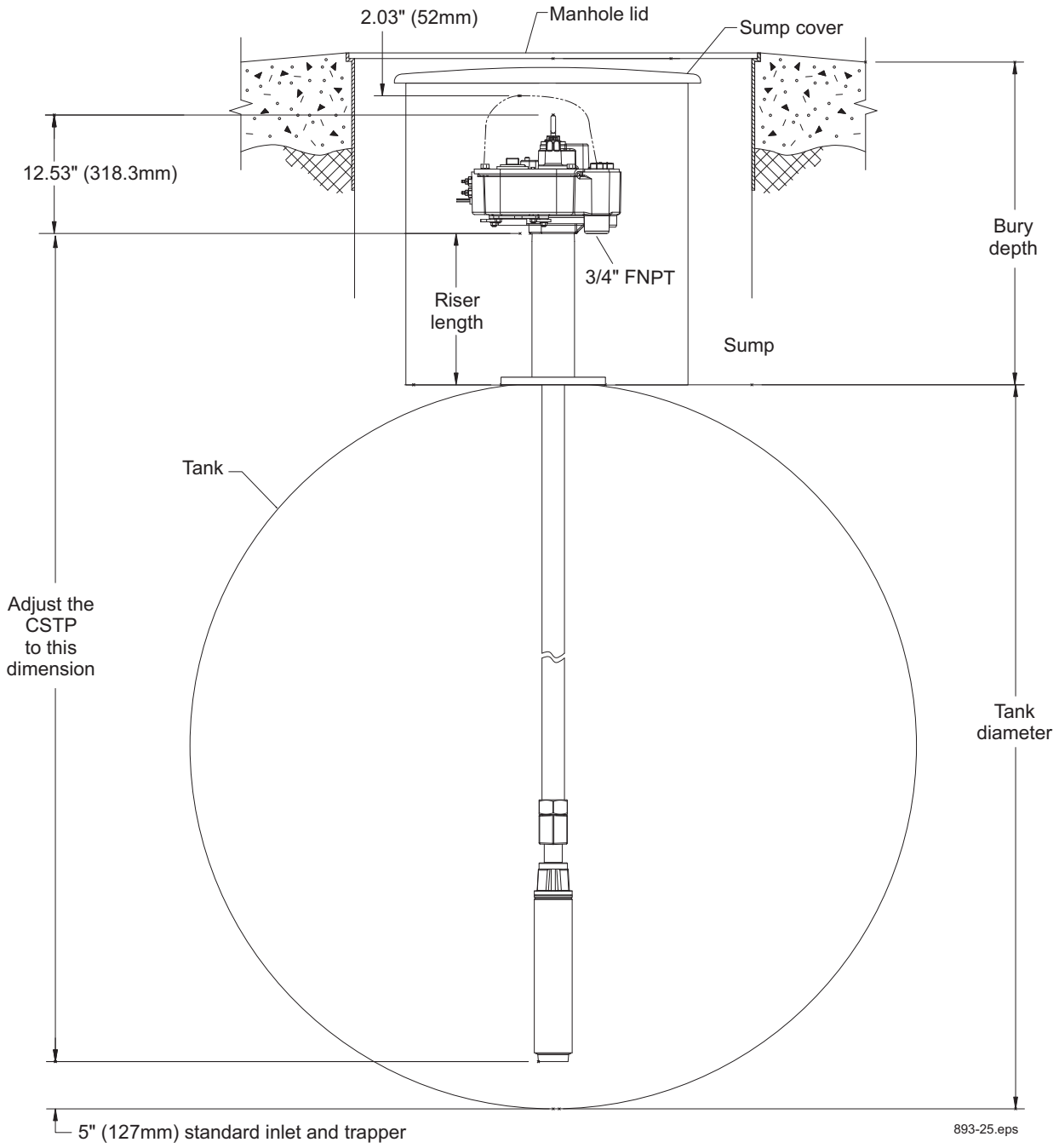


Figure 2. Measuring The Tank (See Table 2 For Adjustment Ranges).

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
AGPC75S1RJ1, PC75U1RJ1	72.0	1828	102.0	2589
AGPC75S1RJ2, PC75U1RJ2	102.0	2590	162.0	4113
AGPC75S1RJ3, PC75U1RJ3	162.0	4115	222.0	5637
AGPC75S3-3RJ1, PC75U3-3RJ1	74.0	1879	104.5	2649
AGPC75S3-3RJ2, PC75U3-3RJ2	104.0	2641	164.5	4173
AGPC75S3-3RJ3, PC75U3-3RJ3	164.0	4165	224.5	5697
AGPC75S17-3RJ1, PC75U17-3RJ1	73.0	1853	103.5	2624
AGPC75S17-3RJ2, PC75U17-3RJ2	103.0	2615	163.5	4148
AGPC75S17-3RJ3, PC75U17-3RJ3	163.0	4139	223.5	5672
AGPC150S1RJ1, PC150U1RJ1	74.5	1892	105.0	2667
AGPC150S1RJ2, PC150U1RJ2	104.5	2654	165.0	4191
AGPC150S1RJ3, PC150U1RJ3	164.0	4178	225.0	5715
AGPC150S3-3RJ1, PC150U3-3RJ1	76.0	1932	106.5	2703
AGPC150S3-3RJ2, PC150U3-3RJ2	106.0	2694	166.5	4227
AGPC150S3-3RJ3, PC150U3-3RJ3	166.0	4218	226.5	5751
AGPC150S17-3RJ1, PC150U17-3RJ1	75.0	1903	105.5	2674
AGPC150S17-3RJ2, PC150U17-3RJ2	105.0	2665	165.5	4198
AGPC150S17-3RJ3, PC150U17-3RJ3	165.0	4189	225.5	5722
AGPC200S1-3RJ1, PC200U1-3RJ1	78.5	1994	108.5	2756
AGPC200S1-3RJ2, PC200U1-3RJ2	108.5	2756	168.5	4280
AGPC200S1-3RJ3, PC200U1-3RJ3	168.5	4280	228.5	5804
AGPC200S3-4RJ1, PC200U3-4RJ1	80.0	2030	110.5	2800
AGPC200S3-4RJ2, PC200U3-4RJ2	110.0	2790	170.5	4325
AGPC200S3-4RJ3, PC200U3-4RJ3	170.0	4314	230.5	5850
AGPC200S17-4RJ1, PC200U17-4RJ1	77.5	1975	108.0	2745
AGPC200S17-4RJ2, PC200U17-4RJ2	107.5	2735	168.0	4270
AGPC200S17-4RJ3, PC200U17-4RJ3	167.5	4260	228.0	5790
AGPC200T20-2RJ1, PC200U20-2RJ1	75.0	1902	105.5	2673
AGPC200T20-2RJ2, PC200U20-2RJ2	105.0	2665	165.5	4197

Table 2. Distances From Top Of Lifting Screw To Inlet

Model#	Retracted		Extended	
	in.	mm	in.	mm
AGPC200T20-2RJ3, PC200U20-2RJ3	165.0	4188	225.5	5121

Table 3 and Table 4 show pump electrical service requirements for UMPs with end views A and B, respectively.

Table 3. Electrical Service Information (Use for UMPs Containing A Franklin Motor With End View A

Required power supply rating for 60 Hz pumps is 208 - 230 Vac. Required power supply rating for 50 Hz, 1 phase pumps is 220-240 Vac. Required power supply rating for 50 Hz, 3 phase pumps 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)	Magnetic Starter 279-231-5 Heaters (3 Req'd.)
				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)	___
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)	___
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
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)	___
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)	___
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
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)	___
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)	___
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
AGUMP200T20-2	2	60/50	1	180	265	16	___	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	___	___
UMP200U20-2			3			10						

Table 4. Electrical Service Information (Use For UMPs Containing A Faradyne Motor With End View B

Required power supply rating for 60 Hz pumps is 208 - 230 Vac. Required power supply rating for 50 Hz, 1 phase pumps is 220-240 Vac. Required power supply rating for 50 Hz, 3 phase pumps 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	19	4.7 - 5.7	7.1 - 8.6	11.7 - 14.1	410164-001 (17.5)
AGUMP75S3-3, UMP75U3-3	3/4	50	1	200	250	5.8	18	5.2 - 6.3	10.3 - 12.5	15.4 - 18.6	410164-001 (17.5)
AGUMP150S1, UMP150U1	1-1/2	60	1	200	250	10.5	33	2.8 - 3.4	6.8 - 8.2	9.4 - 11.3	410164-002 (25)
AGUMP150S3-3, UMP150U3-3	1-1/2	50	1	200	250	10	31	2.8 - 3.4	13.4 - 16.3	16.1 - 19.5	410164-002 (25)
AGUMP200S1-3, UMP200U1-3	2	60	1	200	250	11.4	44	1.9 - 2.3	3.4 - 4.1	5.1- 6.2	410164-003 (40)
AGUMP200S3-4, UMP200U3-4	2	50	1	200	250	11	38	2.2 - 2.6	6.0 - 7.3	8.0 - 9.7	410164-003 (40)

When using a Red Jacket IQ™ Control Unit with an UMP containing a Faradyne motor, IQ software 805-001C (Version3.2) or newer, is required for proper operation of the system. The UMPs will have an 'FM' designation printed on the UMP shell. Software upgrade kit part number is 410600-001.

Table 5 lists UMP weights and lengths and Table 6 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.

Table 5. UMP Model Dimensions

		Franklin Motors (Use these lengths for UMPs with end view A shown in Figure 3)		Faradyne Motors (Use these lengths for UMPs with end view B shown in Figure 3)		Weight	
UMP Model	HP	in.	mm	in.	mm	lb.	kg
UMP75U1, AGUMP75S1	¾	17-3/4	447	17-5/8	448	28	12.7
UMP75U3-3, AGUMP75S3-3	¾	20	507	19-7/8	505	30.5	13.9
UMP75U17-3, AGUMP75U17-3	¾	19-1/4	489	----	----	28	12.7
UMP150U1, AGUMP150S1	1½	20-1/2	519	20-5/8	524	34	15.5
UMP150U3-3, AGUMP150S3-3	1½	22-1/4	565	22-1/4	565	34	15.5
UMP150U17-3, AGUMP150S17-3	1½	21	532	----	----	31	14.1

Table 5. UMP Model Dimensions

		Franklin Motors (Use these lengths for UMPs with end view A shown in Figure 3)		Faradyne Motors (Use these lengths for UMPs with end view B shown in Figure 3)		Weight	
UMP Model	**HP**	**in.**	**mm**	**in.**	**mm**	**lb.**	**kg**
UMP200U1-3, AGUMP200S1-3	2	24-1/4	618	24-5/8	626	36	16.3
UMP200U3-4, AGUMP200S3-4	2	26	660	26-1/4	667	38	17.2
UMP200U17-4, AGUMP200S17-4	2	23-3/4	600	----	----	36	16.3
UMP200U20-2, AGUMP200T20-2	2	20-3/4	527	----	----	37	16.8

Table 6. Approximate Pump Shut Off Pressures

UMP Model	Approximate Shut Off Pressure
UMP75U1, AGUMP75S1	28 psi (193 kPa) 0.74 SG @ 60°F (15°C)
UMP75U3-3, AGUMP75S3-3	30 psi (207 kPa) 0.74 SG @ 60°F (15°C)
UMP75U17-3, AGUMP75S17-3	29 psi (200 kPa) 0.74 SG @ 60°F (15°C)
UMP150U1, AGUMP150S1	30 psi (207 kPa) 0.74 SG @ 60°F (15°C)
UMP150U3-3, AGUMP150S3-3	32 psi (220 kPa) 0.74 SG @ 60°F (15°C)
UMP150U17-3, AGUMP150S17-3	32 psi (220 kPa) 0.74 SG @ 60°F (15°C)
UMP200U1-3, AGUMP200S1-3	43 psi (296 kPa) 0.74 SG @ 60°F (15°C)
UMP200U3-4, AGUMP200S3-4	43 psi (296 kPa) 0.74 SG @ 60°F (15°C)
UMP200U17-4, AGUMP200S17-4	43 psi (296 kPa) 0.74 SG @ 60°F (15°C)
UMP200U20-2, AGUMP200T20-2	14-45 psi (96-310 kPa) 0.74 SG @ 60°F (15°C)

Figure 3 illustrates UMP end views A and B,

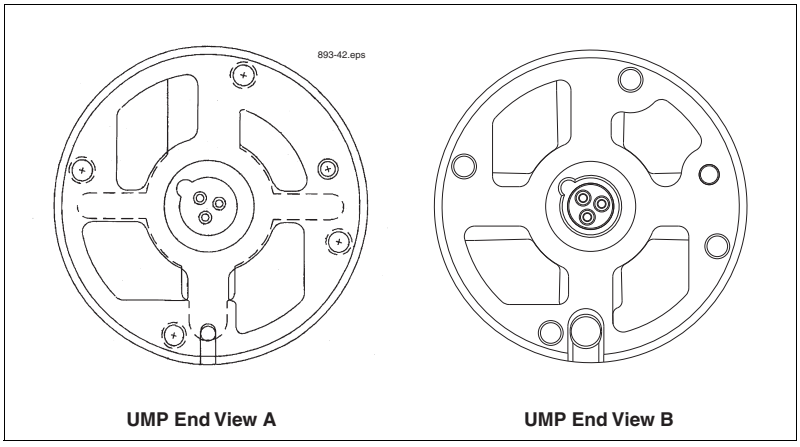


Figure 3. Identifying UMP Models By Their End View

Attaching the UMP

Table 7 lists the applicable UMPs for each packer/manifold.

Table 7. UMP And Packer/Manifold Combinations

Packer/Manifold	UMP
AGPC75S1RJ1, RJ2, RJ3	AGUMP75S1
PC75U1RJ1, RJ2, RJ3	UMP75U1
AGPC75S3-3RJ1, RJ2, RJ3	AGUMP75S3-3
PC75U3-3RJ1, RJ2, RJ3	UMP75U3-3
AGPC75S17-3RJ1, RJ2, RJ3	AGUMP75S17-3
PC75U17-3RJ1, RJ2, RJ3	UMP75U17-3
AGPC150S1RJ1, RJ2, RJ3	AGUMP150S1
PC150U1RJ1, RJ2, RJ3	UMP150U1
AGPC150S3-3RJ1, RJ2, RJ3	AGUMP150S3-3
PC150U3-3RJ1, RJ2, RJ3	UMP150U3-3
AGPC150S17-3RJ1, RJ2, RJ3	AGUMP150S17-3
PC150U17-3RJ1, RJ2, RJ3	UMP150U17-3
AGPC200S1-3RJ1,RJ2,RJ3	AGUMP200S1-3
PC200U1-3RJ1, RJ2, RJ3	UMP200U1-3
AGPC200S3-4RJ1,RJ2,RJ3	AGUMP200S3-4
PC200U3-4RJ1, RJ2, RJ3	UMP200U3-4
AGPC200S17-4RJ1,RJ2,RJ3	AGUMP200S17-4
PC200U17-4RJ1, RJ2, RJ3	UMP200U17-4
AGPC200T20-2 RJ1, RJ2, RJ3	AGUMP200T20-2
PC200U20-2 RJ1, RJ2, RJ3	UMP200U20-2

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 x 1" 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 4).

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

When servicing the unit, use non-sparking tools.

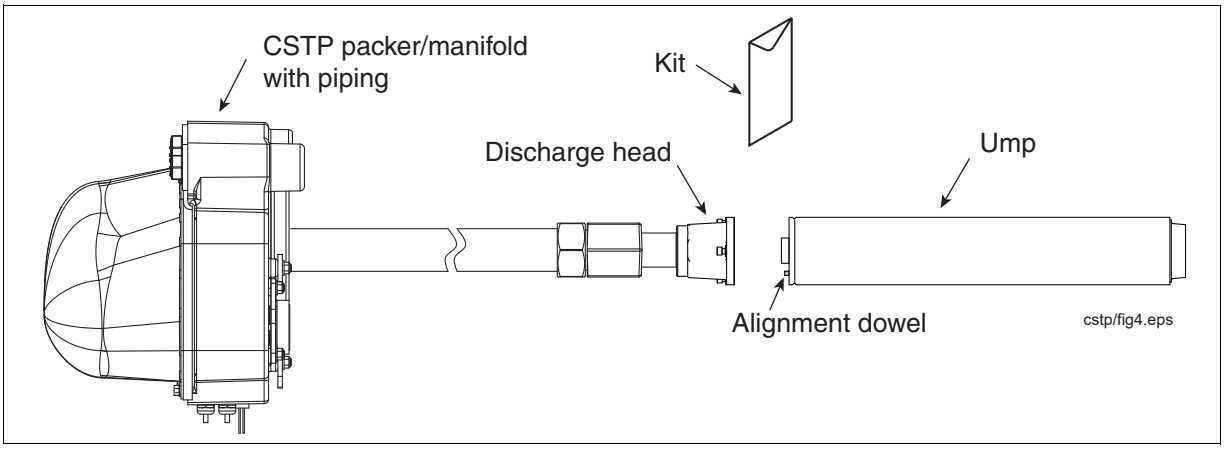


Figure 4. Packer/Manifold With Piping Attaching To UMP

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 5).

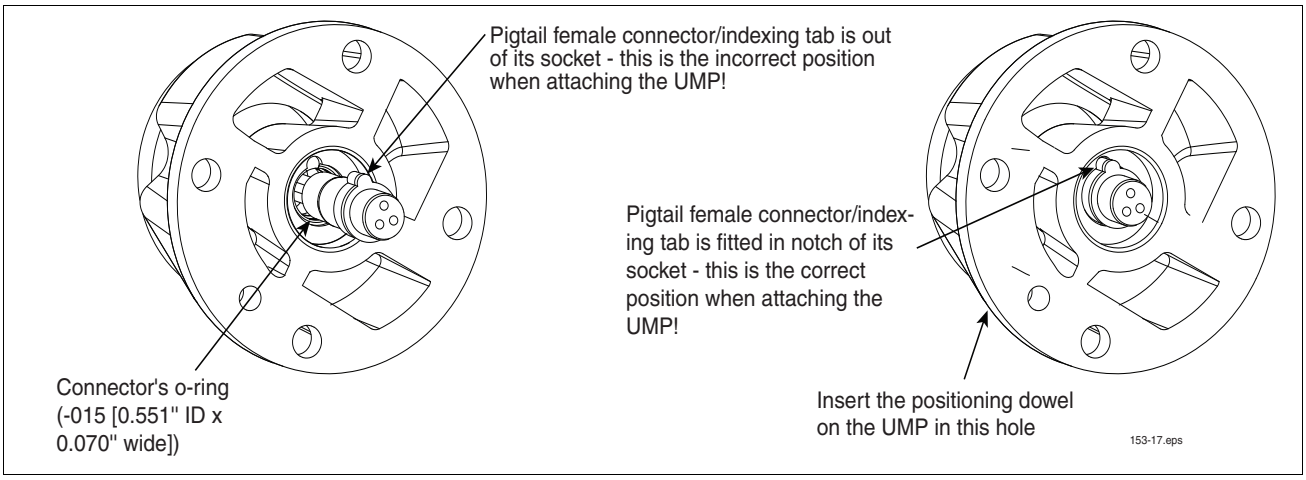


Figure 5. Verifying Pigtail's Female Connector Is Seated Properly

2. Place the new gasket on the new UMP so that all holes align (see Figure 6).

⚠CAUTION **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 (see Figure 5) 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.

⚠WARNING **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.**

4. Install the UMP retaining bolts and lock washers (see Figure 6). Snug and then torque the bolts using a cross-pattern technique to 7 ft-lbs (11 N•m).

⚠WARNING **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. Not following the instructions may cause parts to fail.**

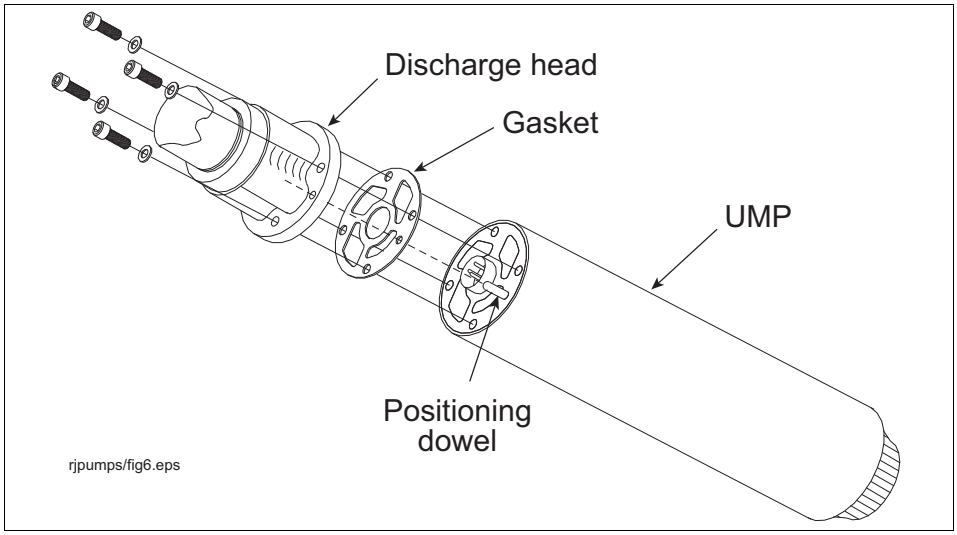


Figure 6. Aligning The UMP GASKET

Installing the Pump

NOTES:

- The Red Jacket CSTP is designed to operate in a Class 1, Group D atmosphere.
- The manufacturer may recommend new specification and installation instructions.
- 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. Apply an adequate amount of fresh, UL classified for petroleum, non-setting 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 7.

   Note: For fixed-length pumps, proceed to Step 10.
3. Remove the cover by extracting the screws. Place cover and the screws on a clean surface.
4. Remove the cover gasket and place it on a clean surface.
5. Remove the packer cover.
6. Uncoil the pigtail at the top of the packer and lay it flat so it will feed into the packer without knotting or kinking.
7. 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 8) a maximum of 1/4 turn.

NOTICE **A slight twisting of the UMP will loosen the seals and facilitate adjusting it to the correct length. Do not rotate piping beyond 1/4 turn.**

8. Pull the UMP end until the distance between the bottom of the manifold and the bottom of the UMP is 5 inches (125 mm) shorter than the distance measured in Step 2 (see Figure 9).

⚠WARNING **Take care not to damage the pigtail. If pump is to be adjusted shorter, keep tension on the pigtail to eliminate kinking.**

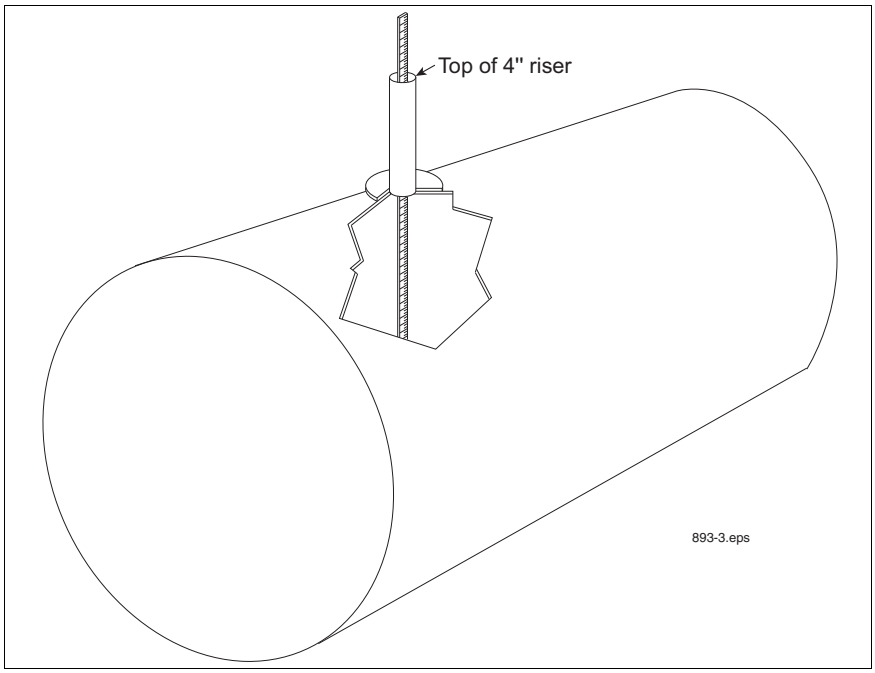


Figure 7. Measuring Tank

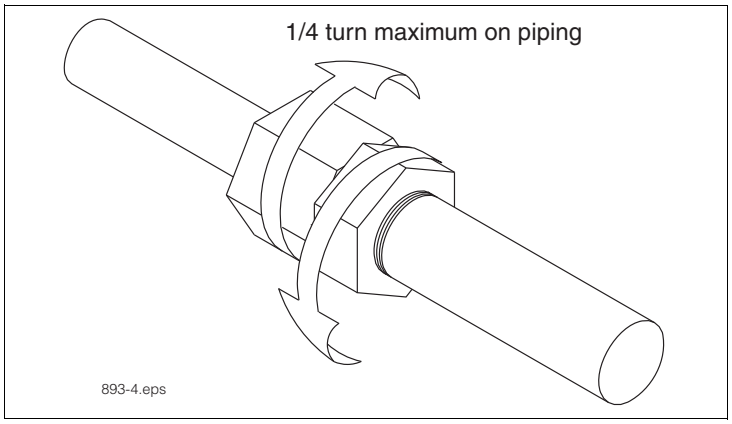


Figure 8. Loosening Locking Nut

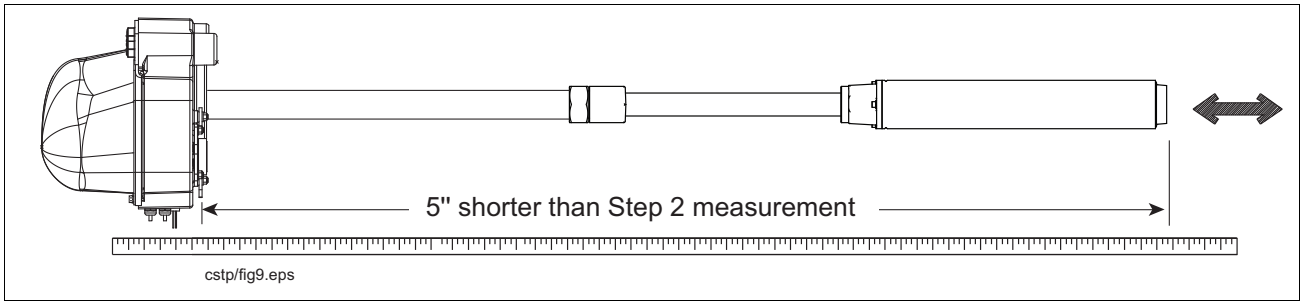


Figure 9. Adjusting Pump Length

9. Tighten the column pipe 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).
10. Attach the siphon return line tubing to barbed fitting in the base of the packer and secure with a clamp (see Figure 10).

NOTICE **The siphon return line should be installed on every application to reduce nuisance trips of electronic tank monitoring.**

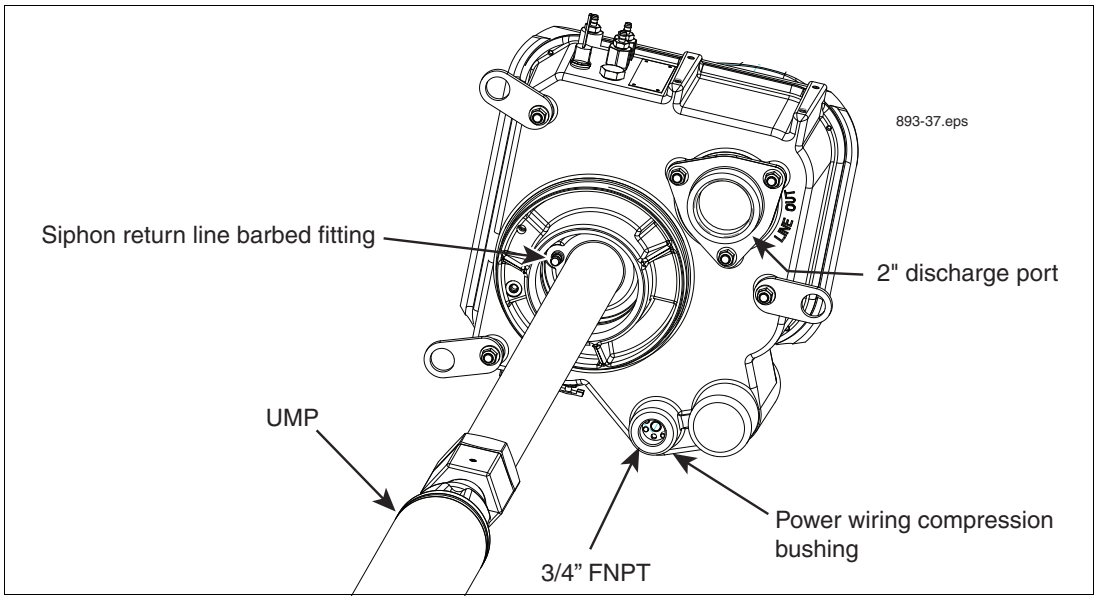


Figure 10. Locating Return Line Fitting On Packer

11. Lay the siphon return line tubing beside the column pipe. Stop 1 - 3 inches (25 - 76 mm) above the discharge head.
12. Secure the siphon return line tubing to the column pipe with tie straps. Locate the tie straps approximately 6 inches (152 mm) from manifold, 6 inches from discharge head, and in the middle of the tubing (see Figure 11).

NOTICE **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, proceed to Step 17.

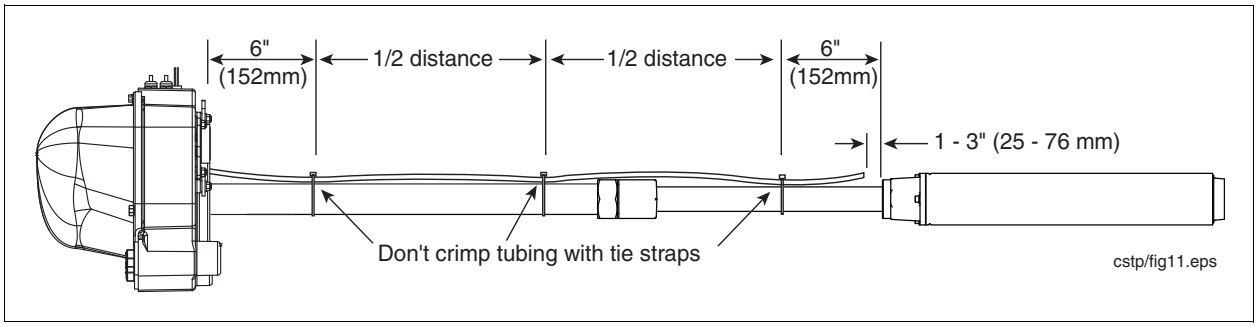


Figure 11. Attaching Return Line Tubing To Pump

13. Pull on the pigtail wires where they exit the packer wiring compartment. Snip pigtail wires approximately 8 inches (200mm) beyond top of packer.
14. There will be three wires from the male connector installed in the packer's housing and from the three-wire pigtail from the UMP.
15. Strip insulation off all six wires 3/8 inch (10mm).
16. 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 the wires inside the packer's wiring compartment (see Figure 12).

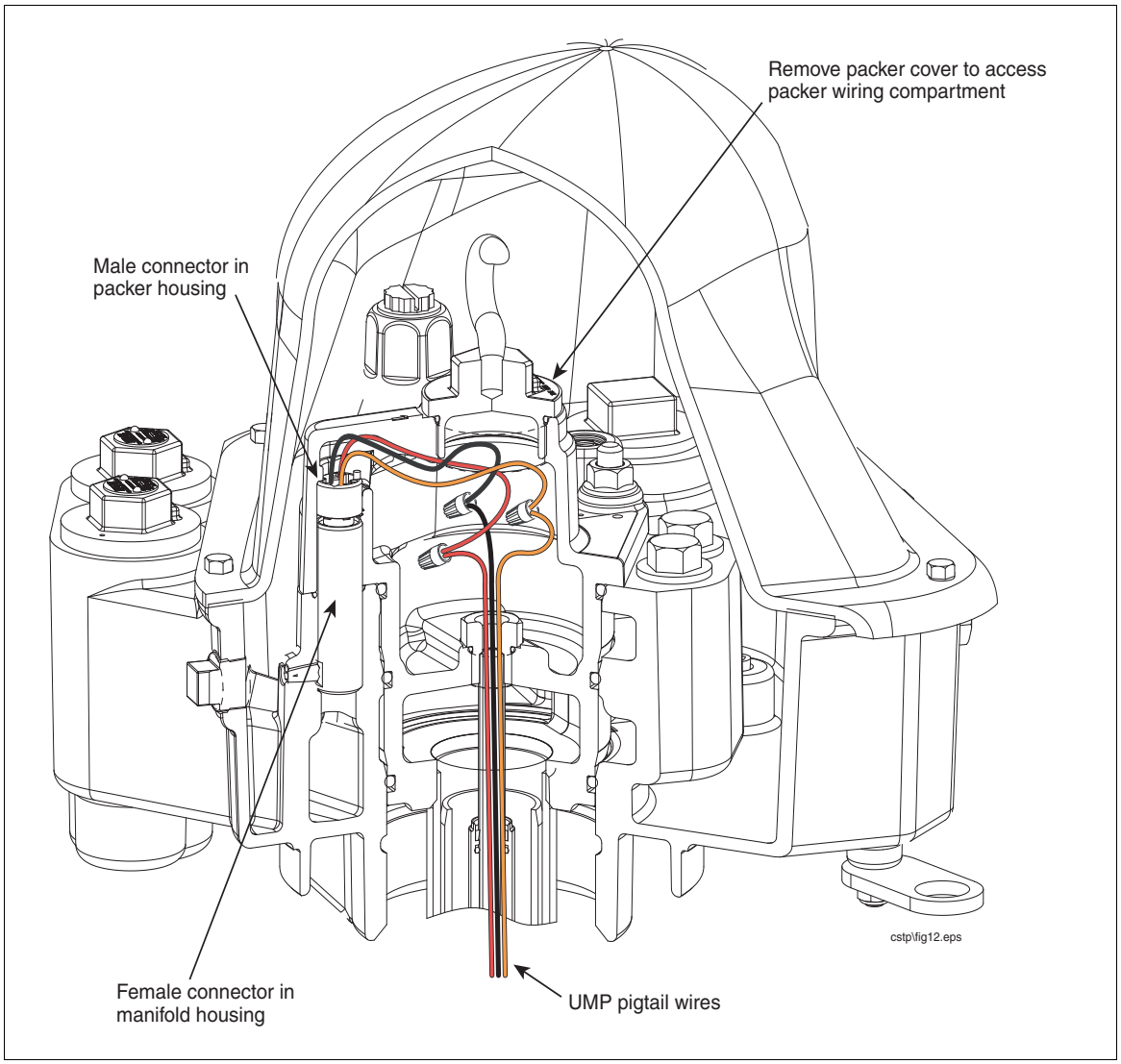


Figure 12. Connecting UMP To Packer Wiring

17. Lubricate the o-ring on the packer wiring compartment cover (with lifting eye bolt) 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).
18. Remove the two extractable lock-down nuts (see Figure 31). The springs on the lock-down studs between the extractable flange and the manifold will push the extractable up, breaking the seals.
19. Pull out the extractable unit and place it on a clean surface.
20. Install the CSTP manifold onto the 4-inch riser pipe using UL classified for petroleum, non-setting thread sealant until watertight and align appropriately to connect to the product line piping.

⚠WARNING **Confirm that the packer wiring compartment cover (with lifting eye bolt) is properly torqued to 10 ft-lbs (13.6 N•m) with a minimum of 6 full threads installed. Occasionally, eye bolts are removed after pump installation and corrosion may occur in the threaded areas of the wiring compartment cover (eye bolt plug) and the eye bolt. If corrosion has occurred, the cover and eye bolt should be replaced.**

21. Utilize the lifting eye bolt to suspend the pump vertically and then reinstall the extractable unit into the CSTP manifold and tank. Torque the extractable lock-down nuts in an alternating pattern to 50 ft-lbs (68 N•m).
22. Verify the flange surface of the CSTP is clean and then place the cover gasket on it.
23. Verify the sealing surface of the cover is clean.
24. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).

Wiring Power from the Panel to the CSTP

Disconnect, lock out, and tag power at the panel before servicing the pump.

1. Connect electrical conduit approved fittings to the power wiring entry at the base of the manifold's contractors box (see cutaway example in Figure 13 for single phase power wiring or Figure 21 for three phase power wiring).

NOTICE **For installations requiring ATEX approval, the end user must use an ATEX Ex d IIB certified cable gland or stopping box.**

2. Loosen the two screws in the conduit bushing just enough so you can remove the bushing from its socket in the bottom of the manifold's contractor box (see Figure 13) - continue lifting the bushing up until it is accessible. 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 remain in any unused hole. For example, 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.

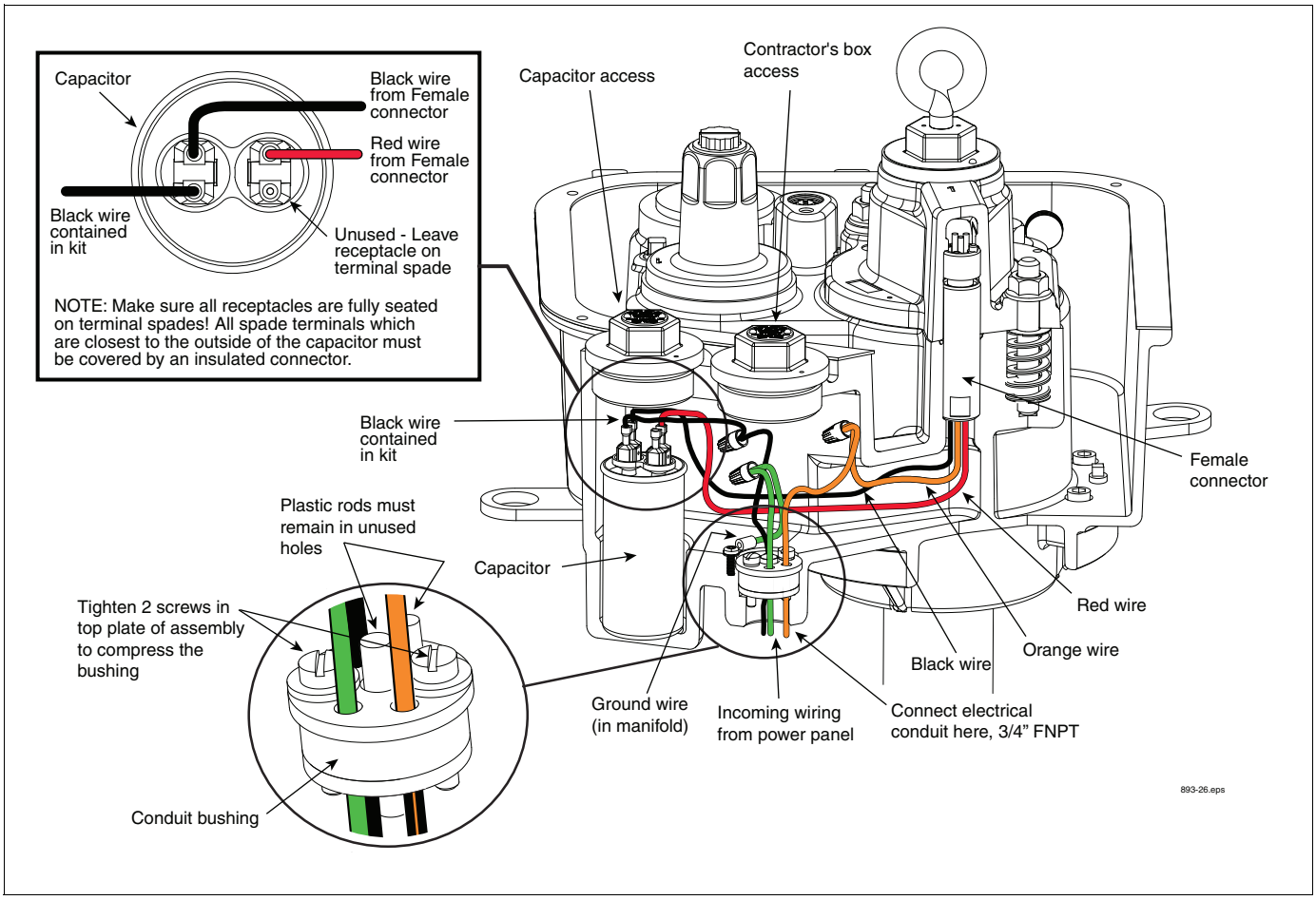


Figure 13. Power Wiring Enters Through Compression Bushing - Single Phase Example Shown

For Single Phase Pumps with Capacitor

See Figure 14 for Steps 1 through 4.

1. Connect the orange wire from the manifold's female connector to M1 from the output of the control box.
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 the open end of this black wire to M2 from the output of the control box.
3. Connect the ground wire from power panel to the attached ground wire in manifold.
4. Replace the o-rings on the access covers. Lubricate the o-rings with petroleum based jelly. Reinstall the access covers. Torque to 35 ft-lbs (50 N•m). Thread sealant should NOT be used.

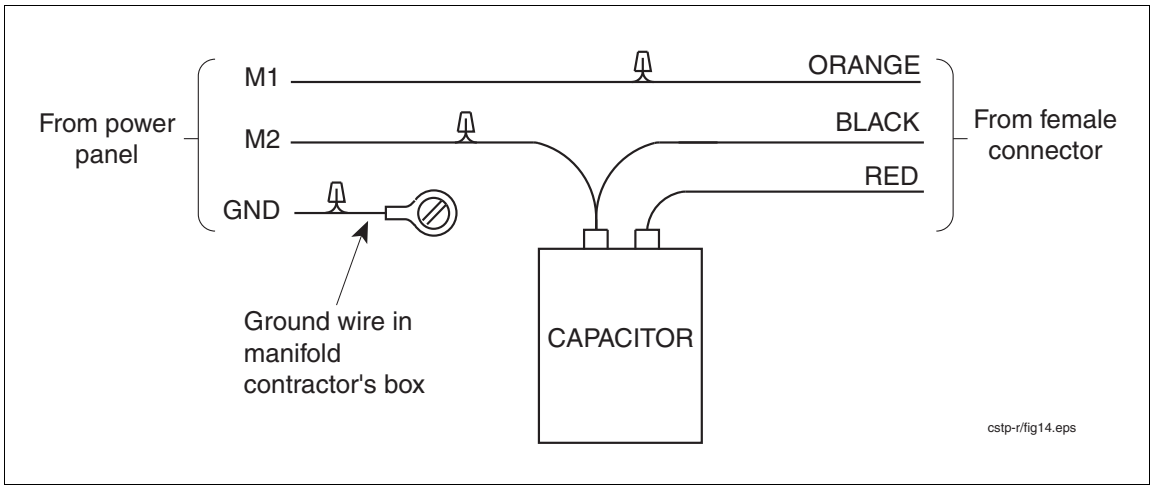


Figure 14. Power Wiring Schematic For Single Phase Pumps

Single Phase Pump Example Wiring Diagrams

Refer to Figure 15 through Figure 20 for single phase pump system example wiring diagrams.

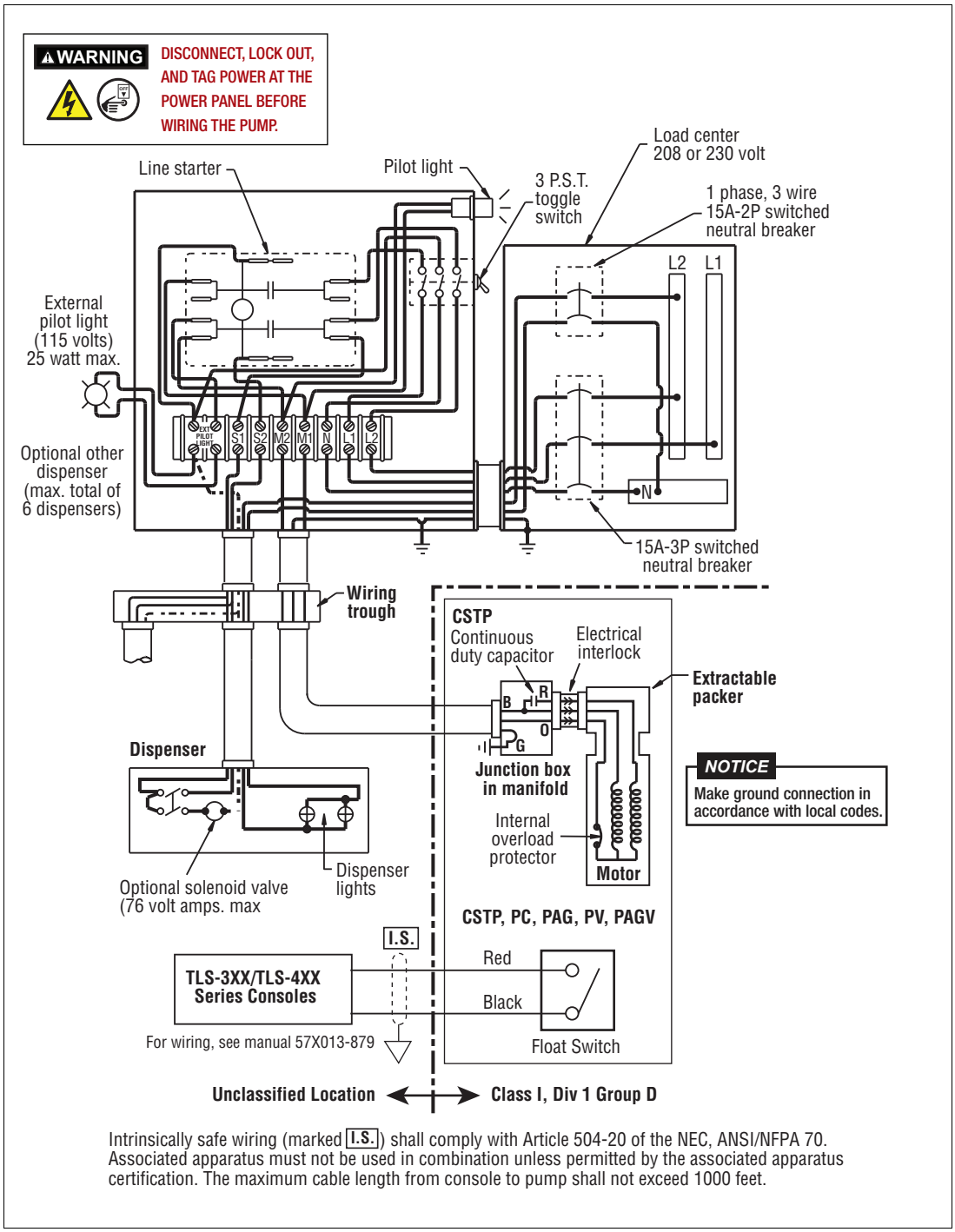


Figure 15. 230 Vac Remote Control Box With 110 Vac Coil - Model 880-041-5

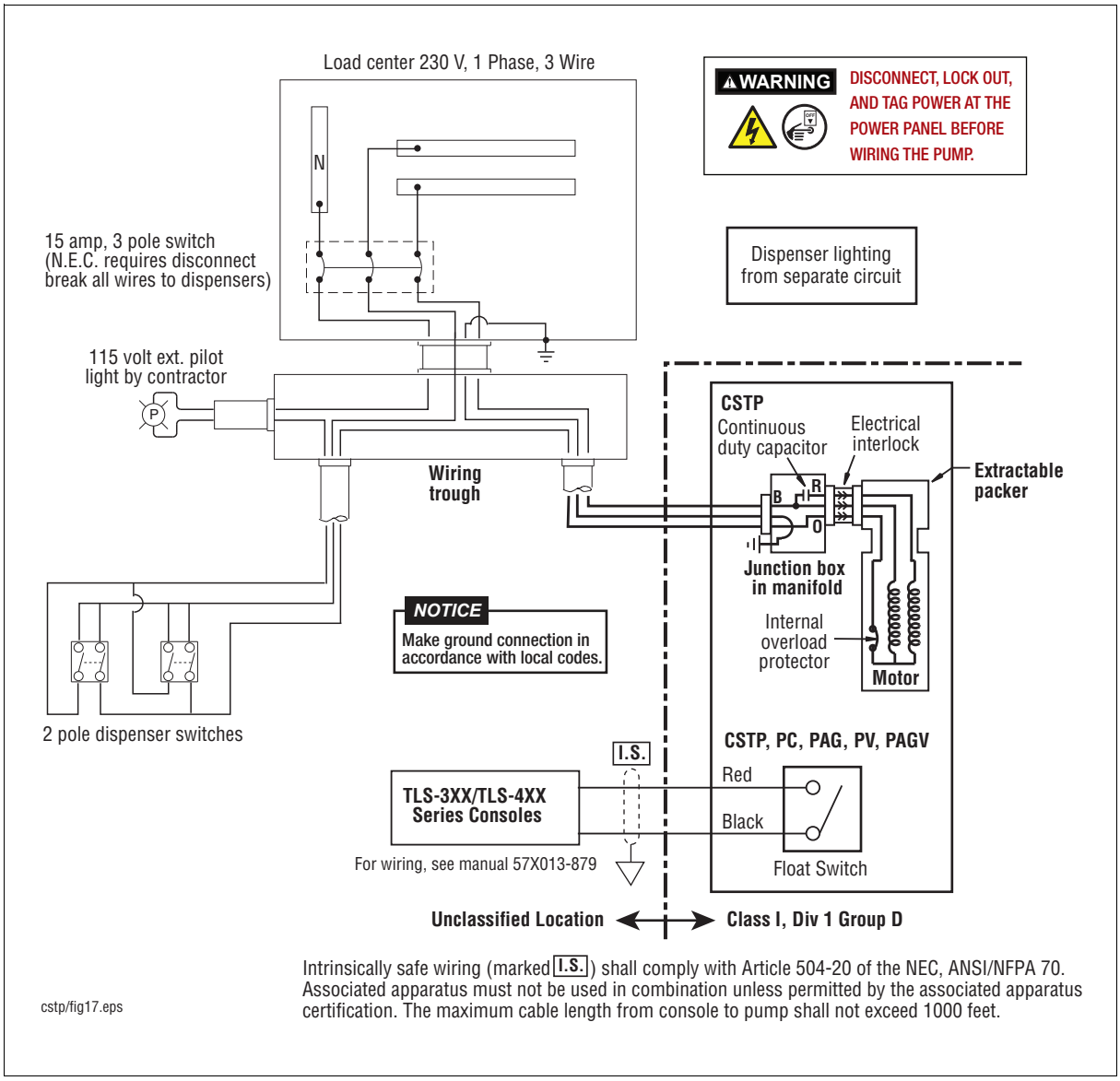


Figure 16. Suggested Wiring Diagram Without Optional Control Box

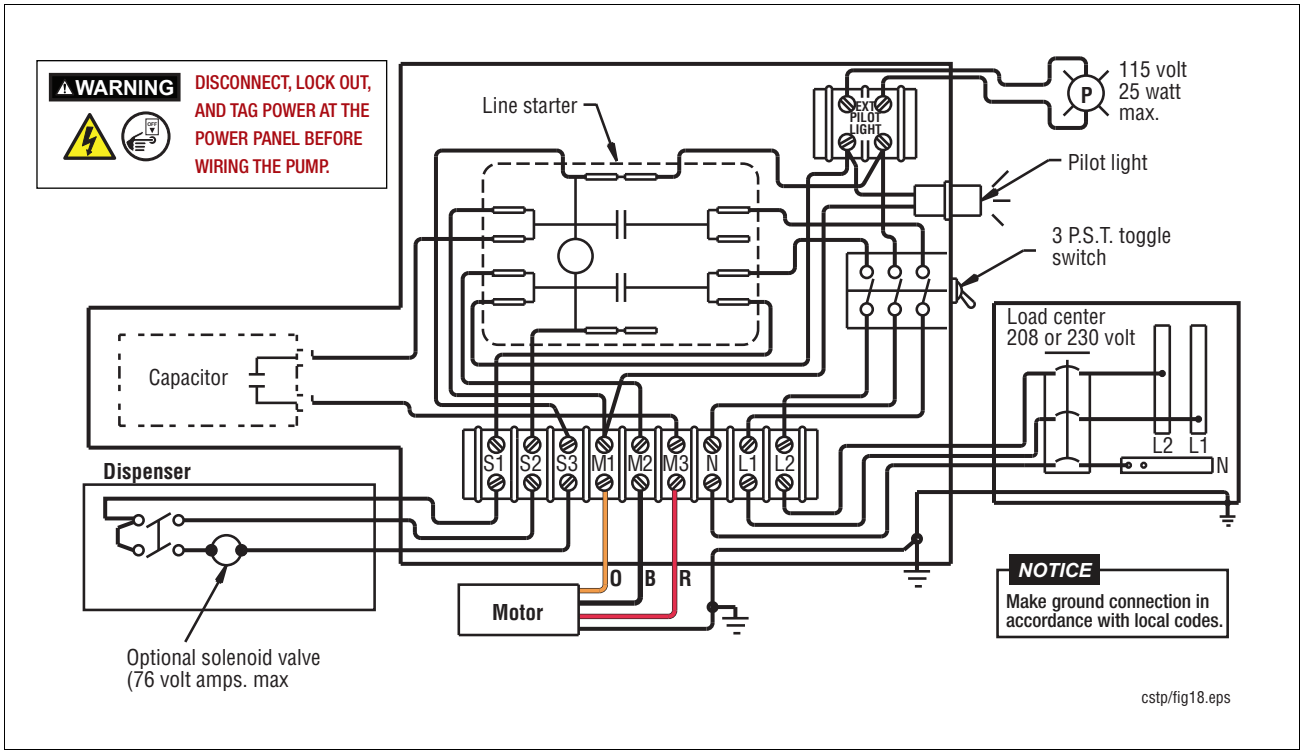


Figure 17. 230 Vac Remote Control Box With 110 Vac Coil And Cap - Model 880-045-5/880-046-5

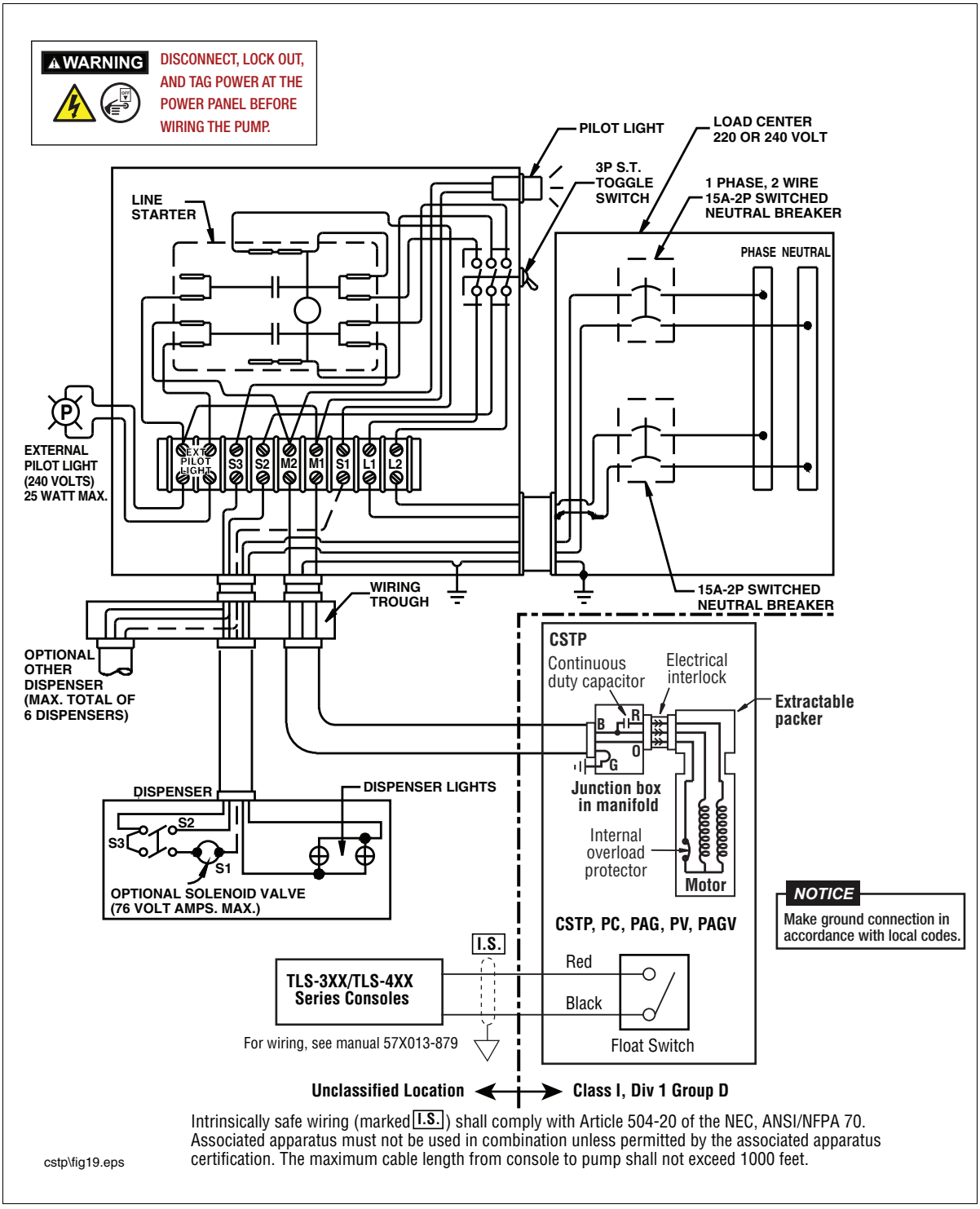
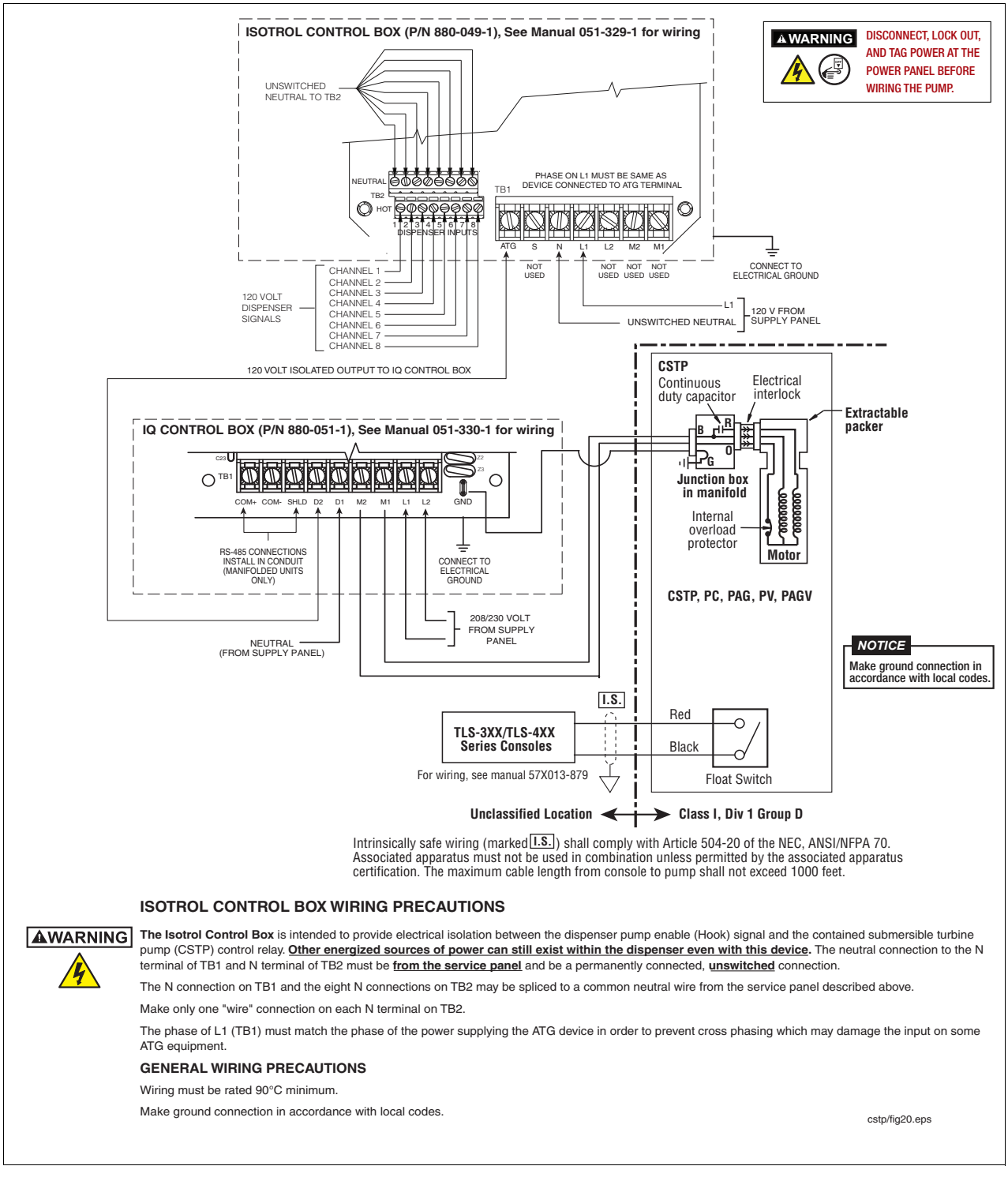


Figure 18. 230 Vac Remote Control Box With 230 Vac Coil - Model 880-042-5



Intrinsically safe wiring (marked I.S.) shall comply with Article 504-20 of the NEC, ANSI/NFPA 70. Associated apparatus must not be used in combination unless permitted by the associated apparatus certification. The maximum cable length from console to pump shall not exceed 1000 feet.

ISOTROL CONTROL BOX WIRING PRECAUTIONS

WARNING

The Isotrol Control Box is intended to provide electrical isolation between the dispenser pump enable (Hook) signal and the contained submersible turbine pump (CSTP) 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.

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.

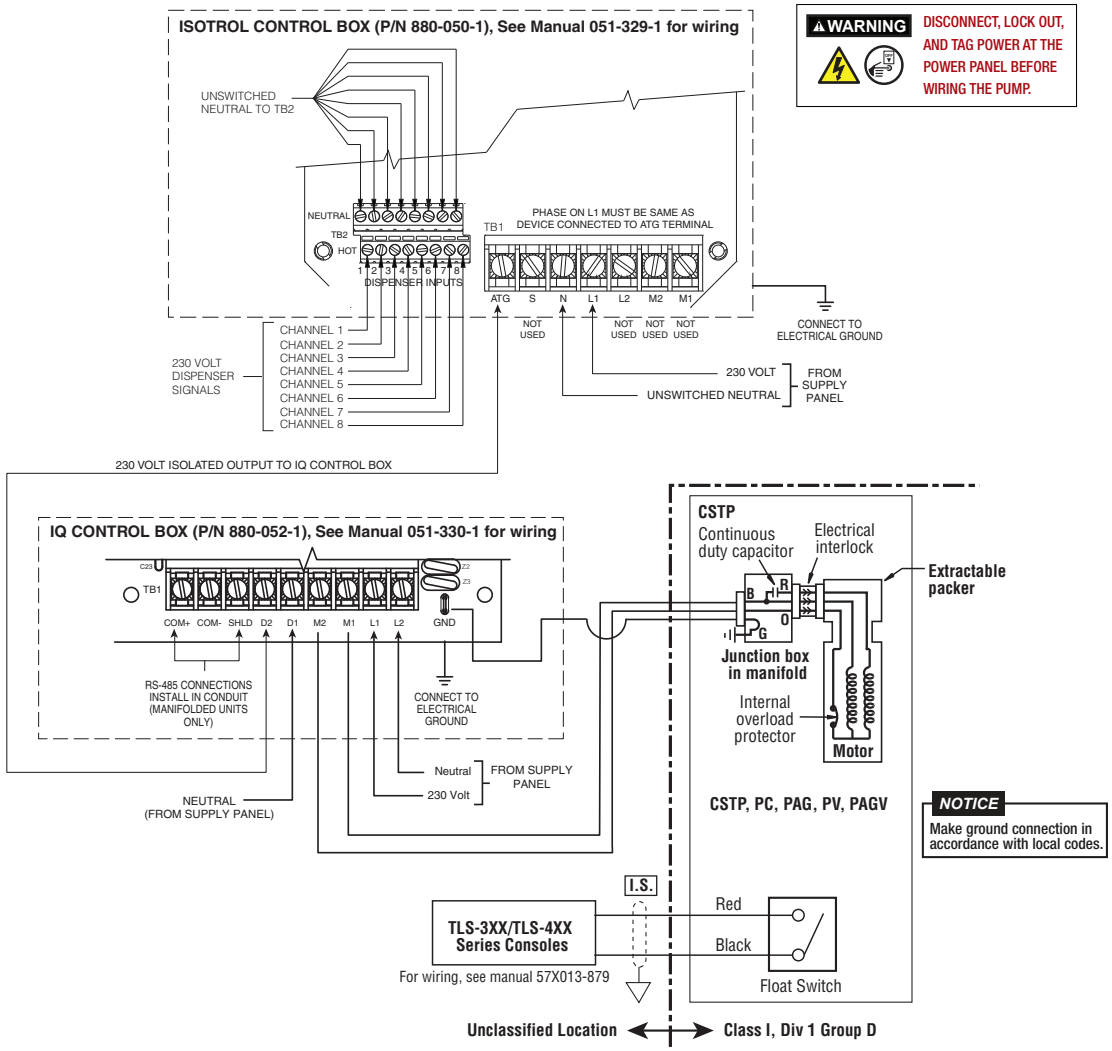
GENERAL WIRING PRECAUTIONS

Wiring must be rated 90°C minimum.

Make ground connection in accordance with local codes.

cstp/fig20.eps

Figure 19. Isotrol To IQ System Wiring - 120 Volt Dispenser Signals



Intrinsically safe wiring (marked I.S.) shall comply with Article 504-20 of the NEC, ANSI/NFPA 70. Associated apparatus must not be used in combination unless permitted by the associated apparatus certification. The maximum cable length from console to pump shall not exceed 1000 feet.

WARNING **ISOTROL CONTROL BOX WIRING PRECAUTIONS**

The Isotrol Control Box is intended to provide electrical isolation between the dispenser pump enable (Hook) signal and the contained submersible turbine pump (CSTP) 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.

cstp/fig21.eps

Figure 20. Isotrol To IQ System Wiring - 230 Volt Dispenser Signals

For Three Phase Pumps (without Capacitor)

See Figure 21 for Steps 1 through 5.

1. Connect the orange wire from the manifold's female connector to M1 from the output of the control box.
2. Connect the black wire from the manifold's female connector to M2 from the output of the control box.
3. Connect the red wire from the manifold's female connector to M3 from the output of the control box.
4. Connect the attached ground wire in the manifold to the ground wire from the power panel.
5. Replace the o-rings on access covers. Lubricate the o-rings with petroleum based jelly. Reinstall the access covers. Torque to 35 ft-lbs (50 N•m). Thread sealant should NOT be used.

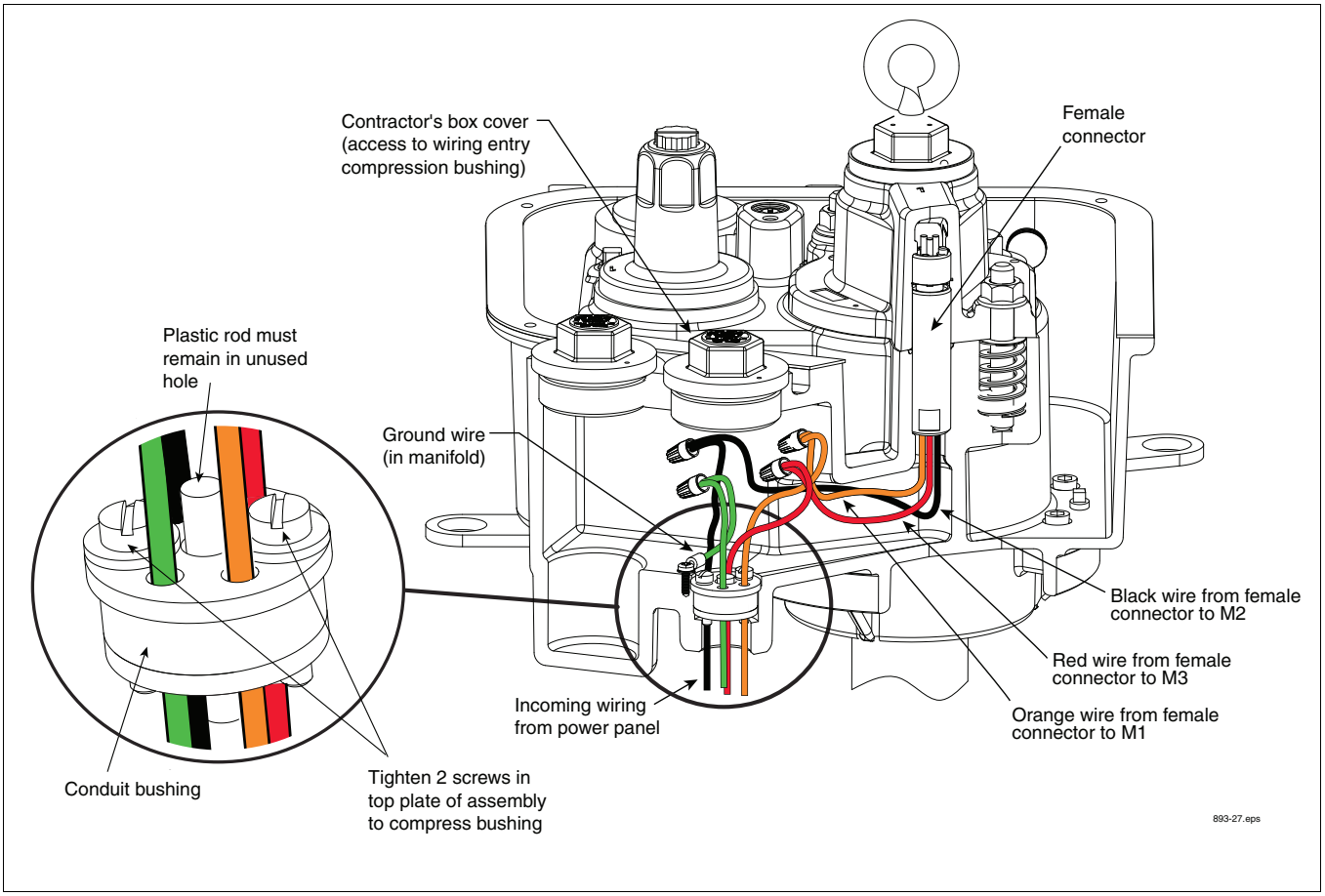


Figure 21. Power Wiring Enters Through Compression Bushing - Three Phase Example Shown

Three Phase Pump Example Wiring Diagrams

Refer to Figure 22 for three phase pump example wiring diagrams.

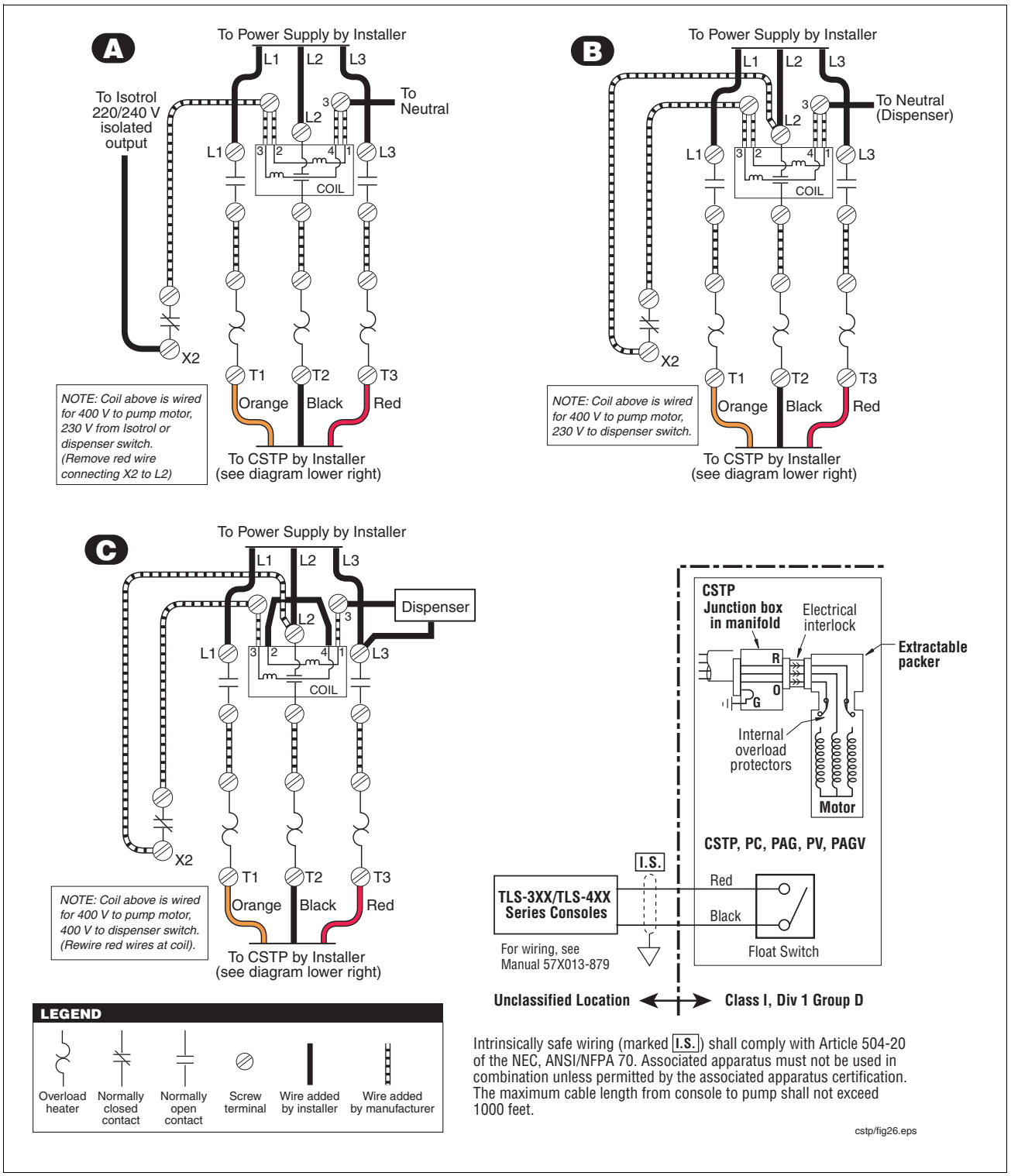


Figure 22. Three Phase Pump Example Wiring Diagrams

Red Jacket VSFC Operation Selections

Stand Alone Pump Operation

The VSFC Controller's microprocessors are pre programmed from the factory for stand alone operation, i.e., one VSFC Controller and one VSFC CSTP pressurize the line.

Tandem Pump Operation

When multiple VSFC CSTPs are required (maximum of 4) to maintain proper flow, their VSFC Controllers can be programmed to operate in tandem. The primary VSFC Controller varies the speed of the primary pump depending on the pressure in the line. When the primary pump can no longer maintain proper pressure, additional pump(s) come on line to supplement the pressure and maintain proper flow. Instructions can be found in the VSFC Installation Guide (P/N 577013-815) that explain how to setup for tandem operation.

Primary-Secondary Operation

The installer can designate one VSFC Controller as the primary unit and the others as secondary units. The primary VSFC Controller monitors line pressure and determines when a supplemental pump is required. Additional pumps will turn on if they have received a dispense-enable signal.

Alternating Operation

This feature allows the pumps to alternate and prevent the problem of having one tank run dry. It also ensures that one pump does not wear excessively. Foe each dispensing cycle, the primary VSFC Controller determines which VSFC CSTP will be the primary pump. When the primary controller receives the dispense-enable signal, the primary pump starts. The primary VSFC Controller monitors line pressure and determines when a supplemental pump is required. Additional pumps will turn on even if they have not received a dispense-enable signal.

Tank-Based Operation

Individual pumps will turn on when they have received a dispense-enable signal. The primary VSFC Controller monitors line pressure and determines when a supplemental pump is required. Additional pumps will turn on even if they have not received a dispense-enable signal.

IMPORTANT NOTICE!

For VSFC stand alone installations a V-R PLLD pressure transducer is required in the VSFC CSTP. To install this transducer, refer to the relevant section of the PLLD Site Prep guide (P/N 576013-902).

For VSFC Tandem, Primary-Secondary, Alternating or Tank-Based installations, a V-R PLLD pressure transducer is required only in the VSFC CSTP that is connected to the primary VSFC Controller. To install this transducer, refer to the relevant section of the PLLD Site Prep guide (P/N 576013-902).

For VSFC installations in sites that have a TLS-350 console with PLLD line leak detection monitoring the product line, a separate PLLD transducer is not required because the VSFC unit and the PLLD system will share the same transducer that is installed in the VSFC CSTP.

For all VSFC CSTP installations you must make wiring connections in the pump (i.e., pressure transducer, I.S. Barrier and pump power connections) following the instructions in the VSFC Installation Guide (P/N 577013-815).

Required Kits

- VSFC tubing kit (P/N 410370-001)
- VSFC Controller (P/N 330020-450) for I.S. wiring - includes pressure transducer, or

- VSFC Controller (P/N 330020-451) for non-I.S. wiring - includes pressure transducer and I.S. Barrier

Reference Manuals - As Required

- VSFC Controller Installation Guide - P/N 577013-815
- PLLD Site Prep and Installation Guide - P/N 576013-902
- FXV Leak Detectors Installation Instructions - P/N D042-106-1

Pressure Transducer Installation

See “Installing an Electronic Line Leak Detector Transducer or Mechanical LLD” on page 57.

I.S. Barrier Installation

If an I.S. Barrier is being installed, refer to the appropriate section of the VSFC Site Prep manual (P/N 577013-815) for installation instructions.

Tubing Kit Installation

1. Remove and set aside the cover of the contractor’s box over the wiring entry conduit bushing (refer to Figure 21).
2. If necessary loosen the two screws in the top of the compression bushing until you can lift it out of the manifold (see Figure 23).

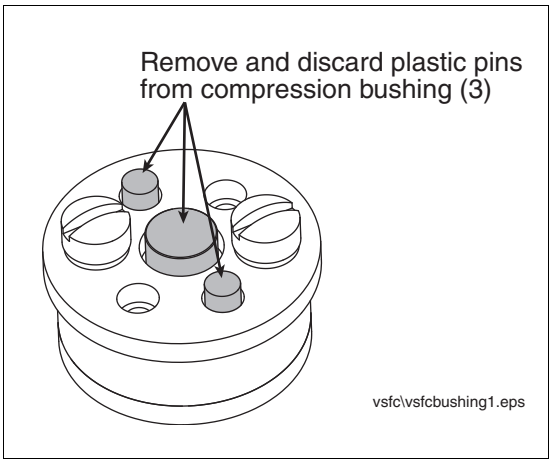


Figure 23. Compression Bushing

3. The compression bushing is used to water seal the wiring entry port of the VSFC CSTP. Figure 24 through Figure 26 illustrate the recommended installation of the bushing in the VSFC CSTPs with and without an I.S. Barrier.

⚠WARNING **YOU MUST FOLLOW THE WIRING INSTRUCTIONS IN THE VSFC INSTALLATION GUIDE (P/N 577013-815) WHEN CONNECTING POWER AND PRESSURE TRANSDUCER/I.S. BARRIER WIRING TO THE RED JACKET VSFC CSTP.**

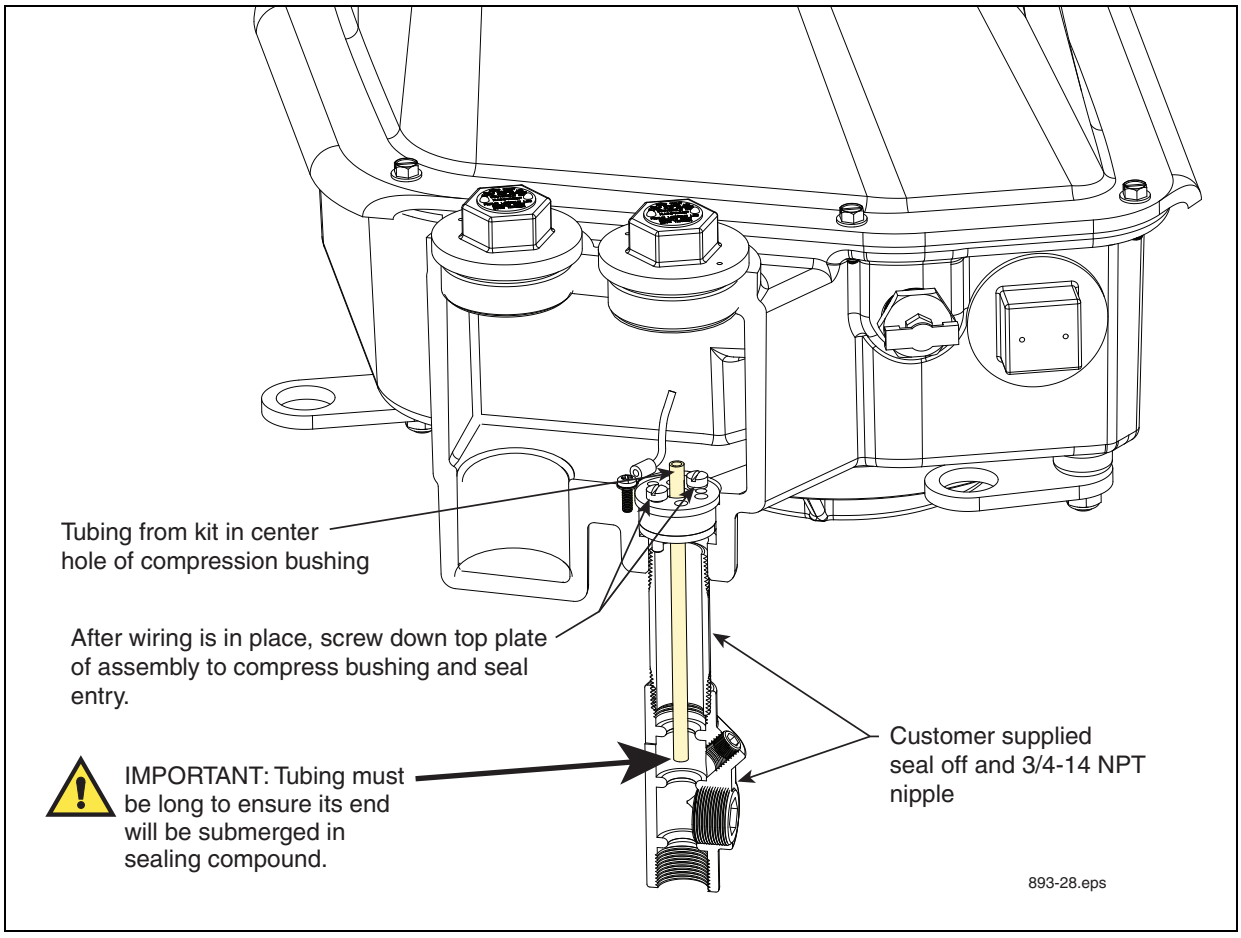


Figure 24. Tubing from Kit Installed In Compression Bushing

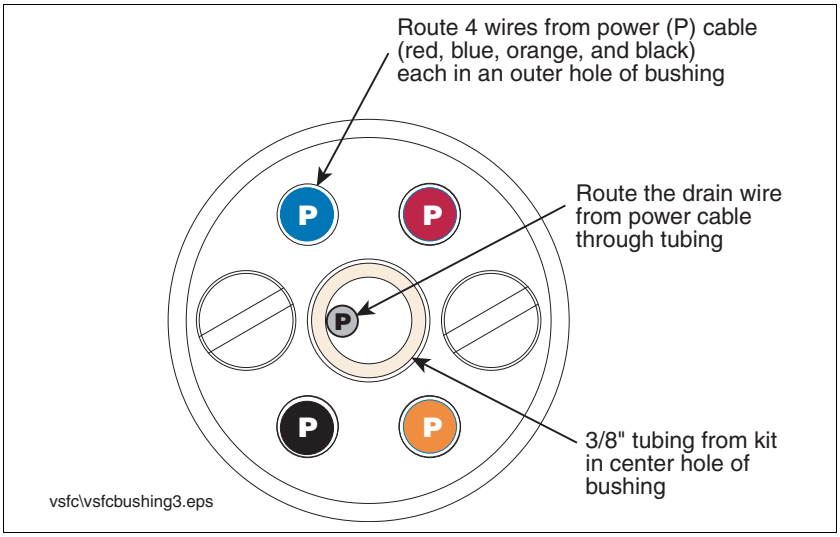


Figure 25. Recommended Power Wire Entry Through The Compression Bushing

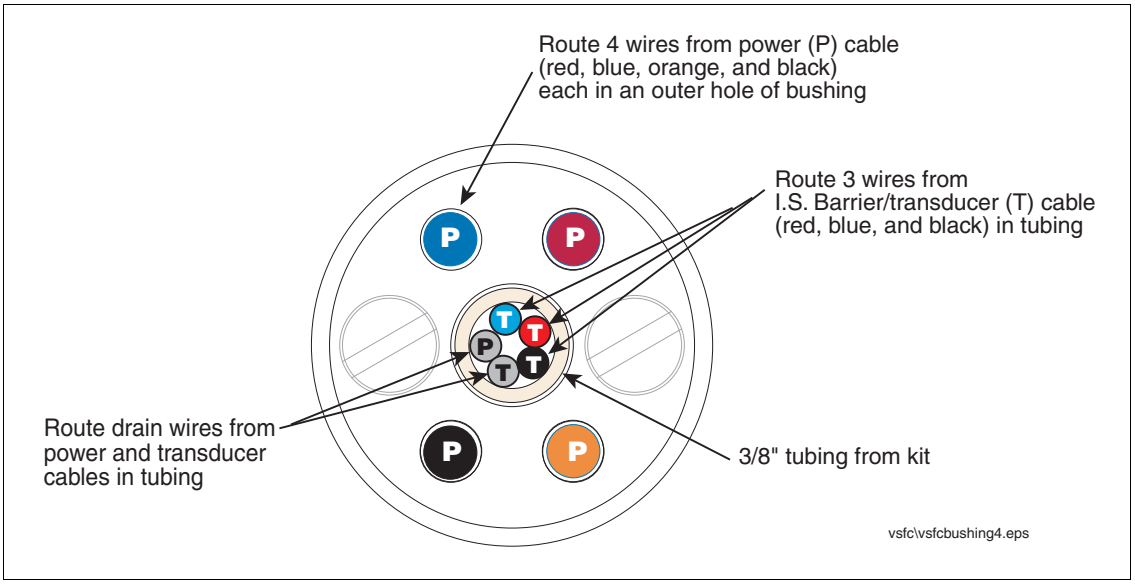


Figure 26. Recommended Power Wire/I.S. Barrier (Transducer) Wire Entry Through The Compression Bushing

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 27, tandem systems offer backup support so operations can continue if one pump stops working.

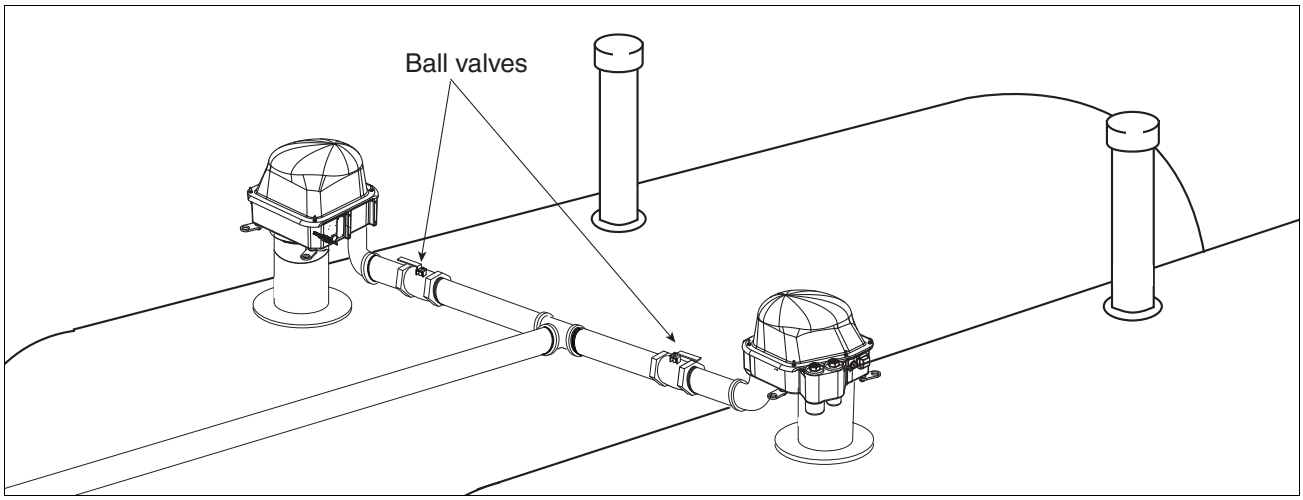


Figure 27. Tandem Pumps

⚠WARNING **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.**

Wiring Single Phase Tandem Pumps

Figure 28 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 with demand-based sequencing. UMPs containing a Faradyne motor require IQ software 805-001 C (Version 3.2 or newer for proper operation of the system. Refer to specification section.

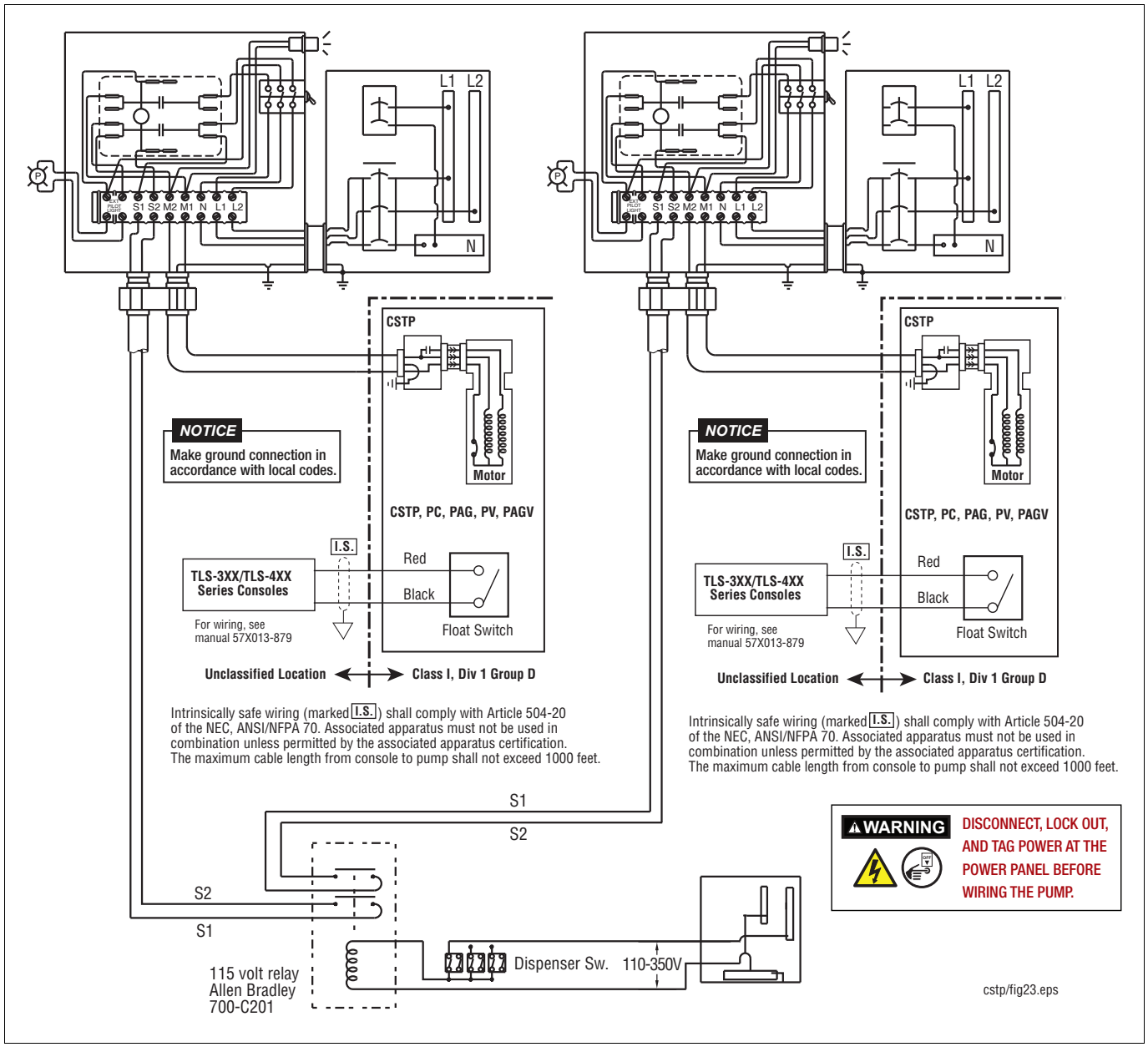


Figure 28. Suggested Wiring For Single Phase Tandem Pumps

Wiring Three Phase Tandem Pumps

Figure 29 shows the wiring schematic which allows both three phase STPs to operate simultaneously with any combination of dispensers turned on.

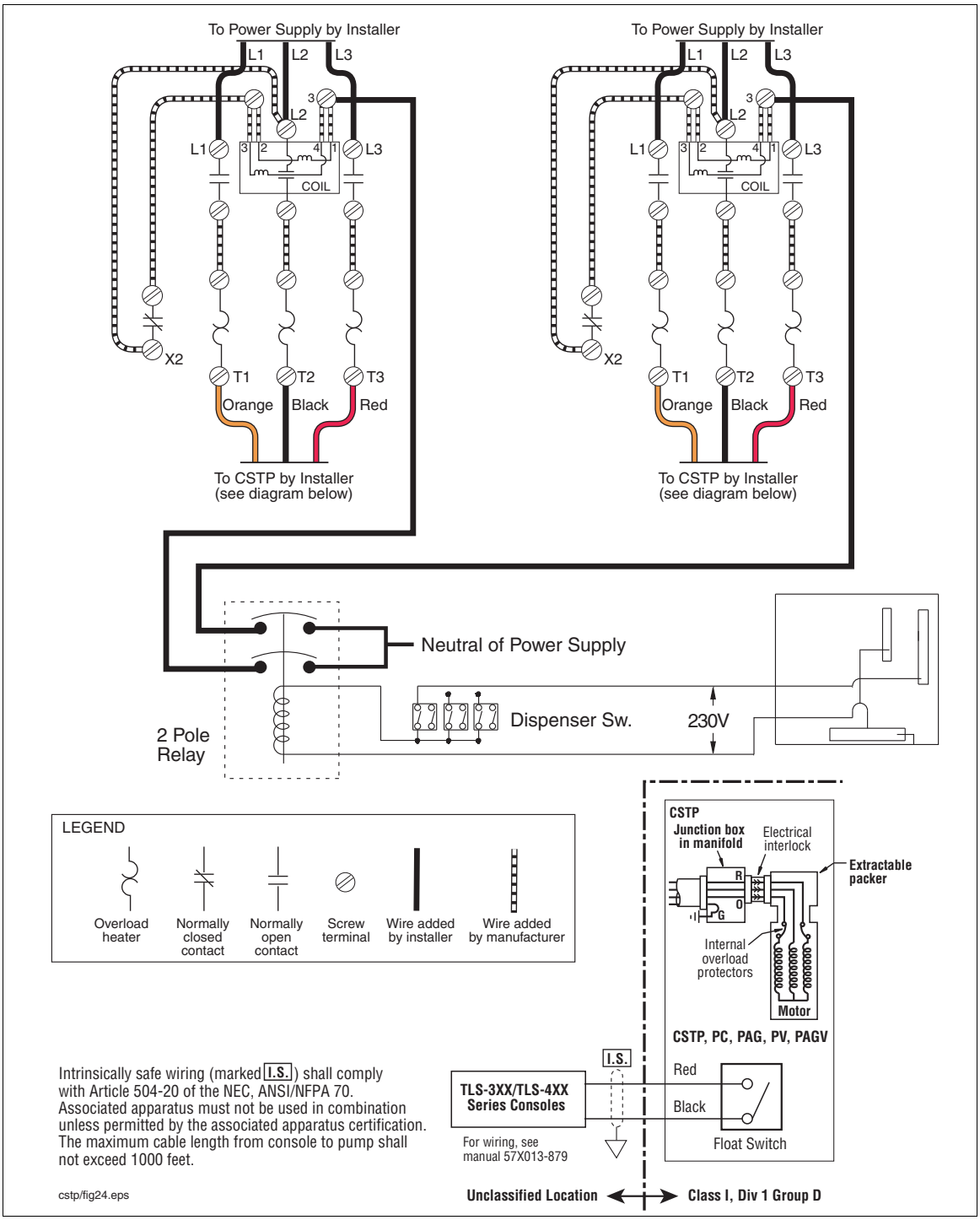


Figure 29. Suggested Wiring For Three Phase Tandem Pumps

Siphon Ports

The siphon port for the Red Jacket CSTP is in a brass siphon assembly that fits into one of the two vacuum ports (see Figure 30). The port end can be swiveled after loosening the hex on top to accommodate the incoming siphon tube. Torque the siphon assembly to 25 ft-lbs (33 N•m) after positioning.

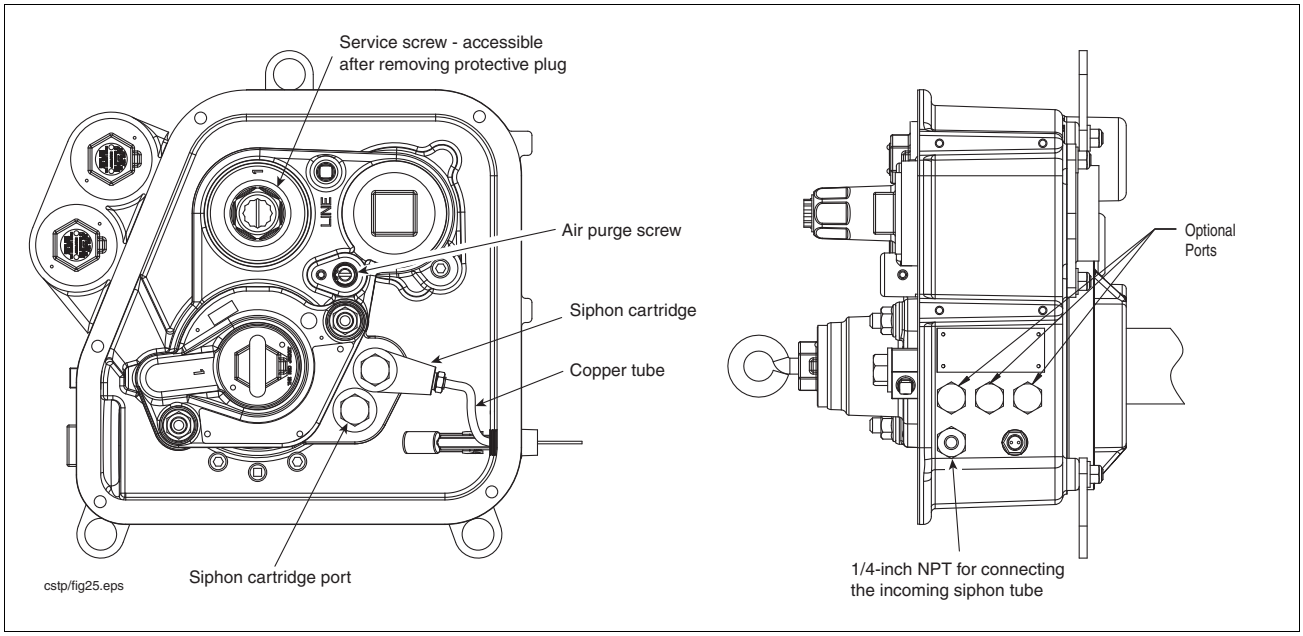


Figure 30. Siphon Connection

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

Liquid Switch Wiring

The CSTP liquid switch should be wired to the TLS-XXX console as shown in Figure 22.

Initial Start Up of Pump

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

Pump start up is now complete.

For Three Phase Pumps Only

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

Connect the pump leads to terminals T1, T2, and T3 of the magnetic starter observing the color code shown in Figure 22 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 the pumping rate.

Next, reverse power leads at L1 and L2. Repeat either the pressure or capacity test, as described above. If the 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 the correct rotation.

Where the power supply has been properly marked L1, L2, and L3 in accordance with the 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’.

Replacing the UMP

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- UMP Replacement Kit (P/N 144-327-4)
- Hardware/Seal Kit (AG) (P/N 410539-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

   Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove the two extractable lock-down nuts (see Figure 27). The springs on the lock-down studs between the extractable's flange and the manifold will push the extractable up, breaking the seals.

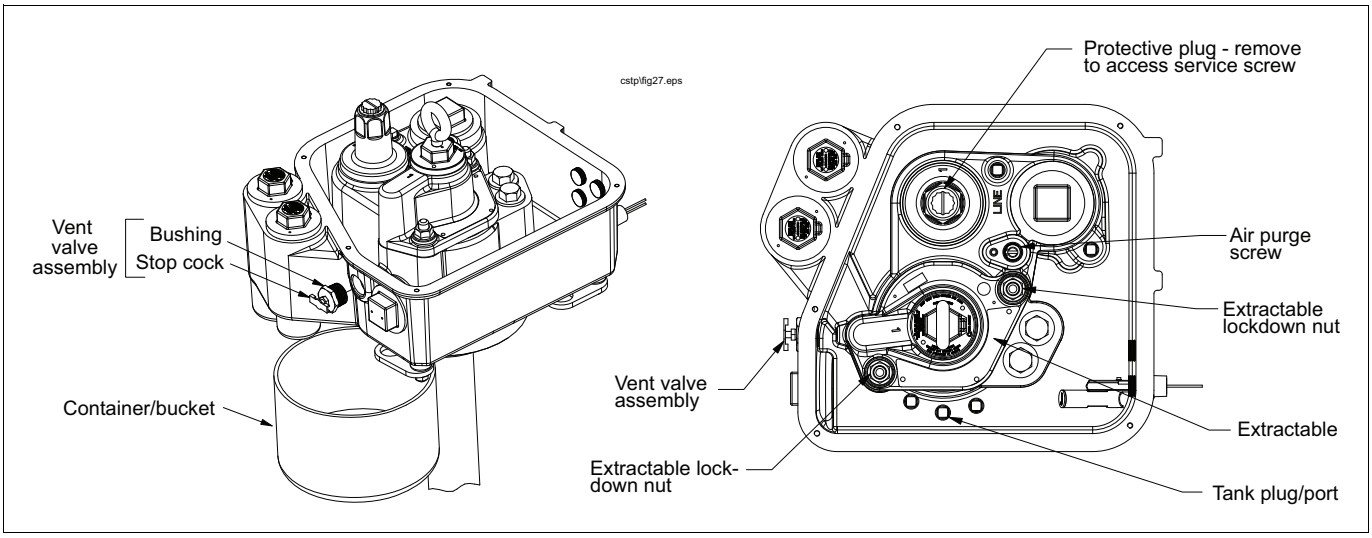


Figure 31. Extractable Lockdown Nuts

⚠WARNING **Confirm that the packer wiring compartment cover (with lifting eye bolt) is properly torqued to 10 ft-lbs (13.6 N•m) with a minimum of 6 full threads installed. Occasionally, eye bolts are removed after pump installation and corrosion may occur in the threaded areas of the wiring compartment cover (eye bolt plug) and the eye bolt. If corrosion has occurred, the cover and eye bolt should be replaced.**

8. Utilize the lifting eye bolt to lift out the extractable unit and place it on a clean surface. Removal of the extractable section of the pump must be conducted with caution. Make certain that the extractable section remains centered within the riser pipe and that no portion of the extractable binds during the removal process. If binding occurs during removal, stop and determine the cause of the binding and correct the situation before proceeding with removal.
9. Remove the old UMP by removing the four bolts holding the discharge head as shown in Figure 32. Discard the old gasket.
10. Place the new gasket from the UMP replacement kit on the new UMP so that all the holes align.

⚠WARNING **Gaskets from competitive UMPs will not seal properly and performance will be reduced.**

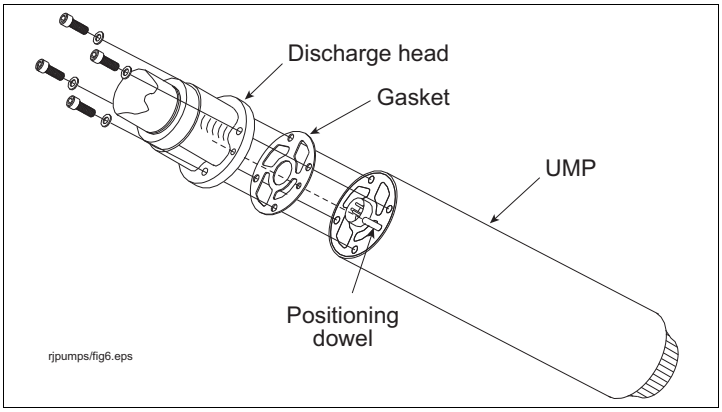


Figure 32. UMP Bolts And Gasket

11. Pull the pigtail connector in the discharge head out far enough to see the o-ring in the sidewall of its socket (see Figure 33). 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.

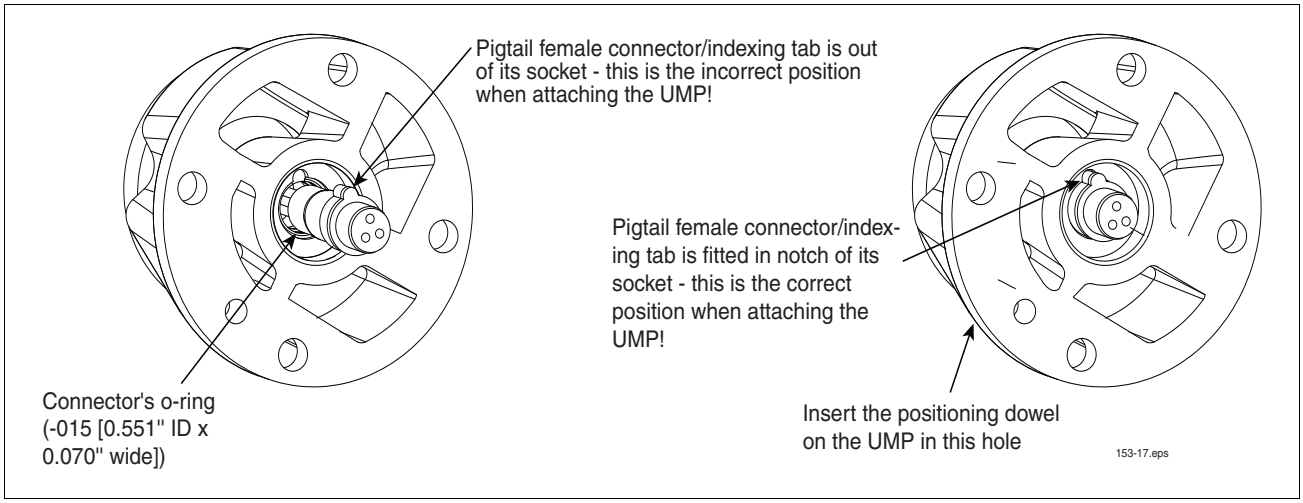


Figure 33. Verifying Pigtail's Female Connector Is Seated Properly

12. Align the UMP positioning dowel so it inserts in the proper hole in the discharge head (See Figure 33) 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.

⚠WARNING **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.**

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

⚠WARNING **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. Not following the instructions may cause parts to fail.**

14. Remove the three extractable o-ring seals (-345, 3.975'' ID x 0.210'' wide [upper], -344, 3.850'' ID x 0.210'' wide [middle], and -343, 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 34).
15. Remove the manifold's female connector's o-ring (see Figure 34). Get a -118, 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.
16. 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).

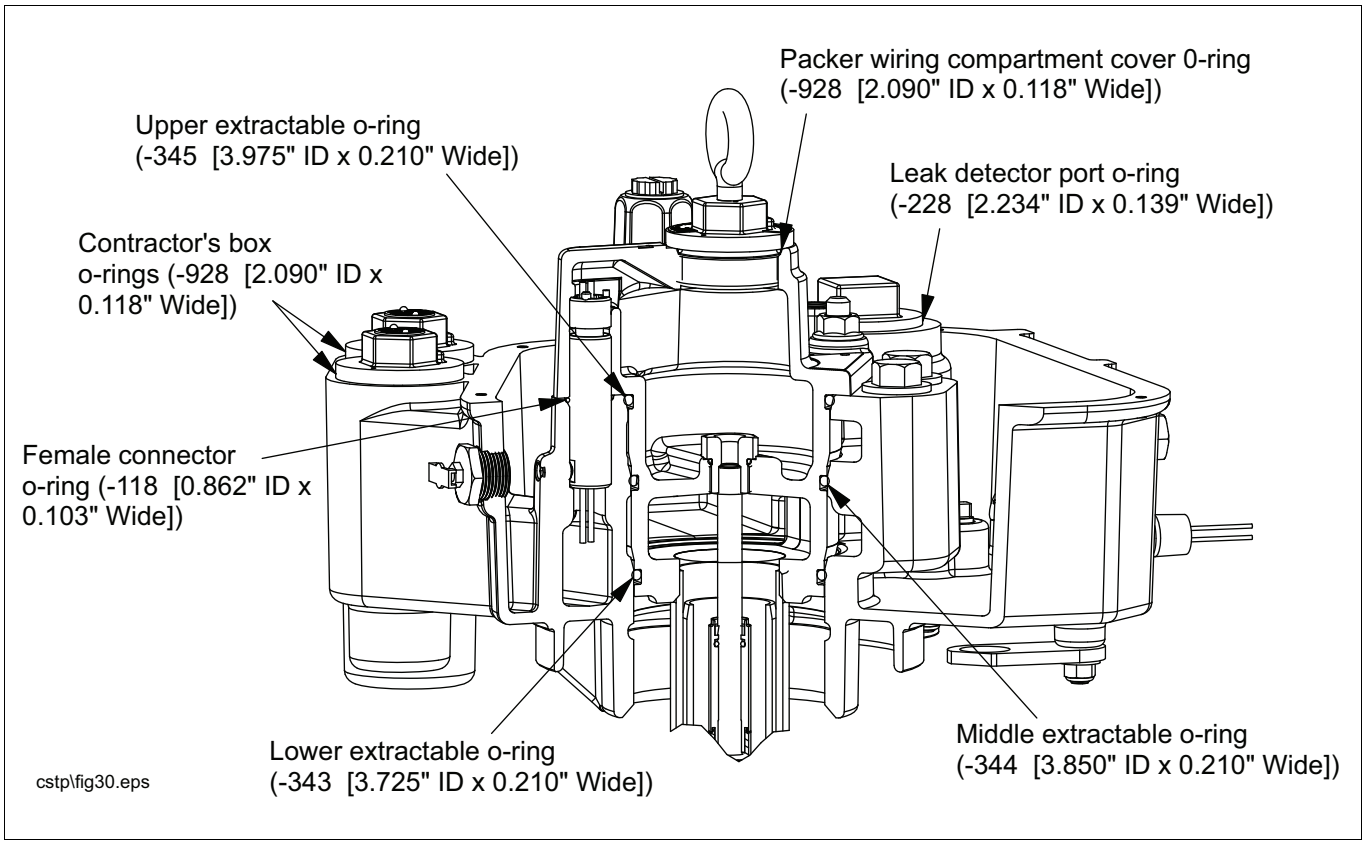


Figure 34. Locating Packer And Manifold O-Rings

17. Verify the flange surface of CSTP is clean and then place the new gasket on it.
18. Verify the sealing surface of the cover is clean.
19. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs. (6 - 7 N•m).
20. If applicable, open the ball valve down line from the pump.

Replacing the Capacitor in the Manifold for Single Phase Pumps

⚠WARNING **Disconnect, lock out, and tag power at the panel before servicing the pump.**

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

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

NOTICE **The capacitor is 440V, 17.5 µF continuous duty with internal bleed resistor for 3/4 HP models. The capacitor is 440V, 25 µF continuous duty with internal bleed resistor for 1-1/2 HP models. The capacitor is 440V, 40 µF continuous duty with internal bleed resistor for 2 HP models.**

Kits Required

- Capacitor Kit (P/N 410164-001 [17.5 µF], 410164-002 [25 µF], or 410164-003 [40 µF] as required).
- Hardware/Seal Kit (AG) (P/N 410539-001)

Procedure

1. Remove capacitor access cover and discard the o-ring (See Figure 35).

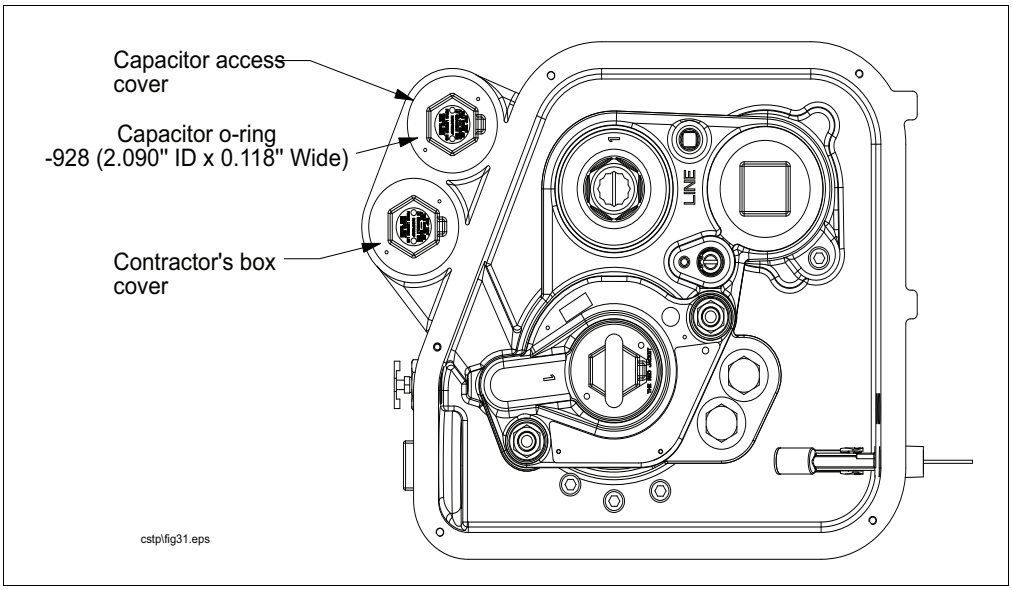


Figure 35. Locating Contractor's Box And Capacitor Compartment

2. Examine the current wiring attached to the existing capacitor as the wiring will attach in an identical manner to the replacement capacitor.
3. Remove wires from the old capacitor and remove the old capacitor from the manifold compartment.
4. Insert new capacitor into the manifold compartment and attach the wire terminals exactly as connected to the old capacitor (See Figure 14 on page 21).
5. Replace the -928 o-ring (2.090'' ID x 0.118'' wide) in the capacitor access cover after lubricating the new o-ring with petroleum jelly. Reinstall the cover. Do not use thread sealant. Torque the cover to 35 ft-lbs (48 N•m).

Installing a Siphon Assembly

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Siphon Cartridge Kit (P/N 410507-001)
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

   NOTE: the CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.

   Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).
4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 36). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Remove one of the two siphon port plugs from the manifold (see Figure 37).
9. Apply petroleum jelly onto the three o-rings on the outside of the new siphon cartridge.
10. Insert the siphon cartridge into the siphon port. 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 25 - 30 ft-lbs (34 - 41 N•m).
11. Remove protective plug from the siphon cartridge suction port.
12. Connect one of the fittings from the kit to the siphon outlet port (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 17 ft-lbs (23 N•m).
13. Connect the other fitting from the kit (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) to the bushing included in the kit and torque to 17 ft-lbs (23 N•m).
14. Remove and discard the 1/2-inch plug on the CSTP secondary wall (see Figure 37).
15. Install the bushing (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) into the 1/2-inch port and torque to 30 ft-lbs (41 N•m) (see Figure 37).

16. Connect the fittings with the copper tubing provided in the Siphon Cartridge Kit.
17. Turn the service screw counterclockwise all the way up. As the screw approaches its top position, the check valve will drop into position.
18. Replace the protective plug over the service screw.

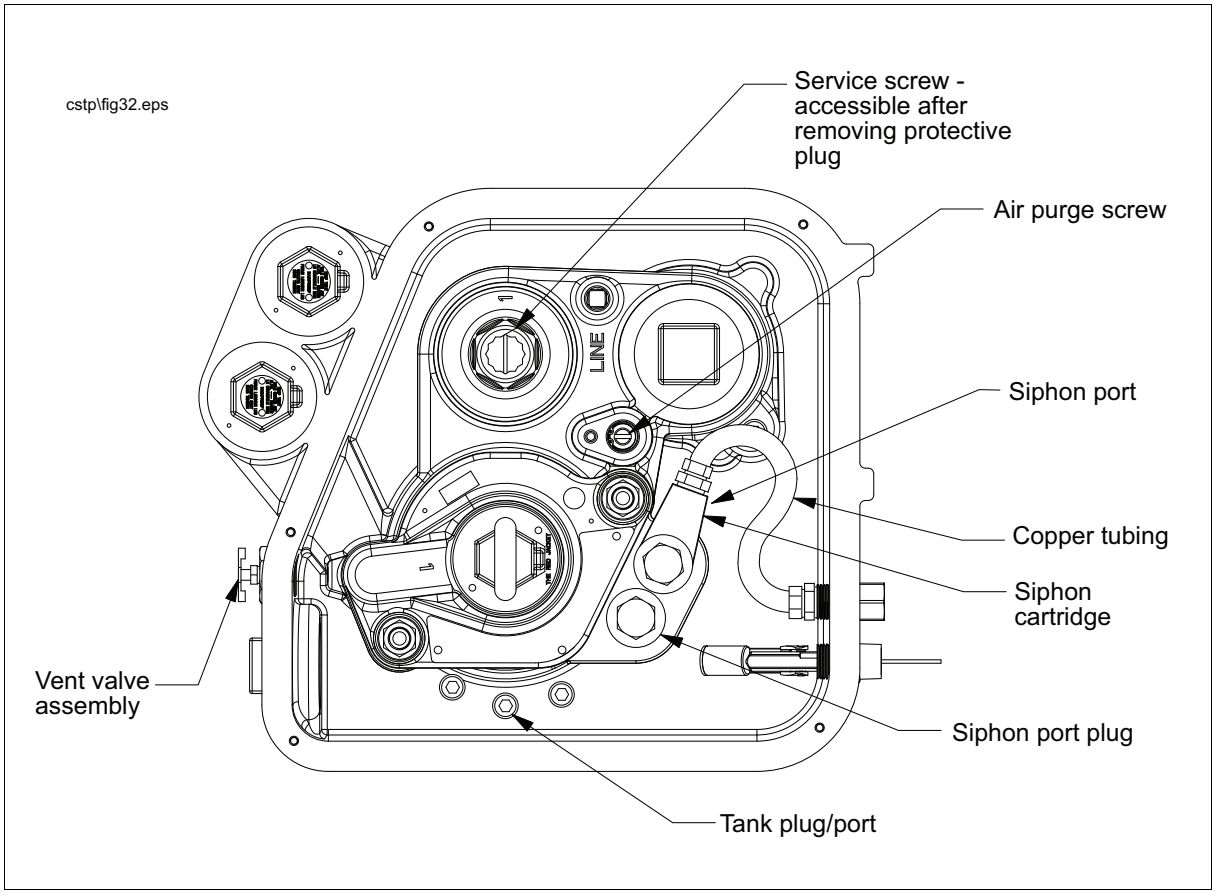


Figure 36. Siphon Ports

19. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring.
20. 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.
21. Verify the flange surface of CSTP is clean and then place the new gasket on it.
22. Verify the sealing surface of the cover is clean.
23. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6 -7 N•m).
24. If applicable, open the ball valve down line from the pump.

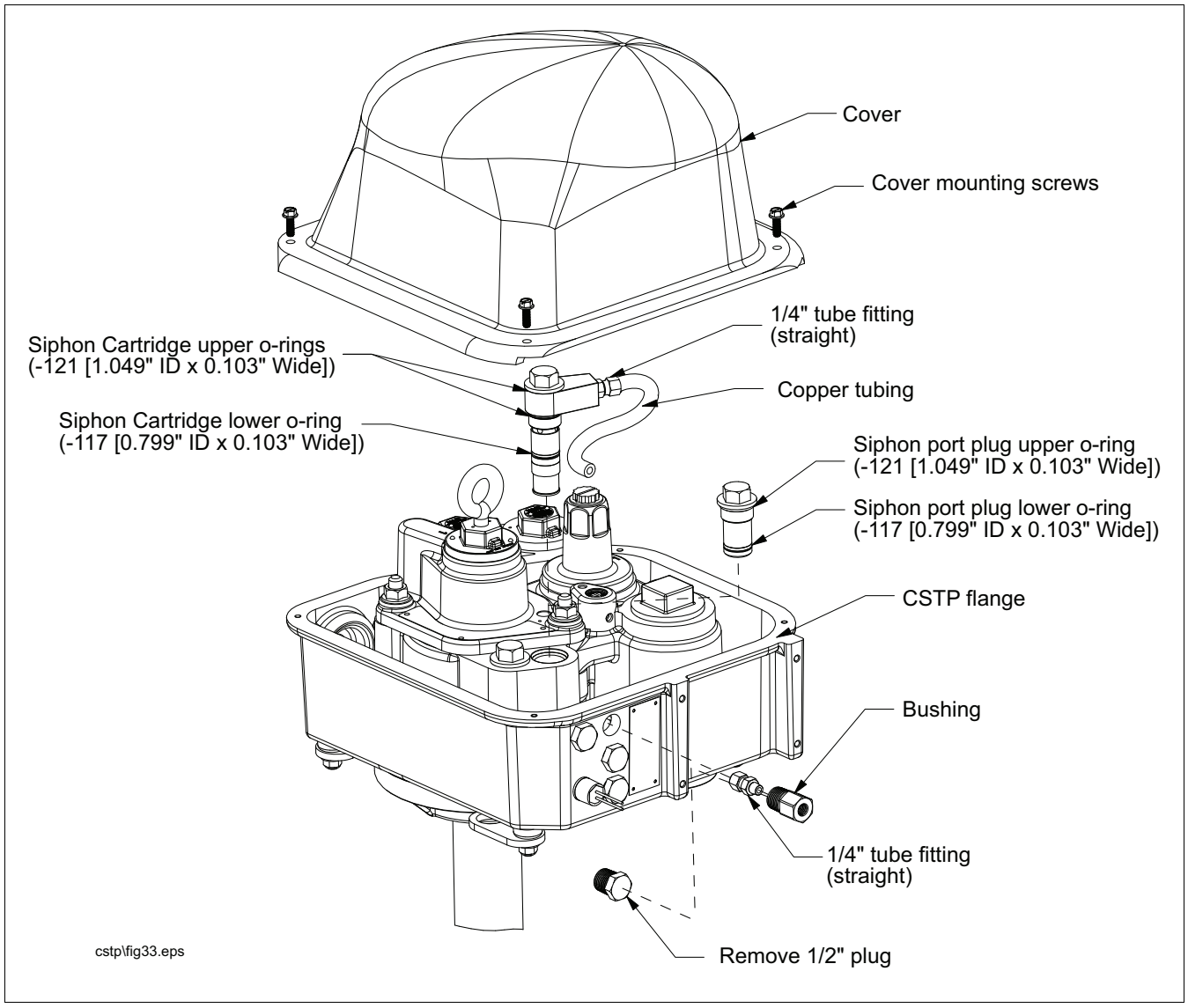


Figure 37. Inserting Siphon Assembly Into Manifold

Replacing the Check Valve Assembly

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Check Valve Housing Kit (P/N 410152-001), or
- High Pressure Check Valve Housing Kit (P/N 410152-002)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 36). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities. Continue to turn the screw counter clockwise until you hear the check valve drop down into position.
8. 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 (see Figure 38).

NOTICE **If replacing the check valve o-ring, avoid twisting or rotating the new o-ring as it is being installed on the check valve.**

9. Get the new check valve and spring from the kit. If using the check valve housing kit, get the new housing and -231 o-ring (2.609'' ID x 0.139'' wide) from the kit. If using only the check valve kit, get a new -231 o-ring (2.609'' ID x 0.139'' wide) from the hardware/seal kit.
10. Lubricate the new housing o-ring and the new -225 o-ring (1.859" ID x 0.139'' wide) on the check valve with petroleum jelly.
11. 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 34). Place the check valve housing with o-ring over the spring and check valve and screw it in hand tight. Torque the housing to 40 - 50 ft-lbs (54 - 68 N•m). Replace the protective plug over the service screw and full thread into place to ensure a good seal.

12. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring.
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. Verify the flange surface of CSTP is clean and then place the new gasket on it.
15. Verify the sealing surface of the cover is clean.
16. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6 - 7 N•m).
17. If applicable, open the ball valve down line from the pump.

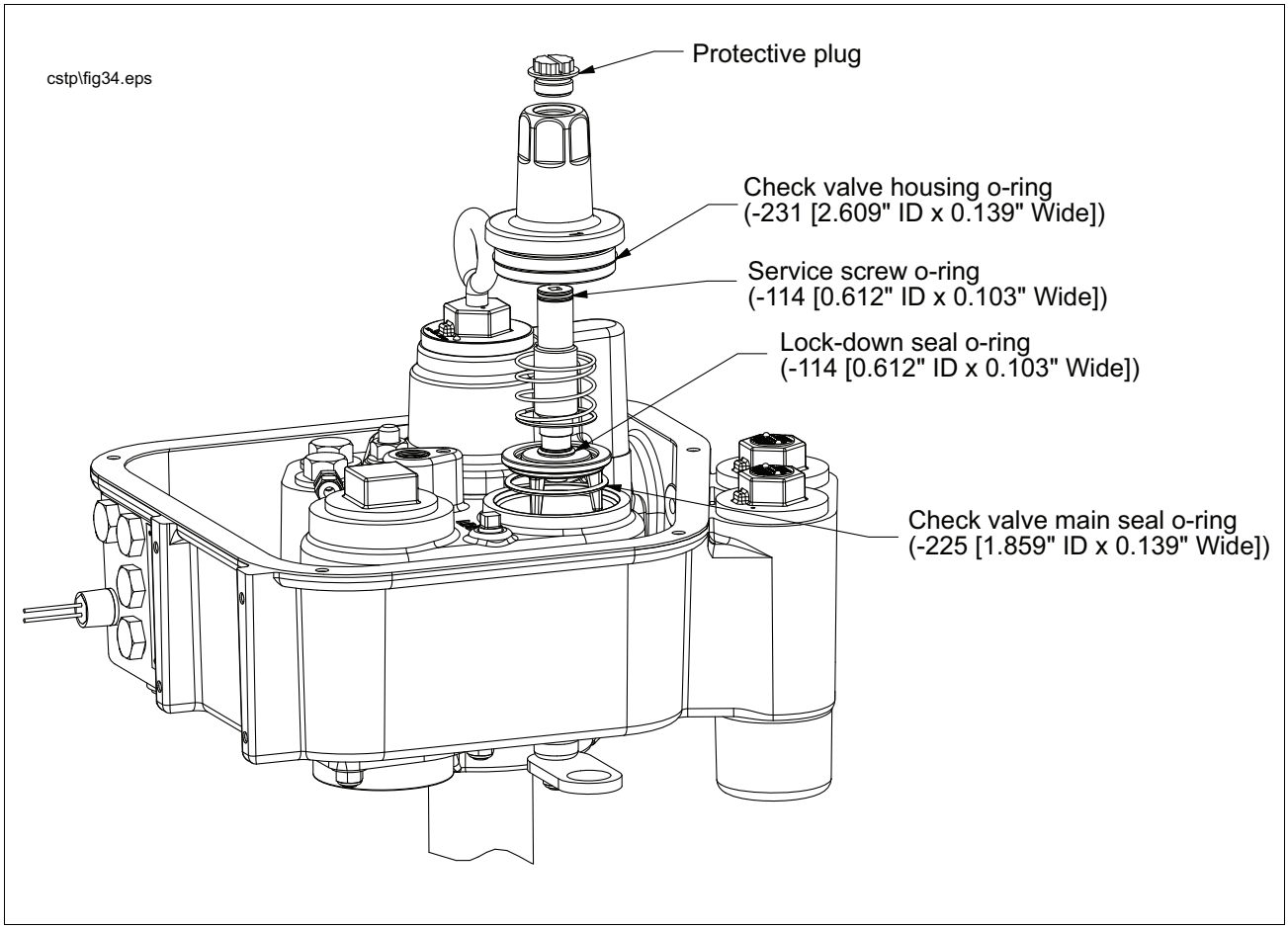


Figure 38. Inserting Check Valve Assembly Into Manifold

Replacing the Conduit Bushing

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Conduit Bushing (P/N 410486-001),
- Hardware/Seal Kit (AG) (P/N 410539-001)

Procedure

1. Remove the contractor's box cover (see Figure 35 on page 42). 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 13 on page 20). 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 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 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 -928 o-ring (2.090'' ID x 0.118'' wide) 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, and do not use thread sealant. Torque the cover to 35 ft-lbs (48 N•m).

Replacing the Pigtail

WARNING **Disconnect, lock out, and tag power at the panel before servicing the pump.**

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

Kits Required

- UMP Replacement Kit (P/N 144-327-4)
- Pigtail Assembly (P/N 410156-001)
- Hardware/Seal Kit (AG) (P/N 410539-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove the two extractable lock-down nuts (See Figure 39 on page 51). The springs on the lock-down studs between the extractable's flange and the manifold will push the extractable up, breaking the seals.

WARNING **Confirm that the packer wiring compartment cover (with lifting eye bolt) is properly torqued to 10 ft-lbs (13.6 N•m) with a minimum of 6 full threads installed. Occasionally, eye bolts are removed after pump installation and corrosion may occur in the threaded areas of the wiring compartment cover (eye bolt plug) and the eye bolt. If corrosion has occurred, the cover and eye bolt should be replaced.**

8. Utilize the lifting eye bolt to lift out the extractable unit and place it on a clean surface. Removal of the extractable section of the pump must be conducted with caution. Make certain that the extractable section remains centered within the riser pipe and that no portion of the extractable binds during the removal process. If binding occurs during removal, stop and determine the cause of the binding and correct the situation before proceeding with removal.
9. Remove the UMP by removing the four bolts holding the discharge head as shown in Figure 28. Discard the old gasket.
10. Remove the packer wiring compartment cover (see Figure 34). 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.

11. Look at the end of the discharge head. Attach a snake to the wires (this will help with the insertion of the new cable) and 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 (see Figure 33).
12. Get the new pigtail assembly and uncoil the pigtail so it lays flat.
13. Get a -015 o-ring (0.551'' ID x 0.070'' wide) 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 (see Figure 33).
14. Connect the wires to the snake and pull the snake until the wires 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 (see Figure 33).
15. Align the UMP positioning dowel so it inserts in the proper hole in the discharge head (see Figure 29) 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.

⚠WARNING **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.**

16. 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.**

17. Install the four UMP retaining bolts and lock washers. Snug and then torque the bolts using a cross-pattern technique to 7 ft-lbs (10 N•m).

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

18. 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.
19. Strip insulation off the three pigtail wires 3/8 inch (10 mm).
20. 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 the wires inside the packer's wiring compartment (see Figure 12).
21. Get a -928 o-ring (2.090'' ID x 0.118'' wide) from the hardware/seal kit. Lubricate the o-ring on the packer wiring compartment cover (with lifting eye bolt) with petroleum based jelly. Screw in the packer wiring compartment cover (thread sealant should not be used) and torque to 35 ft-lbs (48 N•m).
22. Get the three extractable o-ring seals -345 (3.975'' ID x 0.210'' wide [upper]), -344 (3.850'' ID x 0.210'' wide [middle]), and -343 (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 30).
23. Remove the manifold's female connector's o-ring (see Figure 30). Get a -118 o-ring (0.862'' ID x 0.103'' wide) from the kit and lubricate it with petroleum jelly. Slide the o-ring over the female connector and push it down into its groove.
24. 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).
25. Verify the flange surface of CSTP is clean and then place the new gasket on it.
26. Verify the sealing surface of the cover is clean.
27. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).

28. If applicable, open the ball valve down line from the pump.

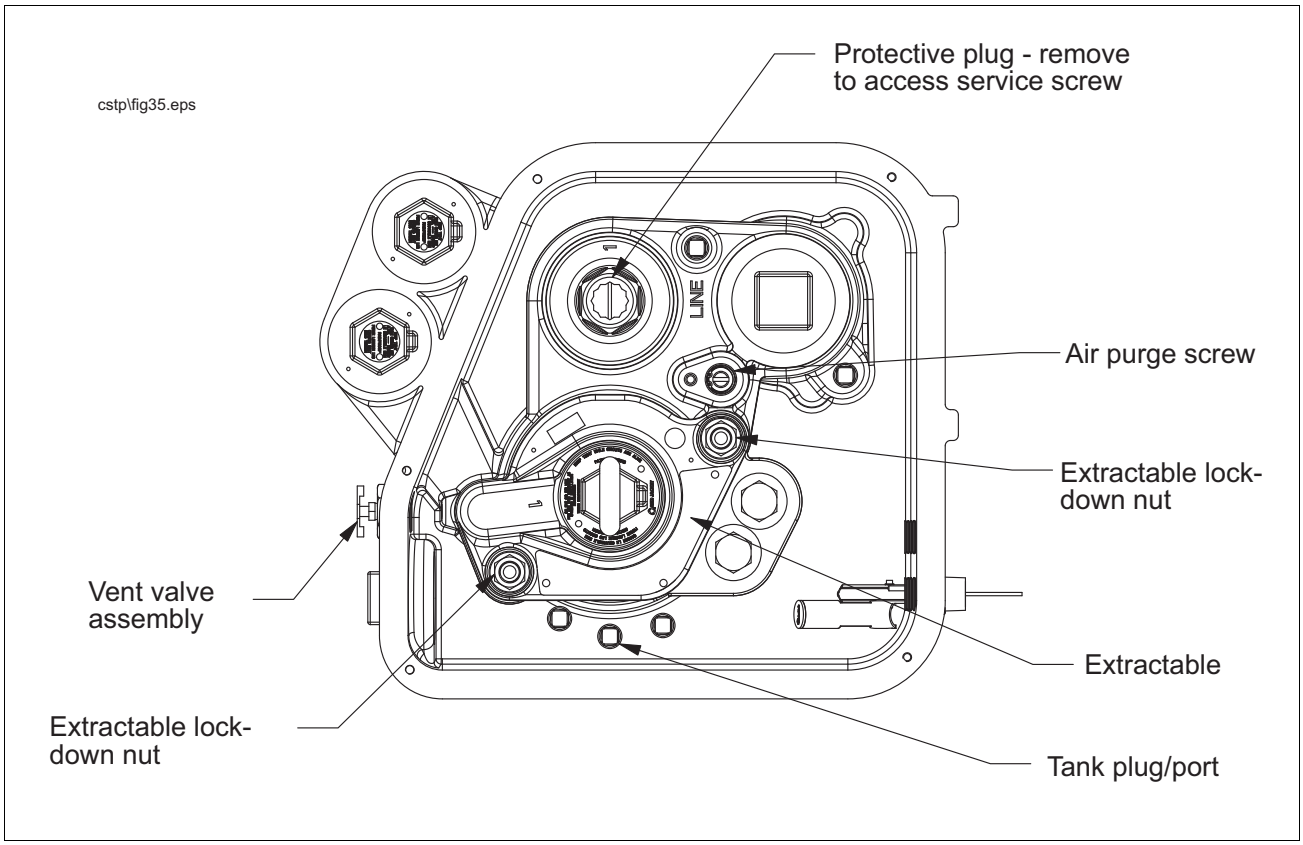


Figure 39. Extractable Lockdown Nuts

Replacing the Packer-to-Manifold Wiring Connectors

WARNING **Disconnect, lock out, and tag power at the panel before servicing the pump.**

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

Kits Required

- Electrical Connector Kit (P/N 410165-001)
- Hardware/Seal Kit (AG) (P/N 410539-001)

Special tools - not supplied in kits:

- 3/16'' hex wrench, medium point felt-tip pen, small piece of masking tape, a small ruler, and needle-nose pliers

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove the two extractable lock-down nuts (see Figure 39). The springs on the lock-down studs between the extractable's flange and the manifold will push the extractable up, breaking the seals.

WARNING **Confirm that the packer wiring compartment cover (with lifting eye bolt) is properly torqued to 10 ft-lbs (13.6 N•m) with a minimum of 6 full threads installed. Occasionally, eye bolts are removed after pump installation and corrosion may occur in the threaded areas of the wiring compartment cover (eye bolt plug) and the eye bolt. If corrosion has occurred, the cover and eye bolt should be replaced.**

8. Utilize the lifting eye bolt to lift out the extractable unit and place it on a clean surface. Removal of the extractable section of the pump must be conducted with caution. Make certain that the extractable section remains centered within the riser pipe and that no portion of the extractable binds during the removal process. If binding occurs during removal, stop and determine the cause of the binding and correct the situation before proceeding with removal.
9. Remove the packer wiring compartment cover (see Figure 34). 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.

10. Locate the male connector inside the packer (see Figure 40).
11. Place a mark on the facing of the Packer using a felt pen to indicate the position of the index hole (see Figure 42).
12. Use a pair of needle nose pliers to remove the retaining washer that holds the male connector in its socket.
13. Remove the male connector.
14. Get the new male connector and retaining washer from the electrical connector kit.
15. Notice the small indexing pin on the back of the male connector (see Figure 41).
16. 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 42) for the connector to be correctly oriented relative to the female connector.
17. Place a small piece of masking tape on the pins side of the connector inline with the indexing pin (see Figure 43).

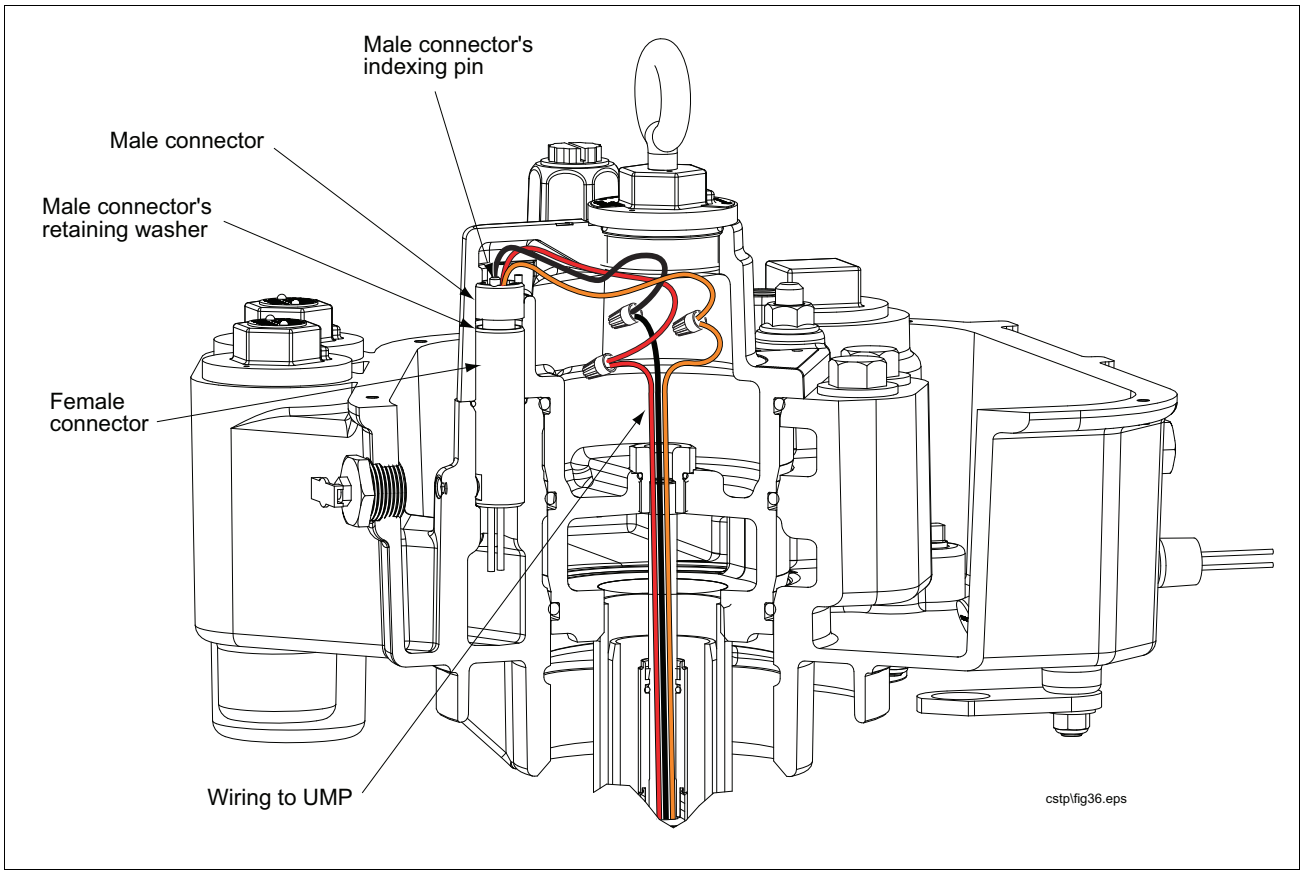


Figure 40. Packer-To-Manifold Wiring Connectors

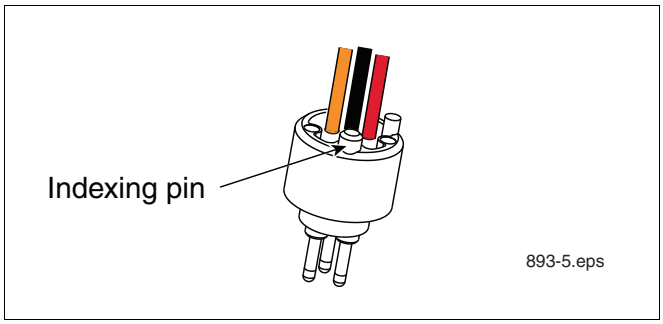


Figure 41. Male Connector's Indexing Pin

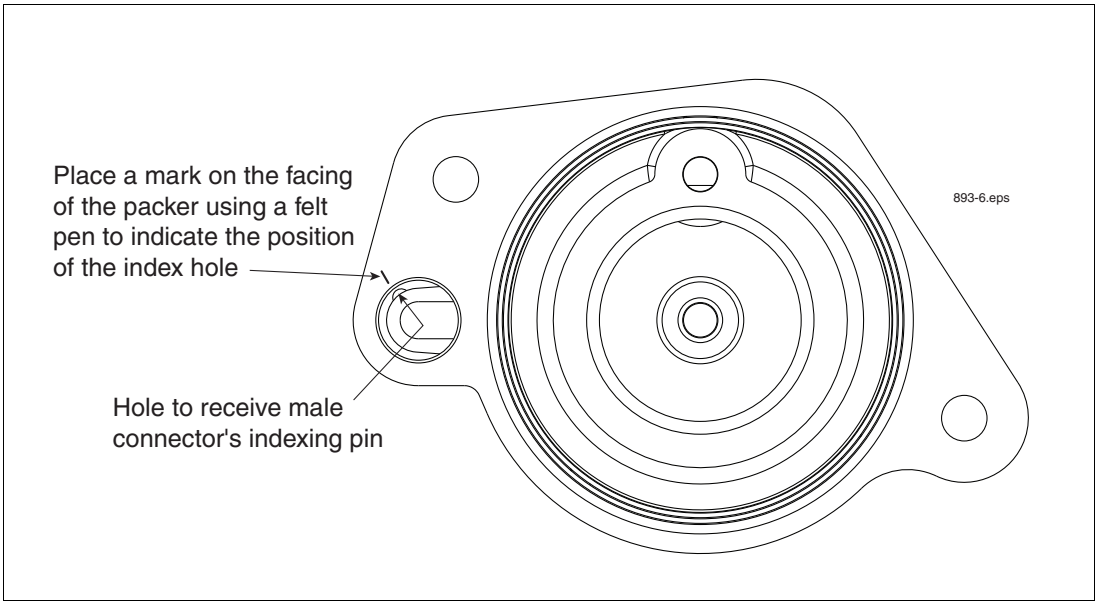


Figure 42. Male Connector Index Hole In Base Of Socket

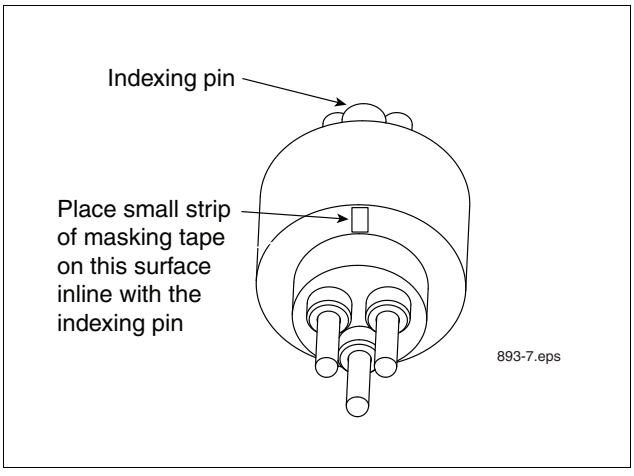


Figure 43. Placing Masking Tape Alignment Marker On Front Of Male Connector

18. 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 44). Hold the wires tight to keep the connector in position and insert a new 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.

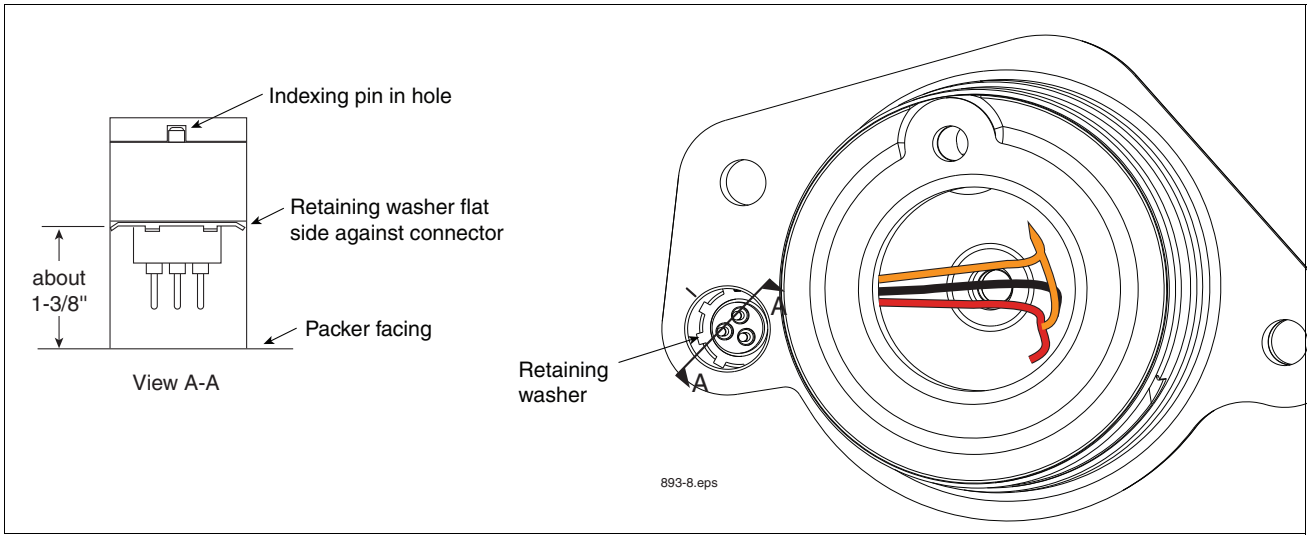


Figure 44. Correct Depth Of Male Connector In Packer Socket

19. Strip insulation off the three connector wires 3/8 inch (10 mm).
20. 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 12 on page 18).
21. Get a -928 o-ring (2.090''ID x 0.118'' wide) from the hardware/seal kit. Lubricate the o-ring on the packer wiring compartment cover (with lifting eye bolt) with petroleum based jelly. Screw in the packer wiring compartment cover (thread sealant should not be used) and torque to 35 ft-lbs (48 N•m).
22. Remove capacitor access cover (see Figure 35). 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.
23. 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 45).

⚠WARNING Do not try to remove the set screw.

24. Remove the manifold female connector's o-ring. 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.

25. Reconnect the connector's three wires as per the notes made in Step 19 above.
26. Get a -928 o-ring (2.090'' ID x 0.118'' wide) from the hardware/seal kit. Lubricate the o-ring on the packer wiring compartment cover (with lifting eye bolt) 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).

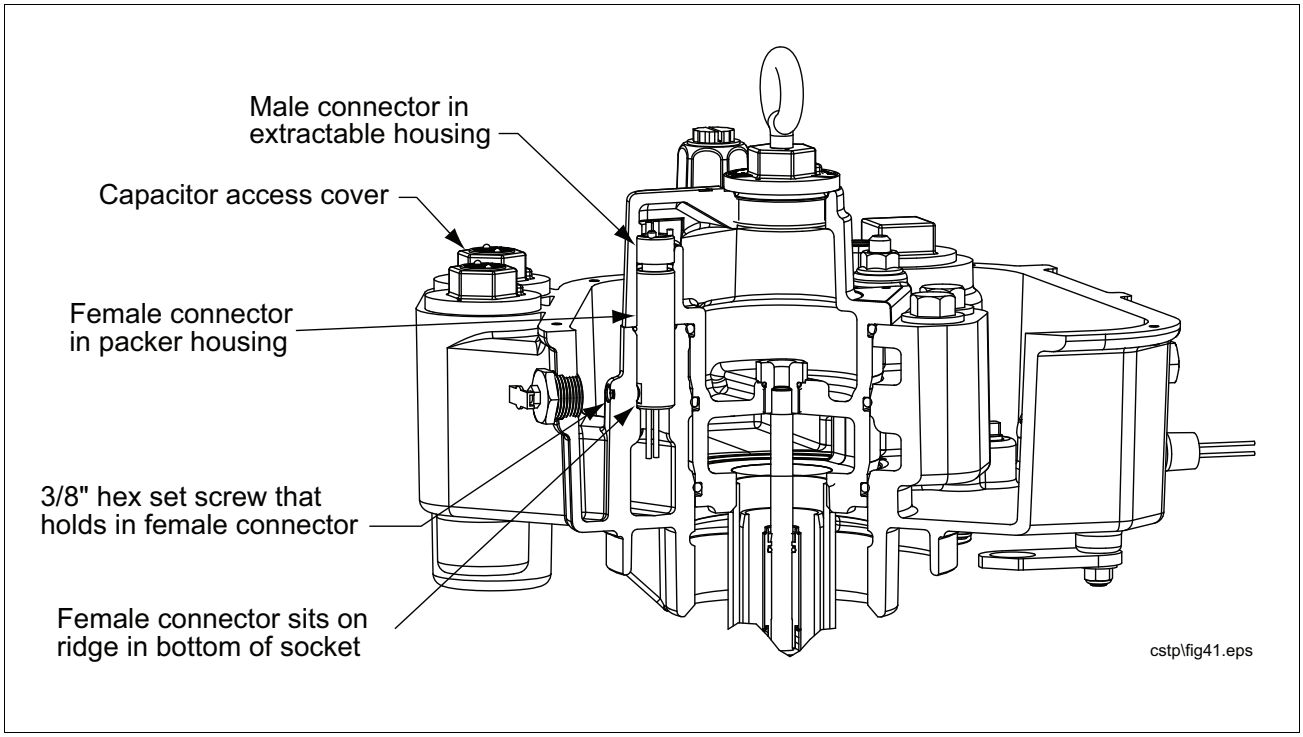


Figure 45. Locating Female Connector Set Screw

27. Get the three extractable o-ring seals -345 (3.975'' ID x 0.210'' wide [upper]), -344 (3.850'' ID x 0.210'' wide [middle]), and -343 (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 34).
28. Remove the manifold's female connector's o-ring (see Figure 30). Get a -118 o-ring (0.862'' ID x 0.103'' wide) from the kit and lubricate it with petroleum jelly. Slide the o-ring over the female connector and push it down into its groove.
29. 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).
30. Verify the flange surface of CSTP is clean and then place the new gasket on it.
31. Verify the sealing surface of the cover is clean.
32. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6 -7 N•m).
33. If applicable, open the ball valve down line from the pump.

Installing an Electronic Line Leak Detector Transducer or Mechanical LLD

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Hardware/Seal Kit (AG) (P/N 410539-001)
- Return to Tank Kit (P/N 410508-0010 for MLLD only)
- Compression Fitting Kit (P/N 410509-001 for PLLD only)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

   Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 36). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Remove the 2'' NPT plug from line leak detector port (see Figure 46).
9. If you are installing Electronic Line Leak Detector proceed to Step 17.
10. Install mechanical leak detector (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) onto the 2'' NPT mechanical leak detector threads and orient it as shown in Figure 43.
11. Replace ¼" plug, for the tank connection, on the MLLD with the fitting (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) from the kit and orient it as shown in Figure 47.
12. Replace ¼" tank port plug on the CSTP with 4" long pipe nipple (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) from the kit and torque to 20 ft-lbs (27 N•m).
13. Connect the bushing/union (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) from the kit to the pipe nipple and torque to 20 ft-lbs (27 N•m).

14. Connect the second fitting (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) from the kit to the bushing and orient it as shown in Figure 47.
15. Connect the copper tubing to the fittings (bend the tube as needed) and tighten the nut on the fitting (see Figure 47).
16. Go to Step 21.
17. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads of the electronic line leak detector and install it into the 2'' NPT port and torque to 110 ft-lbs (150 N•m) as shown in Figure 44.

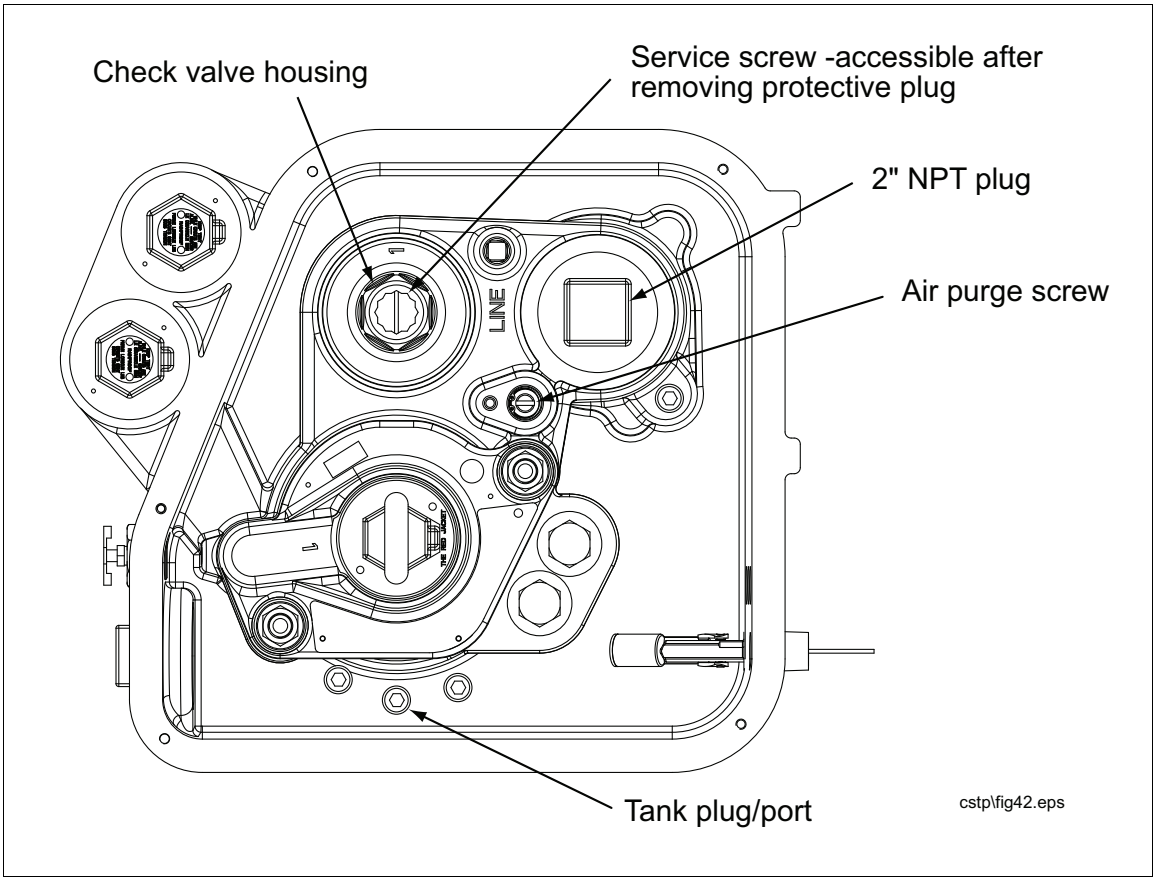


Figure 46. Locating Discharge Port Plug For Line Leak Transducer

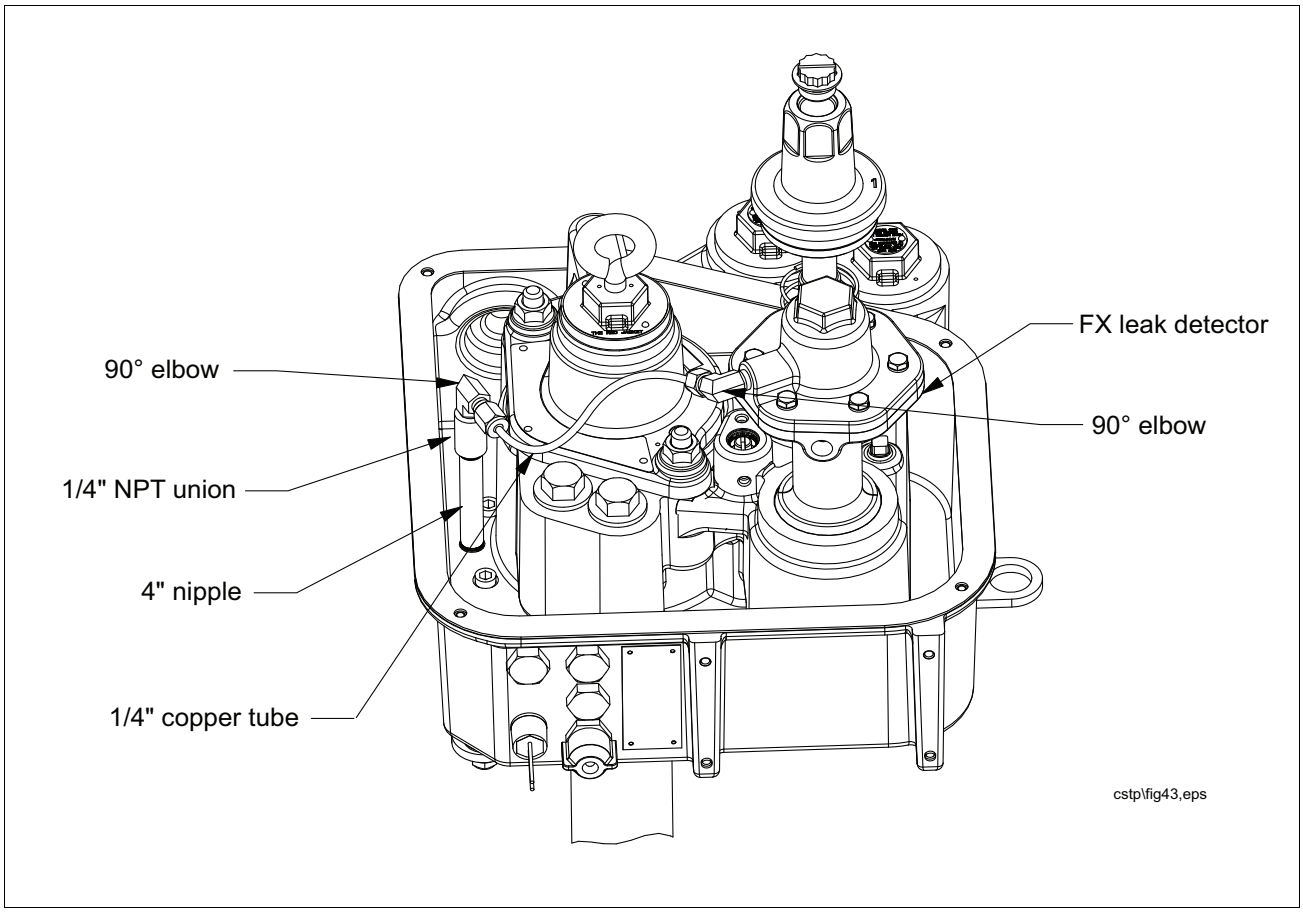


Figure 47. Installing Mechanical Line Leak Detector

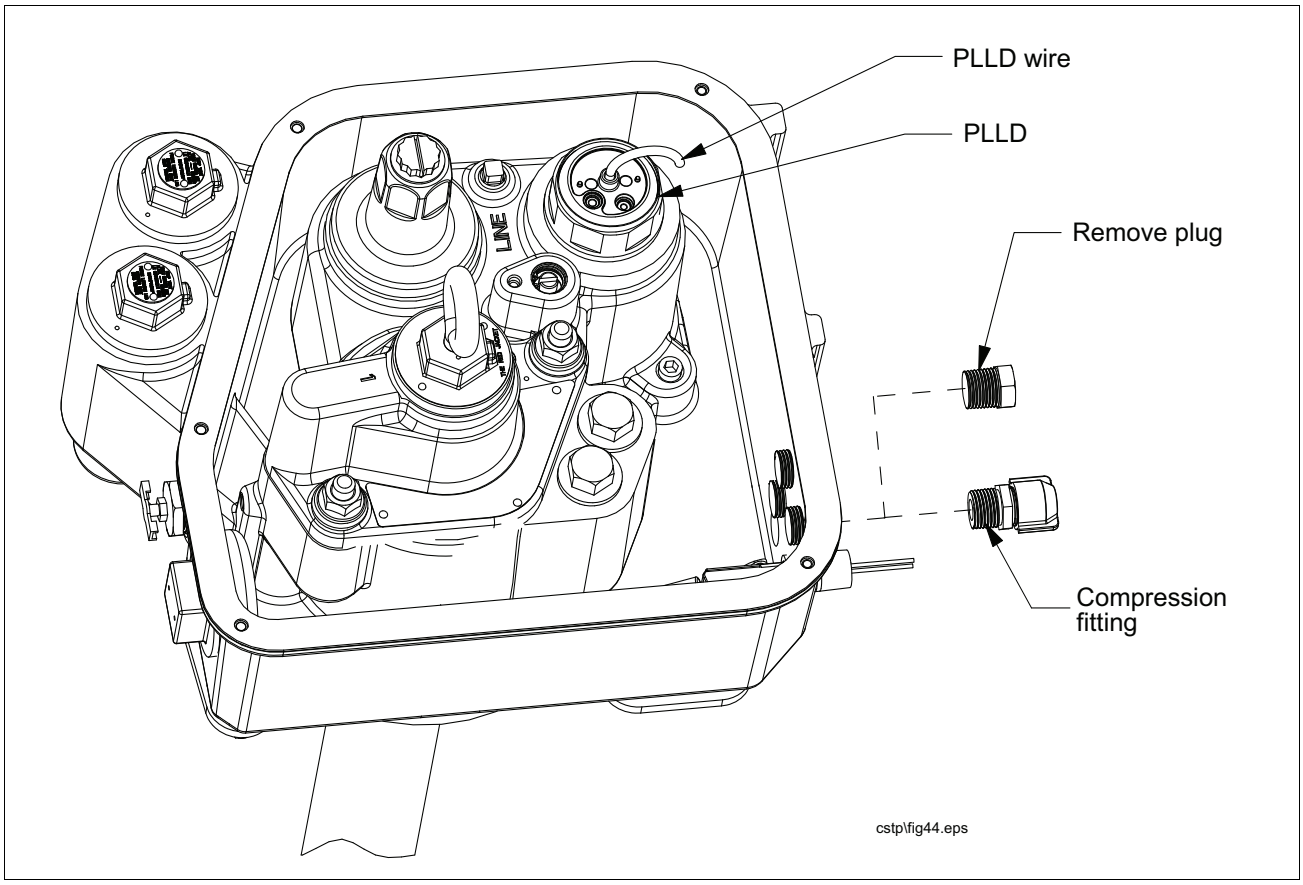


Figure 48. Installing Electronic Line Leak Detector

18. Replace one of the 1/2-inch plugs on the secondary wall of CSTP with the compression fitting (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 30 in-lbs (3 N•m).
19. Run the wiring of electronic line detector through the compression fitting.
20. Torque the nut on the compression fitting to 20 ft-lbs (27 N•m).
21. 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 and fully thread into place to ensure a good seal.
22. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring (see Figure 49).
23. 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.
24. Verify the flange surface of CSTP is clean and then place the new gasket on it.
25. Verify the sealing surface of the cover is clean.
26. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6 -7 N•m).
27. If applicable, open the ball valve down line from the pump.

Replacing the Air Purge Screw

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Air Purge Screw (P/N 410134-001),
- Hardware/Seal Kit (AG) (P/N 410539-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 36). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Locate the air purge screw on the top of the manifold (see Figure 49).
9. Remove the purge screw retaining ring.

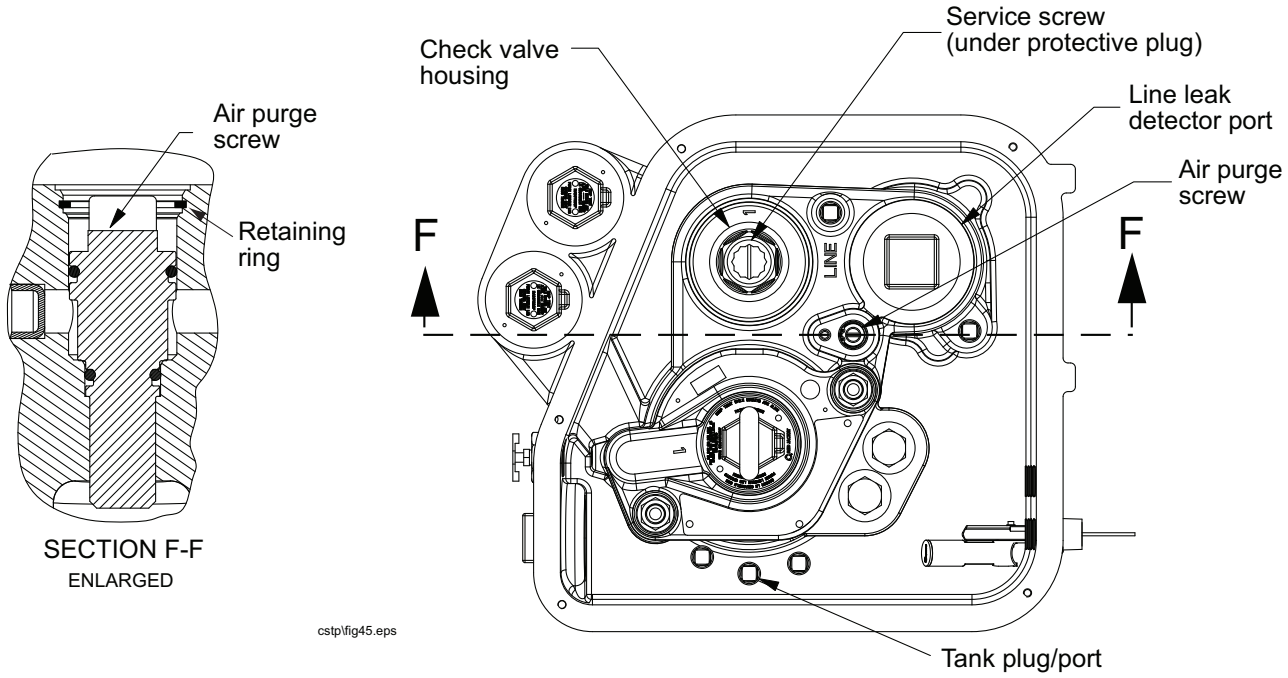


Figure 49. Locating Air Purge Screw

10. Remove the purge screw by unscrewing it.
11. Lubricate the two o-rings on the new purge screw with petroleum jelly.
12. Screw the purge screw into its place until it is completely closed.
13. Reinstall the purge screw retaining ring in its groove.
14. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring.
15. 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.
16. Verify the flange surface of CSTP is clean and then place the new gasket on it.
17. Verify the sealing surface of the cover is clean.
18. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6 - 7 N•m).
19. If applicable, open the ball valve down line from the pump.

Replacing the Liquid Switch

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Liquid Switch Kit (P/N 410511-001)
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

   Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Disconnect the liquid switch wiring from the junction box.
8. Remove the liquid switch by unscrewing it (see Figure 50).
9. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the new liquid switch.
10. Screw the liquid switch into the port and torque it to 65 in-lbs. (7 N•m) and then turn the switch until the N.O. (normally open) arrow is in the upward position (the float should hang down) (see Figure 50).
11. Connect the liquid switch wiring to the junction box (see Figure 19 and Figure 20).
12. Verify the flange surface of CSTP is clean and then place the new gasket on it.
13. Verify the sealing surface of the cover is clean.
14. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
15. If applicable, open the ball valve down line from the pump.

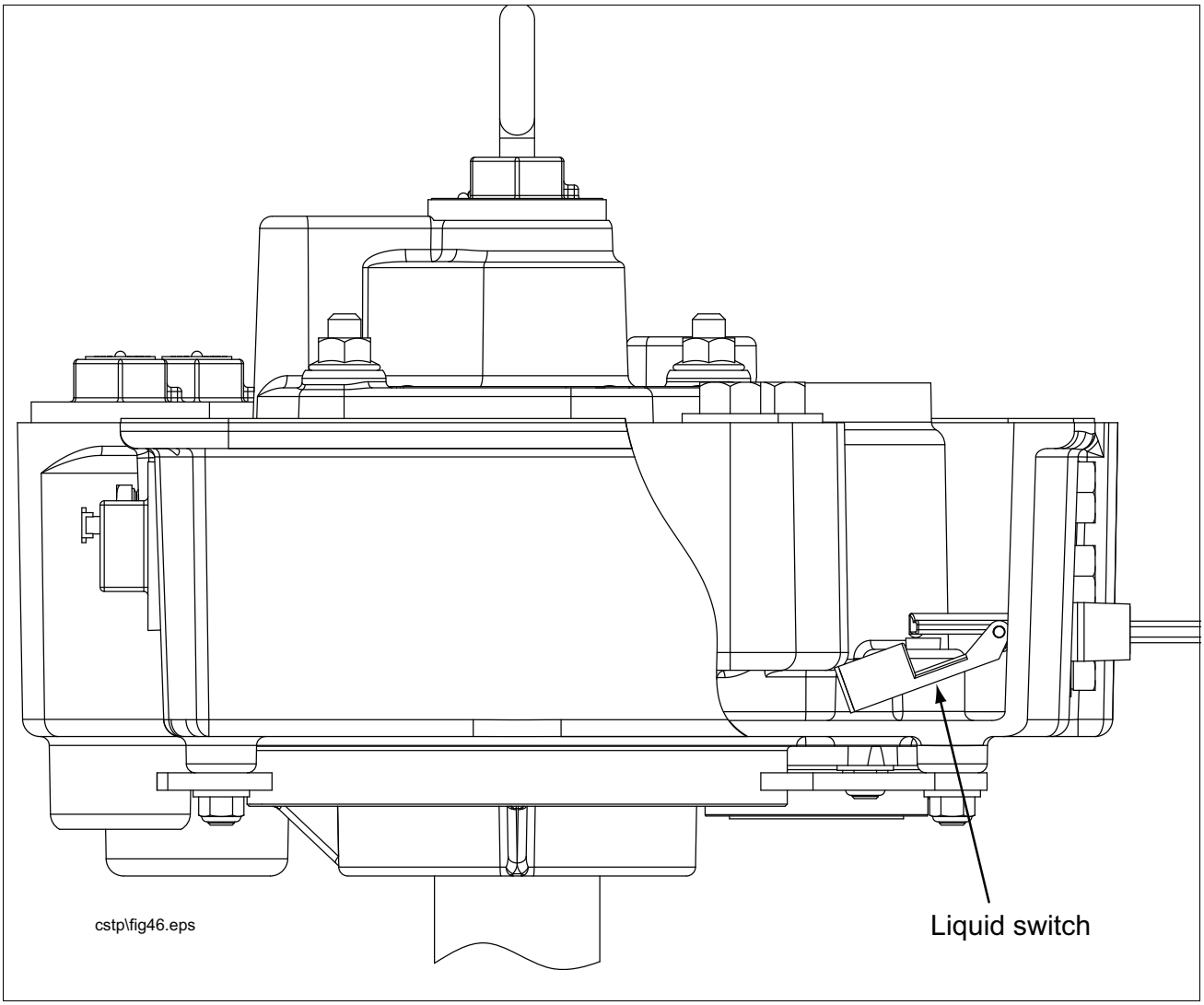


Figure 50. Locating Liquid Switch

Replacing FX Adapter

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- FX Adapter Kit (P/N 410512-001)
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 36). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Disconnect the main pipe from the FX adapter.
9. Remove the three lock nuts from the FX adapter (see Figure 51) and discard them.
10. Remove the FX adapter.

    Note: If it is needed use a screw driver to pry out the FX adapter.

11. Place the two new o-rings on the new FX adapter and apply petroleum jelly to them.
12. Push the new FX adapter into its place.
13. Install the three new lock nuts from the kit and torque to 20 - 25 ft.-lbs. (27 - 34 N•m).
14. Connect the main pipe to the FX adapter (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads).
15. Turn the service screw counterclockwise all the way up. As the screw approaches its top position, the check valve will drop into position.
16. Replace the protective plug over the service screw.
17. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring.

18. 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.
19. Verify the flange surface of CSTP is clean and then place the new gasket on it.
20. Verify the sealing surface of the cover is clean.
21. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
22. If applicable, open the ball valve down line from the pump.

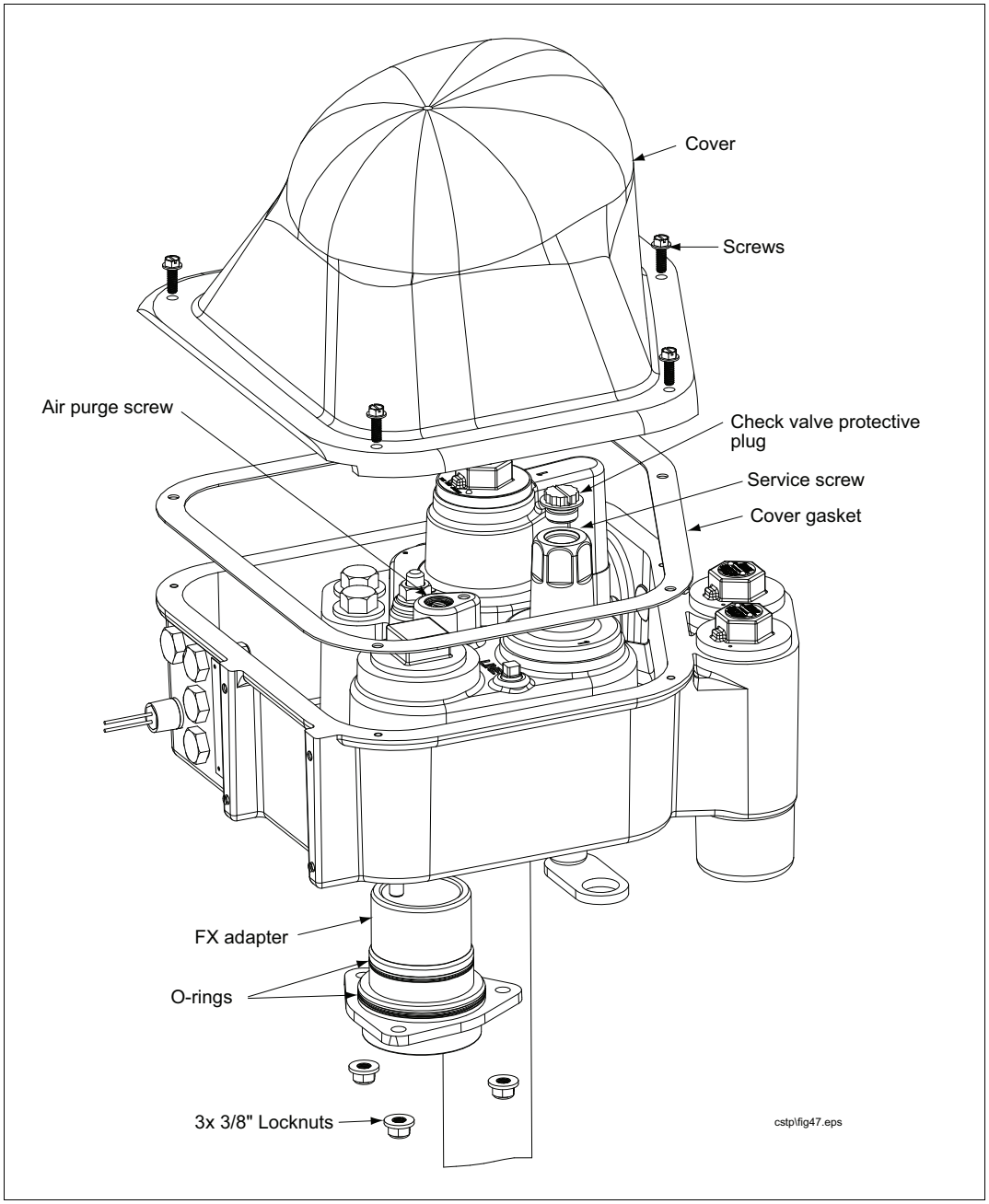


Figure 51. Locating FX Adapter

Replacing Vent Valve Assembly

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Vent Valve Assembly (P/N 410513-001)
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and discard the vent valve assembly (see Figure 52).
8. Install the new vent valve assembly by screwing it into place (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 40 - 50 ft-lbs (54 - 68 N•m).
9. Turn the stop on the vent valve assembly clockwise until it is closed.
10. Verify the flange surface of CSTP is clean and then place the new gasket on it.
11. Verify the sealing surface of the cover is clean.
12. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
13. If applicable, open the ball valve down line from the pump.

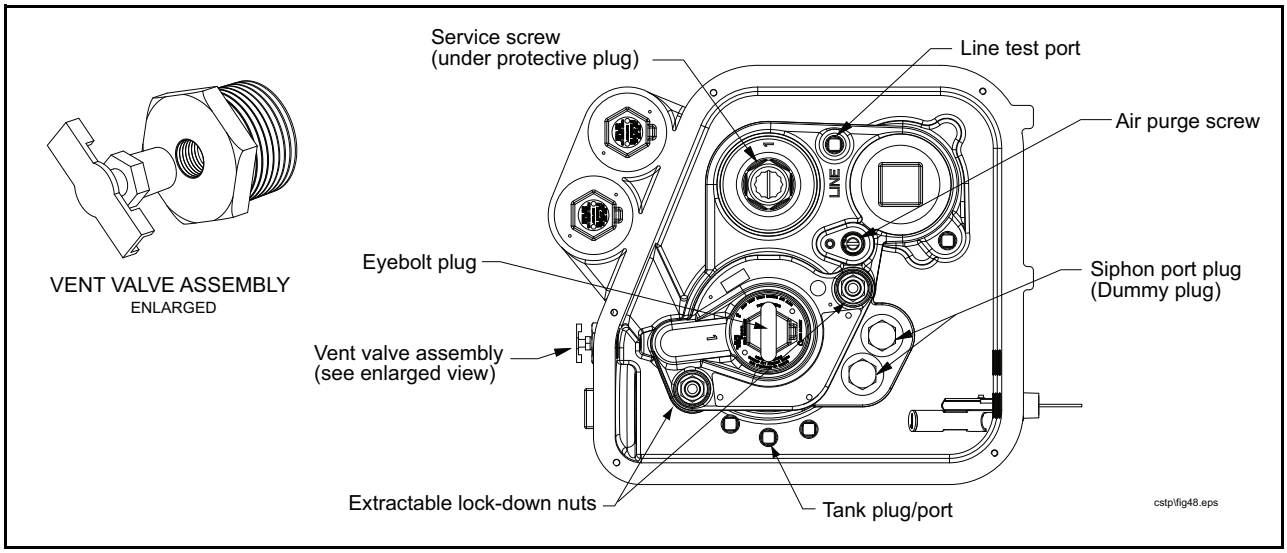


Figure 52. Locating Vent Valve Assembly

Replacing the Dummy Plug

WARNING **Disconnect, lock out, and tag power at the panel before servicing the pump.**

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

Kits Required

- Dummy Plug Kit (P/N 410483-001)
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.

6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 53). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Remove the dummy plug that is going to be replaced from the manifold (see Figure 52).
9. Apply petroleum jelly onto the o-rings on the outside of the new dummy plug.
10. Insert the dummy plug into the port and torque it to 25-30 ft-lbs (34-41 N•m).
11. Turn the service screw counterclockwise all the way up. As the screw approaches its top position, the check valve will drop into position.
12. Place the protective plug over the service screw.
13. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring (see Figure 52).
14. 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.
15. Verify the flange surface of CSTP is clean and then place the new gasket on it.
16. Verify the sealing surface of the cover is clean.
17. Reinstall the cover using the new screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
18. If applicable, open the ball valve down line from the pump.

Replacing Die Springs

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Die Springs Kit (P/N 410485-001)
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 53). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Remove the two extractable lock-down nuts. The springs on the lock-down studs between the extractable's flange and the manifold will push the extractable up, breaking the seals.
9. Pull out the extractable unit 10 inches above the manifold flange.
10. Remove the die springs.
11. Place the new die springs over the studs.
12. Push the extractable unit back into its place.
13. Torque the extractable lock-down nuts in an alternating pattern to 50 ft-lbs (68 N•m).
14. Turn the service screw counterclockwise all the way up. As the screw approaches its top position, the check valve will drop into position.
15. Place the protective plug over the service screw.
16. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring (see Figure 52).
17. 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.
18. Verify the flange surface of CSTP is clean and then place the new gasket on it.
19. Verify the sealing surface of the cover is clean.
20. Reinstall the cover using the new screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
21. If applicable, open the ball valve down line from the pump.

Replacing the Eyebolt Plug

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Eyebolt Plug Kit (P/N 410482-001)

- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and the eyebolt plug (see Figure 52).
8. Apply petroleum jelly onto the o-ring on the outside of the new eyebolt plug.

⚠WARNING **Confirm that the lifting eyebolt is properly torqued to 10 ft-lbs (13.6 N•m) with a minimum of 6 full threads installed.**

9. Install and torque the eyebolt plug to 40 ft-lbs (54 N•m).
10. Verify the flange surface of CSTP is clean and then place the new gasket on it.
11. Verify the sealing surface of the cover is clean.
12. Reinstall the cover using the new screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
13. If applicable, open the ball valve down line from the pump.

Replacing Cover

⚠WARNING  **Disconnect, lock out, and tag power at the panel before servicing the pump.**

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

Kits Required

- Cover Kit (P/N 410533-001)

Procedure

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

2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Verify the flange surface of CSTP is clean and then place the new gasket on it.
8. Verify the sealing surface of the new cover is clean.
9. Install the new cover using the new screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
10. If applicable, open the ball valve down line from the pump.

Conversion of Non-Vacuumed CSTP to Vacuumed CSTP

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Kits Required

- Vacuum Conversion Kit (P/N 410545-001)
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly.

NOTICE **The CSTP secondary volume is 3.8 gallons. A maximum of 1.5 gallons could be discharged during this procedure.**

Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).

4. Remove the cover by extracting the screws.

5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 53). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Remove one of the two siphon port plugs from the manifold (see Figure 54).
9. Apply petroleum jelly onto the two o-rings on the outside of the new siphon cartridge.
10. Insert the siphon cartridge into the siphon port. 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 25 - 30 ft-lbs (34 - 41 N•m).
11. Remove protective plug from the siphon cartridge suction port.
12. Connect one of the 1/4-inch fittings from the kit to the siphon outlet port (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 17 ft-lbs (23 N•m).
13. Connect the second 1/4-inch fitting and a barb fitting from the kit (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads of both parts) to the bushing and torque both parts to 17 ft-lbs (23 N•m).
14. Remove and discard the 1/2-inch plug on the CSTP secondary wall (see Figure 54).
15. Install the bushing (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) from Step 13 into the 1/2-inch port and torque to 30 ft-lbs (41 N•m) (see Figure 53).
16. Connect the fittings with the copper tubing provided in the kit (see Figure 54).
17. Connect the second barb fitting to the second bushing (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 17 ft-lb (23 N•m), (see Figure 54).
18. Remove and discard the second 1/2-inch plug on the CSTP secondary wall (see Figure 54).
19. Install the bushing (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) from step 17 into the 1/2-inch port and torque to 30 ft-lb (41 N•m), (see Figure 54).
20. Identify and install the sensor package (see vacuum sensors manual 577013-836) and connect it to the vacuum source and the secondary of CSTP zone (see Figure 53).
21. Turn the service screw counterclockwise all the way up. As the screw approaches its top position, the check valve will drop into position.
22. Replace the protective plug over the service screw.
23. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring.
24. 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.
25. Verify the flange surface of CSTP is clean and then place the new gasket on it.
26. Verify the sealing surface of the cover is clean.
27. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
28. If applicable, open the ball valve down line from the pump.

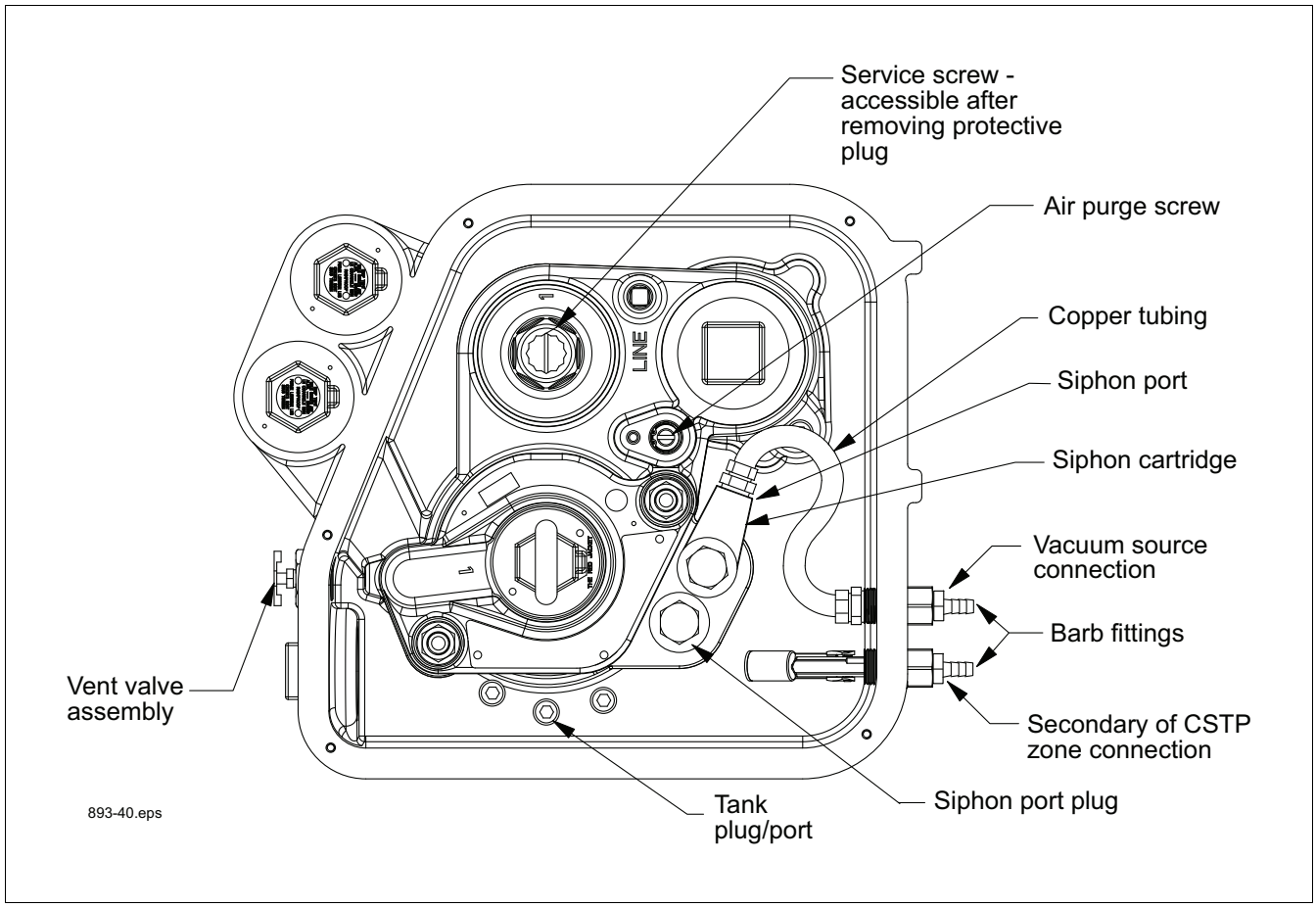


Figure 53. Siphon Ports

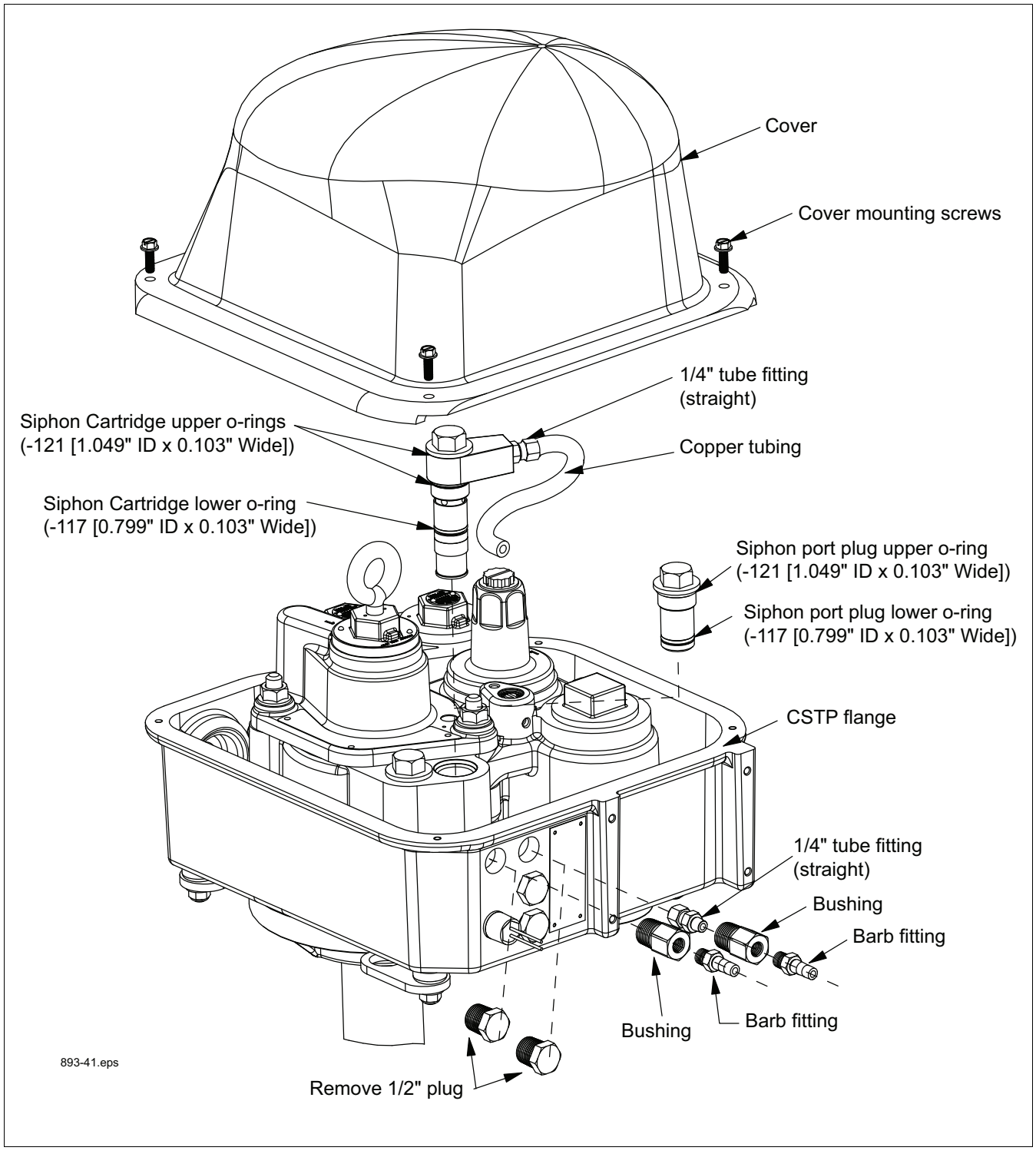


Figure 54. Inserting Siphon Assembly Into Manifold

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 52).

Checking Relief Pressure at the Pump

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Equipment and Kits Required

- Pressure gauge with appropriate fittings to connect to the 1/4'' NPT line test port
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).
4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and save the protective plug over the service screw and turn the service screw clockwise (see Figure 36). As the screw approaches its bottom position, you will hear the system depressurizing. Bottom the screw, then backoff 4 turns to lift the check valve allowing the fuel to drain out of the manifold's hydraulic cavities.
8. Remove the line test port plug (see Figure 52) and attach test gauge.
9. Open the air purge screw until its shoulder comes in contact with the retaining ring.

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. Turn off the pump and measure the relief pressure.
12. 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.
13. Turn the service screw counterclockwise as far (up) as possible (when the screw is almost up, the check valve will drop down into position).
14. Replace protective plug over the service screw.
15. 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).
16. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring.
17. 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.
18. Verify the flange surface of CSTP is clean and then place the new gasket on it.
19. Verify the sealing surface of the cover is clean.
20. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
21. If applicable, open the ball valve down line from the pump.

Testing the Line

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Equipment and Kits Required

- Pressure generating equipment with appropriate fittings to connect to the 1/4'' NPT line test port
- Cover Gasket Kit (P/N 410506-001)

Procedure

1. Block lines at each dispenser.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40 - 50 ft-lbs (54 - 68 N•m).
4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.

6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and retain the protective plug over the service screw and turn the service screw clockwise (see Figure 55). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further.
8. Remove line test port plug (see Figure 55). Apply line test pressure at line test port (50 psi [345 kPa] maximum).

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

9. Depressurize the line (as per Step 7 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).
10. 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.
11. Turn the air purge screw counterclockwise until its shoulder comes in contact with the retaining ring (see Figure 55).
12. 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.
13. Verify the flange surface of CSTP is clean and then place the new gasket on it.
14. Verify the sealing surface of the cover is clean.
15. Reinstall the cover using the screws and torque them in a cross-pattern technique to 55-65 in-lbs (6-7 N•m).
16. Open lines at each dispenser.
17. The pump is now ready for normal operation.

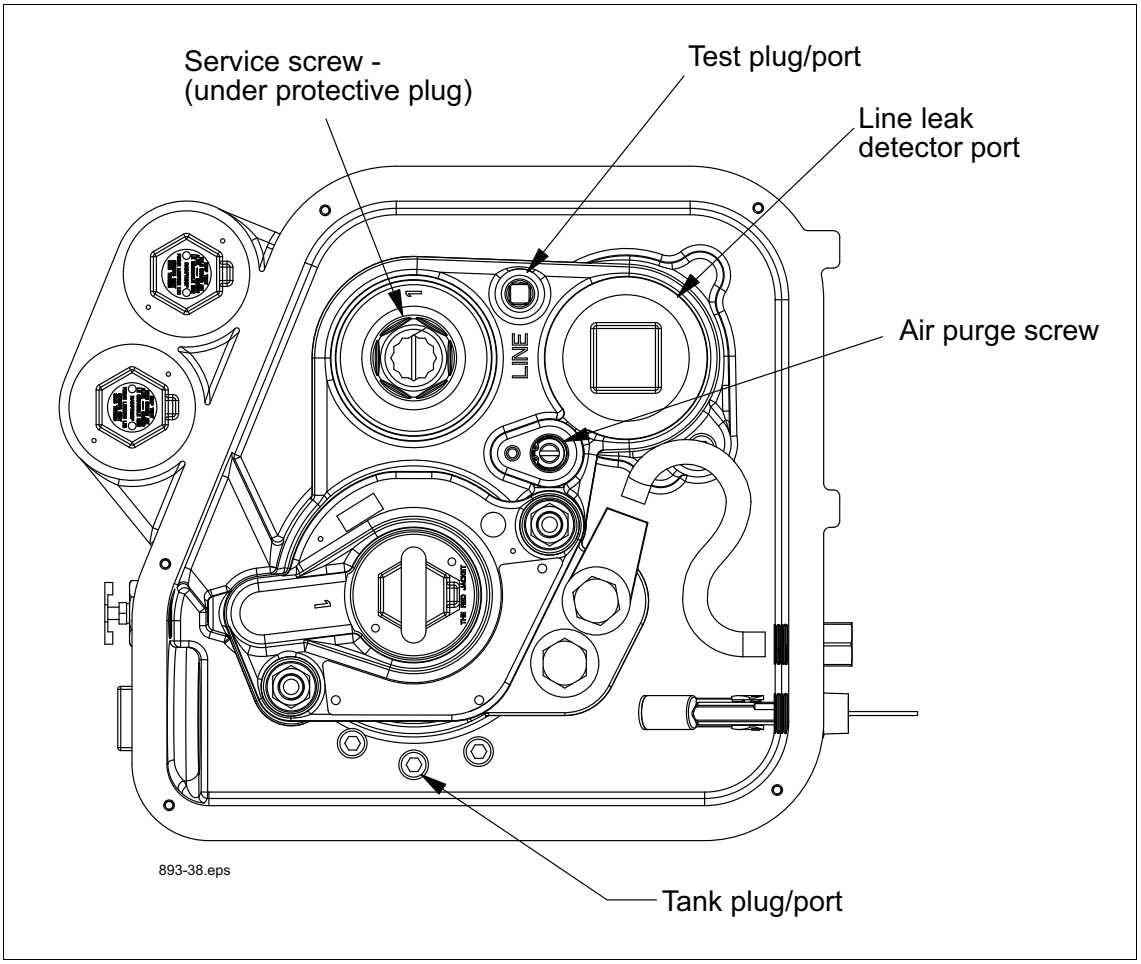


Figure 55. Service Screw, Line Test Port, And Air Purge Screw Locations

Testing the Tank

Disconnect, lock out, and tag power at the panel before servicing the pump.

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

Equipment and Kits Required

- Pressure generating equipment with appropriate fittings to connect to the 1/4'' NPT tank test port
- Cover Gasket Kit (P/N 410506-001)
- Nipple and Union Kit (P/N 410534-001)

Procedure

1. If a ball valve is installed down line from the pump, close it.
2. If CSTP liquid switch has not been activated, open and close the stop cock on the vent valve assembly and proceed to Step 4.
3. If the liquid switch has been activated, place a 2 gallon container/bucket underneath the vent valve assembly and then remove the vent valve assembly. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads. Wait until no liquid is coming out of the CSTP and then torque back the vent assembly to 40-50 ft-lbs (54 -68 N•m).
4. Remove the cover by extracting the screws.
5. Remove and discard the cover gasket.
6. If there is fuel in the CSTP secondary, drain the fuel back to the tank by removing the tank plug. Once all the fuel is drained back into the tank, reinstall the tank plug (apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant to the threads) and torque to 15 ft-lbs (20 N•m).
7. Remove and retain the protective plug over service screw and turn the service screw clockwise (see Figure 55). As the screw approaches its bottom position, you will hear the system depressurizing. Continue turning the screw until it can go no further.
8. Remove and save the 1/4'' NPT tank plug.
9. Attach the 6" nipple with the union to the tank port (see Figure 56).
10. Attach the tank testing equipment to the union and perform the tank test.
11. Depressurize tank and remove testing equipment.
12. Remove the 6" nipple and the union.
13. Apply an adequate amount of fresh, UL classified for petroleum, non-setting thread sealant on the 1/4'' NPT plug and place it in the tank port. Torque the plug to 14-21 ft-lbs (19.4-29 N•m).
14. 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.
15. Turn the air purge screw counter clockwise until its shoulder comes in contact with the retaining ring.
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. Replace the gasket for the cover.
18. Verify the flange surface of CSTP is clean and then place the new gasket on it.

19. Verify the sealing surface of the cover is clean.
20. Reinstall the cover using the screws and torque them in a cross-pattern techniqueto 55-65 in-lbs (6-7 N•m).
21. If applicable, open the ball valve down line from the pump.
22. The pump is now ready for normal operation.

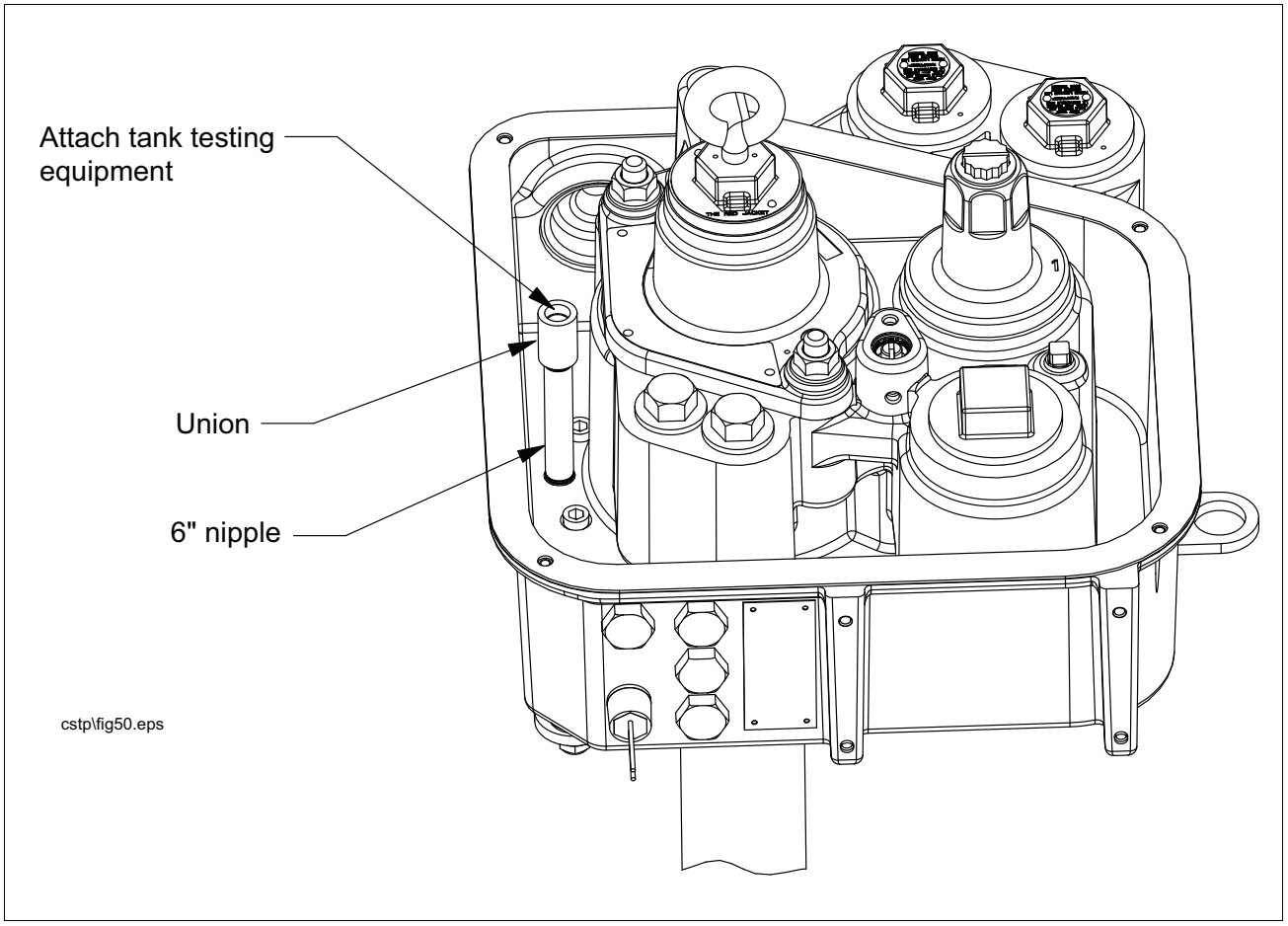


Figure 56. Tank Test Port On Manifold

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 57)	Part No.	Description	Qty
1	410156-001	20 ft. pigtail	1
2	852-199-5	UMP75U1	1
2	852-084-5	AGUMP75S1	1
2	852-200-5	UMP150U1	1
2	852-085-5	AGUMP150S1	1
2	852-221-5	UMP200U1-3	1
2	852-222-5	AGUMP200S1-3	1
2	852-209-5	UMP200U20-2	1
2	852-175-5	AGUMP200T20-2	1
3	144-327-4	Kit - flex siphon/UMP (includes gasket, lock washers and bolts)	1

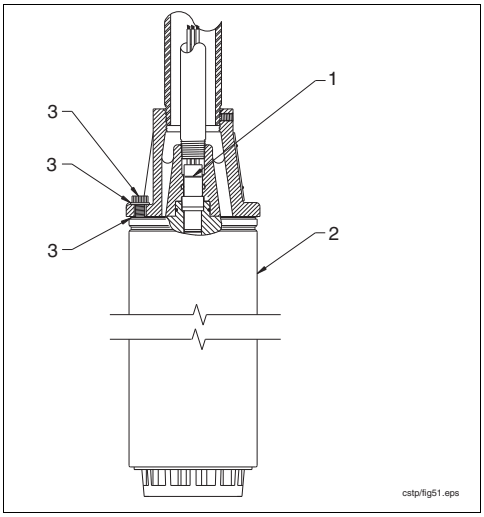


Figure 57. Pump Parts

Table 8. International Pump Parts List

Item (ref. Figure 57)	Part No.	Description	Qty
1	410156-001	20 ft. pigtail	1
2	852-204-5	UMP75U3-3	1
2	852-192-5	UMP75U3-3 W/2" Discharge head	1
2	852-107-5	AGUMP75S3-3	1
2	852-058-5	UMP75U17-3	1
2	852-195-5	UMP75U17-3 W/2" Discharge head	1
2	852-145-5	AGUMP75S17-3	1
2	852-205-5	UMP150U3-3	1
2	852-193-5	UMP150U3-3 W/2" Discharge head	1
2	852-108-5	AGUMP150S3-3	1
2	852-059-5	UMP150U17-3	1
2	852-196-5	UMP150U17-3 W/2" Discharge head	1
2	852-146-5	AGUMP150S17-3	1
2	410184-005	UMP200U3-4	1
2	410184-007	UMP200U3-4 W/2'' Discharge Head	1
2	410184-001	AGUMP200S3-4	1
2	410184-006	UMP200U17-4	1
2	410184-008	UMP200U17-4 W/2'' Discharge Head	1
2	410184-002	AGUMP200S17-4	1
NS	410145-001	PACMAN-P75U3-3 (packaged) - 20%	1
NS	410146-001	PACMAN-P75U17-3 (packaged) - 20%	1
NS	410147-001	PACMAN-P150U3-3 (packaged) - 20%	1
NS	410148-001	PACMAN-P150U17-3 (packaged) - 20%	1
NS	410149-001	PACMAN-X4P150U3 (packaged) - 20%	1
NS	410150-001	PACMAN-X4P150U17 (packaged) - 20%	1
NS	410162-001	PACMAN-P200U3-4 (packaged) - 20%	1
NS	410163-001	PACMAN-P200U17-4 (packaged) - 20%	1
NS	410161-001	Seal - conduit adapter assembly	1
3	144-327-5	Kit - flex siphon/UMP (includes gasket, lock washers and bolts)	1
NS	144-194-5	Trapper - retrofit (not shown)	1

NS = Not Shown

Siphon Cartridge Kit Parts

Table 9 lists the 410507-001 Siphon Cartridge Kit parts list and Figure 58 depicts the parts.

Table 9. 410507-001 Siphon Cartridge Kit Parts List

Item (ref. Figure 58)	Part No.	Description	Qty.
1	410071-002	Tube - Copper	1
2	410255-001	Siphon Assembly	1
3	410389-001	Fitting – CSTP Manifold	1
4	514100-430	Fitting – ¼ TUBE	2

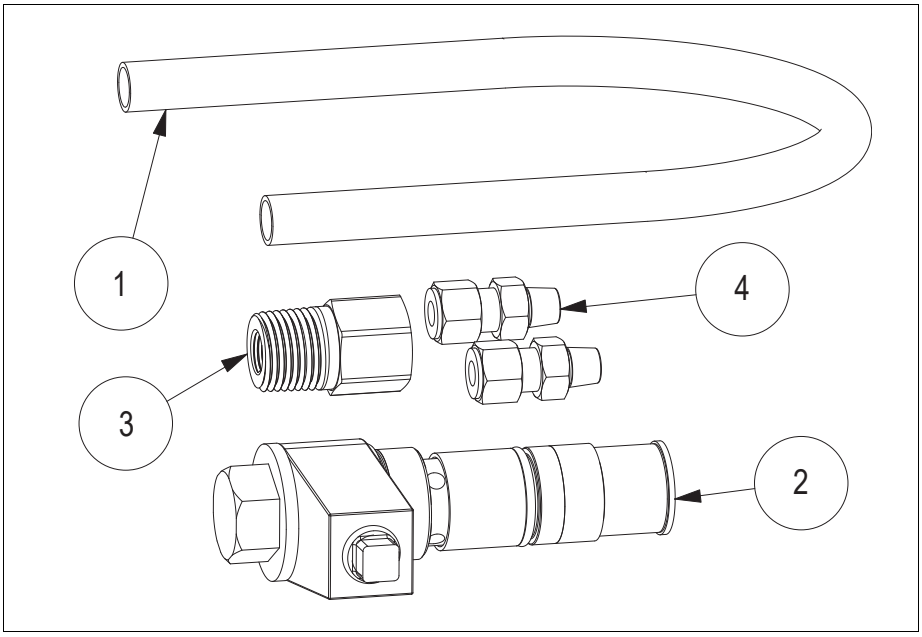


Figure 58. Siphon Cartridge Kit

Check Valve Housing Kit Parts

Table 10 lists the 410152-001 Check Valve Housing Kit parts list and Figure 59 depicts the parts.

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

Item (ref. Figure 59)	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

Table 11 lists the 410152-002 High Pressure Check Valve Housing Kit parts list and Figure 59 depicts the parts.

Table 11. 410152-002 High Pressure Check Valve Housing Kit Parts List

Item (ref. Figure 59)	Part No.	Description	Qty.
1	410016-001	Housing assembly - chk/rlf vlv	1
2	410027-001	Spring	1
3	410022-002	Poppet assembly - chk/rlf vlv	1

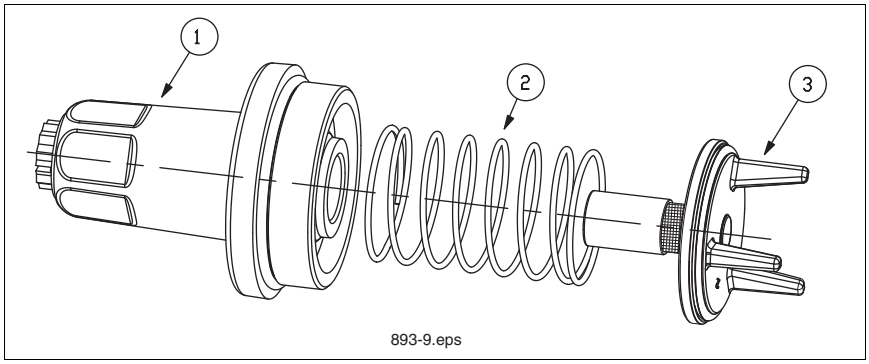


Figure 59. Check Valve Housing Kit

Check Valve Kit Parts

Table 12 lists the 410153-001 Check Valve Kit parts list and Figure 60 depicts the parts.

Table 12. 410153-001 Check Valve Kit Parts List

Item (ref. Figure 60)	Part No.	Description	Qty.
1	410022-001	Poppet assembly - Check/relief valve	1
2	410027-001	Spring	1

Table 13 lists the 410153-002 High Pressure Check Valve Kit parts list and Figure 60 depicts the parts.

Table 13. 410153-002 High Pressure Check Valve Kit Parts List

Item (ref. Figure 60)	Part No.	Description	Qty.
1	410022-002	High pressure poppet assembly - Check/relief valve	1
2	410027-001	Spring	1

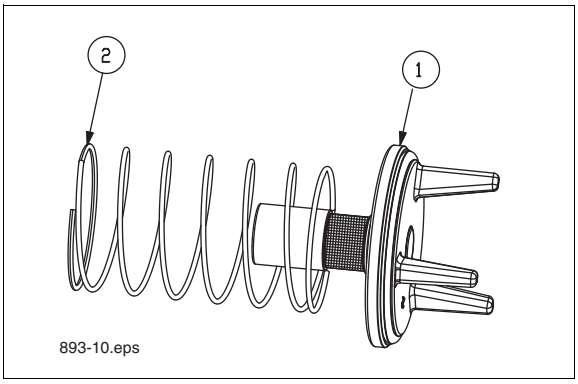


Figure 60. Check Valve Kit

O-Ring Kit Parts

Table 14 lists the 410539-001 O-ring Kit parts list and Figure 61 depicts the parts.

Table 14. 410539-001 O-Ring Kit Parts List

Item	Part No.	Description	Qty.
1	072-541-1	O-ring - 118-FKM-ELECTICAL CONN.	1
2	072-578-1	O-ring - 225-FKM	1
3	072-690-1	O-ring - 015-FKM	1
4	072-720-1	O-ring - 928-FKM (CONDUIT BOX PLUGS)	3
5	410127-001	Nut - flanged - M12x1.75-6H	2
6	410287-001	GASKET, COVER	1
7	579005-001	O-ring - 343-FKM	1
8	579005-002	O-ring - 344-FKM	1
9	579005-003	O-ring - 345-FKM	1
10	579005-004	O-ring - 117-FKM	2
11	579005-005	O-ring - 121-FKM	3
12	579005-006	O-ring - 231-FKM	1
13	579005-007	O-ring - 014-FKM	1
14	579005-012	O-ring - 146-FKM	1
15	579005-013	O-ring - 152-FKM	1
16	579005-014	O-ring - 011-FKM	1
17	579051-001	HEX NUT - 3/8”-16	3
18	579053-001	RING - INTERNAL- 0.75” HOUSING DIA.	1
19	579067-001	SCREW - .25-20 X .75 LG WASHER HD	9

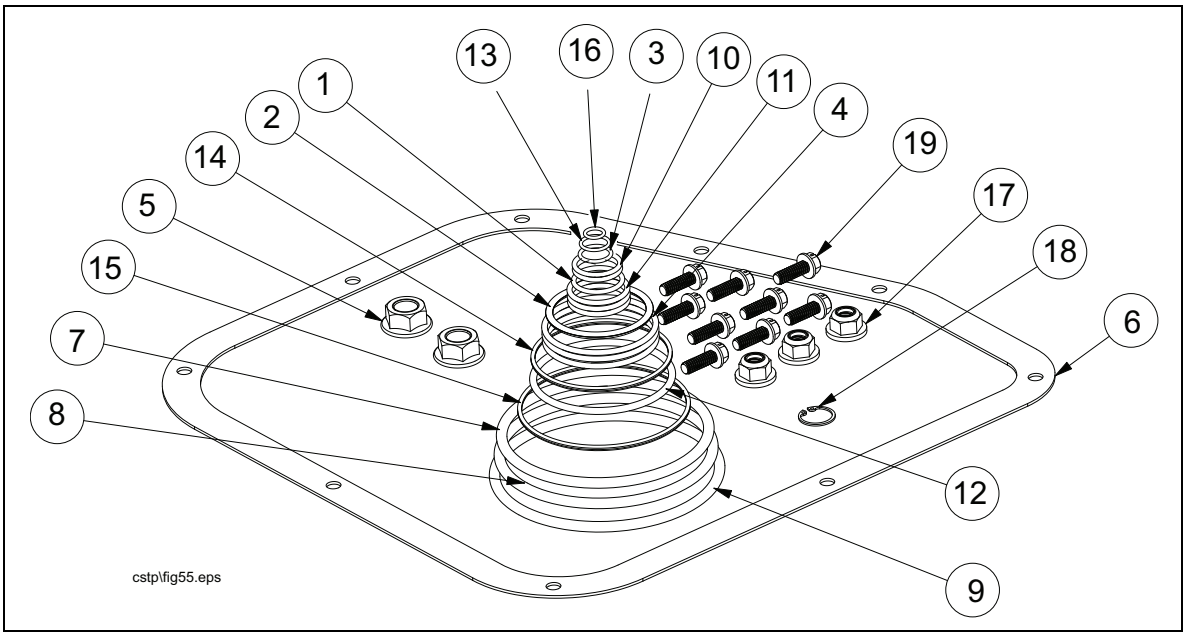


Figure 61. O-Ring Kit

Capacitor Kit Parts

Table 15 lists the Capacitor Kit and Figure 62 depicts a representation of the kit.

Table 15. Capacitor Kits

Item (ref. Figure 62)	Part No.	Description	Qty.
1	410164-001	17.5 μF Capacitor	1
1	410164-002	25 μF Capacitor	1
1	410164-003	40 μF Capacitor	1

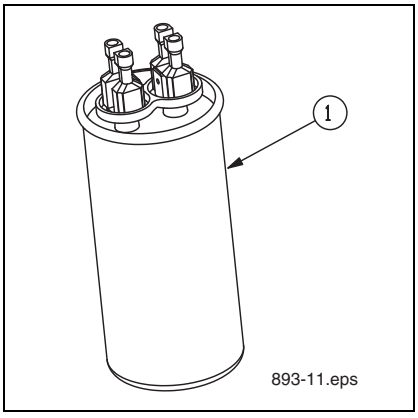


Figure 62. Capacitor Kit

UMP Replacement Kit Parts

Table 16 lists the UMP Replacement Kit 144-327-4 and Figure 63 depicts the parts.

Table 16. 144-327-4 UMP Replacement Kit Parts List

Item (ref. Figure 63)	Part No.	Description	Qty.
1	031-136-1	Gasket	1
2	144-181-1	Kit - Fastener	1
3	082-029-1	Tie - Plastic	3
4	014-909-1	Connector – Hose (1/2”)	1

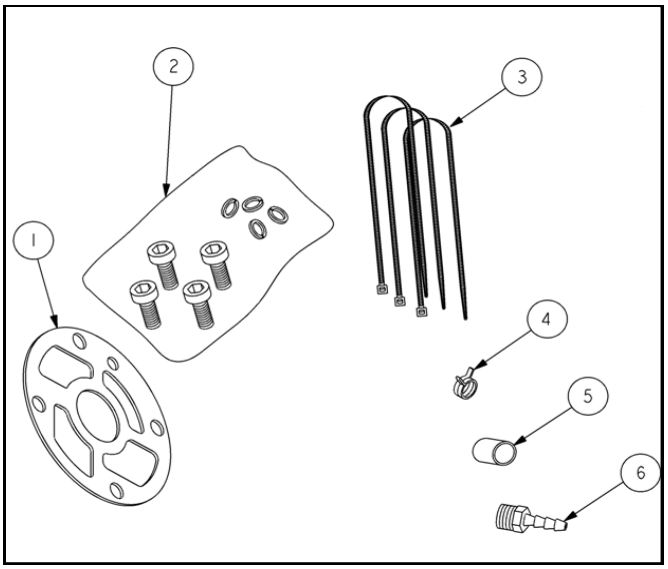


Figure 63. UMP Replacement Kit

Cover Gasket Kit Parts

Table 17 lists the Cover Gasket Kit 410506-001 and Figure 64 depicts the parts.

Table 17. 410506-001 Cover Gasket Kit Parts List

Item (ref. Figure 64)	Part No.	Description	Qty.
1	410287-001	Gasket - Cover	1
2	579067-001	Screws	9

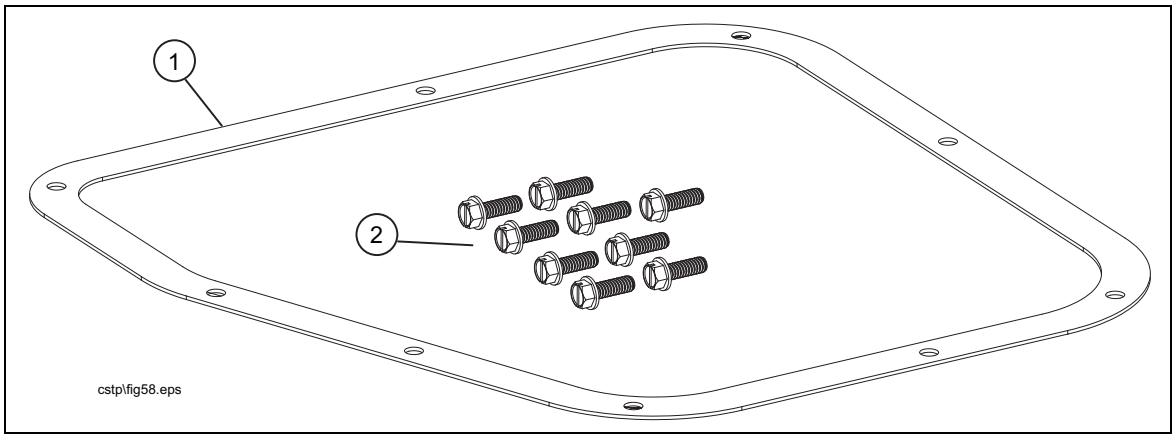


Figure 64. Cover Gasket Kit

Conduit Bushing Kit Parts

Table 18 lists the Conduit Bushing 410486-001 and Figure 65 depicts the kit.

Table 18. 410486-001 Conduit Bushing Kit Parts List

Item (ref. Figure 65)	Part No.	Description	Qty.
1	410301-001	Bushing - Conduit	1

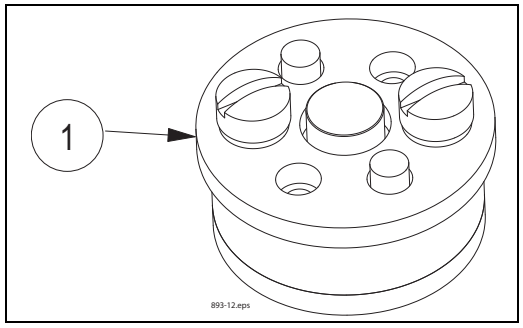


Figure 65. Conduit Bushing

Pigtail Kit Parts

Table 19 lists the Pigtail Kit 410156-001 and Figure 66 depicts the kit.

Table 19. 410156-001 Pigtail Kit Parts List

Item (ref. Figure 66)	Part No.	Description	Qty.
1	213-165-1	Connector – 20 FT	1

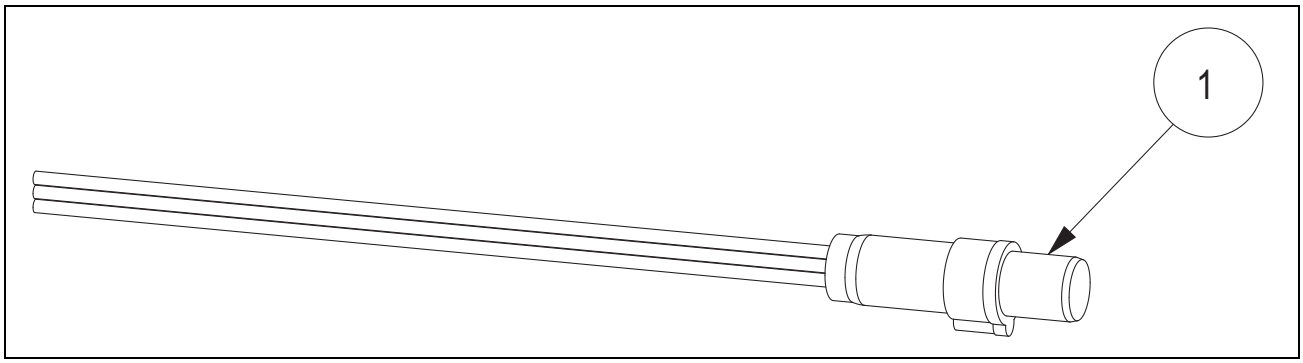


Figure 66. Pigtail Kit

Return to Tank Kit Parts

Table 20 lists the Return to Tank Kit 410508-001 and Figure 67 depicts the parts.

Table 20. 410508-001 Return to Tank Kit Parts List

Item (ref. Figure 67)	Part No.	Description	Qty.
1	579056-002	Nipple, 4" long	1
2	579066-001	Fitting – ¼ tube	1
3	027-026-1	Coupling	1

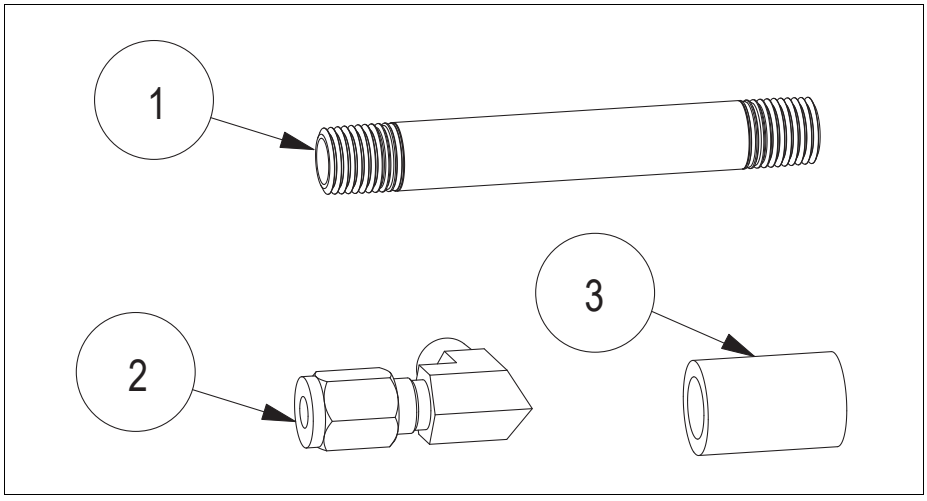


Figure 67. Return To Tank Kit

Compression Fitting Kit Parts

Table 21 lists the Compression Fitting Kit 410509-001 and Figure 68 depicts the kit.

Table 21. 410509-001 Compression Fitting Kit Parts List

Item (ref. Figure 68)	Part No.	Description	Qty.
1	331028-001	Group – Cord Grip	1

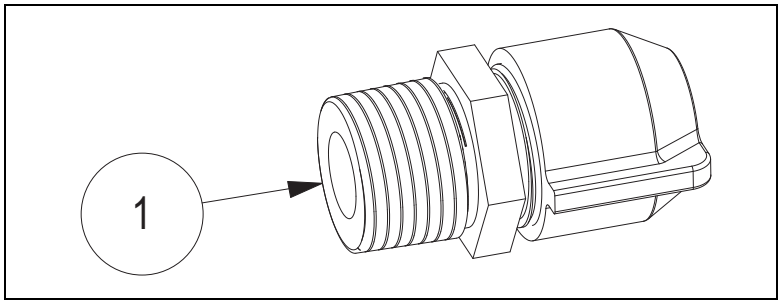


Figure 68. Compression Fitting Kit

Air Purge Screw Kit Parts

Table 22 lists the Air Purge Screw Kit 410510-001 and Figure 69 depicts the kit.

Table 22. 410510-001 Air Purge Screw Kit Parts List

Item (ref. Figure 69)	Part No.	Description	Qty.
1	410285-001	Assembly – Purge Valve Screw	1
2	579053-001	Ring - internal	1

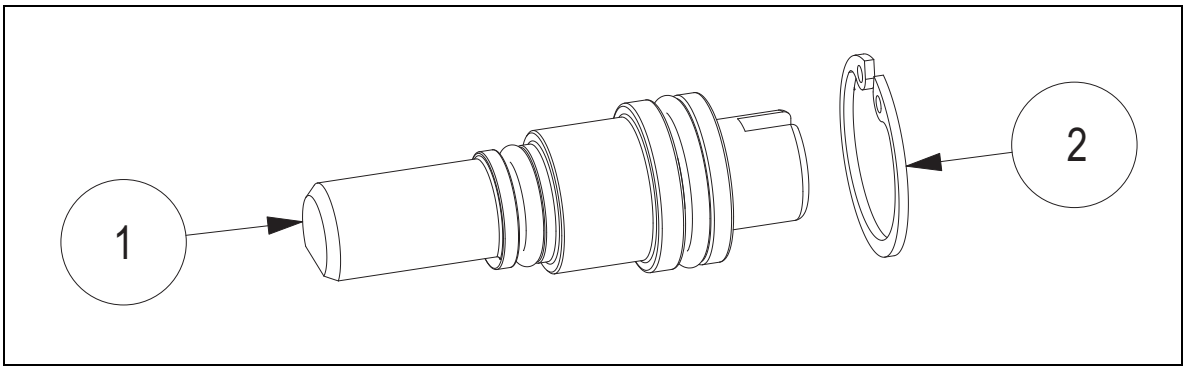


Figure 69. Air Purge Screw Kit

Liquid Switch Kit Parts

Table 23 lists the Liquid Switch Kit 410511-001 and Figure 70 depicts the kit.

Table 23. 410511-001 Liquid Switch Kit Parts List

Item (ref. Figure 70)	Part No.	Description	Qty.
1	579044-001	Switch - level	1

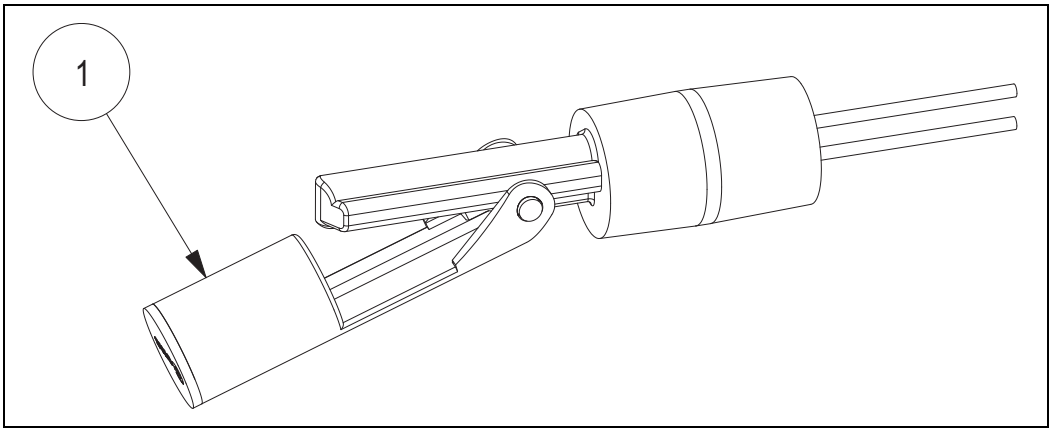


Figure 70. Liquid Switch Kit

FX Adapter Kit Parts

Table 24 lists the FX Adapter Kit 410512-001 and Figure 71 depicts the parts.

Table 24. 410512-001 FX Adapter Kit Parts List

Item (ref. Figure 71)	Part No.	Description	Qty.
1	410284-001	Adapter Insert – FX Leak Detector	1
2	579005-012	O-ring - 146 FKM	1
3	579005-013	O-ring - 152 FKM	1
4	579051-001	Nut - Hex	3

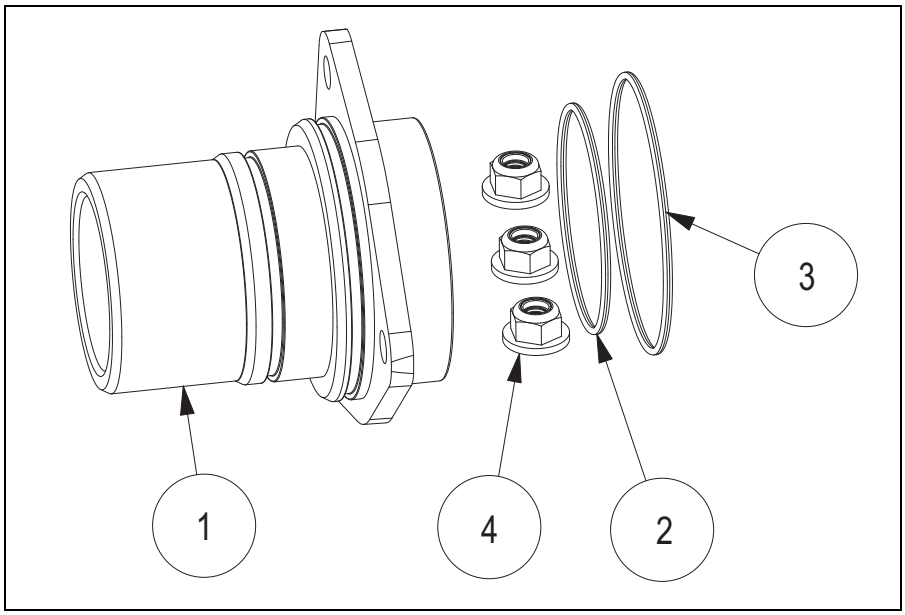


Figure 71. FX Adapter Kit

Vent Valve Assembly Kit Parts

Table 25 lists the Vent Valve Assembly Kit 410513-001 and Figure 72 depicts the kit.

Table 25. 410513-001 Vent Valve Assembly Kit Parts List

Item (ref. Figure 72)	Part No.	Description	Qty.
1	410258-001	Vent Valve Assembly	1

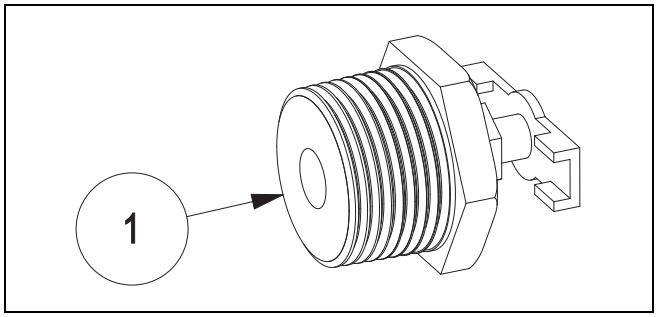


Figure 72. Vent Valve Assembly

Cover Kit Parts

Table 26 lists the Cover Kit 410533-001 and Figure 73 depicts the parts.

Table 26. 410533-001 Cover Kit Parts List

Item (ref. Figure 73)	Part No.	Description	Qty.
1	579067-001	Screws	9
2	410240-001	Cover-Molded	1
3	410287-001	Gasket - Cover	1

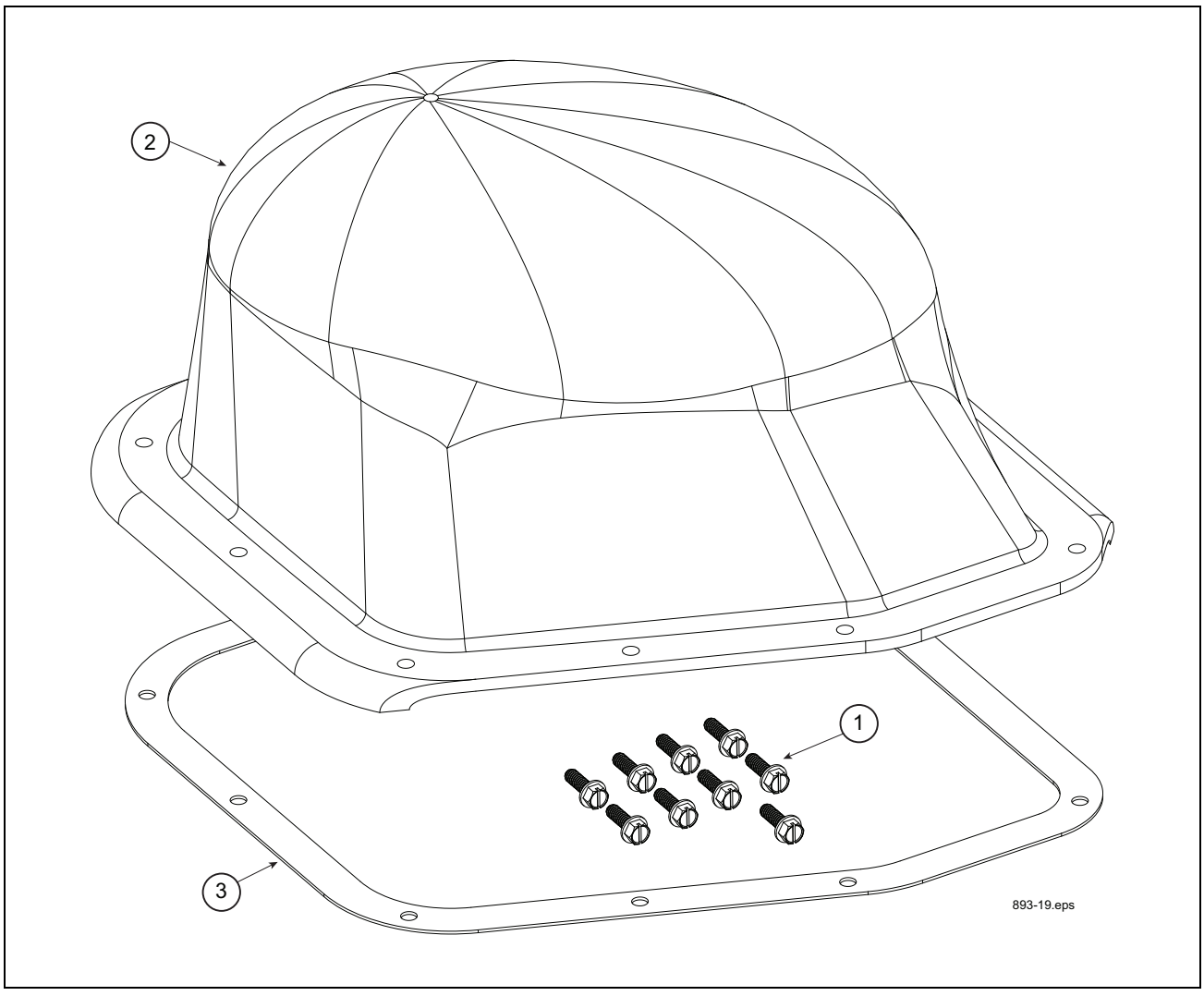


Figure 73. Cover Kit

Nipple and Union Kit Parts

Table 27 lists the Nipple and Union Kit 410534-001 and Figure 74 depicts the parts.

Table 27. 410534-001 Nipple and Union Kit Parts List

Item (ref. Figure 74)	Part No.	Description	Qty.
1	027-026-1	Coupling	1
2	579056-001	Nipple	1

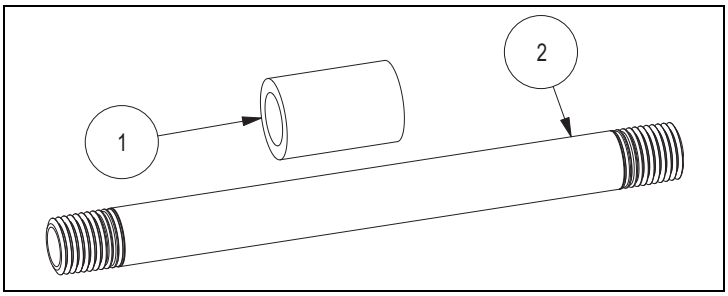


Figure 74. Nipple And Union Kit

Electrical Connector Kit Parts

Table 28 lists the Electrical Connector Kit 410165-001 and Figure 75 depicts the parts.

Table 28. 410165-001 Electrical Connector Kit Parts List

Item (ref. Figure 75)	Part No.	Description	Qty.
1	113-640-4	Connector - male	1
2	410117-001	Connector - electrical	1
3	072-541-1	O-ring - 118 - FKM	1
4	072-214-1	Ring - internal lock - 5/8” ID x 7/8” OD	1

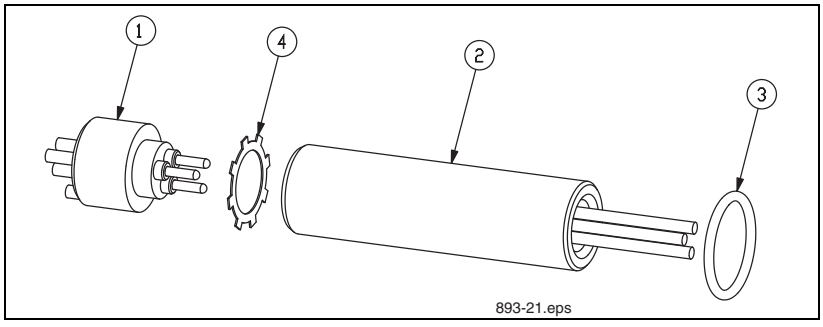


Figure 75. Electrical Connector Kit

Dummy Plug Kit Parts

Table 29 lists the Dummy Plug Kit 410483-001 and Figure 76 depicts the parts.

Table 29. 410483-001 Dummy Plug Kit Parts List

Item (ref. Figure 76)	Part No.	Description	Qty.
1	410081-001	Port plug - siphon	1
2	579005-004	O-ring (2-117) FKM	1
3	579005-005	O-ring (2-121) FKM	1

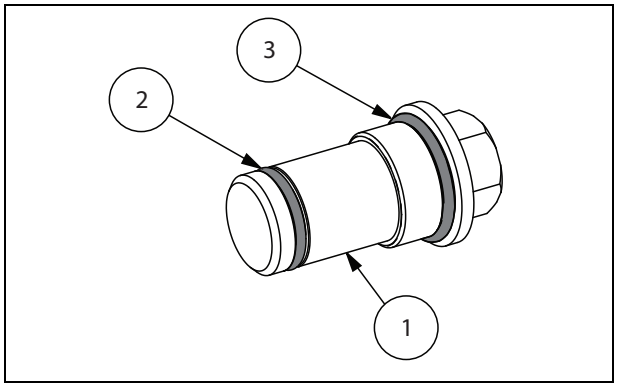


Figure 76. Dummy Plug Kit

Eyebolt Plug Kit Parts

Table 30 lists the Eyebolt Plug Kit 410482-001 and Figure 77 depicts the parts.

Table 30. 410482-001 Eyebolt Plug Kit Parts List

Item (ref. Figure 77)	Part No.	Description	Qty.
1	410118-001	Plug - lifting eyebolt	1
2	036-064-1	Eyebolt lifting	1
3	072-720-1	O-ring-928-FKM (conduit box plug)	1
4	410126-001	Nameplate - lifting plug	1
5	026-236-1	Screw - #2 x 3/16” drive	2

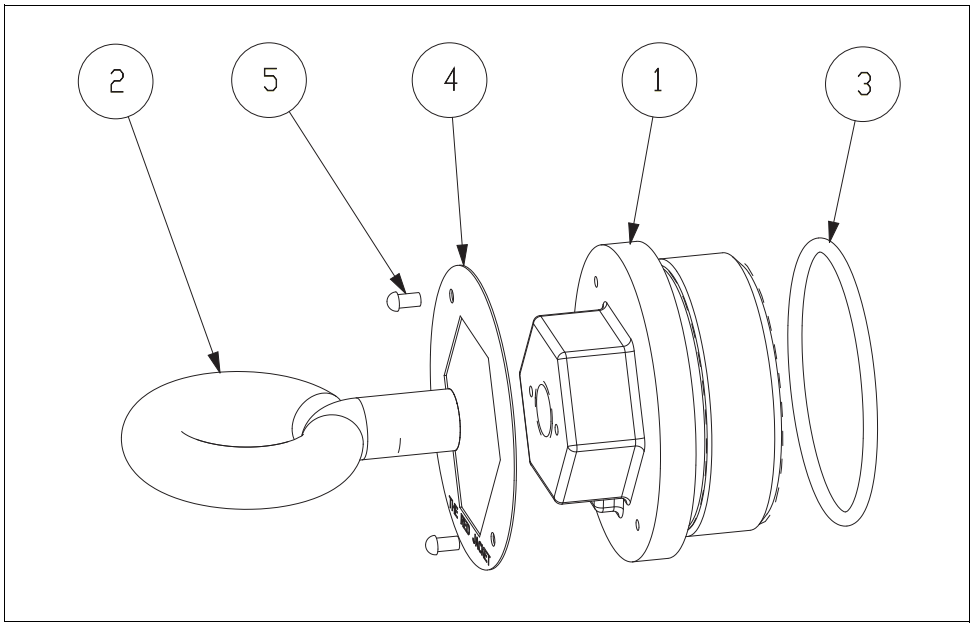


Figure 77. Eyebolt Plug Kit

Die Springs Kit Parts

Table 31 lists the Die Springs Kit 410485-001 and Figure 78 depicts the parts.

Table 31. 410485-001 Die Springs Kit Parts List

Item (ref. Figure 78)	Part No.	Description	Qty.
1	410133-001	Spring - die - 1.5" lg	2

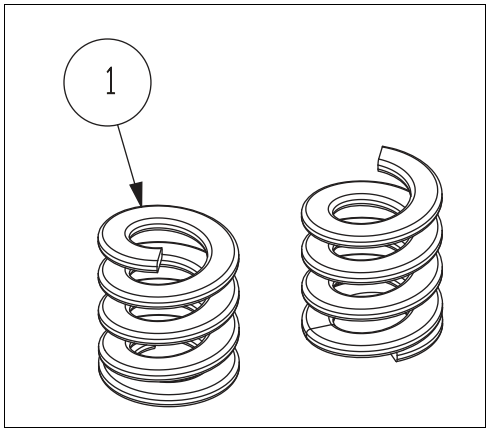


Figure 78. Die Springs Kit

Control Boxes

Table 32 lists the Control Box w/115V Coil Kit 880-041-5 and Figure 79 depicts the parts.

Table 32. 880-041-5 Control Box w/115V Coil (60 Hz) Parts List

Item (Ref. Figure 79)	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 33 lists the Control Box w/230V Coil Kit 880-042-5 and Figure 79 depicts the parts.

Table 33. 880-042-5 Control Box w/230V Coil (50/60 Hz) Parts List

Item (Ref. Figure 79)	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

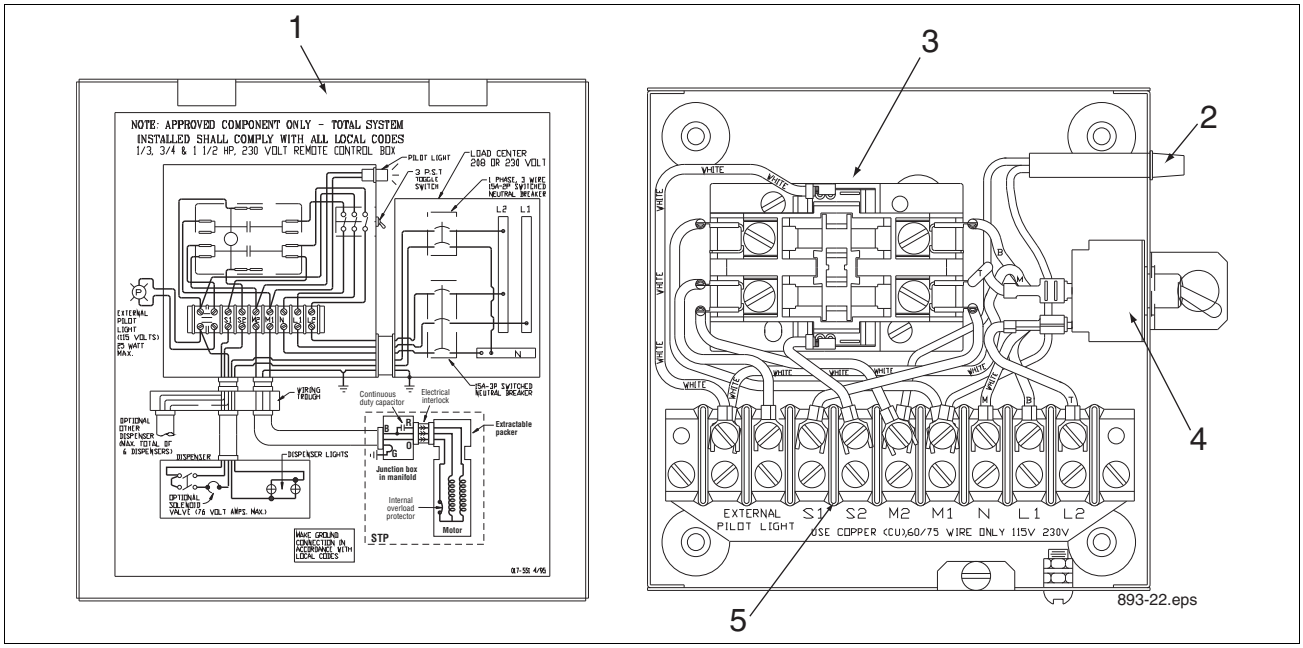


Figure 79. 880-041-5/880-042-5 Control Box

Table 34 lists the 1/3 & 3/4 HP Control Box w/Cap Kit 880-045-5 and Figure 80 depicts the parts.

Table 34. 880-045-5 1/3 & 3/4 HP Control Box w/Cap (115V Coil) Parts List

Item (Ref. Figure 80)	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 35 lists the 1-1/2 HP Control Box w/Cap Kit 880-046-5 and Figure 80 depicts the parts.

Table 35. 880-046-5 1-1/2 HP Control Box w/Cap (115V Coil) Parts List

Item (Ref. Figure 80)	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

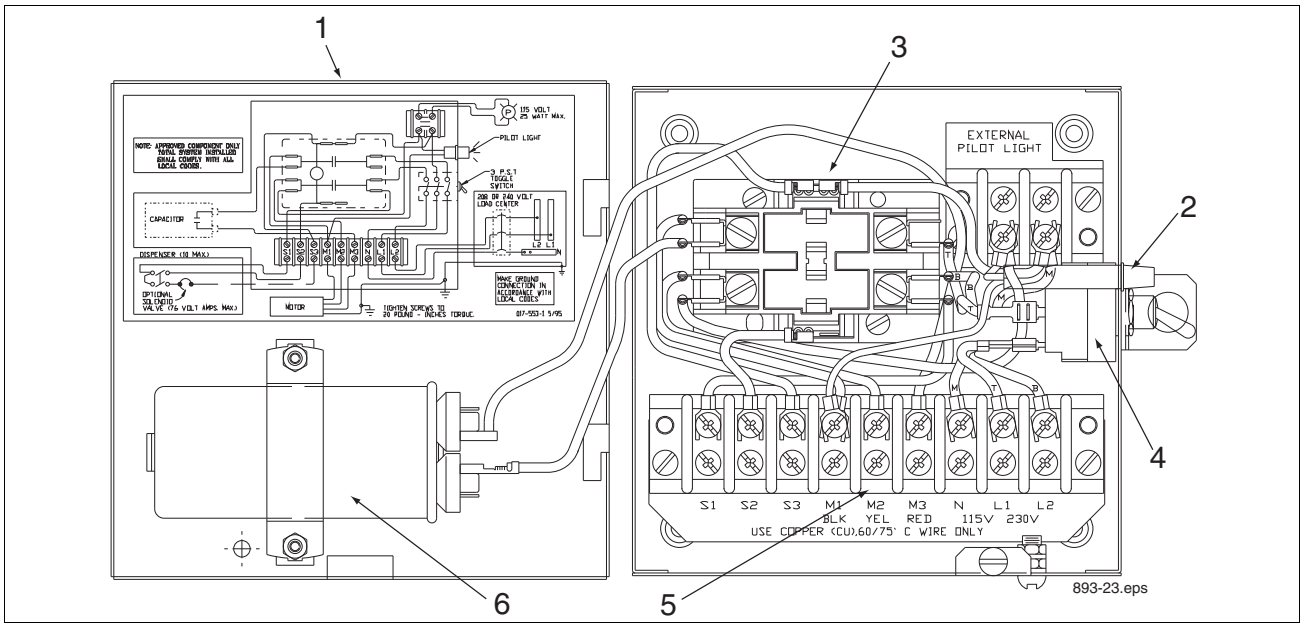


Figure 80. 880-045-5/880-046-5 Control Box

Vacuum Conversion Kit Parts

Table 36 lists the Vacuum Conversion Kit 410545-001 and Figure 81 depicts the parts.

Table 36. 410545-001 Vacuum Conversion Kit Parts List

Item (ref. Figure 75)	Part No.	Description	Qty.
1	027-271	Fitting - hose barb	2
2	410389-001	Fitting - CSTP manifold	2
3	514100-430	Fitting - 1/4 tube	2
4	410255-001	Siphon Assembly	1
5	085-330-1	Tube - copper	1

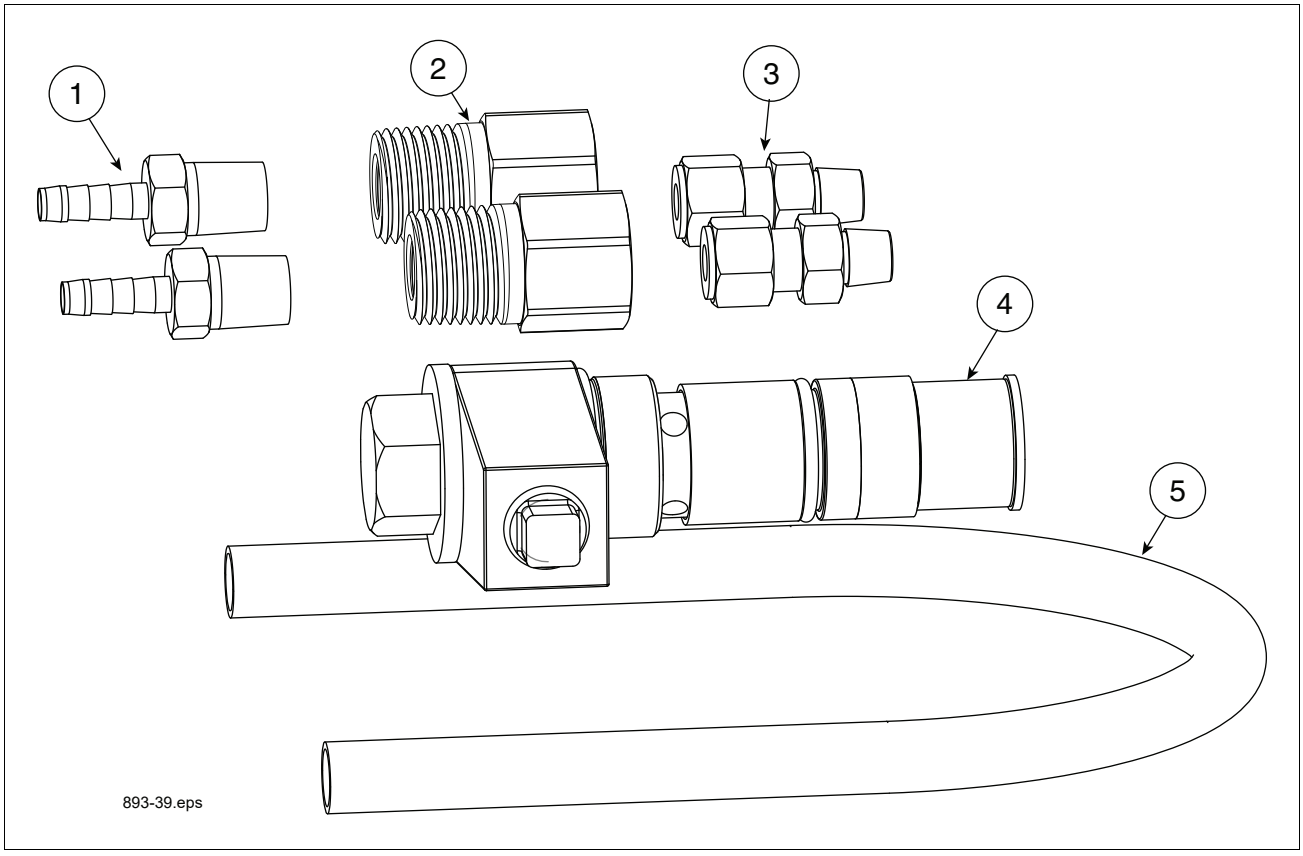
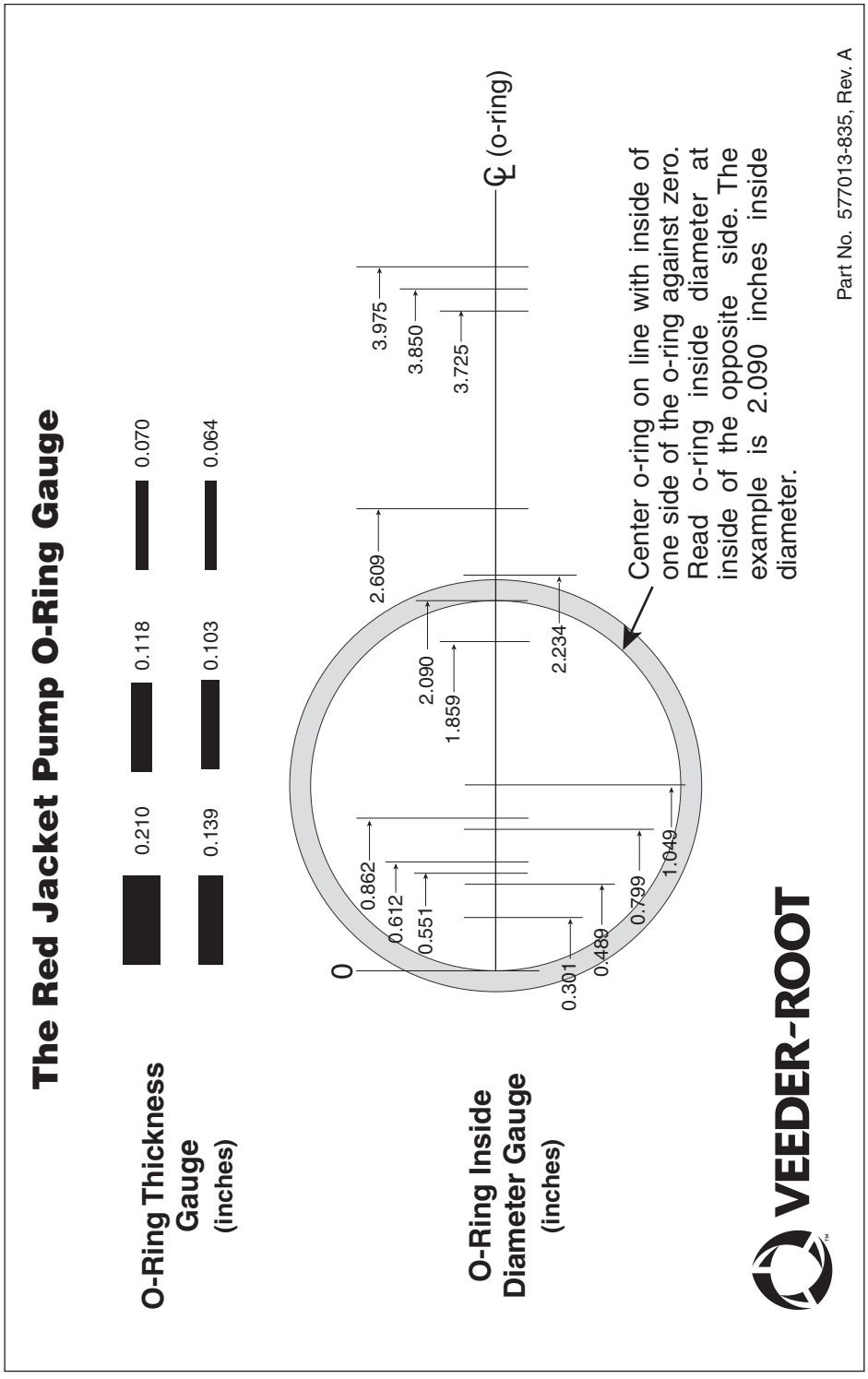


Figure 81. Vacuum Conversion Kit

Appendix A: Hardware/Seal Kit O-Ring Gauge



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